This year has seen a sea change in how Maynooth University works with entrepreneurs and businesses in our region. Over the last five years, quietly and efficiently, we have been working to turn the University into a springboard for new businesses and a resource for local industries.

Have we been successful? Independent business analysis (source: Scival) has revealed that between 2010 and 2015, Maynooth University was the national leader in Academic-Corporate Cooperation. This survey which looks at how industry and Universities work together showed that our shared outputs are almost twice the national average. A remarkable result after many years of hard work. This is of course a reassuring metric suggesting that our knowledge exchange strategy is on the right track, but there are better things to come.

In October of 2015, the University in partnership with Enterprise Ireland opened MaynoothWorks, our high-tech business incubator for the region. Demand for new business space in MaynoothWorks has exceeded our most optimistic projections, suggesting that our indigenous job creation through spin-out companies is working well. Importantly this also suggests that the University is acting as an attractor for high value businesses into the region.

It has been obvious to those of us promoting enterprise that there is greater opportunity to use the intellectual and practical skills in the universities to create businesses, and value. In order to realise that, the first thing we (agencies and universities) had to do was listen to industry itself.

To that end we recently asked some CEOs “What are the major challenges facing an Irish business?” The answers came back faster than we had planned - “keeping good people, declining revenue prospects in major economies, domestic political uncertainty, compliance, availability of key skills”. It was clear that our regional entrepreneurs and managers share a small set of similar issues. So what can we do?

Firstly, there are some spectacular new opportunities emerging for Irish manufacturing and services. The publication of the National IP protocol and the Government’s Strategy Innovation 2020, has provided a better framework for collaboration and for creating shared value. In fact there’s never been a better time to collaborate with Universities for companies large or small. For example, the new Knowledge Box, essentially a low tax rate on income generated from R&D, means that Maynooth and other Irish universities are well placed to help companies realise the maximum value from their investments. Genuine income and competitive advantage are achievable for Irish industries looking to boost their R&D spend, and funding schemes from Science Foundation Ireland and Enterprise Ireland can leverage every company euro by multiples of the original investment if there is a University partner. Why would any company take all the innovation risk, when it can be so clearly offset and leveraged?

The national agency, Knowledge Transfer Ireland have been very supportive in helping us meet the opportunities in this area and we are pleased that they are now committed to funding our programme for another 5 years, reflective of our excellent performance to date. Indeed the Maynooth University led technology transfer consortium (including Athlone IT, IT Carlow and Waterford IT) has become a benchmark for this activity across the country.
Secondly, we hear the demands from industry for skilled people. The new Maynooth University curriculum is perhaps the most radical reappraisal of University education in the system in decades. Not surprisingly it has been informed by enterprise leaders and is now broader, enquiry driven and more suited to an era when we need problem solvers and adaptable thinkers than in the past. In combination with this, we have just opened our new Eolas building which has greatly increased our capacity to prepare students in Software and ICT disciplines, areas of real shortage according to most commentators.

Thirdly, we know there is a huge opportunity for European funding (Horizon 2020) to support Irish business, but we also know that the process of competing and managing this can be daunting to even the hardest entrepreneur. Whilst Maynooth University cannot change European structures, we have been successful in sharing strategies and solutions developed over 30 years with our collaborators. These have worked for us and have helped Irish businesses get into (and through) the European system. It does require time and effort but when the University partners with you in an application the time and effort is not wasted.

Finally, the most encouraging thing about our interaction with enterprise is the infectious enthusiasm business brings to the University. The Irish economy is performing at three times the European average in terms of GDP and we may be poised at a period of intense local innovation and unprecedented export driven growth. Those companies with ambitions to innovate and grow can use the universities as a resource – we are enthusiastic partners and the timing has never been better.

Prof Bernard Mahon  
Vice President for Research
Up until about 15 years ago, universities understood their contribution to the knowledge economy as mainly confined to teaching with limited and poorly funded research activity. Top level, highly qualified graduates were streamed from our institutions into the jobs market and formed a talent pool that represented one of the great draws of Foreign Direct Investment into Ireland. This contribution was widely feted.

With the establishment of Science Foundation Ireland in 2003, a much stronger focus on research emerged and funding for basic science grew dramatically. In the last number of years, and particularly since the publication of the Innovation Taskforce Report in 2010, and more recently the Innovation 2020 Report, the role of universities has been re-evaluated in terms of how this investment in research can impact our economy.

The Innovation Taskforce Report outlined a new strategy for investing in research to drive economic growth and foster a culture of collaboration between companies, entrepreneurs and academics. This coincided with a widespread growth in confidence amongst business leaders in the value of investing in research: between 2008 and 2013, industry investment in R&D grew by 31% to just over €2 billion.

The growing desire of universities to support national policy and work with entrepreneurs and companies to commercialise research has resulted in significant changes in the profiles and activities of Irish universities. This represents a huge opportunity for companies that are willing and able to engage with the sector. Not only can they leverage the broad range of supports offered by universities to access world-class expertise and state-of-the-art services and facilities, but they can also avail of significant funding supports from Enterprise Ireland, Science Foundation Ireland, and the EU. The much talked about “Knowledge Development Box” that will guarantee a favourable tax rate for income generated through R&D investment only serves to make the proposition more attractive.

Furthermore, entrepreneurs and companies can benefit from a shift in intellectual property management and dissemination making it very favourable to industry. The National Intellectual Property Protocol published in 2012 called for universities to avoid retaining exclusive control of intellectual property rights. It put the infrastructure in place to make it easy for businesses to exploit and commercialise discoveries. The establishment of Knowledge Transfer Ireland (KTI) has made it even simpler for entrepreneurs and companies to utilise this system. KTI gives prospective collaborators access to the available expertise at all Irish universities, “how-to” guidelines, and model intellectual property agreements.

The upshot of all this is that there has never been a better time for entrepreneurs to work directly with universities. Research collaboration, consultancy, use of facilities and equipment, engagement with the undergraduate and postgraduate student pool all provide opportunities for companies at various stages of development and growth.
The Commercialisation Office at Maynooth University (MU) has just completed its third year of a four year programme as consortium lead of the EI funded technology transfer alliance in partnership with Waterford Institute of Technology (WIT), Athlone Institute of Technology (AIT), and Institute of Technology Carlow (ITC). The consortium remains focused on ensuring a professional and efficient approach to the identification, protection and commercialisation of research and continues to be supported by the Enterprise Ireland Technology Transfer Strengthening Initiative (TTSII) 2013-2016. The commercialisation team at Maynooth University comprises Dr. John Scanlan, Director; Peter Conlon and Dr Karen Griffin, both ICT Commercialisation Executives; Dr Paul Tyndall, Biosciences Commercialisation Executive; and Lorraine Kane, Office Manager. Owen Laverty recently took on the role of Centre Manager in our MaynoothWorks incubator and is supported by Sharon Comerford.

The consortium comprises a team of dedicated technology transfer experts with considerable experience in directing innovation and commercialising technologies across a wide range of sectors including engineering technologies, medical devices, pharmaceuticals, drug delivery, sensors, biomaterials, bioeconomy, health science and ICT. While each institution manages its own outputs, the lead institute reports consortium metrics to EI and performed very well against our 2015 targets, and as a group score highly on the outputs-to-research spend ratio.

The Maynooth University 2015 performance metrics are outlined overleaf. Against international standards per research expenditure, MU continues to rank in the top percentiles. This performance is down to the outstanding research and the desire of our researchers to see their work make not just a scientific impact but an economic one.

The Commercialisation Office continues to focus on 3 pillars of activity:

1. Connecting Maynooth University researchers with industry and the market place
2. Developing a culture of research commercialisation at Maynooth University
3. Identifying and commercialising the IP developed by Maynooth University researchers

The output of these 3 pillars of activity contributes to the growth and development of Ireland’s knowledge economy and job creation.

John Scanlan
Commercialisation Director
MAYNOOTH UNIVERSITY PERFORMANCE METRICS

Under the TTSI funding programme all 3rd level institutes work toward achieving a set of target metrics. These metrics are a measure of knowledge transfer (KT) activity, helping to map progress nationally, and include invention disclosures recorded, new patents filed, licence deals completed, collaborations with industry and company spinouts created.

The impact of these metrics and wider knowledge transfer activities are key drivers in generating economic and social returns on State investment in knowledge transfer in the form of economic growth and jobs.

2015 PERFORMANCE METRICS

1 NEW SPIN-OUT COMPANY
7 NEW LICENSE AGREEMENTS
4 NEW PATENTS FILED
16 NEW INVENTION DISCLOSURES
78 NEW INDUSTRY LINKS

2005–2015 PERFORMANCE METRICS

17 SPIN-OUT COMPANIES
63 LICENSE AGREEMENTS
56 PATENTS FILED
151 INVENTION DISCLOSURES
345 INDUSTRY LINKS
COMMERCIALISATION OF MAYNOOTH UNIVERSITY RESEARCH

2015 SPIN-OUT COMPANY ACTIVITY

Maynooth University spun-out one new company, Innovation Value Services Ltd. (IVI Services), during the year. This newly formed start-up venture is now the exclusive distributor of commercial services built on IT-CMF and future IT best practice research that originates from the Innovation Value Institute (IVI). IVI Services continues this tradition of innovating service delivery. This newly formed start-up venture is now the exclusive distributor of commercial services built on IT-CMF and future IT best practice research that originates from the Innovation Value Institute. As an institution with not for profit status, Maynooth University could not actively participate in the deep commercial engagement required by companies deploying IT-CMF. IVI Services assumes responsibility for creating and managing these commercial relationships allowing IVI to focus on its core mandate, that of researching, developing, and disseminating empirically proven and industry validated IT best practice through a unique open collaboration between leading academic and industry practitioners.

We also continue to support the spin-out companies we completed in the last number of years. Some highlights from these companies over the year include:

**Avectas** is a 2011 spinout company from Maynooth. Avectas has become the anchor tenant in the new MaynoothWorks Business Incubator. They have a research team of 18 in Ireland, and also have US offices in Cambridge, Massachusetts. Avectas’ research is beginning to attract the interest of the pharmaceutical industry, and the Avectas technology is now being tested in the labs of some of the largest pharmaceutical companies. Another example of their success is their recent multi-million euro collaboration and investment from Adapt Pharma which will support the continued development of the technology platform with the aim of advancing therapeutics across a number of disease areas. [www.avectas.com](http://www.avectas.com)

**Neuromod™** is a medical device company headquartered in Dublin, Ireland, specialising in the research and development of neuromodulation technologies. The company is committed to developing innovative patient-centric treatments that promote positive therapeutic change in the human nervous system. Neuromod was a 2010 company spinout from Maynooth University, based on research and development of neuromodulation treatments for chronic tinnitus. The company initially raised c. €2 million in a series of private investments, with support from Enterprise Ireland. They recently raised €5.5 million to fund clinical trials in the US for a device that targets millions of people suffering from chronic tinnitus. [www.neuromoddevices.com](http://www.neuromoddevices.com)
2015 Licensing Activity

2015 was another successful year for knowledge transfer in the Commercialisation Office. Several Maynooth University research outputs were licensed to companies, both here in Ireland to SME’s and to overseas companies.

The following is a brief summary of this activity:

- We licensed software code to a company in Switzerland. The code was developed by Stephen Doherty and colleagues in the Terahertz physics group and will be used by the company to enhance their terahertz receiver and waveguide design capabilities.

- We licensed assessment and training tools to one of our spinout companies to enable commercial delivery of IT business value. The IT-CMF assessment and compliance framework is the product of the successful Innovation Value Institute research collaboration. By licensing the framework to a spinout the learning from many years of research can be made available to a much larger industry community.

- We licensed fault detector technology for use in diagnostics of electrical equipment to an Irish company, which was developed by Brian Daniels of Electronic Engineering. The software system detects when arcing or arc over occurs in a high voltage switch or breaker and allows the arc condition to be mitigated quickly thereby extending the life of the switch/breaker.

- We licensed ocean mapping software to an Irish SME in the marine renewable energy field. The technology was based on work by the team in the Centre for Ocean Energy Research (COER), led by Prof John Ringwood, and will help the company identify areas for energy optimisation.

- We licensed software toolbox technology to an Irish renewable energy company. The software was based on the work of Prof Ringwood and Josh Davidson, and colleagues in COER group and will be used by the company to assess wave energy models and technologies.

- We licensed networking coding techniques to a large US based company in the future networks and communications field. As data volumes increase providing more efficient ways to transmit and receive data through communications has become increasingly important. Prof Leith of the Hamilton institute has developed a number of inventions aimed at increasing data flow.

- We licensed environmental assessment technology to an Irish SME. As a result of a one year collaboration between the SME and researchers from the National Centre for Geocomputation (NCG), the company now has better methods for visualisation of inshore tides and currents.
TECHNOLOGY TRANSFER STRENGTHENING INITIATIVE

Through the Technology Transfer Strengthening Initiative (TTSI) programme, Enterprise Ireland has invested in developing the capability and capacity to support knowledge transfer and commercialisation activities in 3rd level institutes.

The Commercialisation Office at Maynooth University completed a Mid Term Review (MTR) as consortium lead of a technology transfer alliance in partnership with Waterford Institute of Technology (WIT), Athlone Institute of Technology (AIT), and Institute of Technology Carlow (ITC). National KT consortia were reviewed by a panel of international experts and our consortium received the accolade of an A rating (achieved by 3 of the 8 national consortia, comprising 25 research performing organisations).

Our consortium was deemed to be “robust and a consortium that shows trust, engagement, sharing and effectiveness. The sharing of MU established networks with partners is a great example of such trust. There is excellent leadership and mentoring from the lead MU”.

The MTR panel recognised our success as a consortium stating that “this as an impressive consortium that truly sees itself as a team serving four institutions and working together in partnership. A strong KT strategy with effective KT operations is evident. There is also strong evidence of trust, sharing and a good working relationship between the partners”. The Panel noted that metrics have been met and/or exceeded to date, and admired the attention to quality of output.

Overall the Panel concluded “that this is a strong consortium and particularly applauded the shared marketing initiatives, transfer of expertise and general collegiality and trust between the partners”.

The panel further noted “that this consortium represents a genuine partnership delivering value for money and successfully achieves its metric targets. Maynooth University TTO was singled out for the partnership ethos within their consortium in which all members were treated equally, and their excellent leadership and mentoring”.
We expect 2016 to be another good year for commercialisation of research at Maynooth University and our consortium partners. There are several projects which we expect to mature this year:

**COMPOUNDS TARGETING HIV-1**
The human DEAD-box helicase DDX3 protein is required for the replication of multiple viruses, including HIV-1 and Hepatitis C virus, making it an interesting target for the development of novel antiviral therapeutics. We have recently embarked on early drug discovery projects with the aim of preventing ‘hijacking’ of DDX3 by viruses. We now aim to further develop the hit compounds identified.

**OCEAN ENERGY TECHNOLOGIES**
The Centre for Ocean Energy Research (COER) at Maynooth University has core strengths in mathematical modelling, control systems, prognostics and optimization – all focused on ocean energy research. COER is strongly supported by EI and has programs in place to drive at least two spin-out companies, one focussed on ocean energy technical services and another focussed on wave energy converter technology.

**MICROBIOME DISCOVERY**
The world of antibiotics and antibiotic resistance is not confined to human pathogens. We are investigating different microbiomes (human, animal and environmental) as reservoirs of current and novel antibiotic resistance mechanisms and antibiotics.

**HNSCC BIOMARKERS**
HNSCC is the sixth leading cancer by incidence worldwide and eighth by death. There are approximately 600,000 new cases a year worldwide with a five-year survival rate of 40-50%. Our technology relates to the detection of HNSCC by measuring the abundance levels of specific proteins present in saliva. Human saliva is an increasingly attractive medium for biomarker discovery due to its amenability to non-invasive and repeated sampling, ease of collection and processing, and suitability for single/multiple protein measurements. The ability to monitor specific protein abundance levels in patient saliva, focusing on the detection of recurrence and response to treatment, are significant areas in the management of HNSCC patients.
We are investigating antibiotic resistance from a One Health perspective by analysing the environment, animals and humans for common links to understand the origins of resistance and how it transfers between these microbiomes. In addition, we investigate the bacterial populations within environmental, animal and human niches and how they react to stresses outside and within these niches.

PELLINO THERANOSTICS

The incidence of inflammatory bowel disease (IBD) is rising globally with an especially large increase in children. The 2 major forms of IBD are Crohn’s disease (CD) and ulcerative colitis (UC) and a distinguishing diagnosis of these diseases is challenging and generally relies on a combination of inputs including clinical presentation, results of radiography, endoscopy and histological findings. We have assessed the levels of expression of Pellino3 protein in colonic biopsy samples from control, CD and UC patients. The data demonstrates that the levels of Pellino3 protein are strongly reduced in colonic tissue from Crohn’s disease subjects relative to control or UC subjects. These data suggest that the protein expression levels of Pellino3 may be a strong diagnostic indicator of subjects with Crohn’s disease and we propose value for a Pellino3-based test as the basis for a diagnostic. We propose development to proceed on 2 parallel tracks; (i) further validation of Pellino3 expression (various tissue sources, including blood, to be studied) as a biomarker for CD and (ii) development of a technology platform to translate Pellino3 biomarker to the user interface.

BIOMARKER SENSORS

We have developed novel biosensors to selectively monitor neurochemicals in the living brain on a timescale from milliseconds to days. The sensors are used to understand the complex functioning of the brain in terms of behaviour and disease. One of the major hurdles to the discovery of new medicines to treat psychiatric and neurological disorders is the paucity of suitable animal models capable of predicting clinical benefit. This is particularly true of disorders associated with cognitive disturbance such as schizophrenia and Alzheimer’s disease. We can provide preclinical drug discovery with the advantages that functional imaging such as fMRI has given to human cognitive neuroscience during its development over the past 10 – 15 years. The sensor monitoring concept provides a solution to this deficit in pre-clinical drug discovery. The work has significant potential clinical applications.
2015 saw Maynooth University form 78 new partnership contracts with industry. These links are based on research collaborations and range from working relationships with SME’s under the Enterprise Ireland Innovation Voucher Programme to collaborations with multinational companies on specific issues for which Maynooth University has research excellence. Maynooth University and its Institutes now has over 175 ongoing industry collaborations across all disciplines which are an indication of the outward facing culture at Maynooth University.

Successful research commercialisation or commercialisation is based on the execution of three key tasks; selection of projects with good commercial potential, execution on those projects and securing sufficient capital funding to bring the technology to market. Getting the first two right tend to make the last one easier, and we therefore focus most of our efforts on the first two. Given that we have a relatively small commercialisation team, having expertise in multiple fields and staying market informed is practically impossible, so we must rely on external partners to help in the selection and execution of worthwhile projects.

Our extended team of market partners continues to be a vital part of our commercialisation process. The team now includes more than 100 professionals in various roles such as product development, marketing, legal, IP, business owners, clinicians, investors from organisations of all sizes from small companies to multinationals. This group remain our sounding block to help ensure the commercialisation projects we focus on are “market-informed” and we continue to deliver solutions to “problems that are worth solving”.

## CONNECTING INDUSTRY AND MAYNOOTH UNIVERSITY

### INDUSTRY LINKS

### MARKET PARTNERS
SEEDING INNOVATION AT MAYNOOTH UNIVERSITY

CONNECT EVENT

CONNECT is hosted biennially by the Commercialisation Office in conjunction with its technology transfer (TT) consortium partners (Athlone Institute of Technology, Waterford Institute of Technology and Institute of Technology Carlow) and is focused on two objectives;

(i) to showcase research expertise and encourage industry to tap into the knowledge base of the University and its partner institutes and thereby develop research collaborations; and

(ii) to provide a networking opportunity for delegates to meet and explore how they can work together.

Maynooth University and its TT partners continue to engage with the business community. Both nurturing and developing good business ideas are essential to Ireland’s economic recovery. R&D can be an expensive and difficult process which many businesses struggle to pay for. Working in partnership with a 3rd level education institute can help overcome these barriers.

The commercialisation of research and the collaboration between business and academia has never been stronger in Ireland and these partnerships have the potential to create significant employment. The economic changes mean an increase in people setting up their own companies with a renewed focus on innovation. We are now witnessing the real impact of research on industry, through the formation of more spin-out companies from 3rd level institutes and the direct transfer of expertise and knowledge from these institutions to established companies.

Research teams often want a practical way to apply their work through the industry setting, and businesses want to focus more on research and development but don’t have the finances or resources. Therefore the link between research and business is a natural fit and Ireland can reap the rewards in terms of job creation, exports and innovation.
Innovation and Research Commercialisation

Each year the Commercialisation Office team delivers a module on campus for early career researchers and research students. This module entitled “Innovation and Research Commercialisation” aims to introduce early career researchers to the culture of commercialisation of research and equip them with the skills required to commercialise the outcome of their research, to provide them with the ability to interact with industry and to improve their skills to innovate and act with an entrepreneurial mindset.

The course covers the basics of intellectual property, technical marketing, product development, spin-out company formation and research commercialisation contracts.

Also included are workshops and exercises, including preparation of a marketing pitch, culminating in a group business plan and final presentation of their business concept. The participants thus learn how to present their ideas as a business opportunity rather than as just interesting science, a practical approach which then complements their academic training.

The current climate requires that graduates have the know-how, competencies and confidence to set-up and deliver new commercial opportunities. Our detailed case-studies and practical workshops facilitate this in a relaxed hands-on environment. In recent years MU has opened up the programme to early career researchers from our Technology Transfer alliance partners, Athlone IT, Waterford IT and IT Carlow.

This year five students from the Institute of Technology Carlow DesignCore also participated in the programme. Their product design skills were complementary to the expertise of researchers from the scientific disciplines and they brought a different perspective to the product development element of the business concept presentations. Participant feedback has confirmed that the programme creates an awareness of commercial opportunities from the early stages of research and identifies/promotes aspirations of creating start-up ventures in the future.

Commercialisation Award

Each year the Commercialisation Office presents a Commercialisation Award which recognises excellence in the commercialisation of research at Maynooth University. We consider activity such as invention disclosures, licence deals, patents filed, spin-outs and linking with industry as key factors in bringing research to the market place.

This year the Annual Commercialisation Award was presented to two colleagues, Martin Delaney and Paul Heynen of the Innovation Value Institute for their significant achievements in the area of research commercialisation which includes the creation of a spinout company, IVI Services. Martin is the Technology Leader and General Manager of IVI and Paul is the Operations Manager.
COMMERCIALISATION OFFICE STAFFING CHANGES

The Commercialisation team has remained constant over the last number of years. However 2015 brought staff changes as we welcomed Karen Griffin who joined our team as a Commercialisation Executive. Karen will work on all aspects of technology transfer from invention disclosure through to company spin-off at Maynooth University. Karen will also provide knowledge transfer support to consortium partner, Athlone IT.

Karen obtained a PhD from the UCD School of Medicine and subsequently went on to complete a Master’s in Business with Smurfit School of Business. She previously worked with The Centre for BioNano Interactions (CBNI), where her responsibilities included managing all aspects of research grants, technology transfer and business development.

Karen has taken over the role from Owen Laverty who has moved on to manage the new state-of-the-art business incubation centre, MaynoothWorks.

“MAYNOOTHWORKS” BUSINESS INCUBATION CENTRE

MaynoothWorks is Maynooth University’s business incubator. It offers state-of-the-art office space and critical advice/supports for technology and other start-up companies. Designed to impress, the incubator boasts modern facilities, including individual offices, hot desk spaces, labs and meeting rooms.

One of our client companies shares their experience of MaynoothWorks:

“Verifly is an international drone technology company, managed by seasoned technology entrepreneurs, with offices in Ireland, the US and China. Central to Verifly’s decision to setup its Geospatial R&D operation in Ireland was the need for expertise to help identify high-quality geospatial data-sets and develop spatial algorithms that enable basic aeronautical & urban descriptors to be transformed into useful information services for drone operation. Maynooth University has played a key role in providing the expertise to train Verifly’s engineering team to build these databases as well as the various geospatial systems that deliver these information services. Maynooth University’s Commercialisation Office understands the needs of the tech Industry and has played a pivotal role in helping Verifly compete in a rapidly changing global drone technology market.”

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