

NSF GROW – Potential Research Hosts in Ireland

SFI Research Centres

BEACON Bioeconomy Research Centre

www.bioeconomybeacon.ie

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BEACON Overview and Research Programme Description

BEACON Bioeconomy Research Centre harnesses the of the wealth of Ireland's natural resources on land and in the sea for the development of a sustainable circular Irish bioeconomy. The bioeconomy encompasses the production of renewable biological resources and the conversion of these resources (including waste streams) into value added products, such as food and feed ingredients, biobased chemicals, biomaterials and bioenergy. A well-functioning bioeconomy can solve the interdependent challenges of food, non-food products, sustainability and climate change.

The bioeconomy will provide a bio-based replacement of current fossil-resource paradigms that can maximise output from raw materials, reduce energy consumption and greenhouse gas emissions, water consumption and waste generation and substantially break the link between human consumption and environmental damage, while maintaining increasingly high standards of living. BEACON is developing novel processes to achieve this.

BEACON specifically focuses on the Agri-food and Marine sectors, both strong indigenous industries in Ireland which produce residues during food production. The conversion of these residues to higher value products (including food/feed ingredients) will create new business opportunities and new value chains which will allow these industries to diversify and add value to the sector, increase resource efficiency and complement food production activities.

BEACON integrates a spectrum of research disciplines to address major challenges for the bioeconomy, identified by industry and policy makers. These key challenges are: '**Selective Separation**', '**Conversion**', and '**Sustainability**'. Within Sustainability BEACON is addressing scientific, social and economic research questions for the development of a sustainable Irish bioeconomy.

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Confirm Research Centre – Smart Manufacturing

www.confirm.ie

Confirm
Smart Manufacturing

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Research Centre Overview and Research Programme Description

Confirm - Smart Manufacturing is a new SFI research centre that aims to transform Ireland's manufacturing industry to become a world-leader in smart manufacturing. Smart manufacturing seeks to add intelligence to our production systems, creating the factories of the future, where products can be fully customised and adaptable, decisions made in real-time, supply-chains shortened and new innovations realised. Confirm will be a game changer for Irish manufacturing competitiveness, delivering the technological advances and expertise for a smart manufacturing innovation ecosystem, enabling companies to compete within the rapidly changing global landscape, and boosting Ireland's reputation as a leading international manufacturing location.

Confirm will carry out fundamental research in Virtual Industrialisation, Cyber-physical Manufacturing Systems and Self-aware Manufacturing Systems, and this research will feed higher TRL research projects carried out with our Industry partners on Smart Products, Smart Machines, Smart Production Systems and Smart Supply Chains. All research findings will be demonstrated through test-beds and prototype lines located at our multiple-partner sites. Confirm is distinctive in the international manufacturing research landscape due to its manufacturing "systems level" research programme and through its hub and spoke centre architecture, where fundamental PhD research feeds higher TRL level research carried out directly with our industry partners. Confirm has research partnerships with 16 international manufacturing centres of excellence, and will grow this partnership through new collaborative research projects funded through international funding calls, leading to demonstrable research outputs through publication in high impact journals, PhD, Post-graduate and undergraduate digital manufacturing education, and generation of new intellectual property.

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FutureNeuro – Irish Research Centre for Chronic and Rare Neurological Disease



www.futureneurocentre.ie

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FutureNeuro Overview and Research Programme Description

The FutureNeuro Research Centre, located at Royal College of Surgeons in Ireland, pursues innovative, frontier research focused on reducing the societal burden of neurological disease, in a manner that increases economic growth. Established in 2017, the centre leverages existing clinical research infrastructure and neuroscience excellence in Ireland and connects national and multinational industry partners based in Ireland with key academic researchers and clinicians in our leading hospitals. Supporting platform technologies include genetic and pathway discovery, pre-clinical disease phenotyping, clinical research and trials infrastructure and microfluidics, devices and mobile health. Building initially on world-leading pre-clinical and clinical research into epilepsy and motor neurone disease, the FutureNeuro Centre is a scalable platform that will expand quickly to focus on other chronic and rare neurological diseases.

FutureNeuro research programme addresses three main themes:

- Diagnostics – provision of accurate molecular diagnosis
 - Next generation sequencing
 - Biomarker discovery and detection
- Therapeutics – development of novel treatments targeting multiple molecular defects
 - MicroRNA, “network” treatments, neuroinflammation and cannabinoids
 - Drug delivery to the brain
- eHealth – development of connected health solutions to improve care and enrich research
 - EHR portals
 - Connected health and clinical decision support tools.

FUTURE-NEURO will transform the lives of people affected by neurological disorders, support an innovation ecosystem and culture of entrepreneurship and provide the environment for the next generation of neuroscientists and engineers to meet the challenges of rising life expectancy.

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I-FORM – Advanced Manufacturing Research Centre

<http://www.deantus.ie/>



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I-FORM Overview and Research Programme Description

I-Form's research is focused on the convergence of the digital agenda with the most fundamental scientific/technological aspects of Additive Manufacturing (AM). This includes for example, the development of new in-situ techniques for process monitoring during the fabrication of AM parts. As well as the simulation and performance prediction of new AM part designs. This type of research is critical because it will enable low-cost, low-risk design of new products and refinement of existing offerings. In addition to advanced process diagnostics, a further objective is the development of advanced process control and feedback systems. The aim is to facilitate the manufacture of high-value components exhibiting enhanced material performance, while reducing processing times and achieving enhanced process reliability. Industry partners within the I-Form Centre are involved in a range of industry sectors, including the manufacture of medical devices, aerospace, automobile and microelectronic components. In addition to companies applying and developing advanced digital and process feedback technologies for use in manufacturing.

The I-Form Centre research falls under three main platforms:

Platform 1: Digitisation of Additive Manufacturing

Platform 2: Additive Manufacturing Process and Simulation

Platform 3: Advanced Analytics and Engineer Feedback

The fundamental outputs from the three Research Platforms will feed into the technology solutions required for the Spoke projects. Each of the five Spokes have Targeted Projects defined in collaboration with industry partners.

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AMBER - Advanced Materials and BioEngineering Research Centre

<http://ambercentre.ie/>



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AMBER Overview and Research Programme Description

AMBER (Advanced Materials and BioEngineering Research) is a Science Foundation Ireland funded centre that provides a partnership between leading researchers in materials science and industry. AMBER is jointly hosted in Trinity College Dublin by CRANN and the Trinity Centre for Bioengineering, in collaboration with University College Cork and the Royal College of Surgeons in Ireland. AMBER brings together Ireland's leading material science researchers working across the disciplines of Physics, Chemistry, Immunology, Bioengineering and Medicine; with an international network of collaborators, clinicians and companies. The centre has attracted 35 million (€) investment from Science Foundation Ireland and 23 million (€) funding from industry, and hosts Ireland's largest concentration of European Research Council [ERC] award holders (8). The industry partners are diverse, covering the four primary sectors of ICT, medical devices, pharmaceuticals and advanced manufacturing technologies. A primary objective of the AMBER centre is to create new knowledge and intellectual property, and to successfully transfer that knowledge to industry through licensing agreements, staff exchange and formal transfer of know-how. Research is structured into 3 core programs -2D materials, Biomaterials, and Heterostructures and Devices, with cross-cutting activity in microscopy, modelling and materials safety/toxicology. Our research programmes are tackling significant industrial challenges and include the development of novel data processing and memory applications, thermoelectric devices, food and pharmaceutical packaging, medical implant coatings, diagnostics and drug delivery systems, and regenerative tissue engineering.

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Please see <http://ambercentre.ie/people/#investigators> for a full list of AMBER Investigators and their profiles. If you are interested in working with any of our investigators, please contact deirdre.caden@tcd.ie in the first instance and we will put you in touch with a suitable host.

Lero – the Irish Software Research Centre

www.lero.ie



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Lero Overview and Research Programme Description

Lero is the Irish software research centre. It brings together leading software research teams from Universities and Institutes of Technology in a coordinated centre of research excellence with a strong industry focus. Lero has raised the level and profile of Irish software research with such effect that it is now one of the best known and highly regarded software-related research centres in the world. The centre has the proven capacity to attract and retain global research leaders and to make a substantial contribution both to software-related research and to the Irish economy.

The Lero Centre is supported by a Research Centre grant from SFI, by other state grants, by industry contributions and by external funding (particularly the EU's research programmes). Lero interfaces with a wide range of industry, state agencies, educational bodies and international collaborators to deliver on its twin goals of research excellence and social and economic relevance. Lero's overall vision is to establish Ireland as a location synonymous with high quality software research and development, to the extent that 'Irish software' can enter the lexicon in the same way as 'German automotive' or 'Scandinavian design'.

Lero's mission is to provide the research basis for the Irish software community to become international leaders. Lero is focused on advancing the state-of-the-art in software engineering and related topics. Our research is focused on how software comes into being and how it evolves over time, with an emphasis on reliability, security and fitness-for-purpose. Working with a range of industry partners, Lero's research is focused on helping to improve the quality of software across a broad range of factors and applications, as well as producing a stream of highly-qualified software practitioners for the future. The key goal is to improve the practice of software development, thus improving the effectiveness, reliability and security of software and the productivity of the people producing it.

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Please see further details at

https://www.lero.ie/aboutlero/managementandgovernance/executive_committee

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CÚRAM Centre for Research in Medical Devices

<http://www.curamdevices.ie/curam/about-us/>



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CÚRAM Overview and Research Programme Description

CÚRAM, the Centre for Research in Medical Devices, is an innovative global hub of expertise in medical technology consolidating fundamental and applied science. Its mission is to drive the translation of clinician- and industry-informed research into next generation medical devices. CÚRAM's core research strengths are biomaterials, drug delivery, cell-based technologies, device design, and glycoscience. By developing physiologically-responsive, biomimetic and electrically-active medical devices, CÚRAM will provide next generation and disruptive therapeutic interventions for a broad spectrum of clinical areas including cardiovascular, musculoskeletal, neural, soft tissue, renal, and respiratory diseases.

CÚRAM is focused on developing 'smart' functionalised biomaterials capable of organ-specific targeting of drug-device delivery systems for 'hard-to-deliver' biomolecules. These new therapies can control the inflammatory responses leading to better clinical outcomes. CÚRAM is also developing nerve conduits capable of repairing nerve damage over large distances. CÚRAM is working to improve the quality, efficacy, safety, and impact of medical devices; while reducing health care costs.

Utilising their collective expertise, the CÚRAM team, led by 54 CÚRAM-funded investigators (<http://curamdevices.ie/curam/about-us/our-people/investigators/>), aim to develop and validate new medical devices to address unmet clinical needs.

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iCRAG - Irish Centre for Research in Applied Geosciences

<http://icrag-centre.org/>



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iCRAG Overview and Research Programme Description

The Irish Centre for Research in Applied Geosciences (iCRAG) was established in 2015 and is funded by Science Foundation Ireland with the support of industry. iCRAG research provides generic insights on issues across the geosciences by capitalising on Ireland's unique geological resources, including its world-class base metal deposits, its unusually extensive and highly prospective offshore basins and its world-class lowland karst and fractured bedrock aquifers. iCRAG is a partnership between University College Dublin, Trinity College Dublin, NUI Galway, University College Cork, Maynooth University and Dublin Institute for Advanced Studies, together with 53 industry partners and 3 government organizations.

The iCRAG research programme spans a broad spectrum of application areas linked to Applied Geosciences, including raw materials, marine, groundwater, energy and geohazards. These applied 'spokes' are built around four enabling 'platforms', including geophysics, geochemistry, 3D modelling and public perception and understanding of the geosciences. iCRAG has a comprehensive suite of analytical resources and research infrastructure including world-class facilities in geochemistry and microscopy, and in 3D subsurface in geological and geophysical modelling.

The centre is designed to promote the exchange of ideas, data and methodologies between and within spokes and platforms, with cohesion derived from shared analytical and modelling techniques and pervasive cross-cutting themes such as fluid flow, rock deformation and sedimentation. Spokes were selected to build on demonstrable islands of scientific excellence, with internationally leading researchers and both large- and small-scale industry partners.

Prospective GROW Research Fellows can make contact directly with the iCRAG Co-PIs whose research area best fits their interests.

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Synthesis & Solid State Pharmaceutical Centre (SSPC)

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SSPC Overview and Research Programme Description

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, 9 research performing organisations, and 12 international academic collaborators. With €42 million in direct funding and a further €39 million leveraged, SSPC supports a community of over 350 individual national and international active members, including 33 Investigators, 40 Post-Doctoral Researchers and 60 PhD candidates. The SSPC is the largest research collaboration in Ireland, and one of the largest globally within the pharmaceutical area. 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 the formulation of the medicine.

SSPC Research Programme

- Strand 1: New Frontiers in Pharmaceutical Synthesis
- Strand 2: Crystal Growth and Design
- Strand 3: Drug Product Formulation and Manufacture.
- Recent collaborative projects include:
 - Advanced Biopharmaceutical Technologies, SSPC works with seven industry partners and three research performing organisations.
 - An SFI funded project, MOMEnTUM (Modelling of Multi-Phase Transport Processes to Enable Automation in Manufacturing), a collaboration between Johnson & Johnson Automation Centre of Excellence and Rusal Aughinish Alumina Ltd.
 - An SFI funded US-Ireland R&D partnership of 3 centres, SSPC, the NSF-sponsored Centre for Structured Organic Particulate Systems (CSOPS) and the Centre for Pharmaceutical Sciences at Queen's University Belfast, to research continuous manufacturing for nano-based pharmaceutical drugs.

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ADAPT: Centre for Digital Content Technology

www.adaptcentre.ie



Engaging Content
Engaging People

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ADAPT Centre Overview and Research Programme Description

ADAPT is spearheading the development of digital content technologies that will revolutionise the way people interact with content, systems and each other to achieve unprecedented levels of access and efficiency. Combining the world-class expertise of researchers at four universities with that of its industry partners ADAPT plays a strategic role in Ireland's vision of becoming a global innovation leader.

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

- Analysing media, content and customer interactions.
- Enabling global reach through innovative machine translation.
- Transforming and delivering personalised content across languages in real-time.
- Extracting actionable knowledge from digital content and user interactions.
- Empowering innovative customer engagement and interaction across media.

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

- Conduct better investigations for insurance claims through social media connections.
- Generate real-time, visual representations of public opinion mined from topic related tweets using sentiment analysis.
- Virtual reality visualisation of unstructured enterprise data.
- Develop Linked Data publishing pipelines helping companies integrate and interact with data intelligently.
- Deliver personalised content delivery for individuals or targeted customer segments.
- Enhance translation productivity to save money and improve productivity in the translation supply chain.

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INFANT - The Irish Centre for Fetal and Neonatal Translational Research

www.infantcentre.ie



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INFANT Overview and Research Programme

The Irish Centre for Fetal and Neonatal Translational Research (INFANT) located, mainly, at University College Cork and Cork University Hospital, is Ireland's first and only perinatal research centre and is focussed on making pregnancy safer and improving health outcomes for mothers and their babies worldwide. Founded on over a decade of awarding winning collaborative research which was formally recognised with the award of core funding under the auspices of Science Foundation Ireland's (SFI) 2012 Centre Call, INFANT is now home to a truly diverse multidisciplinary team of close to 100 scientists, clinicians, engineers and technicians, whose work encompasses a wide variety of closely integrated research domains, spanning bench to bed and cot-side. We have formal collaborations with over 20 industry partners ranging from large multinationals to SMEs including our own spinout. INFANT co-leads the Health Research Board Perinatal Clinical Trial Network, which reaches 56,000 of the 75,000 births on the island of Ireland each year. This unique resource enables us to move rapidly to clinical trials and, incentivises industry to use Ireland as a test-bed in a competitive and cost-effective way.

INFANT has four research area pillars:

- Pregnancy, Birth, Newborn Health, Child Health

There are seven thematic areas that cut across these pillars:

- Metabolomics, Physiological Monitoring, Medical Devices, Maternal and Infant Nutrition, Epidemiological Studies, Perinatal Clinical Trials, Connected Health

Since its establishment, INFANT has undergone a period of exponential growth and embraced new thematic research areas such as maternal and infant nutrition. INFANT is supported by competitively awarded, peer reviewed funding from Science Foundation Ireland, Health Research Board, EU FP7, Horizon 2020, National Institutes of Health, Wellcome Trust, Grand Challenges, National Children's Research Centre, City of Dublin Skin and Cancer Charity Hospital, Epilepsy Ireland, Enterprise Ireland, Irish Research Council, and other sources, as well as a range of industry partners and philanthropic contributions.

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IPIC - Irish Photonic Integration Centre

www.ipic.ie



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IPIC Overview and Research Programme Description

IPIC is one of Science Foundation Ireland's twelve world-leading large scale research centres, established to provide major economic impact for Ireland. Bringing together over 100 researchers from the Tyndall National Institute, Cork Institute of Technology, Dublin City University and University College Cork, our mission is to deliver excellence in photonics research and advance & miniaturise photonics integration science in order to develop leading edge technologies and products.

Already, the global photonics market is worth over €350 billion and is projected to reach over €600 billion by 2020. At IPIC we are focusing on producing micro- and nanoscale optoelectronic systems tailored to the needs of our industry partners. We bring together a full research value chain through our integrated research team who has expertise spanning semiconductor and biomaterials; integrated photonic and microelectronic circuits; and fully packaged photonic systems. Our work is dedicated to developing the next generation of highly-compact and miniaturised photonics technologies in order to tackle some of society's greatest challenges, especially in the areas of ICT and Health.

- Highly energy efficient >400Gb/s transceivers for short-reach optical interconnects in data centres to address a critical bottleneck in these data warehouses
- Terabit/s communications systems for wide area networks, based on integrated photonic circuits that allow information channels to be packed in individual optical fibres in order to approach theoretical maximum capacities (1 Terabit = 10^{12} bits)
- Miniaturised and potentially wearable diagnostics systems through the use of the emerging science of silicon photonics as well as hybrid & monolithic integration technologies
- Surgical instruments with integrated miniaturised photonics-based sensors, including the development of flexible microLEDs for optogenetics

Working alongside our industry partners in the ICT, medical devices and diagnostics sectors, IPIC's world-class research team aims to deliver fully integrated solutions to companies, which will increase economic activity, drive job creation and develop technologies which will significantly improve all of our day to day lives.

IPIC Principal Investigators

The IPIC team - <http://www.ipic.ie/research/our-team/>

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Insight Centre for Data Analytics

<http://www.insight-centre.org/>



GROW contact point at Insight:

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Insight Overview and Research Programme Description

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. With €88 million in funding, Insight has 350 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

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

Insight Principal Investigators

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MaREI - Centre for Marine and Renewable Energy

www.marei.ie



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MaREI Overview and Research Programme Description

MaREI is a research, development and innovation centre, supported by Science Foundation Ireland, that operates across the fields of marine research, marine renewable energy, and renewable energy. The Centre's endeavours are motivated by the need to address global challenges such as blue growth, climate action, and the energy transition, resulting in the development of a dynamic research ecosystem that is responsive to the needs of academia, industry, government and society. MaREI's strengths lie in the multi-disciplinary nature of its research teams, allowing it to combine insights across areas such as Marine Renewable Energy Technologies, Materials & Structures, Observation & Operations, Coastal & Marine Systems, Bioenergy, Energy Policy & Modelling, and Renewable Energy Management. As a driver of collaboration, the Centre comprises over 200 world-class researchers who are collaborating across more than 36 countries, and who have a proven track-record in academic excellence, consistently publishing in high-impact journals and participating in major EU and international initiatives.

In addition to fundamental scientific research, the Centre provides targeted research and novel consulting services to a wide range of companies, including 46 active industry partners, which has established it as a preferred research and development partner for both academia and industry worldwide. MaREI also offers unique world-class infrastructure and testing facilities, which include the Lir National Ocean Test Facility (Lir-NOTF), that allow the systematic identification and reduction of development risks through a structured 'Technology Readiness Level' (TRL) development cycle. MaREI welcomes NSF Graduate Research Fellows (GRFs) interested in pursuing world-class research across a wide range of disciplines, including the following:

- Mathematicians
- Marine Biologists
- Environmental Scientists
- Civil Engineers
- Mechanical Engineers
- Electrical Engineers
- Environmental Engineers
- Material Scientists
- Legal Graduates
- Chemists
- Microbiologists
- Climatologists

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APC Microbiome Institute

<http://apc.ucc.ie>



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APC Overview and Research Programme Description

The APC Microbiome Institute (<http://apc.ucc.ie>) is an internationally renowned research institute which explores the role of the microbiome (microbiological community) in health and disease. The scale and scope of microbiome research has become one of the fastest moving areas of biology, of relevance to all branches of human medicine and veterinary science, and is of growing importance to the economic welfare of society. The APC has created a trans-disciplinary environment conducive to innovation with a mission to link Irish science with industry and society through excellence in research, education and outreach. Our institute is a partnership between University College Cork, Teagasc Food Research Centre, Cork Institute of Technology and the Cork and Mercy University Hospitals, and is home to a team of over 300 researchers and clinicians. The APC collaborates with over 25 industry partners from the pharmaceutical, biotechnology, food, agriculture and diagnostic sectors from across the globe. APC research focuses on mining the microbiota to identify products (probiotic strains, metabolites, phage, prebiotics, anti-microbials etc) that can promote health and help prevent disease. This is of relevance to many populations, such as infants, athletes and elderly, and very relevant to disorders such as obesity, cardiovascular health, inflammation and colon cancer. The APC Microbiome Institute operates in the functional food and pharmaceutical sectors, developing food and pharma solutions targeting the gut microbiota for health promotion throughout life. The key Research Themes are:

- Microbes to molecules
- Diet and microbes at the extremes of life
- Gut-brain-microbiota axis
- Host-microbe response

APC Principal Investigators

For all senior APC Investigators please see <http://apc.ucc.ie/people/apc-faculty/>

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CONNECT: The Centre for Future Networks & Communications

<http://connectcentre.ie/>



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CONNECT Overview and Research Programme Description

The CONNECT Centre for Future Networks & Communications will solve multi-faceted scientific and engineering challenges relating to the design of flexible and responsive future communications networks. We envisage networks of the future as systems of highly heterogeneous connections between sensors, mobile devices, access points and smart nodes, which are performed into existence in response to a service need, creating the ultimate service-aware network. Central to our vision is the idea of open communications: we will design network infrastructure that is shared by unlimited virtual operators supporting specialised services. This infrastructure will be able to seamlessly handle everything from light-weight IoT services, to media-rich applications, to mobile services. We will take a system-wide, end-to-end view, considering challenges from the service, the network and the underlying physical perspectives. We will create a virtualized and programmable network substrate, in which distributed software services directly configure networking functionality to meet their needs. We will push resource sharing to the extreme, throughout the network. We will design smart sensors, sophisticated processing-intensive intelligent nodes and complex infrastructural elements that are responsive to the service and network needs. Our vision will be exemplified via a range of targeted projects co-designed with our extensive team of industry partners.