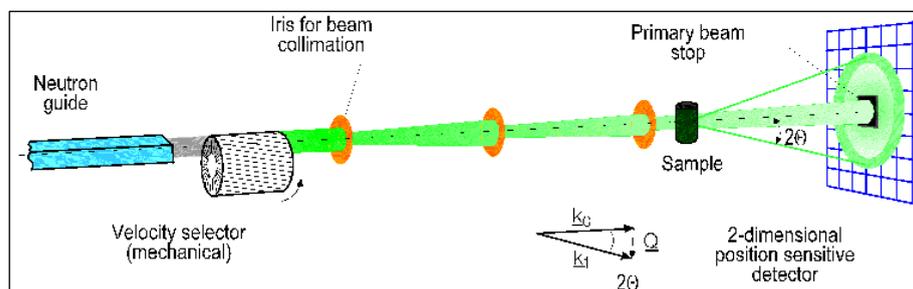




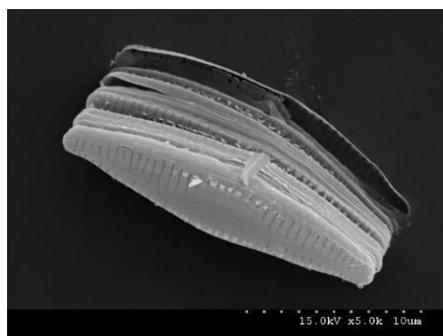
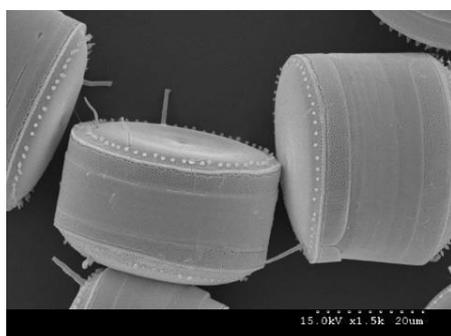
The Journal of the Institute of Chemistry of Ireland

Feature Articles:-

Chemical Physics application of Small Angle Neutron Scattering (SANS)



Natural Resources to Sense and Solve Water Pollution



Engaging with Industry: Research Centres & Technology Transfer Offices, PMBrc



Engaging with Industry: Research Centres and Technology Transfer Offices



Dr James O'Sullivan MBA RTTP

James has managed the Technology Transfer Office in Waterford Institute of Technology for five years. Prior to his role in WIT James worked as a managing consultant in the strategy and science centres of the blue chip organisations of Accenture and PA Consulting respectively. James has also worked for a US semiconductor company as a technologist and as an expert advisor to the European Patent Office. Having graduated more than two decades ago James went on to complete a Ph.D. from Trinity College Dublin and an MBA from the Open University.

Background

Over the past few decades the government has been working to ensure that the activities of the research centres based at academic institutes are meaningful to industry. In December 2015 the government published Innovation 2020¹ – a strategic document for Ireland which underpins the significance of innovation to the competitiveness of our enterprise base.

To achieve this innovation successive governments have provided investment into the academic landscape to increase the capability and capacity of the overall eco-system. A key tenet of the strategy is the coordination of the activities of the various policy instruments such that the maximum benefit can be realised by enterprise. As a small nation Ireland naturally has a limited capacity and hence the need to focus. The National Prioritisation² ensures this focus on a discrete number of sectors which can be mapped across six broad enterprise themes. These are ICT, Health and Medical, Food, Energy, Manufacturing and Materials and Services and Business Processes.

¹ <https://www.djei.ie/en/Publications/Innovation-2020.html>

² <https://www.djei.ie/en/Publications/Publication-files/Research-Prioritisation.pdf>

The various state agencies which are engaged with academic institutes such as SFI and Enterprise Ireland have a remit to address this strategy through a variety of approaches. One key approach has been to create centres of excellence where an already existing capability has been developed. These centres typically have a sectoral approach with respect to engaging with industry and are based at a given academic institute though often have partner institutes involved.

Within Waterford Institute of Technology there are three such centres of which the PMBRC focuses on the pharma and lifesciences which address several of the National Prioritisation priority areas of Medical Devices, Diagnostics, Therapeutics and Processing and Novel Materials. The centre is funded through Enterprise Ireland to assist companies with research and development in these areas.

The Pharmaceutical and Molecular Biotechnology Research Centre (PMBRC)

The Pharmaceutical and Molecular Biotechnology Research Centre (PMBRC) is an applied research centre which aims to support the sustainable growth of the pharmaceutical and healthcare industry in the south east of Ireland. Situated in the heart of the region on the WIT campus, the centre seeks to stimulate research and innovation, allowing companies to embed R&D into their activities. One of 15 Enterprise Ireland Technology Gateways, the PMBRC consists of a 800 m² state-of-the-art facility with 34 highly-trained research personnel. The PMBRC has established links with national and international partners in industry, academia and medical care institutions.

There are a number of advantages for industry for engaging a centre such as the PMBRC. Firstly academic research centres have a wealth of high-end research equipment. Most companies, even large MNCs, often need only a small range of laboratory equipment on-site which is core to their operations. Accessing specialist equipment and expertise, such as NMR for example, on a pay-as-you-go basis can be a cost effective means of getting the benefit of the equipment infrastructure without the upfront capital expenditure. Secondly, working with a research centre allows companies to access academic and research staff with a wide range of expertise. Finally, there are a number of excellent industry-academic funding schemes available which can substantially lower the cost (and risk) of conducting a research project. Some examples of these schemes are illustrated in the following PMBRC case studies.

So what exactly does the PMBRC do for industry? The following case studies provide three examples of industry engaging with the PMBRC and the specific outcome.

Case study 1: Direct Funded Collaboration with Waters Technologies Ireland

Waters Technologies Ireland, located in Drinagh, Wexford, is the primary manufacturing infrastructure for Waters Corp Mass Spectrometry Instruments, LC Chemistry consumable, Clinical testing and Data Informatics products worldwide. Specifically Waters generates business advantages for laboratory-dependent organizations by delivering practical and sustainable scientific innovation to enable significant

advancement in healthcare delivery, environmental management, food safety, and water quality and employs over 300 people. Waters products are used by pharmaceutical, life science, biochemical, industrial, academic and government organizations working in research and development, quality assurance and other laboratory applications.

The PMBRC has established an ongoing relationship with Waters, supporting their manufacturing and R&D activities. Central to this relationship is the strong analytical capability in the PMBRC including HPLC, LC/MS, GC/MS, NMR, AFM and thermal analysis techniques. The centre has supported Waters in a range of process optimisation, quality investigation and product development projects. The strong research activity in the PMBRC in the area of analytical science has also benefitted the R&D programme at the Waters Technologies Ireland site.

“Having the PMBRC on our doorstep has been really important for us in Waters over the last number of years. The ease of access to the equipment and scientific team in the centre has enabled us to rapidly progress quality investigations and R&D projects which were urgent for the site. We have a very good relationship with the team in the centre and now see their capability almost as part of the overall capability of the Wexford site”. Pat Curtis, Principal Process Chemist.

Case study 2: Innovation Voucher with Xeolas Pharmaceuticals

Xeolas Pharmaceuticals is a cutting edge start-up Irish speciality pharmaceutical company based in Dublin. Xeolas develops medicinal products for niche markets, specialising in value-added, innovative or novel formulations of established active substances. Xeolas is an R&D based, technology focussed company. The Dublin base focusses on project management, development planning, clinical development, regulatory, quality and logistics with an expansion plan in 2014 bringing R&D, clinical and small-scale manufacture in-house.

Xeolas is developing a novel, liquid formulation of a drug for the treatment of cardiovascular disease. The drug is normally supplied as a tablet, but Xeolas wish to develop a liquid formulation for use in paediatric patients or patients that are unable to swallow tablets. The drug is not very stable in water however and tends to degrade over time in liquid formulations.

In collaboration with Xeolas, researchers at the PMBRC prepared a number of prototype formulations designed to prevent degradation of the drug in water. The researchers developed analytical methods and used these to assess the stability of the prototype formulations over a period of time. The results have been promising and have proved that a stable formulation of this drug can be prepared if the formulation components are carefully controlled. Xeolas now wish to develop this product further and it has become an important part of the company's R&D portfolio. This project was funded by the Enterprise Ireland Innovation Voucher programme where small companies get a grant of up to €5,000 to engage in a research project with a third level knowledge provider.

Case study 3: Innovation Partnership with Teva Pharmaceuticals Ireland

Teva Pharmaceuticals Ireland is part of Teva Pharmaceutical Industries Ltd, the world's leading generic pharmaceutical company. Teva's Waterford plant is responsible for the manufacture and development of respiratory products for supply to the United States and other global markets. The Spiromax® Dry Powder Inhaler (DPI) is a proprietary technology developed by Teva for the treatment of respiratory conditions. DPIs contain fine drug particles blended with a carrier material (usually lactose). In order to work properly the drug must stick to the lactose particles, but not adhere too strongly such that they do not detach on actuation. The physicochemical properties of the drug and lactose are critical to getting this balance right. This project aimed to help Teva understand the critical material properties required for the optimum performance of the Spiromax® DPI.

The PMBRC Technology Gateway used a variety of characterisation techniques to understand the properties of the raw materials involved and probe the interactions between the drug and carrier. In particular the researchers were able to understand the effect of certain formulation and processing factors which affected the performance of the device. The work in this project focussed on a single DPI product and the work has enabled Teva to understand the optimal formulation and process parameters for the manufacture of that product. The analytical techniques developed as part of the project and the knowledge gained can now be applied to all other DPI products currently in development in Teva, Waterford. A number of invention disclosures and academic publications are currently in preparation. Teva have agreed to fund the continuation of the research for a further two years.

“The work carried out by the PMBRC on the project has significantly enhanced our understanding of the drug-carrier interactions in our DPI product. Pharmaceutical regulators demand a thorough understanding of the factors affecting drug product performance. The knowledge gained in this project will help us to meet our regulatory obligations and will also have a knock-on effect on products currently in development. We are so pleased with the research that we have agreed to fully fund the continuation of the work for a further two years”. Dr. Julian Blair, Vice President, Respiratory Product Development Teva Pharmaceuticals.

The centre itself is structured to be responsive and meaningful to industry. The PMBRC is funded by the Technology Gateway programme which was established by Enterprise Ireland to provide Business Development resources to the Institutes of Technology (IoTs) to help them interact with industry on a local, regional and national basis. Up to €23 million will be invested in the Programme between 2013 – 2017 to leverage the capabilities of the IoTs on behalf of industry in Ireland. The Technology Gateways provide the IoTs with dedicated resources who work with industry to articulate their problems in a manner that can be addressed by the Institute's research base. The individual Gateways target industry sectors relevant to the IoTs core research capability. The PMBRC has a dedicated manager with significant industrial experience in the sector whose purpose is to engage with industry in relation their specific requirements. The centre manager is supported by technology leaders who have expertise in certain technology areas such as analytical science and

drug product formulation. Finally, the PMBRC has an industry-led steering committee made up of R&D Directors from 6 local pharma and medical device companies, which oversees the development of the centre. Despite of the pharma/medical device focus of research within the PMBRC, the centre has engaged with companies in a wide range of sectors including food, agri-products, veterinary, analytical and engineering companies. Many of these companies view the offering of the PMBRC to be an extension of their own R&D capabilities. The PMBRC also works closely with other national academic centres and is part of the Synthesis and Solid State Pharmaceutical Centre (SSPC, funded by SFI) and the Pharmaceutical Manufacturing Technology Centre (PMTTC, funded by EI). Therefore engaging with the PMBRC opens up wider access to the third level sector in Ireland.

The Technology Transfer Office

So where does the Technology Transfer Office (TTO) fit into the picture. The TTO in each academic institute has a remit to ensure the professional management of the engagement with industry. Put another way the TTO will undertake activities such as contracting and protecting intellectual property on behalf of the industry party. So as for a typical engagement the TTO will be involved right from the start ensuring that confidentiality agreements are put in place and are fit for purpose. The TTO will also work with the company to identify funding models (depending on the project type / company type etc) and ensure that the contract or heads of agreement is signed prior to work commencing. The TTO will work with the academic / research team to ensure any IP developed is protected correctly based on the contract with the company and finally the TTO will ensure the project results are transfer to the industry partner such that they can be exploited as intended.

What is key to the above activities is that the TTO actually provides services both internally and externally such that there is a quick and efficient engagement between the parties. There is no room for mistakes in our fast paced global economy. The TTO by managing the process professionally ensures that all of the necessary steps are performed correctly. The TTO has a set of rules to adhere to which are based on the National Protocol³ and in essence these follow the principles noted below:

- Commercial agreements are quick and easy to set up
- The central TTO can act as the first port of call
- TTOs retain the freedom and flexibility to “do a deal” with industry that is in the best interests of both parties
- Commercial terms are generous
- More open innovation in multi-party collaborations is encouraged

³ <http://www.knowledgetransferireland.com/ManagingIP/KTI-Protocol-2016.pdf>

- ❑ Intellectual property is managed in a professional way.

As a result of professionally managed services and our ambition in WIT to provide open access to industry we now completed several hundred contracts with our research partners on an annual basis.

Conclusion

For companies interested in engaging with academic institutes the first port of call is often the TTO. The TTO can provide direction to the internal expertise within institutes and confidence to industry that the engagement will be professionally managed. Centres such as the PMBRC have capacity and capability to deliver specific services to industry to enhance their innovation potential.

