

# ACCESSING THE **ENTERPRISE IRELAND TECHNOLOGY GATEWAY NETWORK**

A guide for companies

**#GlobalAmbition**

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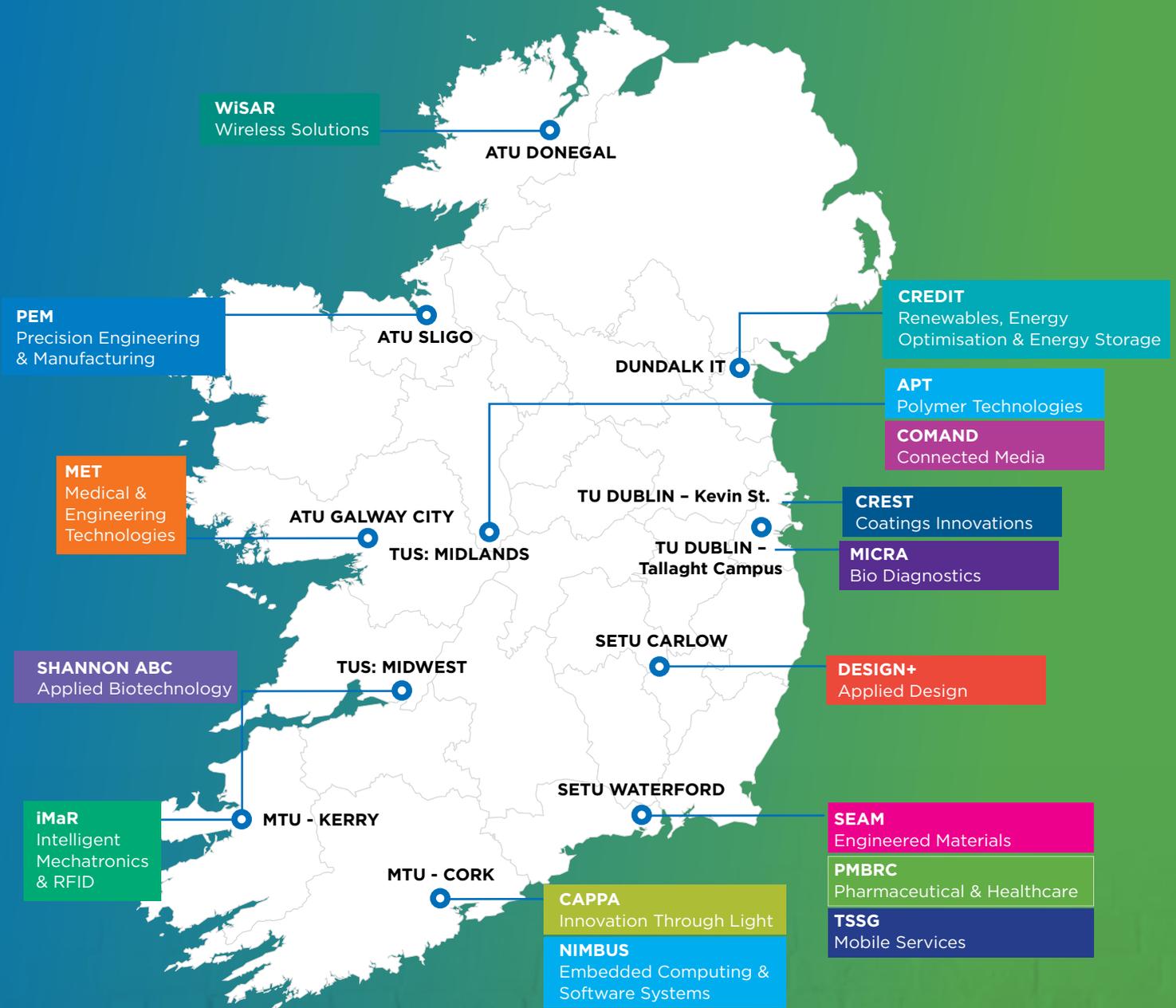
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**FIGURE 1** PROFILE OF TECHNOLOGY GATEWAY INDUSTRY COLLABORATORS



# INTRODUCTION TO THE TECHNOLOGY GATEWAY NETWORK

## NEAR-TO-MARKET SOLUTIONS FOR BUSINESS AND INDUSTRY

Companies all over Ireland are using Technology Gateways to develop new or better products and services and smarter ways of doing things. Through the Technology Gateway Network, they are leveraging the expertise of over **300 industry-focused researchers**, together with the specialist equipment and facilities of the Technological Universities and Institutes of Technology, to access near-to-market innovation and solutions.

Since 2013, **over 4,250 Irish based companies** have used Technology Gateways to complete more than 6,000 innovation based projects at a total value of over €55 million, **50% of which has come directly from industry**.

## FROM POLYMERS AND PHOTONICS TO MOBILES AND MECHATRONICS

This publication provides a guide to **16 specialist technology gateways** within the network. Each gateway focuses on key technology areas **aligned to industry needs**. These range from polymers and photonics to mobiles and mechatronics and everything in between – materials, industrial design and precision engineering – to biotechnology and pharmaceuticals – right through to embedded solutions and wireless services.

Each Gateway acts as a portal to the industry focussed capability across the network and beyond to the wider research infrastructure in Ireland. To optimise the power of the Network 3 clusters were established to deliver market lead innovation solutions for Irish companies, in the areas of Applied Internet of Things, Engineering, Materials & Design and Food and Beverages.

Within each Gateway, a dedicated **Gateway Manager** and a team of sector specific business development staff act as the **key contact points** for industry and manage the successful delivery of projects **on time and within budget**.

## INNOVATION SOLUTIONS DELIVERING BIG IMPACTS

Technology Gateways are used by companies of all sizes, but especially SMEs. Typical projects focus on the development of a new product or service or the optimisation of a process. The project sizes vary from small short term, of which 60% are €5-10,000, to larger projects which range up to €200,000 typically funded from the Enterprise Ireland Innovation Partnership Programme. For businesses – and for Ireland Inc – the impact of these collaborations can be big.

An independent economic review of the programme carried out in 2022 on the impact of the Technology Gateway Network for partner companies found that:

- 45% of companies stated that Technology Gateway Programme supports have enhanced their ability to export.
- 54% of companies indicated that engagement with the programme resulted in the development of a new product(s) and 32% indicated that engagement resulted in a new service(s) developed.
- 89% of companies indicated that the programme resulted in increased technological knowledge.
- 79% of companies indicated that participation within the programme developed or improved a culture of innovation within their organisation.
- 89% of company respondents indicated that engagement with the programme resulted in increased technological knowledge within their business.
- The Programme has demonstrated an Economic Value Add of €9.18 for every €1 of Enterprise Ireland funding.

Moreover, successful collaborations often result in the Gateway becoming an extension of the company's R&D facility over time, as it partners with the business along the innovation journey towards increased growth, sustainability and competitiveness.

Gateway staff are always happy to discuss potential collaborations with industry, so for more information, read through this guide, visit **www.technologygateway.ie**, follow us on **Twitter @EITechGateway** or simply get in touch at **infotech@technologygateway.ie**



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PROFILE OF  
**THE GATEWAYS**

The **APT Technology Gateway** is hosted within the Materials Research Institute (MRI) at TUS: Midlands, which is an interdisciplinary material science and technology research centre. APT is the leading hub for industrial polymer research and development in Ireland, with TUS playing a key role in supporting the Irish polymer and plastics industry for more than 30 years. APT acts as an industry-led research hub supporting Irish-based plastics and polymer companies in creating solutions to overcome the current challenges faced by the industry. Products of the Irish plastics and polymer sector are integral to the products of many other large industrial sectors, including medical devices, pharmaceutical, automotive, packaging and construction, which provide combined exports in excess of €50 billion. APT is a dedicated resource for the Irish polymer manufacturing industry and regularly provides training and information dissemination, as well as production demonstration days for companies. Industries can access:

- Design, DFM and Rapid Prototyping - A design engineering team offering our full expertise to produce prototypes quickly and efficiently. The vast experience available within the team often times saves you time and money by giving you the best advice on your component, considering process, tolerance and predicting potential problems.
- Pilot and Production scale Injection Moulding, Micro-Moulding, Blow Moulding, Thermoforming, Extrusion and Compounding lines and 3D additive printing - APT has installed a state of the art laboratory with equipment for polymer processing. This resource continues to expand as new demands continue to emerge in the development of materials of higher performance and functionality. We have developed a diversified staff of technical experts to become a one-stop vendor for our customers.
- Advanced Analytical Facilities for materials research, testing and troubleshooting - APT offers independent, reliable and cost-effective test services for troubleshooting and product/process development. Our scientists, engineers, chemists, and technologists are highly qualified professionals with years of industry experience who use state-of-the-art instrumentation to provide a full range of quality, product safety, materials and research analysis and testing services. Within those industries, APT routinely conducts complete standard and customized polymer testing programs for; material suppliers, processors, manufacturers and end users.

## CASE STUDY DESIGN AND DEVELOPMENT OF INJECTION MOULD TOOLING

Teleflex is a global provider of medical technologies designed to improve the health and quality of people's lives. They apply purpose-driven innovation to benefit patients and healthcare providers. Their portfolio is diverse, with solutions in the fields of vascular and interventional access, surgical, anaesthesia, cardiac care, urology, emergency medicine and respiratory care. Their EMEA office is based in Athlone. Teleflex wished to use design and injection moulding capabilities at Applied Polymer Technologies (APT) to provide a solution for innovative, custom-designed medical device parts with quick turnaround times. The Gateway worked with stakeholders at both the Athlone and US sites, designing and development of injection mould tooling and, subsequently, manufacture of components for research and development purposes. The designed moulds could subsequently be used in conventional machines for the production of parts. By leveraging APT Gateway's expertise in polymer materials and injection moulding, Teleflex was able to develop innovative medical device

concept parts and gain an increased understanding of the materials it is using and the effects that the process has on their properties. The company is also considering further collaboration work with APT and the wider network as a result of its initial interactions with APT.

*"The equipment and expertise available to us at APT enabled us to optimise and refine our concept and produce an innovative manufacturable product."*

**Morgan Tierney, Teleflex**

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The **CAPPA Technology Gateway** based in MTU Cork is applying light based photonic technologies for near to market problems for industrial partners seeking solutions for:

- New Photonics Devices
- Med Tech & Pharmaceuticals
- Food & Beverages
- Manufacturing Technologies

## CASE STUDY DEVELOPMENT OF A WIDE FIELD FLUORESCENCE IMAGING SYSTEM

Hooke Bio is a microfluidics company operating in the fields of preclinical drug discovery and personalised medicine. It draws its strength from the close co-operation it has between its biologists and engineers. Hooke Bio has patented microfluidics technologies that allow their screening platform to work with volumes of liquid 10 to 100 times less than current liquid handling systems. This approach requires very high throughput automated testing at small volumes with relevant, translatable disease models.

The primary focus of Hooke Bio is on drug combinations; however the technology is highly adaptable and can be easily used in a variety of additional applications. There is an important unmet need for new medicines that can be mediated by the use of high-throughput microfluidic screening in 3D cell culture. High-throughput screening is required to screen vast numbers of drugs and drug combinations, as their effects on cells are difficult to predict. Hooke Bio developed the Enigma platform to tackle this problem.

The Hooke Bio platform was restricted by narrow field of view of ca. 1 x 1.5mm, which limited the testing to one fluidics channel only. CAPPA has designed and prototyped a bespoke imaging system with a larger field of view that allows investigation on multiplexed channels. Moreover, the expensive and potentially eye-hazardous 488nm laser was replaced with an LED based illumination solution. A system was also integrated with a tailor made software solution. Hooke Bio envisages expanding its range of tests to other cell lines and disease models and is also interested in personalised medicine.

Taking samples of cells from patients and screening the relevant disease specific drugs against these samples.

The high content screening and image analysis is a process that is going to grow in sophistication. The optics and software development will form part of an on-going collaboration between Hooke Bio and CAPPA in the future.

*"I would happily recommend CAPPA because of their high levels of expertise. The system that we are developing is quite a high throughput system so not only did we need to have some bespoke optics designed we also needed some software to manage that process and software to do the analysis. The great thing about coming to CAPPA and talking to the staff here is that it is a one stop shop for quite a broad variety of needs. CAPPA are very flexible and willing to engage with industry. I wouldn't even know where to look for the service in the country and probably in Europe."*

**Mark Lyons - CEO, Hooke Bio**

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The **COMAND Technology Gateway** based in TUS: Midlands, delivers solutions for the software industry across multiple media platforms. The industry focussed technology offer from COMAND includes:

- Cloud Media Platform: Leverage media processing in the cloud and end user
- Media Systems: Intelligent and Cross Platform Multimodal Development
- User Interfaces: multimodal interfacing
- Real Time Data Analytics
- Interoperability of the Internet of things

## CASE STUDY GENERIC APPLICATION DEVELOPMENT PLATFORM

TownApps Ltd an SME based in the Midlands, produces mobile apps tailored to individual cities in Ireland, the UK, the US and Canada. The TownApps application is a tourist guide of hotels, restaurants and places of interest.

Multiple entries exist in the app store corresponding to City Partners that have subscribed to the app type. For instance, TownApps could have several apps available including Athlone, Dublin, and Galway. Each app is “subscribed” to annually by a City Partner, each Partner can manage Business Listings within that city, and app Users (mobile phone users) can view Listings by category, and can give the Listing a star-rating and make comments.

Despite this almost identical nature of the city apps, each app stems from a separate code-base. This means that the Dublin and Galway version of TownApps each have their own code-base despite differing only in such elements as title screen and content listing. The purpose of this project was to integrate development so that apps could be produced from a single code-base in combination with a unique city configuration.

The final project resulted in a complete system for the configuration, build, and deployment of multiple mobile apps with associated cloud-based website, database, and associated application functionality from a single template with minimal owner involvement.

The finished system is described at a high level as:

### Design

Authentication, Build, and Config servers

- Each deployed as docker containers on an AWS EC2 VM
- Auth and Config servers use MongoDB for backend storage, located on a separate AWS EC2 Volume for separation of concerns, and ease of backup and recovery
- Build server uses S3 and ECR to store build artefacts and docker images respectively
- Authentication Server

- Uses Node.js backend API to manage credentials store
- Config Server
- Uses Node.js back-end API to manage application logic
- Uses Angular front-end to display management portal for configuration and management of Partner (Client) applications
- Build Server
- Uses Jenkins-CI to build mobile and docker application artefacts, and deploy Partner (Client) VM

*“Townapps inherited an old platform to publish our original apps. This platform was built on unstable technology and wouldn't allow us to scale our business internationally in a cost-effective, secure, flexible and future-proofed way. Our clients wanted a host of new offerings including live trails and other critical user-engagement techniques.*

*We engaged the team at the Command Technology Gateway with the assistance of an Innovation partnership to travel the journey with us and give us the necessary software development expertise and advice. The end result is now we are using a very balanced solution to roll-out our much improved apps in a lot faster time. There are now very few limitations on the many new commercial opportunities that we can bolt into our existing platform as and when these opportunities arise.”*

**Joe Connaughton - CEO, Townapps**

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The **CREDIT Technology Gateway** is an interdisciplinary research centre based in Dundalk Institute of Technology which provides world class technical expertise for SMEs and larger organisations in the field of Renewables, Energy Optimisation and Energy Storage. The Gateway is fast becoming a vital part of Ireland's energy and renewables research and innovation landscape. Actively supporting business and industry to become more competitive through problem solving, targeted R&D, innovation and enabling faster adoption of emerging technologies and processes to create new markets in the low and zero carbon sector.

The **CREDIT Technology Gateway** provides access to R&D solutions for all types of industry, with a particular focus on helping start-ups and SMEs explore product innovation, source applied research opportunities and leverage technical solutions for their needs. CREDIT Technology Gateway offers companies expertise in:

- Renewables
- Energy Optimisation
- Energy Storage

## CASE STUDY ENERGY BASELINE AND APPRAISAL FOR LAMBAY ISLAND

Lambay Irish Whiskey Company is a partnership between Lambay Estate Company and the French cognac distiller Camus. The two companies formed a partnership in 2018 based around a view to produce Irish whiskey on Lambay Island, initially ageing the product there and then manufacturing part or all of the product there.

Lambay Island is not grid connected and sources most of its electrical power from wind and solar installations, with a backup generator. There are batteries associated with this energy system to maintain supply when there is little wind or sun. There is a significant expansion in the island energy system forthcoming where a distillery is to be established on the island and this will have significant impact on the energy required on the island. Furthermore, the company wishes the island to be as renewable as possible.

CREDIT Technology Gateway research staff undertook an energy appraisal of the current loads and forecast future loads and possible energy supplies including a battery storage system. This involved installing electricity metering on the island with dedicated broadband connection which was capable of monitoring the electrical flows on the island with high accuracy (5 seconds). This time resolution was required to capture the heat pump and other transient loads on the island and to identify the resource available from the wind turbine (6 kW) and the installed solar PV system (12kW).

CREDIT Technology Gateway worked to identify that the battery system was weakening and that the heat pump system was overloading the batteries and

should be turned off as it was causing power outages. The current battery system was put out to competent suppliers to provide a proposal for its replacement.

The company have obtained an energy baseline for the island and know the impact that the new distillery will have on the island. They have received an overview of the current renewable capacity which was not known in detail and also the current load profiles. CREDIT Technology Gateway has built a relationship with the team and will be available for future consulting and have assisted the team in obtaining quotations for the equipment required for expansion of the energy storage facility on the island.

*"A very interesting study. The first step in terms of energy could be to increase the solar panel system, probably the easier to make a first production for the distillery. The study about the consumption and the table about what the wind is giving and the solar panels are very interesting indeed. Let us hope to see this distillery in creation."*

**Yonael Bernard, Production Manager - Lambay Irish Whiskey Company**

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The **CREST Technology Gateway** based in TU Dublin - Kevin St. delivers coatings innovation solutions for industry in the engineering, construction, healthcare and biomedical industries. CREST offers companies expertise in:

- Coatings and surface treatments on construction materials
- Protective Coatings for challenging environments
- Surface treatment of metal components
- Coatings for Environmental Applications
- Biomedical Devices
- Sustainable Building Technologies

## CASE STUDY A PILOT LINE TO TRIAL NEW ALUMINIUM ANODISING TECHNIQUES

Graph Engineering is an Irish-owned, family-run business with over 50 years' experience specialising in the treatment of aluminium. Graph offers a high-capacity and rapid-turnaround anodising service. They specialise in sulphuric acid anodising, hard anodising, PTFE impregnation, chromate conversion, spray coatings and dry film lubricants.

Anodising is a technique for forming protective oxide (anodic) layers on metal alloys such as aluminium and titanium. However, the bulk of titanium parts for the medical device industry are currently being anodised overseas. The CREST team has been working on anodic surfaces for more than 10 years, developing aesthetic coatings that enable the finish to withstand exposure to extreme pH conditions. Through an Enterprise Ireland Commercialisation Fund project (ADAP), a pilot-scale production line was built to investigate the new technology to support ongoing patent activity and to develop new projects with Irish companies.

The CREST team has been working on anodic surfaces for more than 10 years, developing aesthetic coatings that enable the finish to withstand exposure to extreme pH conditions. Some of these coatings have been commercialised with Irish companies and are now in full-scale production (e.g. Volvo XC60). Over the last five years, the team has also developed new anodising techniques that can be introduced onto existing production lines.

The pilot line built by CREST enabled Graph to work on trial parts for new customers without impinging upon the daily workload of their full production line.

With the analytical expertise in CREST, these new products can be then characterised by electron microscopy and accelerated corrosion testing according to recognised international standards. Based on this work in CREST, Graph has recently started providing a competitive service in Ireland for Titanium anodising. This generated knowledge enabled the team to join a consortium with SEAM (WIT), Schivo Medical and Stryker Orthopaedics working next generation 3-D printed medical devices. The consortium is funded under the recently funded Disruptive Technology Fund, announced in December 2018.

### **Brendan Duffy,**

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The **DESIGN+ Technology Gateway** based in SETU Carlow champions the application of the design thinking process within the Technology Gateway network, with a focus on the Engineering, ICT and Bioscience sectors.

The technology offers to industry include:

- Design: design strategy, visual communication and product design capabilities
- Engineering: smart energy systems, embedded circuits & systems technologies and surface and coating engineering
- Prototyping: 3D printing, machining and modelling

## CASE STUDY DESIGN DEVELOPMENT OF A WATER TESTING DEVICE

Founded in 1991, T.E. Laboratories (TelLab) is an Irish-owned company, focused on science and technology in the areas of environmental analysis, oil analysis, chemical manufacturing, research and new product development. Based in Tullow, Co. Carlow, TelLab houses four laboratories, a production area and a dedicated R&D centre, staffed by an expert, multi-disciplinary team of chemists, researchers and engineers.

This project focused on the design of a new water testing unit being developed by TelLab. The Design+ team at IT Carlow was asked to explore a means of securing the unit to a tank and incorporating the necessary internal electronic components and a removable cartridge system, containing both chemical and waste fluid. In addition, the team was asked to develop a visual identity for the unit, with the final design to result in a scale appearance prototype for testing purposes.

The solutions were delivered through three stages:

**Stage 1:** Examination of TelLab's water testing device was undertaken from a user's perspective. This focused research identified two key areas for innovation – The main housing and the removable cartridge system. Within these two areas, there were a number of design challenges to be addressed – portability, tethering, loading/locking the cartridge system and overall usability.

**Stage 2:** The design team identified a number of creative and technical solutions exploring form, function and visual aesthetic. These solutions were presented to the TelLab team through 3D sketch modelling allowing them to make important decisions on the key aspects they wanted to bring into a single concept for further development.

**Stage 3:** This single concept was further refined and developed into a component assembly using CAD 3D modelling. Suitable manufacturing processes and materials were identified. Full-scale prototype parts were created using 3D printing for visual demonstration, testing and analysis.

The project will enable the client to move forward with communicating this new water testing device to the market.

*"We were delighted with the opportunity to work with the Design+ team at IT Carlow and look forward to working with them again in the future."*

**Mark Bowkett - CEO, T.E. Laboratories (TelLab)**

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The **IMaR Technology Gateway** based in MTU Kerry is applying its core expertise in the areas of hardware (mechatronics, robotics, control systems), software (data management and intelligent systems), IoT (RFID, Sensors) and data analytics to deliver increased productivity in the manufacturing, agriculture and process sectors to industry partners. IMaR's Technical offering is:

- Intelligent mechatronics, process automation and robotics for agricultural technology and advanced manufacturing
- Industrial Internet of Things, RFID and Data analytics for Industry 4.0

## CASE STUDY DEVELOPMENT OF A BESPOKE HARDWARE UNIT TO TRACK USER EYE/MARKER AND ESTIMATE LINE OF SIGHT

Marksmanship Technology Ltd. is currently developing wearable devices for detection and analysis of eye movement during sporting activities, having designed the World's First Wearable Marksmanship Coach, which provides real-time feedback during training sessions. Marksmanship Technology are currently in the process of developing a novel wearable product and are currently enrolled in the NDRC's catalyser programme since November 2016.

Marksmanship Technology intends to develop a concept to locate where the user is trying to point a device, or track a moving object, such as a ball in motion, by using a rear facing camera to measure the position of the users eye in relation to the tracked object. The measured position is then used to estimate the rotation, angle and direction, which can be applied to stabilize any device to the estimated line of sight. An initial system was developed using a basic smartphone demonstrator, but Marksmanship Technology required the development of a piece of bespoke hardware, incorporating a high precision camera and bespoke image-processing software to demonstrate this concept in a more close-to-market demonstrator.

In collaboration with IMaR, Marksmanship Technology Limited accessed a co-funded Enterprise Ireland Innovation Voucher. IMaR initially delivered a detailed project plan and identified suitable camera and actuator systems with which a prototype could be developed to realise the concept. This first project led to the development a functioning prototype system to prove the eye tracking concept. In a follow-on project IMaR delivered a bespoke electromechanical system housed in a compact 3D

printed enclosure. The prototype developed was aimed to demo this system to investors to bring this concept to the next stage. During the course of the project, IMaR continuously engaged with Marksmanship Technology gaining valuable feedback to produce the prototype as required and within a tight schedule.

The successful delivery of this project has enabled Marksmanship Technology to develop a prototype stage demonstrator to showcase the functionality of their system to a potential investors.

*"I selected IMaR for this project after discussing the spec with a number of different research institutions. IMaR presented me with a range of technical solutions to the proposed problem and had solutions that were cutting edge which were not presented by any of the others. During the project, the dialogue between our company and IMaR was excellent and they were very accommodating to allow me to input by email and visit with input throughout the period. The researchers provided were of top quality and easy to work with. I would not hesitate recommending IMaR to anyone who is researching an electro-mechanical solution"*

**John Daly - CEO, Marksmanship Technology Limited**

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The **MET Technology Gateway** based in ATU Galway City has a technology offer for the medical device and engineering companies based in the West of Ireland and nationally which consists of:

- Medical Imaging Technologies
- Biomedical Engineering Technologies/Solutions
- Data Analytics and Visualisation
- Design Engineering/Verification
- Medicinal Nutrition

## CASE STUDY CLINICALLY RELEVANT CARDIOVASCULAR MODELS FOR THE DEVELOPMENT OF TECHNOLOGIES TO TREAT CHRONIC TOTAL OCCLUSION

Capsos Medical is a High Potential Start-Up medical device company based in Galway that design & develop medical devices to penetrate total occlusion of blood vessels. The company has developed a patented balloon catheter & guidewire combination device called CapBuster to facilitate the treatment of chronic total occlusions (CTO). CapBuster re-opens the most resistant total occlusions where a calcified cap has formed on the surface of the blockage. This new device utilises standard tools and techniques used in all angioplasties in every Cath lath in the world.

Currently, 50% of CTO's are managed with medications, whilst approximately 40% are treated with bypass surgery, which is an invasive procedure with high surgical costs associated. No clinically relevant CTO's was commercially available that replicates the specific anatomical challenges relevant to test the company's device. MET Technology Gateway and Capsos Medical collaborated on an Enterprise Ireland innovation partnership project to address the technology gap by developing an in vitro simulation system for testing the performance of their product.

MET researchers gathered the relevant clinical data and designed and developed various CTO's plaque configurations, which were incorporated into clinically relevant coronary vessels. Following the vascular replication, MET designed a state of art customised in vitro simulation system with interchangeable vascular sections which was fluoroscope compatible.

By providing a highly realistic CTO model and a simulated use environment, the company could carry out design verification studies to evaluate and optimise their prototypes. This customised simulated system accelerated the product development cycle and reduced significant costs associated with pre-clinical animal testing. The capabilities developed through this project enabled Capsos Medical to design a CTO treatment device that performs in a fashion superior to other products in the market. Since completion of the project, GMIT has maintained a high level of interaction with the company and has generated various models with varying CTO properties.

*"This project enabled Capsos to test our CTO treatment device (CapBuster), in an environment that accurately simulates challenging in-vivo conditions, and to evaluate and refine our designs rapidly and effectively, shortening the development cycle and therefore reducing the development cost."*

**Brendan McLaughlin - CEO, CAPSOS Medical**

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The **MiCRA Technology Gateway** based in TU Dublin - Tallaght Campus delivers solutions across the agri-food, in-vitro diagnostics (animal and human), environmental, and biopharmaceutical industries with expertise in:

- Rapid and portable electrochemical sensor design, development and prototyping
- Specific expertise in bio-, immuno- and chemical sensors for the detection of microbes, biomarkers, chemicals and food allergens
- Application in areas of quality, toxicity, viability and chemical and biological contamination analysis
- Advanced analytical services and materials development

## CASE STUDY BEE HIVE HEALTH - DEVELOPING REAL-TIME MONITORING SOLUTIONS

Advance Science is an Údarás na Gaeltachta company based in Connemara in the West of Ireland, with offices located in the National University of Ireland, Galway (NUIG). The company is committed to safely improving bee health worldwide and to make new technologies available to beekeepers. Its goal is to create a more sustainable future for bees and pollinators. The company has a clear research focus and strives to provide innovative, effective and practical solutions that are cost competitive for the beekeeping industry. The company is focusing on the areas of disease, nutrition and gut health.

The Bee Hive Health Project drew on the expertise of MiCRA Biodiagnostics in the R&D of bio- and electro-chemical sensors. The project partners outlined an ambitious programme to design and engineer sensor technology to facilitate detection and differentiation between specified target entities – or biological markers of the health of the bee hive. They sought to develop a solution capable of performing with high analytical sensitivity and low time-to-result. A variety of chemical analysis techniques were validated for their detection capabilities including molecule differentiation and concentration dependence for the relevant signalling molecules. The research led to the development of prototype sensors and incorporated testing of early-stage prototypes in a live beehive environment.

*“We were delighted with the outcome of this short turn-around research engagement. The results achieved went beyond our expectations and vastly exceeded the initial scope and objectives of the project. We are excited at the possibilities and look forward to further advancing these concepts under future research collaborations with the team at MiCRA.”*

**Dara Scott, Managing Director, Advance Science**

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The **NIMBUS Technology Gateway** based in the Nimbus Centre at MTU Cork, has a team of 40+ hardware and software researchers working with companies who require technical expertise in Smart Technologies, Internet of Things and Cyber Physical Systems. NIMBUS supports all levels of innovation from idea-filtering to prototype development and commercialisation. NIMBUS specialises in the following domains:

- Industry 4.0
- Energy
- Water, Maritime and Environmental
- Smart Cities
- Applications in Ed-Tech, Agri-Tech, Security and eHealth

## CASE STUDY TOWARDS AN INDUSTRY 4.0 SMART FACTORY SOLUTIONS SERVICES SUITE

Smart Factory Solutions Ltd (<https://smartfactory.ie>) was setup to address the shortfall of Industry 4.0 data analysis solutions within the manufacturing industry. They capture, analyse and visualise key performance indicators from the manufacturing, logistics and utility sectors, using smart Industry 4.0 technology. Their smart solutions reduce the amount of time and resources required to capture, and communicate, critical information across an organisation and dynamically translate this data into actionable intelligence. They empower employees to take the appropriate corrective action to help eliminate losses and promote a sense of ownership and collaboration. Smart Factory Solutions' secure OPC architecture can communicate to virtually every type or brand of PLC. Smart wireless sensors facilitate the capturing of data from non-networked machines or semi-manual/manual processes. Intuitive mobile touch screen devices convert manual paperwork into lean digital workflows. Interactive smart digital displays eliminate the wasteful effort of preparing and printing paper reports and help to digitise the daily management process.

Smart Factory Solutions approached the Nimbus Technology Gateway to implement an IoT Platform to collect, store and visualise data coming from a factory setting and control devices through the OPC-UA protocol. The platform needed to be flexible to accommodate future deployments, provision redundancy and high availability. An additional project provides for visual assistance by illuminating relevant inventory containers during component packaging procedures.

*"The work being delivered by the Nimbus Technology Gateway is pivotal to Smart Factory's Industry 4.0 services offering. The team have been very innovative and the whole experience to date has certainly been worthwhile, amazing value and rewarding. We are currently planning further projects with the Nimbus Technology Gateway for 2019 and beyond."*

**Brendan Sheppard - CEO, Smart Factory Solutions Ltd**

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The **PEM Technology Gateway** based in ATU Sligo has a technology offering for industry in precision engineering, manufacturing and materials targeted at companies based in the North West and nationally which consists of:

- Precision Engineering and Design
- Manufacturing Process Modelling and Simulation
- Advanced Process Monitoring and Control
- Advanced Material Syntheses and Characterisation

## CASE STUDY MATERIAL AND SURFACE HARDNESS ANALYSIS OF A HIGH PRECISION COMPONENT

ATA Air Tools (ATA) manufactures and distributes pneumatic air tools to over 50 countries for major industries including the Aerospace and Automotive sectors. A previous Innovation Voucher project completed with the PEM Gateway led to two important developments for ATA. The first of these was the optimisation of a turbine design for a new air motor which “proved invaluable in the design” of that tool.

Optimisation was achieved through a review of the existing design; leading to a Computer Aid Design (Computational Fluid Dynamics) analysis of identified modifications and the 3D printing of these components for prototype testing.

The second development was an introduction to the product development company Zenoz Ltd. Resulting from the ATA Innovation Voucher, Zenoz Ltd were tasked with both design projects and as a component manufacturing sub-contractor for ATA. This introduction, and the success of the components manufactured by Zenoz, has developed into a mutually beneficial and longstanding business arrangement for both ATA and Zenoz.

Being familiar with PEM’s precision engineering expertise, in 2018 Zenoz applied for an innovation voucher with us to investigate the mechanical properties of a material Zenoz and ATA were considering for a new product and wanted to compare against existing materials used.

PEM undertook a literature review to determine the optimum way to test unique aspects of the materials in question. Following this PEM used IT Sligo’s Materials Testing and Analysis Lab to carry out a series of tests, which also included hardness testing.

The results of the tests were presented to Zenoz / ATA with insight given on the suitability of the material ATA hoped to use for their new product. Because of this work, Zenoz and ATA were confident that the new material would meet their performance criteria and this allowed ATA develop a lighter air tool.

ATA were then able to sell this product into a new market and had the necessary experimental results to reinforce their performance claims for it. In

conjunction with the material analysis carried out by PEM, ATA ran their normal in-house and end-user tests to prove the quality of the modified product. The experimental results from PEM will prove invaluable when ATA are introducing their product to a wider market base in the future.

### ATA Testimonial

*“ATA in conjunction with our manufacturing partner Zenoz Ltd recently used the PEM centre to conduct material and surface hardness analysis of one of our most high precision components. The reason for carrying out this analysis was twofold, firstly to test an alternative material and hardness treatment against our traditional methods and secondly to compare our sample components against similar components already in the market place.*

*The resulting report produced by PEM made comparisons with both and has given us the confidence to move forward with an alternative to our traditional methods. This has the advantage of reducing the overall weight of our assembly as well as reducing the production costs. Without the comparative analysis produced by PEM we would have had to undertake extended end-user test therefore delaying this project considerably.”*

### Zenoz Ltd Testimonial

*“It was great to work with the PEM Gateway and utilise their research expertise, capabilities and facilities. Having an independent party verify the approach we took with ATA to develop an alternative production method for their new device allowed us to quickly progress its implementation in their manufacture.”*

#### Russell Macpherson,

PEM Technology Gateway Manager

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The **PMBRC Technology Gateway** in SETU Waterford is working with the pharmaceutical, medtech, food and healthcare sectors in areas such as analytical science, formulation, drug delivery, process technology, biotechnology and biomedical science. The PMBRC has expertise in:

- Physico-chemical characterisation of materials.
- Advanced analytical capability.
- Formulation, process development and drug delivery

## CASE STUDY CHARACTERISATION OF NOVEL WOOD PRODUCTS

MEDITE SMARTPLY is a market-leading manufacturer of innovative medium density fibreboard (MDF) and oriented strand board (OSB) panels. Combining the very latest technologies, sustainable raw materials sourced from our own forests and customer-led innovation allows MEDITE SMARTPLY produce products of the highest quality, defining the standards of engineered timber panels. Their manufacturing sites in Clonmel (MEDITE) and Waterford (SMARTPLY) in Ireland feature the latest production technology to deliver quality products and customer service unparalleled within the industry. Continuous development and investment over the past 30 years has enabled MEDITE SMARTPLY to enter new diverse markets and sectors, ensuring that there is always a fresh pipeline of new products to address market demands.

MEDITE SMARTPLY believe that the next generation of wood panels products will be determined by scientific-led research and enabling technologies. The PMBRC has been an important R&D partner with MEDITE SMARTPLY since 2012, providing technical support to the product development process with an increasingly important role in our development of “Intelligent Engineered Wood Panels”.

In particular, their expertise combined with a wide range and expertise combined with a wide range of analytical equipment such as DSC, TGA, DVS, HPLC-MS, and GC-MS have been used to solve complex problems and characterise new prototype products.

The equipment and expertise of the PMBRC is not available in-house in MEDITE SMARTPLY. By partnering with the PMBRC, the company has been able to develop new solutions and products and get them to market quicker than would have been possible otherwise. This in turns helps MEDITE SMARTPLY maintain its market leading position.

*“PMBRC provide skills and expert knowledge essential for MEDITE SMARTPLY to deliver our growth strategy through “Value Add” based product and service approach. Key to this strategy is the development of innovative new product solutions through scientific-led research where PMBRC are a key collaborator. It is very important that we have the expertise and facilities of PMBRC on our doorstep in the South East as this accelerates our rate of innovation”.*

**Dr. Rory Rice - Technical Development Specialist,  
Medite Smartply**

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The **Shannon ABC Gateway** is based on the MTU - Kerry and TUS: MidWest campuses and develops new processes and novel products from bio-resources, transferring these solutions to Biotech, Food and Life Science industries. Shannon ABC has expertise in:

- Bio-Prospecting & Bio Processing: Screening, extraction, characterisation and testing of bioactive molecules, as well identifying routes to scale-up.
- Analytical and Research Services: Expertise and state of the art facilities and equipment are available to assist companies to address specific challenges.
- Food Innovation: providing Food and Beverage companies with scientific support from raw material to final product

## CASE STUDY RESEARCH INTO THE BENEFITS OF SEAWEED ON SKIN CELLS

The Shannon ABC Technology Gateway is a collaboration between Limerick Institute of Technology and the Institute of Technology, Tralee. With a focus on developing, enhancing and commercialising biotechnology through collaboration, the centre has benefited a wide range of Irish food, cosmetic and pharmaceutical companies. One such company is Voya.

With its office based in Sligo, Voya ([www.voya.ie](http://www.voya.ie)) offer luxury results-driven products based on the highest quality botanical ingredients and aromatherapy oils. The company are committed to producing products that are organic and sustainable, and that provide results for the consumer. Voya partner with a range of airlines, high-end spas and outlets to deliver their products to their consumers, and have received numerous awards for their cosmetic and spa products.

Seaweed and seaweed extracts are a key component in the Voya product range, and Voya wanted to develop specific scientific information regarding the impact of their seaweed on skin.

Shannon ABC have specific expertise in the area of seaweed and cosmetics and together with the Principal Investigator of the project, dedicated a research scientist to work on this project with Voya. This project was funded by Enterprise Ireland through the Innovation Partnership Program.

The impact of a number of Voya seaweeds on skin cells grown in cell culture was determined. This data was translated in the development of cosmetic formulations containing these extracts. These formulated cosmetic products were then tested on a volunteer panel using a range of skin testing probes, including moisturisation and elasticity.

The results of this study provided vital scientific data to Voya regarding the positive impact of their seaweed on skin cells grown in the lab, as well as translating this into a real formulated product, that could similarly positively impact the skin of volunteers.

*"Voya partnered with Shannon ABC to conduct research into the benefits of seaweed on skin cells. The research included four types of seaweed using in vivo and in vitro testing. The positive results were presented professionally with periodic meetings to discuss results and answer questions. I highly recommend Shannon ABC as a research partner."*

**Robert O'Donnell - General Manager, Voya**

For more information on Shannon ABC, visit [www.shannonabc.ie](http://www.shannonabc.ie)

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The **SEAM Technology Gateway** based in SETU Waterford provides engineering material solutions for industry in sectors such as Bio-medical devices, Pharmaceuticals, Micro-Electronics, Precision Engineering & Construction with expertise in:

- X-Ray Micro-tomography (XMT): 3D Non-destructive characterisation
- Finite Element Analysis & Computational Fluid Dynamics: 3D Software Modelling
- 3D Metal Additive Manufacturing
- Materials & Precision Engineering: Engineering Design & Characterisation
- Bio Medical Engineering: Medical Device Design Optimisation & New Material Assessment

## CASE STUDY TRAILER STRUCTURAL ANALYSIS

Dennison Trailers based in Nass, Co. Kildare is a leading manufacturer of semi-Trailers for the container transport sector in both Ireland and the UK. The company services many other markets including construction, timber, steel and oil industries. In Ireland & the UK, Dennison dominates the Cargo Container skeletal trailer market.

Throughout its history, Dennison has been an innovative company, with continuous research and development being at the core of the business. As a result it has had a strong competitive advantage in terms of new product development.

In 2018, the SEAM Gateway contributed to the company's research and development program by performing an in depth structural analysis. SEAM built a detailed Finite Element Analysis (FEA) model of a trailer design which was used to predict its stress and strain response under operating load conditions. Using its expertise in structural analysis and the results of the FEA model, SEAM was able to provide a comprehensive assessment of the trailer behaviour and design capacity. This detailed picture of the trailer performance made possible by the use of FEA allowed SEAM to make several design optimisation recommendations. The additional insight provided to Dennison Trailers is currently being incorporated into the company's design process.

SEAM utilises engineering simulation and analysis to solve problems across a wide variety of industries. SEAM has expertise in structural analysis involving FEA, as well as Computational Fluid Dynamics (CFD) for the analysis of fluid flow phenomena. The application of these analysis techniques has resulted

in cost reductions for SEAM's client companies through reduction in physical prototyping, improved operating performance, and improved product lifespan.

*"In 2018 we partnered with SEAM, through Ramesh & WIT, to produce an FEA analysis of an existing trailer design which had been displaying early failures in the field. Through their analysis we were able to identify problem areas & rectify the issues with the initial design. We found SEAM to have a great technical knowledge & be highly cost effective. We are looking forward to partnering with them again in the near future"*

**Ronan Lambe - Senior Design Engineer, Dennison Trailers**

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The **TSSG Technology Gateway** based in SETU Waterford collaborates with companies involved in delivering mobile services primarily for smart phones and tablets. TSSG's technology offer is based upon expertise in:

- Distributed & cloud-based mobile services
- Next generation IP based voice and video
- Virtual and Augmented reality services
- Location, context, smart space and social service enablers
- Data science and mining
- UI/UX
- Data analytics
- Communications/networks
- AR/VR
- Machine learning and trialling

## CASE STUDY DEVELOPMENT OF CLOUD STORAGE CAPABILITY

Waterford Technologies, an Enterprise Ireland client company was founded in 2000 and has offices in the UK, US, Ireland and the Middle East. The company provides Data Management solutions for Email and File Archiving and Fax Solutions for an extensive array of clients across all sectors including Legal, Financial, Health, Education and Government.

The company wanted to enhance their 'File Archiver / Analyser' product to use cloud storage instead of archiving files on conventional storage servers. For a continuously increasing customer base and emerging market challenges they also wanted to re-develop their product to be more scalable, reliable, efficient and secure.

TSSG worked with Waterford Technologies to understand in detail their existing business and ideas for creative innovation and developed a comprehensive file archiving and analysing solution to fit their vision and requirements. TSSG delivered the solution with modern and innovative cloud storage features compatible with Microsoft Azure, Amazon S3 and S3- Compatible cloud storage vendors.

The solution has re-incarnated their file archiving product and helped the company stay up to date and competitive in an emerging cloud storage market. The cloud storage functionality has helped Waterford Technologies to attract new customers as well as improved existing customer retention.

*"We were very impressed by the skills and professionalism of the TSSG Gateway, the speed which they engaged with us and how they understood our product, our business requirements and the directions we wished to go in with the new cloud service. Our partnership with TSSG in the development of MFA generation 2 has produced some impressive results so far and we are keen to expand this partnership in the future."*

**Lorcan Kennedy, CTO, Waterford technologies**

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The **WiSAR Technology Gateway** based in ATU Donegal provides solutions to Irish industry for The Internet of Things (IoT) using expertise in wireless, embedded systems and related software. WiSAR offers this expertise to companies in the following sectors:

- Wearable Tech: Healthcare, Sport & Tourism
- Remote monitoring: Industrial control, Transport, Environmental, Marine
- Power electronics: Renewable Energy and Electric Vehicles
- Communications: WLAN, Zigbee, Bluetooth, UWB, RF and Microwave

## CASE STUDY SMART WHEELCHAIR FOR PRESSURE SORES PREVENTION

LC Seating, established in 2008 in Grange Co. Sligo is a medical supplier company specialising in the provision of all types of rehabilitation and seating products. The company operates throughout Ireland, primarily dealing with occupational therapy / seating clinics by providing engineered solutions for a variety of complex seating needs. People with mobility issues can develop pressure sores from sitting in the one position for extended periods of time.

Pressure sores when formed can be difficult to treat, so their prevention is of critical importance and this is achieved through regular movement of the person to alleviate the build-up of pressure. LC Seating and the WiSAR Gateway in LyIT, through an Enterprise Ireland Innovation Partnership Project developed a 'prototype smart cushion' that can detect and monitor the pressure build up and then send wireless alerts to a monitor giving a local reminder to a paralysed person or carer when it is time for their position to change.

Key to the approach taken was the utilisation of smart fabrics that change their electrical properties when stretched providing a signal which can be processed. WiSAR performed extensive research into the identification of suitable pressure sensor fabrics, which were then tested for accuracy and repeatability. A prototype was developed consisting of a bespoke pressure-sensing mat, a wireless data acquisition unit and a wireless base station. Pressure across the cushion surface is represented on a monitor in the form of a heat map which allows real time adjustment of the patient's position to optimise pressure distribution. Thus, the developed prototype can be used as either a pressure monitoring system or a visual pressure mapping system.

*"We were introduced to the WiSAR Technology "It's been a very good experience. These devices can be tested in occupational therapy departments. Our aim was to develop wireless alert systems with WiSAR, which will be much more affordable than what's out there at the minute. Embarking on this new venture is exciting and we're pleased to be funded by Enterprise Ireland - it's a strong vote of confidence."*

**Luke Conway - Managing Director, LC Seating**

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## A-IOT CLUSTER (APPLIED INTERNET OF THINGS) TECHNOLOGY GATEWAY

**Do you have a new or innovative Internet of Things (IoT) idea that could transform your business? Do you currently lack the required resources, funding and/or expertise to explore it? Not sure where to go next or who to talk to?**

The A-IoT Cluster will assist you with getting your idea up and running. Covering all sectors from agriculture to retail, buildings to transportation and energy to security, the A-IoT Cluster can provide you with the appropriate R&D tools and resources you may require. We also provide companies with information and assistance in availing of suitable Enterprise Ireland funding, including the €5000 Innovation Voucher and Innovation Partnerships. Introduction to the A-IoT Cluster through a single point of contact opens up access to five of the Enterprise Ireland Technology Gateways and their expansive technical capabilities in IoT research and development. Via the cluster, industry can avail of full-time researchers and engineering professionals in the areas of software, UI/UX, data analytics, hardware, wireless sensors, robotics, communications/networks, control, AR/VR, machine learning and trialling.

The A-IoT Cluster is available to assist companies of any size including, start-ups, SME's, HPSU's and multinationals.



## EMD IRELAND CLUSTER (ENGINEERING, MATERIALS AND DESIGN) TECHNOLOGY GATEWAY

The **EMD Cluster** is a consortium of six of Enterprise Ireland's Technology Gateways operating within the engineering, materials and design sector. The cluster provides a range of expertise for companies who are looking to access research and development within these areas.

The EMD Ireland Cluster can assist companies with Enterprise Ireland funding mechanisms in the form of Innovation Vouchers, Innovation Partnerships and Innovation Partnership Feasibility Studies. Companies can also directly fund their work with the Gateways

The Cluster is available to SMEs, large indigenous companies and multinationals. It strives to provide companies nationwide with access to the wide range of expertise within the Gateway structure, who can support and aid the development of research and innovation in industry.

By working with the cluster you gain access to six specialised centres across the Enterprise Ireland Technology Gateway Network. Receiving assistance in delivering near-to-market solutions and benefiting from an extension of your company's Research & Development capability.

## **IRISH FOOD TECH CLUSTER TECHNOLOGY GATEWAY**

The Irish Food Tech Cluster is a consortium of seven of Enterprise Ireland's Technology Gateways operating within the food and beverage technology sector. The cluster provides a range of expertise for companies who are looking to access research and development within these areas. The cluster can connect industry with researchers in a wide selection of areas that include bioprocessing, food for health, process control and packaging amongst many others.

Irish Food Tech facilitates your access to the seven specialised centres across the Gateway Cluster. Each centre can provide assistance and support in delivering near-to-market solutions, becoming an important extension of your company's R&D capability.

We offer Industry support in the form of various Enterprise Ireland funding initiatives such as Innovation Vouchers, Feasibility Studies and Innovation Partnerships. You can also access the gateway cluster by direct consultancy. A maximum of four vouchers are available.

Each gateway centre within the cluster has access to a dedicated Gateway manager and a team of specialised business development engineers to help with your companies' individual needs. The Irish Food Tech Cluster is available to SMEs, large indigenous companies and multinationals.



**For further information on Applied IoT,  
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## ENTERPRISE IRELAND INNOVATION VOUCHERS

**The Innovation Voucher initiative was developed to build links between Ireland's public knowledge providers (i.e. higher education institutes, public research bodies) and small Irish businesses. Innovation Vouchers worth €5,000 are available to assist a company or companies to explore a business opportunity or problem with a registered knowledge provider.**

### Am I eligible?

The Innovation Voucher initiative is open to all small and medium-sized limited companies registered with the CRO in Ireland. You do not have to be a client of Enterprise Ireland to apply.

### How does it work?

If you own or manage a small limited company and want to explore a business problem or innovation opportunity, you can apply for an Innovation Voucher. The voucher can be exchanged for advice and expertise from knowledge providers such as the Enterprise Ireland Technology Gateway Network. A maximum of four vouchers are available, one of which must be a 50-50 co-funded Fast Track voucher. Please note, Innovation Vouchers are exclusive of VAT. You will be charged VAT by the knowledge provider and this cost must be settled separately by the company.

You can see the full list of participating knowledge providers, as well as information about the programme and how to apply, on the Enterprise Ireland website.

## ENTERPRISE IRELAND INNOVATION PARTNERSHIP PROGRAMME

**An Innovation Partnership Feasibility Study is a small, short-term study designed to enable the Principal Investigator to develop a proposal for a full Innovation Partnership Application. Maximum funding for an Innovation Partnership Feasibility study provides 100% grant to a limit of €9,000.**

**Feasibility proposals are submitted to Enterprise Ireland by the research institute partner. The grant is paid directly to the research institute upon approval.**

**To apply for an Innovation Partnership Feasibility Study Grant, please complete and submit the Innovation Partnership Feasibility Proposal Application.**

## ENTERPRISE IRELAND INNOVATION PARTNERSHIP PROGRAMME

**The Innovation Partnership Programme encourages Irish-based companies to work with Irish research institutes resulting in mutually beneficial co-operation and interaction. Companies can access expertise and resources to develop new and improved products, processes, and services, generating new knowledge and know-how. The participating company benefits in terms of growth, the evolution of strategic research and the development and creation of new knowledge that it can use to commercial advantage. The research institute benefits in terms of developing skill sets, intellectual property and publications.**

### Am I eligible?

Any manufacturing or internationally traded services company with an operating base in the Republic of Ireland that wishes to collaborate with one or more research institutes, also based in the Republic of Ireland, is eligible to participate. The company must be a registered client of one of the following state development agencies: Enterprise Ireland, IDA Ireland, Údarás na Gaeltachta, or a Local Enterprise Office.

### How does it work?

The Innovation Partnership Programme provides grants of up to 80% towards eligible costs of the research project. All Innovation Partnership projects require the company partner to provide a minimum cash contribution of 20% of the total project cost. In all cases, the partner company must have the resources to contribute its share of the funding for the research and to fund the commercialisation of the research, when completed.

Funding from Enterprise Ireland will normally not exceed €200,000.

## ENTERPRISE IRELAND AGILE INNOVATION FUND

**The new Enterprise Ireland Agile Innovation Fund allows Irish companies to respond quickly to new opportunities and threats such as Brexit, allowing the quick development of products, services and processes for new and existing markets. The fund allows eligible companies to access up to 50% in support for innovation projects with a total cost of up to €300,000.**

### Suitability

The funding is ideal for Irish companies that need to rapidly develop solutions or are planning a first R&D project.

### Am I eligible?

The fund is open to eligible Enterprise Ireland client companies. Please contact your Development Adviser before applying.

### How does it work?

The process has been streamlined for eligible companies with a short online application and fast-track approval.

**For further information on Enterprise Ireland Innovation supports please see:  
<https://www.enterprise-ireland.com>**

## FURTHER INFORMATION



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