

CI hosts two institutes. "The Technology for Embedded Computing (TEC) Gateway with expertise in ICT system level solutions, and the Centre for Advanced Photonics and Process Analysis (CAPPA) with expertise in the generation and exploitation of light."

The vast majority of the research ongoing in IT Tralee is collaborative with external partners, Mac Sweeney points out. "Our research activity has grown exponentially over the past five to 10 years, aided by successive institutional research strategic plans that placed an emphasis on supporting research collaborations across multidisciplinary departments and growing our external partnerships to drive our research and innovation activities."

Research income

CIT's research income directly from industry has shown a steady rise year-on-year with the 2019 figure of €2.64 million representing a significant increase over the 2018 figure of €896,299. "The CIT figure represents 46 per cent of all of the direct industry funded research for the sector," says Smith. "This level of support indicates the value of research to our partners."

The local impact of research efforts is

making the regions more attractive for investment."

Mac Sweeney adds that "our researchers work with micro businesses right through to MNCs, supporting local and regional enterprises to grow and create new jobs and attracting new skills and expertise into the local region".

One example of this work is the RDI hub in Killorglin, Co Kerry. A partnership between IT Tralee, financial services company Fexco, Kerry County Council and Enterprise Ireland, the hub supports members to scale their fintech business through new product development, increased innovation and finding new market opportunities. The RDI hub aims to create 305 new jobs by 2024 and support the establishment of over 35 high-tech start-ups to drive economic growth in the southwest of Ireland and beyond.

In Cork, DENiM is an €11 million project funded by the European Commission through the Horizon 2020 Technologies for Factories of the Future programme and led by researchers from the CIT Nimbus Research Centre. This is a four-year initiative to address the need for energy-efficient manufacturing system management. The DENiM project will provide a novel

Technology clusters

In 2019, IT Tralee was awarded about €700,000 in regional technology clustering funding to establish bioeconomy and agritech clusters in the southwest of Ireland. The clusters bring together Irish companies operating in similar fields and offer them supports through education and research to enhance their capabilities and to drive their competitiveness to win business in international markets.

The nature of the collaborative research projects being undertaken has evolved over the years, according to Smith. "The focus of research in the CIT Technology Gateway in particular has shifted from a large number of small projects with industry to a smaller number of larger projects funded by industry and a greater development of long-term partnerships," he says. "CIT has now moved into strategic multi-annual research programmes with external partners. Those partners are influencing our research activity and we see how we are simultaneously influencing them."

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Dr Niall Smith, head of research at Cork Institute of Technology

try. This is helping us expand our networks and we have gone from cold calling looking for partners to working with influential alumni directly."

The ground has been prepared for the establishment of MTU by the long history of research partnership between CIT and IT Tralee. There is significant alignment already in the research activities of the two institutes, as is common across the institute of technology sector. Both institutes are recognised for their strong research and innovation capacity in Stem (science, technology, engineering, and mathematics) areas, particularly in working with enterprise.

"Our research activities are aligned to the national research priority areas particularly in the areas of ICT and advanced and smart manufacturing, food, climate ac-

tion, health and wellbeing," says Mac Sweeney.

The two institutes are partners of the UCC-led Bridge Network Technology Transfer Consortium. This partnership between the Technology Transfer Offices in UCC, CIT, IT Tralee and Teagasc is funded by Knowledge Transfer Ireland.

"The collaboration is a key driver of technology transfer in Ireland, facilitating the outputs of publicly funded research to be transferred into our partner's hands for the benefit of Irish people," says Mac Sweeney.

IT Tralee and CIT are also established partners in the Enterprise Ireland New Frontiers programme. The two institutes support early stage entrepreneurship in the Rubicon and Tom Crean incubation centres in Cork and Tralee respectively.

fit of our regional partners and driving economic growth in Ireland," says Smith. "Combined, CIT and IT Tralee cover the typical rural and urban landscape distribution in Ireland. This provides our researchers with opportunities for in-situ implementation in a manner which is not available to many other higher education institutes and represents an exciting opportunity for the future."

That opportunity is reflected in the vision for MTU's research and innovation strategy articulated by the research communities in CIT and IT Tralee: "To build a globally connected region that is an exemplar for sustainable, healthy and responsible living."

Mac Sweeney concludes: "MTU is underpinned by almost 50 years of many thousands of successful partnerships forged between current and past staff of IT Tralee and CIT and external partners."

"We have reached the limits of our growth potential as institutes of technology. Enabled by technological university designation, MTU has unlimited capacity to expand and grow as a new vibrant multi-campus Technological University strongly positioned to boost the economic, social and cultural development of the southwest of Ireland, and beyond."

Striking up global partnerships for cutting-edge research projects

Institutes engaged in a range of international projects from smart farming to transnational teacher training

A multimillion-euro pan-European project with the aim of digitally transforming Europe's agri-food sector is being led by Kevin Doolin, director of innovation at the Telecommunications Software & Systems Group (TSSG), an internationally recognised centre of excellence for ICT research and innovation and part of the Waterford Institute of Technology.

The European Union has identified smart farming as a key component in supporting sustainable agriculture and food production, protecting natural resources and boosting food safety. At the heart of this is the need for new technology and standards to achieve full supply chain interoperability. This is the subject of Demeter, a €17.7 million Horizon 2020 project involving 60 partners across 18 countries, 6,000 farmers and 38,000 devices.

"The situation now is that you have various different elements in the agri supply chain - machinery, warehouses, trucks, sensors and so on - but none of these systems 'talk' to each other so it's impossible to get a holistic view from farm to fork," says Doolin. "With Demeter we're trying to connect those elements, so we're developing new industry standards, writing software for platforms and building interfaces."

Co-ordinating 60 partners from multiple jurisdictions is quite a challenge but

one that is mitigated by having good work package leaders, according to Doolin. "Each Horizon 2020 project is structured into a number of work packages with specific roles. If you have a good team of work package leaders, you can leverage them very heavily to co-ordinate the overall effort."

The challenges are offset by the benefits. "Horizon 2020 enables us to engage in large-scale work, with a substantial group of partners from across the agri-supply chain. We have access to technology providers, research and academic experts, real works users and policy makers," Doolin adds.

Consortium

AIT and LIT are part of a new initiative that aims to establish a new European university. A consortium including the two institutes has been successful in its application to join Run-EU (Regional University Network), a new education alliance intended to enable students to obtain a degree by combining studies in multiple EU countries. The network will be integral to promoting the kinds of future and advanced skills necessary for social transformation across the EU.

The AIT-LIT consortium will work with its partners to create one of several new European universities capable of transcending



■ Kevin Doolin, director of innovation at the Telecommunications Software & Systems Group; and (right) research at Limerick Institute of Technology supports the development of educational tools

ing languages, borders and disciplines. The first phase of this ambitious project is expected to be completed by 2024.

"Internationalisation has always been at the heart of our educational approach, as it provides opportunities for growth and learning and gives our student body a well-rounded, holistic educational experience," says AIT president Prof Ciarán Ó Catháin. "We are looking forward to continuing to collaborate with

like-minded higher education institutes across Europe, who see, as we do, the value in sharing knowledge for the benefit of all."

"The selection of Run-EU is not just a recognition of the standing of technological higher education, but also a recognition of role of regions in the EU's future," says LIT president Prof Vincent Cunnane. "As we move towards TU status, this is a clear endorsement of our approach."

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Research by Maria O'Donovan at Limerick Institute of Technology will support the establishment of transnational teacher training and strengthen co-operation between European teachers and education institutions. The project examines

how technology in post-primary education can be a catalyst for inculcating creativity in the curriculum and explores the extent of ICT practice in the Irish postprimary visual art classrooms in comparison with a sample of its European counterparts. The study will assist in the exchange of good practices to enhance the quality of teaching and support the use of digital technologies to improve teaching

and assessment methods.

GMIT and a consortium of European higher education partners have been awarded funding of €4.4 million under the EU Erasmus+ programme to continue delivery of the international master of science in marine biological resources (IMBRSea). The two-year joint master programme, organised by 11 leading European higher education institutions in the field of marine sciences, is supported by the European Marine Biological Resource Centre.

GMIT has been delivering this prestigious programme since 2010, welcoming graduates from all over the world to study for two years at its Marine and Freshwater Research Centre. There are 200 postgraduate students from more than 35 countries in the first and second year of the programme.

Marine biology

With an emphasis on marine biological and ecological processes, the IMBRSea programme links biology of marine organisms and environmental studies with subjects in marine policy and planning.

"The IMBRSea programme recognises the huge importance of healthy marine environments to mitigating climate change and to sustaining marine industries," says Dr Rick Officer, vice-president of research and innovation at GMIT. "GMIT's marine research staff and students are similarly focused on enabling sustainability, conserving biodiversity and improving the productivity of aquatic ecosystems. Our renewed involvement in the IMBRSea programmes ensures that GMIT's expertise will extend worldwide."