KTI
Knowledge Transfer Ireland
Where Research & Business Connect

Supported by
ENTERPRISE IRELAND
where innovation means business

iua IRISH UNIVERSITIES ASSOCIATION

# Annual Review & Annual Knowledge Transfer Survey **2016**

# In 2016

**26**

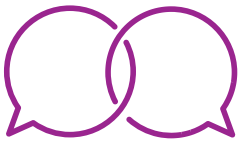
New **products & services were launched** to market in 2016 as the result of a licence from an RPO

**186**

**Licences, options and assignments (LOAs)** to RPO intellectual property were signed

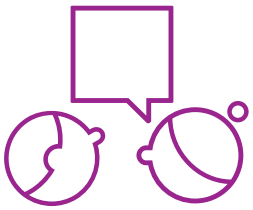
**1,243**

New **collaborative agreements** were signed



**829**

New **consultancy services agreements** were signed

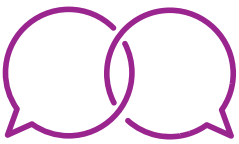


**78%**

of companies that **signed collaboration agreements** with RPOs were **based in Ireland**

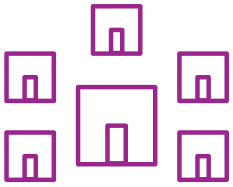
**94%**

of **collaboration agreements** with the SME sector were **with Irish SMEs**



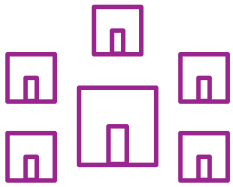
**28**

New **spin-out companies** were formed



**119**

**Spin-outs were thriving** at least three years post-incorporation at the end of the year



**116**

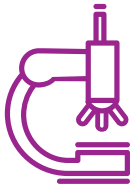
New **patent applications were filed** by RPOs

**461**

New **invention disclosures** in RPOs

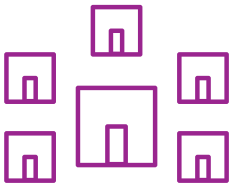
**€535m**

On **RPO research expenditure**



**1,080**

**Jobs in Active Spin-out Companies**



**34**

**Registered Technology Transfer Professionals**

## What KTI Does

KTI is the national office that helps business to benefit from access to expertise, technology and intellectual property that's available within the publicly funded research base in Ireland.

Our aim is to make it simpler for companies to find, connect and engage with Irish research. We are a unique central reference point, providing signposting and resources for companies, investors, research organisations and funders.

KTI is supported by Enterprise Ireland and the Irish Universities Association. We are accountable to the Department of Jobs, Enterprise and Innovation and to the presidents of the Irish universities.

This publication highlights KTI's activities during 2016, reflects on our first 3 years' performance and explains more about who we are. As part of our work, KTI collects and analyses data from Ireland's universities, Institutes of Technology and other state-funded research organisations, together termed Research Performing Organisations (RPOs), to produce the national Annual Knowledge Transfer Survey (AKTS). The AKTS tracks business engagement and commercialisation between the commercial sector and RPOs. The AKTS 2016 is found in the second part of this Review.

# Contents

## Foreword – Ned Costello

Ireland's higher education system is a vital part of the Irish economy. Research and innovation are essential drivers of a dynamic economy, an informed society and a vibrant culture.

Research of world class standard is the bedrock of the innovation ecosystem, underpinning the entire system of knowledge transfer in our higher education institutions. It drives both teaching and learning and engagement with enterprise and society.

Through that engagement, our universities and Institutes of Technology enable innovation, working pro-actively with industry to support regional and national growth and jobs.

Knowledge transfer and commercialisation are now firmly embedded within our HEIs as the data from the Annual Knowledge Transfer Survey consistently show. Over recent years, there have been consistent efforts to develop our knowledge transfer infrastructure and to strengthen professional approaches to the development and commercialisation of the intellectual property emerging from research.

All HEIs now have skilled teams on the ground to help make it easier for universities and enterprise to work together. KTI helps shine a spotlight on the success of these efforts through its case studies and annual awards. KTI's work provides industry and other stakeholders the opportunity to see the wealth of ways to benefit from the HEI sector, growing competitive advantage both for firms and for Ireland as a whole.

The IUA has championed knowledge transfer through its support for KTI and welcomes the positive findings of the recent independent panel review and the panel's identification of further opportunities to continue to build a world class knowledge transfer system through continued collaboration.

**Ned Costello**
Chief Executive, Irish Universities Association

## Foreword – Julie Sinnamon

Innovative firms are successful firms. In a period of unprecedented change and volatility in global markets such as now, innovation was never more important.

Innovation is key in maintaining competitiveness in global markets, and holding onto hard won market share. Irish companies need to operate at the top of their innovation game, to make sure that products and processes are leading edge if they are to compete and win against global competition.

We know from research that R&D performing companies, that collaborate with HEI's, have 144% more turnover and 175% more exports that those that do not. Effective collaborators are networked across the innovation eco-systems from universities, research institutes, technology gateways, technology transfer offices, and importantly, research centres. Their businesses benefit from knowledge and technology transfer and put research to work for business.

To stimulate innovation and to drive competitiveness in businesses, Enterprise Ireland offers a range of R&D supports with the third level. From Innovation Vouchers that allow companies to get quick results and a taste for working with the research base through to the ability to work on market-led R&D in Enterprise Ireland funded Technology Centres.

Knowledge Transfer Ireland (KTI) operates in a unique position at the intersection of business and the research and innovation eco-system. Since its inception, KTI has been instrumental in helping more companies become engaged with and benefit from the rich innovation eco-system that exists in Ireland. KTI's effective signposting to the resources available has raised awareness of the benefits of the Irish research and innovation assets and simplified the process of engagement between business & research.

Through KTI and in partnership with the IUA, Enterprise Ireland will continue to work across agencies and under the national Innovation 2020 strategy, to ensure the optimal business benefit is derived from the State's investment in research.

**Julie Sinnamon**
Chief Executive, Enterprise Ireland

## Now we are three!

In 2016 KTI reached its third anniversary. Combined with the completion of the second phase of the national Technology Transfer Strengthening Initiative funding programme, this has provided an opportunity to reflect on the past and a platform to look towards the future.

I arrived in September 2013 to head up the new office which would take responsibility for the Irish knowledge transfer system. KTI was launched in May 2014 with an ambitious plan. Our mission is straightforward. To make it simple for industry to engage with and benefit from publicly funded research in Ireland. Achieving it is more complex. It requires time, the evolution of a knowledge transfer system and involves many different actors, from government agencies to higher education institutes, from technology transfer offices to industry. Our role is one of co-ordination, catalysis and leadership.

At the end of 2016, we undertook a review of KTI's progress during those first three years to test whether we had achieved what we'd set out to do and to consider how well we had performed. The international panel conducting the review reported that KTI has achieved a great deal in a short time, under strong leadership and with very limited resources. It noted that success and achievements to date have been endorsed by all stakeholders – particularly those from industry. The panel further reported that KTI has contributed to culture change in an unobtrusive way and is developing an increasingly strong and trusted 'brand'.

A key objective for KTI has been to develop resources for industry to help companies to understand how, where and with whom they might work in the research system to boost their R&D and drive innovation. A main route has been through the creation and development of the KTI web portal which now provides a rich source of information including searchable details on Irish research expertise and technology and links to funding supports. The portal has gained increasing traction with over 90,000 people having visited the site since its launch in May 2014.

*"I love the Knowledge Transfer Ireland site! There's a wealth of information there and I use it regularly and often refer my customers to the site. It's a free resource that all industry needs to know about"*

The web portal also hosts the suite of KTI Model Agreements and guides that make the process of negotiating contracts quick and consistent. These have been well received and are becoming used more routinely.

*"As a direct consequence of these agreements we found that we were able to fast-track the process of negotiation."*

We have also worked hard to get the message out about the value of working with the research base and the practical tools that we have made available. KTI has hosted a series of events, seminars, roundtables and one-to-one meetings with industry leaders, industry bodies, government agencies and funder. We have produced publications and reports, including the Annual Knowledge Transfer Survey (AKTS) that analyses national performance in industry-research base engagement and which should give us confidence that we have a well-functioning system.

## Looking Back, Moving Forward

We take a strategic a professional approach to all we undertake, working to tight planning and operating to clear strategic objectives. Since 2013 we have delivered extensively across these pillars and we are committed to continuing to do so into 2017 and beyond. We are very proud of what we have accomplished to date. Here are just some of our achievements from the past three years.

**Over 90,000** visitors to KTI website

**11** Practical Guides
**25** Model Agreements
**5** Pro Forma Templates

**4** Conferences
**6** Workshops & Masterclasses

**27** Impact Awards presented across **3** award ceremonies

*"As a direct consequence of these agreements we found that we were able to fast-track the process of negotiation."*

Since our inception, we have been dedicated to supporting the development of a world-class innovation ecosystem in Ireland. Talking with the people who work at the industry-academic interface has been, and will continue to be, an important part of this. We've convened working groups and committees on issues pertaining to knowledge transfer in Ireland. In updating the national IP Protocol on behalf of the Department of Jobs, Enterprise and Innovation we consulted extensively. A year after its publication, the IP Protocol is widely used, with companies saying that the Protocol and its supporting resources are making things more simple and straightforward for them when engaging with the research base. The legal profession too has welcomed its introduction as it has simplified the negotiation process between client companies and research organisations.

KTI has also worked extensively with the technology transfer and knowledge transfer community in Ireland whom we support through the TTSI funding programme that we manage on behalf of Enterprise Ireland. We have shared best practice, promoting consistency across the system, and supported the development of the knowledge transfer profession in Ireland. The Spark Bursary programme was created to allow Irish knowledge transfer staff to gain experience of university commercialisation in international offices. We encouraged TTO staff to apply for the global Registered Technology Transfer Professional (RTTP) qualification and I'm pleased to say that Ireland now has the highest number of RTTPs per capita in the world.

What might the future look like for KTI? Our next four-year cycle will begin in 2018. Enterprise Ireland and the Irish Universities Association have committed to continuing KTI as a joint venture, with the shared ambition to maximise the accessibility, responsiveness and impact of our knowledge transfer system. Industry has asked for more resources to assist in navigating the research and associated funding landscape and we will look to respond to this. We will also be working more closely with the senior leadership in the Higher Education Institutes to evolve knowledge transfer and to communicate its benefits.

Whilst past performance is no guarantee of future success, I am optimistic. KTI has made a strong start and is now firmly embedded within the Irish innovation landscape. We have established a solid platform from which to develop. Most encouraging is the network of support that has developed. I am very grateful to the people who have helped KTI to deliver to its early promise.

**Dr. Alison Campbell OBE RTTP**
Director, Knowledge Transfer Ireland

**3** Expert Groups Consultations Industry Advisory Board

Managed **€28.5m funding** under TTSI2
Secured **€34.5m funding** for TTSI3

**38.5 FTE funded** (TTSI2)
**34 RTTPs** in Ireland

Produced **National IP Protocol 2016**

Meetings with representatives from **18 countries**

**3** Annual Knowledge Transfer Surveys (AKTS)

**2** AKTS Outcomes Reports

# Highlights 2016

Throughout the year, we undertook a targeted approach to disseminating the Protocol to the knowledge and technology transfer network and raising awareness of it amongst industry and amongst the legal profession who support their clients in these types of engagements.

## Managing the framework for industry engagement with the research base – the IP Protocol 2016

In January 2016, the Department of Jobs Enterprise and Innovation launched the updated National IP Protocol 2016 with us. The Protocol helps business to understand how to work with the research base and sets policy and expectations. This newer version was produced on the back of extensive consultation with industry, investors, TTOs and funders. Whilst policy remains the same, the IP Protocol 2016 makes a few changes based on practical experiences of working under the earlier version. Significantly, the update contains a Resource Guide that elaborates on practical details and provides access to a range of templates that simplify the processes of working across industry and the research base. To make the Protocol more accessible to a range of audiences, in addition to the detailed publication, we also produced a Simple Guide to the IP Protocol.

Throughout the year, we undertook a targeted approach to disseminating the Protocol to the knowledge and technology transfer network and raising awareness of it amongst industry and amongst the legal profession who support their clients in these types of engagements. We delivered a series of information sessions at seven campus locations around the country profiling the new Protocol to around 250 people from industry and academia. We partnered with industry groups to raise awareness amongst their members. This included speaking at the IBEC Regional Roadshows, the American Chamber RDI Network Meeting and hosting an IRDG breakfast reaching more than 650 people from industry and academia across the country. We also met directly with companies, with the relevant committees within IBEC and the Law Society.


**Pictured:** Damien English TD as Minister for Skills, Research & Innovation with Alison Campbell, Director of KTI at the launch of the National IP Protocol 2016.

Companies who have used our resources have been very satisfied. Our challenge, however, is to raise awareness amongst companies who are not familiar with the value of working with the research base and the practical resources that we have to help this.

## Bringing speed and consistency to negotiation: KTI Model Agreements and Practical Guides

Additions to our suite of template agreements and guides included the *Practical Guide to Collaborative Research Agreements* and *Practical Guide to Joint Ownership and Management Agreement* along with the associated KTI Model Agreements for both. This brings the total to 28 KTI Model Agreements and 12 KTI Practical Guides, all freely available for download and use from the KTI website. We also produced a handy summary of all our agreements and guides to help people see, at a glance, what is currently available.


As well as building our own suite of Model Agreements, we supported the Irish Research Council in developing standard terms around access to intellectual property in its Enterprise Programmes – the Enterprise Partnership Scheme and the Employment Based Postgraduate Programme. We worked with them to develop standard agreements to speed up the process of contract negotiation between the enterprise partner and the HEI under these programmes.

## Getting the KT message out

Companies who have used our resources have been very satisfied. Our challenge, however, is to raise the awareness among the companies who are not familiar with the value of working with the research base and the practical resources that we have on offer to help this. To this end, we designed and delivered an integrated communications strategy in 2016 across a range of traditional and digital channels. We secured over €740,000 worth of coverage during the year across print, radio and digital media that profiled key messaging to an audience in excess of 2.8 million.

The number of visitors to the KTI web portal increased by 51% in 2016 on the previous year. The website continues to see high volume of visitors to the site with an average of 3370 coming to our site each month. Visitors to the site yielded over 135,000 page views with the most popular areas of the site proving to be *Publications*, *Find a Research Expert* and *Find a Researcher*.


During the year, we grew our social media presence and engagement through targeted activity.

During the year, we grew our social media presence and engagement through targeted activity, doubling the number of Twitter profile visits and growing our Twitter follower base by over 300. We also almost doubled our LinkedIn audience.

In September 2016, we issued our first quarterly KTI Newsletter and achieved our target of more than 1,000 subscribers by the end of the year. In addition, we publish regular blog posts on topics of interest via LinkedIn Pulse.

TTSI2 was a four year programme that ran from 2013 until the end of 2016. The €28.5 million programme provided funding into eight consortia of TTOs comprising 25 research performing organisations including universities, Institutes of Technology and state research bodies.

## Supporting the KT Infrastructure: The Technology Transfer Strengthening Initiative

The Technology Transfer Strengthening Initiative (TTSI) is the Enterprise Ireland funding programme that we manage which serves to bolster capability and capacity within the knowledge transfer system. TTSI2 was a four year programme that ran from 2013 until the end of 2016. The €28.5 million programme provided funding into eight consortia of TTOs comprising 25 research performing organisations including universities, Institutes of Technology and state research bodies. Through this programme the processes that underpin successful knowledge transfer are enhanced - from helping identify new commercial opportunities through to negotiating contracts with industry partners. We have commissioned an evaluation of the TTSI2 programme which will report in late 2017.

As a ring-fenced funding mechanism, the TTSI programme is pivotal in ensuring that RPOs have resources to support knowledge transfer and commercialisation. We worked with stakeholders and with Enterprise Ireland to shape plans for a third round of the programme and were successful in securing a commitment of €34.5 million to deliver a third phase of the programme. During 2016, we managed the call and evaluation of proposals by a panel of international experts in the field of knowledge transfer and commercialisation. TTSI3 commenced in January 2017.


**Pictured:** John Hallligan TD, Minister for Training, Skills & Innovation (centre) with Gearoid Mooney, Enterprise Ireland's Divisional Manager for Research & Innovation and Alison Campbell, Director at KTI announce €34.5m in funding for the TTSI programme.

## Connecting communities, sharing success: the KTI Events Programme

Our events programme continued throughout 2016 with two headline events – the flagship *KTI Impact Awards* held in June and the *KTI Conference* and *KT Community Forum* held in November.

The *KTI Impact Awards* brought together over 160 people from industry, academia and the technology transfer profession to celebrate some of the successes in knowledge transfer. More especially, the awards recognise the people in Irish technology transfer offices across the country who make possible those successes.

Judged by a panel of international experts, the awards showcased Irish knowledge transfer success across seven categories with winners being presented their awards by Minister Mary Mitchell-O'Connor.

**Pictured:** Minister for Enterprise, Jobs & Innovation Mary Mitchell O'Connor with Alison Campbell, Director KTI and winners of the 2016 KTI Impact Awards.

## Winners of the 2016 KTI Impact Awards

### Research2Business Collaboration

**University College Cork** collaborating with **Statistical Solutions** whose research partnership doubled business within 18 months and gained valuable business insights for the company.

Academic Lead: Dr Brian O'Flaherty

### Consultancy

**Trinity College Dublin** and **Monford Ag Systems** who developed and launched a sensor grass measurement recording tool called GrassOmeter as a result of the consultancy.

Academic Leads: Prof Mike Jones, Dr Jake Byrne, Dr Matt Saunders, Dr Hitesh Tewari

### Licence2Market

**Trinity College Dublin** graphene licences to **Thomas Swan** that positioned the company to develop and launch two new products recognised globally as best-in-class materials.

### Spin-out Company

**AventaMed DAC** from **Cork Institute of Technology**, a medical device company whose product places grommets in childrens' ears without need for anaesthetic and who closed a €13m funding round that allowed significant development of its product and sales and distribution of same.

Academic Founders: John Vaughan and Olive O'Driscoll

### Mature Spin-out Company

**Logentries** from **University College Dublin**, a company that developed an innovative cloud-based solution to search, visualise & analyse machine data and grew to 70 employees serving more than 3,000 customers in over 65 countries analysing 100 billion discrete events per day.

Academic Founders: Dr Trevor Parsons and Dr Villam Holub

### Knowledge Transfer Initiative

**Royal College of Surgeons in Ireland** for their **Building a Knowledge Transfer Culture** initiative that centered on empowering RCSI researchers, recognising and celebrating research commercialisation and streamlining research commercialisation and industry engagement processes.

### Knowledge Transfer Achiever

**Derek John, University College Cork** for the level of personal achievement in his role as well as for the depth and breadth of impact that he had on on knowledge transfer activity at the TTO in UCC.

The KTI Impact Awards brought together over 160 people from industry, academia and the technology transfer profession to celebrate some of the successes in knowledge transfer.

At the KTI Annual Conference "Innovation through Collaboration – Advancing Business Through Research Collaboration" speakers shared their experiences and insights on how collaboration between research and industry drives innovation and competitiveness.

The KTI Annual Conference "*Innovation through Collaboration – Advancing Business Through Research Collaboration"* attracted more than 200 delegates, 40% of whom came from industry. Speakers at the conference included those from industry and from the Irish knowledge transfer community as well as international experts talking to the legal considerations around collaboration and global Knowledge Transfer trends. Speakers at the event shared their experiences and insights on how collaboration between research and industry drives innovation and competitiveness.

We also delivered a series of smaller events throughout the year aimed at further engagement with industry. In December, KTI held an IP roundtable bringing together a number of Ireland's top Intellectual Property solicitors to discuss industry-research interactions and contracting. Throughout the year, we had a presence at a number of national events including the National Ploughing Championships and Enterprise Ireland's International Markets Week.


**Pictured:** Expert panel discussion at the KTI Annual Conference 2016, "Innovation through Collaboration."

## Engaging Across the Agencies

We work with various sister agencies and government departments to further support the development of knowledge transfer and to make the process of engaging with the research base in Ireland more simple and straightforward. In particular, during 2016 this included engaging with SFI in relation to Intellectual Property and Commercialisation through our participation on the SFI Centres Agreement Working Group. We worked with the IRC to develop bespoke Model Agreements for their use and consulted in an advisory capacity with the Department of Agriculture, Food & Marine.

## Enhancing the KT profession in Ireland

HEIs have dedicated staff who support the process of knowledge transfer. Larger universities have teams responsible for innovation support, corporate partnering, IP management and commercialisation whilst in the smaller Institutes of Technology there may be one or two staff responsible for industrial liaison and increasingly IP and commercialisation. These central functions work on behalf of the institution to get new ideas, technology and expertise developed commercially and to enable productive relationships with industry. They are a key liaison point for the Research Centres and Technology Centres that have been established in specific research areas across HEIs.

Ireland now has 34 globally accredited RTTPs in universities, Institutes of Technology and State research organisation. This is the highest number of RTTP per capita in the world.

In 2016, an additional 11 Irish professionals from within the Knowledge Transfer community received their accreditation as Registered Technology Transfer Professionals (RTTPs). Ireland now has 34 globally accredited RTTPs in universities, Institutes of Technology and State research organisation. This is the highest number of RTTP per capita in the world.

**Pictured:** Some of Ireland's 2016 RTTPs with Minister for Training, Skills & Innovation John Halligan (centre) and KTI Director, Alison Campbell.

## Ireland's RTTPs

**Seamus Browne**
Royal College of Surgeons in Ireland

**Alison Campbell, OBE**
KTI

**Ronan Coleman**
Cork Institute of Technology

**Peter Conlon**
Maynooth University

**David Corkery**
University College Cork

**Kevin Dalton**
University College Cork

**Paul Dillon**
University of Limerick

**Gordon Elliott**
Trinity College Dublin

**Tom Flanagan**
Dublin Institute of Technology

**Aoife Gallagher**
Royal College of Surgeon's in Ireland

**John Gleeson**
University of Limerick

**Carolyn Hughes**
Dublin City University

**Derek John**
University College Cork

**Margaret Lawlor**
University of Limerick

**Breda Lynch**
AIT

**Paul Maguire**
Dublin Institute of Technology

**Andrew Marsh**
University College Cork

**Neil McLoughlin**
Dundalk Institute of Technology

**Conor Morris**
University of Limerick

**Anthony Morrissey**
University College Cork

**Patrick O'Boyle**
Dublin City University

**Kieran O'Connell**
Dublin Institute of Technology

**Peter Olwell**
Dublin City University

**Emma O'Neill**
Dublin City University

**James O'Sullivan**
Waterford Institute of Technology

**Karl Quinn**
University College Dublin

**Tim Roche**
University College Cork

**John Scanlan**
Maynooth University

**Richard Stokes**
Dublin City University

**Jacinta Thornton**
NUI Galway

**Paul Tyndall**
University College Dublin

**Emily Vereker**
Trinity College Dublin

**Miriam Walsh**
Teagasc

**Ena Walsh**
University College Dublin

## Introducing the Knowledge Transfer Office

There are a variety of names for the business teams within the HEI sector that link directly to industry. They may be Technology Transfer Offices, Industrial Liaison Offices, Innovation Offices etc. Whatever the name, you will find a set of KT professionals who undertake a variety of activities to enable business engagement and commercialisation. Here are just some of the roles and the people who work in KT around the country.

### Industry Liaison Manager

**Josette O'Mullane**
Cork Institute of Technology

The Industrial Liaison Office (ILO) within an Institute of Technology is one of the main contact points for external business and industry linkages especially for innovation activities.

As Industry Liaison Manger, Josette's role is to facilitate industry partnerships and the commercialisation of research which includes idea generation, IP protection, commercialisation strategies and contract negotiation. Josette was responsible for establishing the technology transfer function at Cork Institute of Technology (CIT) in 2009 and was part of the project team that established CIT's Rubicon Centre – a 2,000m$^2$ facility on campus providing incubation support and advice to entrepreneurs and new start-ups through a team of start-up professionals. Josette is a Company Director and Company Secretary for the Rubicon Centre.

In addition to these commercial activities the role also involves ensuring operational management and controls, data management and reporting.

Josette has previously worked in the State agencies Enterprise Ireland as a Development Advisor and IDA Ireland as a Regional Marketing Executive. She job-shares with Carole O'Leary.

### Start-up Development Manager

**Neil Gordon**
Trinity College Dublin

Trinity College has a number of dedicated functions within the TTO team. The Start-up Development Manager role brings an enhanced focus to the creation of new companies and high potential start-ups from within Trinity's research community.

Neil's role is front-of-house and includes interfacing with staff and students who are establishing new companies, with entrepreneurs, business partners, angel investors, venture capital companies and with enterprise agencies. He works closely with other Trinity entrepreneurship functions such as the Innovation Academy, Launchbox and LaunchPad.

Neil previously worked for 10 years at Cork Business & Innovation Centre where he provided strategic consultancy, investor-readiness and business planning services for high-tech start-ups across a wide range of sectors. Prior to that, he worked in a variety of technology management and business development roles within start-ups, SMEs and several multinationals. Neil has a BEng in Electronic Engineering and an MBA from the University of Limerick.

## Case Manager

**John Gleeson**
University of Limerick

The Case Manager's role is primarily to support the development and commercialisation of new technologies. A major part of this is the development and negotiation of industry collaborations and a variety of strategic University projects.

At UL, John manages the engineering portfolio of technologies working with researchers to commercialise new technologies, finding companies that are best positioned to commercialise them and supporting that process by providing mentoring, drafting and negotiating agreements and licensing, facilitating investment and more. John also works with researchers to facilitate collaborations with industry and he works with new company founders who are commercialising UL research results through the formation of new start-up companies.

In addition, John has worked on initiatives such as the Start-up accelerator courses at UL, the UL inventor awards and commercialisation seminar series. He has also been involved in a number of strategic projects including Industry focused Research Centres and the formation and growth of UL's International Business Centre.

John joined UL after 15 years in the private sector across a variety of engineering and business development roles in the US and Ireland.

## Operations Manager

**Lorraine Kane**
Maynooth University
Commercialisation Office

Working in a TTO is a busy and rewarding job. Lorraine has been the Commercialisation Office Operations Manager at MU since 2010. In addition to managing the day-to-day operations of the MU technology transfer team, her role includes financial and data management, report writing, document control and compliance and reporting to internal and external stakeholders.

Lorraine has responsibility for marketing and event management and event management and acts as consortium operations co-ordinator for the technology transfer alliance of MU-WIT-AIT-ITC. This role involves managing communications, metrics reporting, budgeting, financial reporting and maintaining strong relationships to ensure the smooth running of the consortium.

Lorraine has considerable industry experience including ten years in an international accounting firm based in the USA and five years in an Irish-based start-up. She holds a BSc and MSc in science and business disciplines from MU. She also regularly attends training events and conferences.

# Knowledge Transfer Insights

Ireland's knowledge transfer landscape has undergone somewhat of a transformation in the past ten years and the development of the knowledge transfer eco-system has been well recognised but there is still much headway to be made. Here we asked two of Ireland's leaders in the commercialisation space for their insights into the development of the knowledge transfer eco-system, the direction they see it moving and their professional roles – past and present – within that system.

## Brendan Cremen

As Brendan Cremen steps down after five years in the post of Director of Enterprise & Commercialisation at NovaUCD at University College Dublin, we asked for his reflections on Knowledge Transfer in Ireland, how he has seen it change over the years and what his hopes are for the future of knowledge transfer here.

Brendan held the post of Director of Enterprise & Commercialisation at NovaUCD at University College Dublin from 2012 to June 2017. From 2006 to 2012 Brendan was Director of Technology Transfer at University College Cork where he established the new office and drove commercialisation. He is an experienced executive who previously worked for over 20 years in the start-up and MNC industry sectors in Ireland and the US.

**You've been working in the university commercialisation space for the past 10 years, how have you seen it change?**

Like two sides of a coin, the university sector now has a much better understanding of the culture and requirements of the commercial sector and vice versa. This has resulted from deep engagement and partnership in research and licensing/start-up activities over the years. Consequently, interactions with industry are now about the substantive issues of collaboration and exploitation for mutual benefit. Overall, I would now regard Ireland as being a mature player internationally in university commercialisation.

**What were your expectations when you entered the profession and how close were they to reality?**

Given that it was more or less a green field opportunity at the start, my expectations were simply to get the engine started and see if commercial activity on a par with leading universities (and countries) internationally could be generated. We should not be complacent and say we are at the leading edge yet but we are now operating at a very high level. The international investment through the EIF in the University Bridge Fund (for start-up funding) is an endorsement of that.

**What hopes do you have for the future of knowledge transfer in Ireland?**

I believe we have the ability and capacity to be leading edge in this space. This will require ongoing funding and management commitment from government, agencies and the universities themselves. As a proxy measure for success here, I would like to think that we will have exits of university spin-outs in Ireland in the €200-500m range in the near to mid-future.

**Whilst no two institutions are the same, what words of advice would you offer to Leonard Hobbs as he moves from industry to take up the post of Director of Innovation at Trinity?**

Leonard is a seasoned industry player and does not need guidance from me. As with any change of culture, becoming familiar with and adjusting to the new environment of a university is a big challenge. Maintaining the balance between this adjustment and preserving the essence of the values and learning from many years of industry experience for me requires ongoing focus.....even after 10 years.

## Leonard Hobbs

As Leonard Hobbs, one of Ireland's leading technologists in the ICT sector with close to 30 years experience, takes up his post as Director of Innovation at Trinity College Dublin, we asked him about his expectations of the position and about his thoughts on knowledge transfer and how it is developing in Ireland.

Leonard Hobbs' experience spans leading edge research to technology transfer to advanced manufacturing and high volume operations in the US, Europe and Ireland. He established a unique nanotechnology research programme for Intel in a number of Irish universities and across Europe. His last role at Intel was Director of Public Affairs with responsibility for driving Intel Ireland's policy, communications, education and community agendas. Leonard took up the position of Director of Innovation at Trinity College Dublin in May 2017.

**During your career you have worked extensively with HEIs in a Research, Development and Innovation capacity – how have you seen it change?**

The State's commitment to significant research funding in the early 00's acted as both catalyst and motivator for enterprise engagement in 3rd level R&D in Ireland. The initial projects and programs were a bit 'raw' due to a level of inexperience on both the HEI and industry side, but this has been steadily changing.

I've been primarily engaged with the SFI Centres and have seen the level of sophistication increase, as has the number of companies and the breadth of opportunities. The ecosystem is entering a new level of complexity with more companies engaging with more EI and SFI sponsored centres in addition to a growing interest in EU programs, largely led by the HEI drive in this direction.

**Coming from industry, what are your expectations as you take up the role of Director of Innovation at Trinity College Dublin?**

During my time at Intel, I had many productive collaborations with TCD, spanning a number of programmes including CRANN, TRIL, CONNECT and others. I always found the community at TCD to be engaging and thought provoking, whether delivering world class research outputs, working on national policy issues or providing talent. I now look forward to working with the team from the 'other side of the fence' and I would hope that my industry experience will be useful in helping the University to further improve its engagement with enterprise as well as assist enterprise in getting the most from their TCD interactions.

**What do you see as the challenge for knowledge transfer in Ireland and what are your hopes for the sector?**

The sector has come a long way in the last decade and a half, but it is still quite a young system. We need to be careful as the system evolves and complexity increases, that we don't lose the 'ease of doing business' attributes which currently exist.

We also need a greater level of sophistication in how knowledge transfer is measured and/or articulated as some of the existing objective metrics can distract from the more subjective but impactful results such as supplying the required talent into the Irish economy. We should tread carefully as the ecosystem moves towards the higher level 'TRLs'.

Our pursuit of shorter term 'impacts' from the research must not come from a decrease of focus in so called 'blue skies' research, as the former needs the 'oxygen' from the latter to sustain itself into the future.

# KTI Mission, Vision & Goals

All activity at KTI is underpinned by a strong mission, strategic vision and clear objectives.

## Mission

The KTI mission is to support business, the public sector and the research base to maximise innovation from State-funded research by exchanging knowledge and getting technology, ideas and expertise into the hands of the business and the public sector swiftly and easily for the benefit of the public and the economy.

## Vision

KTI will be recognised and respected as Ireland's central point of reference for business-research base partnership and commercialisation.

## Goals

1. Enabling business to leverage the commercial potential of Irish research and innovation through connecting businesses with cutting-edge research, expertise and opportunities.
2. Taking the guesswork out of knowledge transfer through providing a predictable knowledge transfer system for Ireland.
3. Supporting, developing and building the capacity and capability in the knowledge transfer system in Ireland to deliver a first class service to business and the research community.

## Governance

KTI is supported by Enterprise Ireland and the Irish Universities Association. We are accountable to the Department of Job, Enterprise and Innovation and to the presidents of the Irish universities.

# KTI Steering Groups

To support us in our endeavours and help focus our direction, we consult with an Industry Advisory Group and Knowledge Transfer Stakeholder Group throughout the year. Meeting three to four times each year, these groups continue to inject energy and help us maintain our momentum.

## KTI Industry Advisory Board

The KTI Industry Advisory Board (IAB) supports KTI in setting direction and reviewing our activities. Our advisors are industry and investment professionals with experience of working with the academic research base.

We extend a special thanks to Mike Devane of the American Chamber of Commerce in Ireland for the time, energy and commitment he gave to the Industry Advisory Board. Mike stepped down from the IAB during 2016. His contribution has been extremely valuable.

**Members of the Industry Advisory Board (l to r)** Karl Flannery (Chair), Storm Technology; Brian Dalton, Department of Jobs Enterprise & Innovation; Malcolm Skingle, GlaxoSmithKline; John O'Sullivan, ACT Venture Capital; Helen McBreen, Atlantic Bridge; Keith O'Neill, Abbott Laboratories; Alan Phelan, SourceDogg. *In absentia*: Ena Prosser, Fountain Healthcare Ventures.

## Knowledge Transfer Stakeholder Forum

The Knowledge Transfer Stakeholder Forum (KTSF) brings together representatives from the major funding agencies and the university and Institute of Technology sector with a direct interest in the knowledge transfer agenda in Ireland. The KTSF meets with KTI to consider issues and initiatives with the aim of developing a shared and consistent knowledge transfer system in Ireland.

We extend our gratitude to Tom Flanagan of DIT (past chair of IKTIG) and to Graham Love, formerly of the HRB who stepped down from the Forum during 2016. Their contributions to the Forum have been greatly appreciated and instrumental in the work of the group.

**Members of the KTSF 2016 (l to r)** David Murphy, NUIG for IKTIG; Alison Campbell, KTI; Ned Costello, IUA (Chair); Jennifer Brennan, THEA; Gemma Irvine, HEA; Paul Killeen, DKIT (for THEA); Leo Clancy, IDA; Ray O'Neill, MU (Chair of the IUA VP Research Group); Richard Howell, Dept of Agriculture, Food & the Marine; Eucharia Meehan, IRC. *In absentia:* Brian Dalton, Dept of Jobs, Enterprise & Innovation; Graham Love, HRB; Gearoid Mooney, EI; Darrin Morrissey, SFI.

# The KTI Team

In 2016 Patricia Clare joined our team as Operations Manager bringing a wealth of expertise in relationship and project management and Ursula O'Keeffe has recently taken up the administration mantle replacing Susan Hanna who has moved to SFI. There were further changes towards the end of the year as Peter O'Fegan was promoted to a new role within Enterprise Ireland and Barry Fennell took over management of the TTSI programme. The appointment of Rowena Elliot as Project Executive will bring the KTI team to its full complement of six staff during 2017.

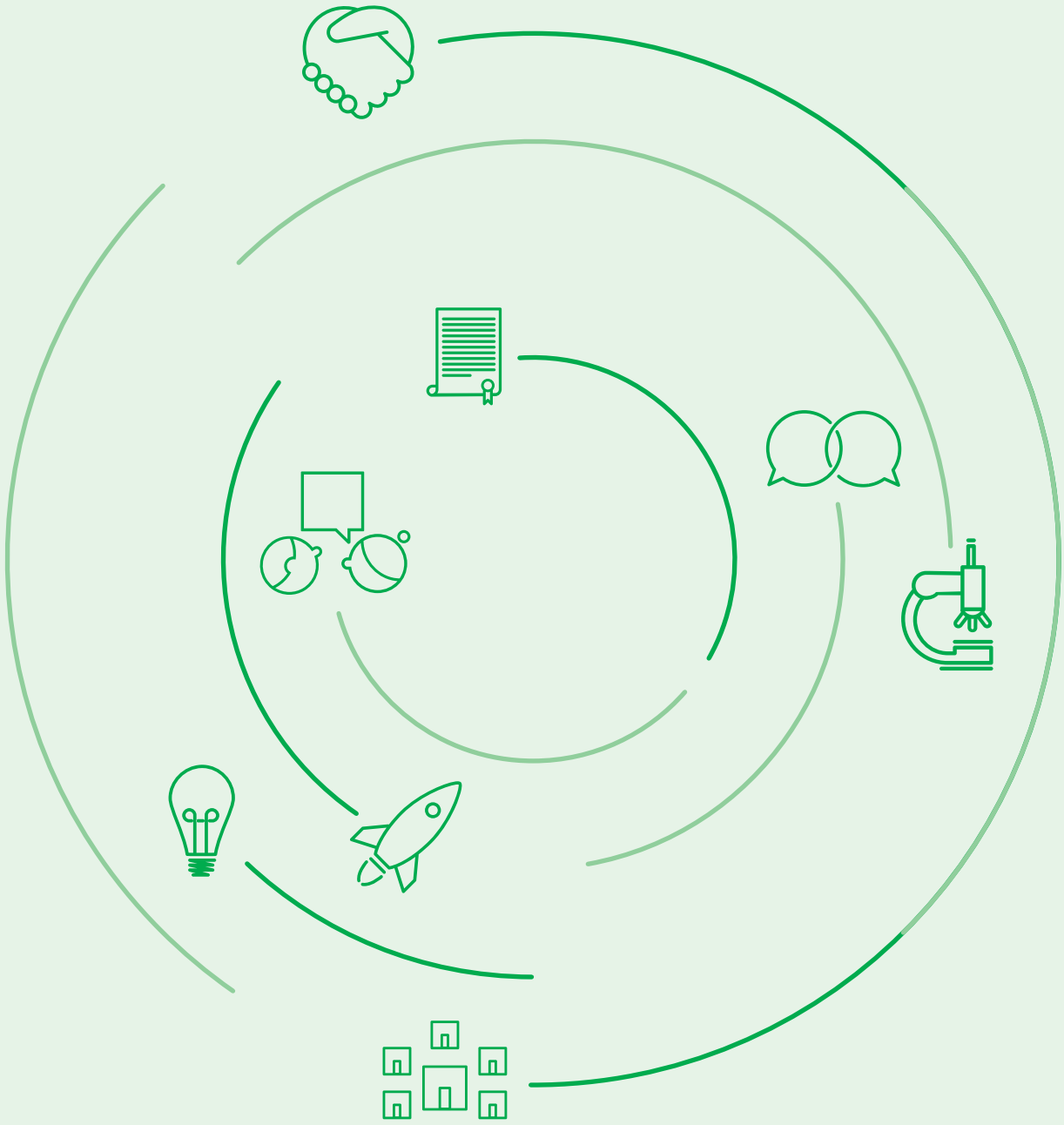
**Alison Campbell (front centre) Director KTI pictured with the KTI team (l to r)** Barry Fennell, Senior Executive – TTSI; Elizabeth Carvill, Senior Executive – Communications; Rowena Elliott, Project Executive; Patricia Clare, Senior Executive - Operations; Ursula O'Keeffe, Team Administrator.

## Contact

To find out more about our work and who to talk to, visit our website at **www.knowledgetransferireland.com**

# Annual Knowledge Transfer Survey 2016

**The annual review of business interaction and commercialisation from publicly-funded research in Ireland**



# 1 Introduction

The Annual Knowledge Transfer Survey (AKTS) is a review of business engagement and commercialisation activity (knowledge transfer[1]).

The AKTS is produced by Knowledge Transfer Ireland in conjunction with the Higher Education Authority (HEA) with data collected from the Research Performing Organisations[2] (RPOs). This is the fourth time that this annual survey has been published.

The purpose of Knowledge Transfer (KT) with the research base is to maximise the flow of technology, IP and ideas. In turn this enables companies (existing and new) and the public sector to drive innovation leading to economic and social benefit. The AKTS covers the range of Knowledge Transfer (KT) activities that include licensing, spin-out company creation, intellectual property commercialisation and business engagement such as collaborative research, consultancy services and use of facilities and equipment.

The main contact at each RPO for this survey was its technology transfer office (TTO)[3]. The survey required other departments in the RPO to support the TTO in providing data. These were mainly the Research Office and the Finance Department, although in some cases information is provided by individual research departments. This placed a significant burden on the TTOs in coordinating the returns. KTI wishes to thank the Technology Transfer Offices and Industrial Liaison Offices in the RPOs for their continued support and contribution to this survey.

Many of the positive impacts of knowledge transfer cannot be captured by simple quantitative measures alone. While this report contains some examples of business impacts, more information is available through the body of case studies which may be found on the KTI website at **www.knowledgetransferireland.com**

1 See glossary at Appendix 4
2 RPOs are the universities, Institutes of Technology and other state funded entities undertaking research, see Appendix 1.
3 See glossary at Appendix 4

# 2 Executive summary

The AKTS 2016 presents data for the period 1 January–31 December 2016. Data are collected on behalf of KTI and the HEA buy Insight Statistical Consulting.

This year 24 RPOs responded to the survey. Two institutions[4] failed to provide a return. In some limited cases, there were partial returns where RPOs do not routinely capture certain data and this is flagged in the relevant sections of this report.

Some changes were made this year to the data collected to bring more clarity and granularity to the nature of the engagements between the research base and industry.

The Consultancy Services definition now includes contracted services and consultancy advice and to provide more detail, contracts relating to Innovation Vouchers are now a specific category under Collaborative Research.

It is apparent from the survey that activity and output measures are stabilising, with trends suggesting figures of around 460 invention disclosures and 117 priority patent applications per annum. The annual rate of spin-out company formation over the past few years is around 26–30 new companies per year. The number of Licensing, Options and Assignments executed is, on average, approximately 170 per year.

When it comes to collaboration with companies, the new and tighter definitions do not permit direct granular annual comparison. To explore trends, figures for collaboration agreements and consultancy services may be combined and compared with previous totals for collaborative research, contract research and consultancy agreements. Whilst there is some fluctuation over the past three years, the figure appears to be settling towards 2,000 new agreements per year. However, as consultancy work is not well captured within the RPOs, these data can be erratic.

It is clear is that collaboration with Irish companies is thriving. This year, 78% of companies that signed collaboration agreements with RPOs were based in Ireland and 94% of collaboration agreements signed with the SME sector were with Irish SMEs. More generally, nearly 1100 different companies have signed agreements with RPOs relating to research related projects and there are over 300 companies for whom this is a repeat engagement over the past three years.

As a follow-on from the AKTS, outcome measures are investigated. The number of new products and services launched on the market by companies, as a result of a licence from an RPO, has been in the range of 26–38 over the past three years. Many of the companies delivering products to the market are spin-outs from RPOs and a significant number of products are within the ICT sector. Active Spin-out companies, three years and more post-formation, declared in the year are also followed up. As this is cumulative, the number of such companies has been growing although, as expected, some will have ceased trading and some will have been acquired. Of the 110 reported at the end of 2015 a significant proportion are in the ICT and Health & Medical Technologies sectors. Almost half have arisen from two universities which may reflect both the size of those universities and the maturity of their technology transfer offices (TTOs). Whilst estimating jobs is an imprecise art, it is thought that the Active Spin-outs reported in 2015 employ over 1,000 people. Similar outcome studies have been commissioned on the 26 products and services launched and the 119 Active Spin-outs reported in this 2016 AKTS.

The outputs reported in the AKTS 2016 have been achieved from a modest research base. Annual research expenditure across Ireland's 24 RPOs was reported at €535 million. This is the equivalent annual research expenditure of the University of Cambridge, UK (€538 million, academic year 2014/15).

**4** Institute of Technology Sligo and Institute of Art and Design, DunLaoghaire (IADT)

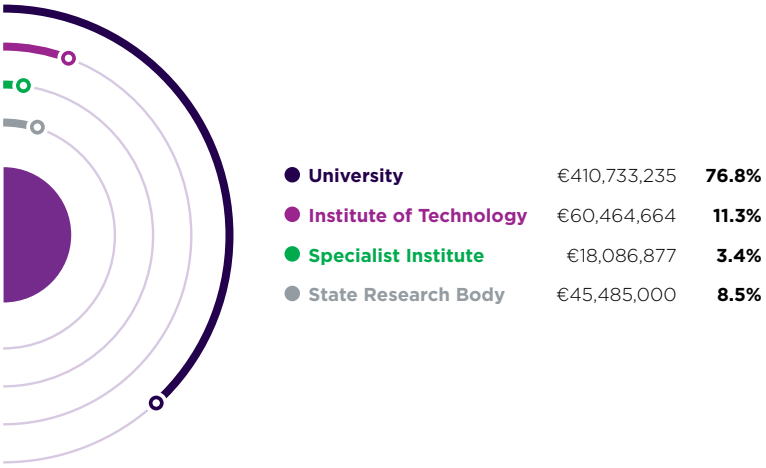
# 3 Research funding in Ireland

The latest (provisional) figure available for Ireland's total investment in Higher Education R&D (HERD) is €730million for 2014/15 (€640 million for 2012).

The figure for actual research expenditure (less block grant) by the RPOs in 2016 was provided by the individual Finance Departments. The total is approximately €535 million (€536 million, 2015). This represents the total expenditure on all types of basic and applied research in Irish RPOs from all funding sources: government, industry, non-profit foundations, etc. It excludes any academic costs dedicated to research, costs of administrative support and capital expenditures on new equipment, buildings or land.

The University sector accounted for most of the research expenditure, at approximately 77% (€411 million). The Institutes of Technology sector accounted for approximately 11% (€60.5 million) of the State's expenditure on research[5]. The Specialist Institute sector (RCSI, NCAD, NCI) and the State Research Bodies (Marine Institute and Teagasc) accounted for the rest.

**Figure 1:** Research expenditures by type of RPO, 2016




Of the total research expenditure, 8% (6.2%, 2015) was related to research revenue from industry, which is low by international standards. On average, the percentage of research expenditure by universities derived from industry ranged from 0 to 12% (2.4% to 11%, 2015). The range this year for the Institutes of Technology was 0 to 19%.

5 Non-responders: IADT & IT Sligo

# 4 Business accessing research and expertise

One of the principal ways that business benefits from working with RPOs is through access to research and expertise.

This is most frequently through two different categories of engagement:

1. **Collaborative Research programmes** – where the RPO and company work together on a research project of mutual interest. Funding may be solely from the company or may be part-funded by the company with some level of co-funding from government sources.

   Characteristics of collaborative research with industry: *The purpose of collaborative research is the generation of new knowledge. Typically, there will be an expectation of publication although the project may be governed by aspects of confidentiality. Intellectual property may be created and how the company benefits will be determined in the collaboration agreement and will depend on the contribution to the project made by the company.*

2. **Consultancy Services projects** – where the RPO provides professional-level work to an external client organisation through an academic, researcher or other member of RPO staff in exchange for a commercial fee. The work is specified (or agreed) by the client against deliverables agreed with the RPO.

   Characteristics of consultancy services: *The purpose of consultancy is not typically the generation of new knowledge, rather it draws on existing knowledge. There will usually be no expectation of publication, results will be confidential and will be transferred to the client. The type of work might typically involve one or more of the following: advice; analysis; production of a report. Projects will generally be of a short term.*

This year contracts relating to Enterprise Ireland Innovation Vouchers are broken out as a specific category under Collaborative Research to provide more detail and consistency in recording.

The total number of Collaboration agreements (including Innovation Voucher funded projects) and Consultancy Services agreements executed in 2016 was 2,072 which was an increase of 21% on 2015 (1,717)[6]. The number of Collaborative Research Agreements (part – and wholly – funded by industry) has fallen slightly (down 3.6%) from 748 in 2015 to 721 in 2016. However, when the Innovation Voucher funded projects are added in, this number rises to 1,243. Overall, the RPOs have signed Collaboration agreements with 1,063 different companies and there were 326 repeat engagements with the same company, or companies, within the past three years, consistent with previous year's figure of 315.

Consultancy Services is a new category that takes in projects that were defined as Contract Services Agreements in 2015 plus previously defined Consultancy Agreements. In 2016, 829 Consultancy Services Agreements were signed which is comparable to the 2015 combined figure for Contract Services Agreements and Consultancy Agreements of 814 (a 2% increase)[7]. It is worth noting that data relating to the latter are traditionally more problematic to collect as the engagements are often not managed centrally within the RPO.

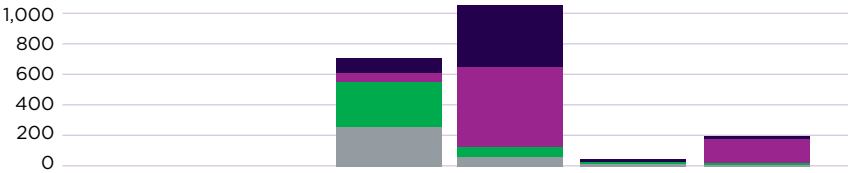
The total number of each type of agreement entered by the relevant groups of RPOs in 2016 is illustrated in Figure 2 which demonstrates a propensity for Collaborative Research in the university and specialist institution groups. The Institute of Technology group shows a greater propensity to engage in shorter term projects through Consultancy Services and projects funded by companies through Innovation Vouchers. The high figure for Consultancy Services in the State Research Body sector is reflective of Teagasc's mission to provide consultancy to the agri-food sector.

**6** Non-responders: IADT & IT Sligo
**7** Non-responders: IADT & IT Sligo, no submission NUIG

# 4 Business accessing research and expertise (continued)

Consultancy services are also provided to non-commercial organisations such as charities and governmental bodies. There were 88 such agreements reported as signed in 2016 by 12 RPOs.

**Figure 2:** Number of collaboration and Consultancy Services agreements with industry in 2016 by RPO type

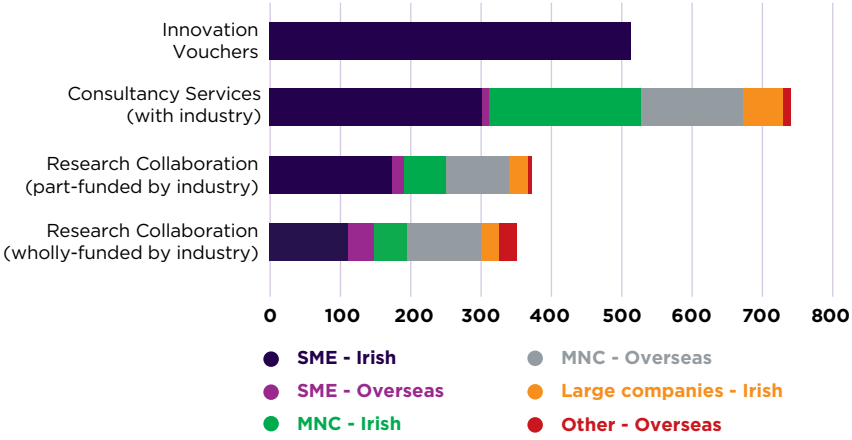



| | University | Institute of Technology | Specialist Institute | State Research Body |
|---|---|---|---|---|
| Innovation Vouchers | 94 | 393 | 17 | 18 |
| Consultancy Services (with industry) | 61 | 520 | 4 | 156 |
| Research Collaboration (part-funded by industry) | 289 | 65 | 11 | 10 |
| Research Collaboration (wholly-funded by industry) | 255 | 60 | 19 | 12 |

## 4.1. Working with Irish companies

From the information provided about sharing research and expertise with companies, 78% of companies with whom the RPOs have executed Collaborative or Consultancy Services agreements are based in Ireland, which is slightly up (6%) on 72% last year. 95% of engagements (collaboration and consultancy services) with SMEs are with Irish SMEs (96% in 2015) and 49% of engagements with MNCs are with Irish-located companies, which is consistent with the 2014 figure (44%) after a significant drop in 2015 (18%).

**Figure 3:** Figure 3: Location of companies with whom the RPO has executed a Collaborative Research or Consultancy Services agreement 2016, by number of agreements signed




Breaking this down further, results indicate that 62% of Research Collaboration agreements (Wholly or Part-funded by industry, excluding Innovation Voucher funded projects) signed by RPOs in 2016 were with Irish companies (65%, 2015). Of these Research Collaboration agreements with Irish companies, 59% were projects co-funded by the State (69%, 2015) and 41% were fully funded by an Irish company (31%, 2015). Of the Research Collaboration Agreements signed with Irish companies 72% (1116) were with Irish SMEs, 21% with Irish-based MNCs and a further 7% (108) with large Irish companies.

Irish companies were reported to account for 99% (521) of agreements signed in 2016 in respect of Innovation Voucher projects (no 2015 comparator) bringing the total number of collaboration agreements signed with Irish companies to 972 (78% of total). Irish SMEs represented 94% (812) of the number of collaboration agreements (wholly and partly industry funded and Innovation Vouchers) signed with SMEs in the year.

Of the Consultancy Services agreements executed with industry in 2016, 77% were with Irish companies (no 2015 comparator).

# 4 Business accessing research and expertise (continued)

## 4.2. Revenue from agreements with industry

### 4.2.1. Revenue from Research Agreements with industry

The AKTS asked for the percentage of research expenditure in the year that was derived from industry-related projects. The agreement may have been signed in previous years but the project (and associated funding draw down) will be live in 2016. Of those RPOs reporting (24)[8] 8% of research expenditure was from industry sources. This equated to approximately €44.7 million in research expenditure in 2016.

### 4.2.2. Revenue from Consultancy Services to business

Five of the 24 RPOs returning data in the AKTS2016 were unable to provide details on gross revenue from Consultancy Services[9]. A further six returned a zero sum. Of the 14 that could provide information, the gross revenue was €3.7 million. There is no comparator with the previous year due to changes in definitions.

Given that consultancy activity tends not to be managed institutionally and in many cases the contracts and finances are not managed centrally, the data returned by the RPOs are likely to be an underestimate of the value of consultancy activity from across the RPO sector.

Of the 16 Higher Education Institutes returning revenue data in this section (four universities and 13 Institutes of Technology) the revenue range was €0–€1.4 million. In the University sector the range was €1,000–€1.4 million and in the Institute of Technology sector, €0–€707,000. Teagasc reported the most Consultancy Services revenue amongst the remaining institutes, reflecting its mission.

**Figure 4:** Revenue from Consultancy Services by RPO type 2016

| | | |
|---|---|---|
| **University** | €1,615,531 | **43.2%** |
| **Institute of Technology** | €1,462,297 | **39%** |
| **Specialist Institute** | €6,065 | **0.2%** |
| **State Research Body** | €658,646 | **17.6%** |

An additional €920,000 was brought in during 2016 by 10 RPOs from Consultancy Services to non-commercial entities.

**8** Non-responders: IADT & IT Sligo
**9** Non-responders: IADT & IT Sligo; no submission MU, NUIG, UCC, GMIT, NCI

## 2016 success story

# Repeat business, Repeat collaboration

### Added value from the research institution:

- Contract negotiation
- Intellectual property
- Collaboration agreement
- Relationship management

### Underpinning Funding Sources include:

- Enterprise Ireland
- Science Foundation Ireland

Suntory is the leading beverage and food company in Japan. In 2016, encouraged by the success of an earlier programme, the company commenced a second collaborative project in the area of functional foods with Teagasc. The research is being carried out with Teagasc researchers who are funded through the SFI-funded APC Microbiome Institute in Cork.

Having previously only collaborated with Japanese universities, the original project in 2011 was the first collaboration for the company with a publicly-funded research organisation outside of Japan. That project involved detailed characterisation of a proprietary Suntory probiotic Lactobacillus strain with the aim of assisting the company to establish credible scientifically-proven health claims for the strain. It also involved Suntory researchers spending time with the research teams in Teagasc and UCC at the APC Microbiome Institute. Results helped provide a detailed understanding of the mechanism of action of the strain, its probiotic properties and pilot scale product development. The company has since seen dramatic increases in sales volumes and the value of the probiotic product.

*"During the project, we benefitted through exchange of scientific information and technology with each other in the field of microbiology and food science. As a result of the collaboration, Suntory can use scientific evidence obtained during the study in the marketing of our lactic acid bacteria product "Lactect"* – Takayuki Izumo, General Manager in Institute for Healthcare Science at Suntory Wellness Limited.

The project established an advanced scientific basis and contributed to continued expertise in the development and use of knowledge of probiotics for human nutrition and health, increasing the critical mass of probiotic research in Ireland. The links with an international leader in function foods has also improved scientific reputation for the research teams.

The TTO at Teagasc was involved in both projects, from the initial stage discussion through to leading negotiation of collaboration agreements which were complex due the nature of the propriety materials being introduced into the project by the company. The TTO worked closely with the company and the research team to understand the scope of the project and to craft the necessary terms.

*"Teagasc TTO worked closely with us to understand the needs of our company and to ensure that the agreement reflected both the importance of our proprietary Background IP and the IP conditions attached to the grant funding"* – Takayuki Izumo of Suntory Wellness Limited.

"The TTO office gave us enormous support and guidance in getting all the necessary agreements over the line"

**Catherine Stanton,**
Teagasc Principal Investigator

## 2016 success story

# Smart consultancy spurs intelligent wound care


### Added value from the RCSI Office of Research and Innovation:

- Project scoping
- Advice on consultancy contracts
- Relationship management

### Underpinning Funding Sources include:

- Enterprise Ireland
- Horizon 2020: ECSEL JU – Grant no: 2014-2-662155
- Irish Research Council

"The value of this engagement has provided us with a key opinion leader insight and guidance in delivering a fit-for-purpose product. Our collaboration with the RCSI has been fundamental to us throughout this process,"

**Ray O'Brien,** Innovation Project Manager at Fleming Medical.

Fleming Medical, a leading healthcare business and trusted partner for Irish and international healthcare providers is developing a smart, wearable dressing for intelligent wound care. This dressing incorporates various sensors to monitor the healing of patients' wounds without having to remove the dressing.

Keen to ensure the development of this smart dressing was clinically informed, Fleming Medical invited internationally recognised Professor Zena Moore, Head of the School of Nursing and Midwifery at RCSI, to act as a consultant in this regard. Professor Moore has performed significant research into wound healing in a clinical environment and has contributed to a significant number of Cochrane systematic reviews in the wound care field.

The attraction for Professor Moore was the opportunity to work with a cutting-edge Irish-based MedTech company who shared a reciprocal interest in developing advances in wound care treatment to improve patient outcomes by decreasing mortality and morbidity while reducing costs to healthcare providers and patients and increasing patient comfortability.

*"What makes Fleming Medical an ideal partner is their ongoing commitment to regular interaction, sharing ideas and interest in evidenced-based wound care treatment and prevention."* – Professor Moore.

The Innovation Team at RCSI's Office of Research and Innovation, the college's equivalent of a TTO, supported the development of this project from the initial point of contact. This included meeting with the company, explaining the RCSI's approach to company engagement, advising internally on consultancy structure, pricing and subsequently identifying suitable mechanisms to scale the initial consultancy engagement into a larger collaboration.

*"The RCSI Office of Research and Innovation were central to the establishment of parameters within which a successful collaborative relationship could develop with Fleming Medical"* said Professor Zena Moore.

This project is part of a wider study for Fleming and its partners the Tyndall National Institute, Ireland and the Holst Centre/ TNO in the Netherlands with the assistance of the InForMed consortium through an ECSEL Joint Undertaking.

The engagement between Fleming Medical and RCSI has been a fruitful one. Through it Fleming Medical became more aware of Professor Moore's groups capabilities, giving rise to new research collaborations supported by the Irish Research Council Enterprise Partnership Programme.

# 5 Invention disclosures

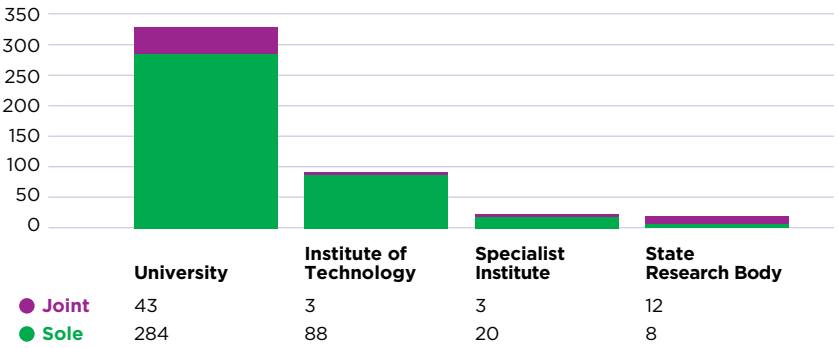
An invention disclosure records a tangible discovery or development.

The Invention Disclosure Form (IDF) contains the basic information needed to evaluate the intellectual property associated with the invention and, where appropriate, to protect and commercialise it.

In 2016, there were 461 invention disclosures[10] (465, 2015) with the proportional split across the different types of RPO broadly similar to the previous year. The majority of IDFs were in the University sector (71%, 327). A further 20% (91) were in the Institute of Technology sector with the remaining 9% in the Specialist Institutes group (23) and in the State Research Body sector (20).

For this survey, both sole and joint invention disclosures are recorded. Sole invention disclosures are those made by researchers working in only one institution and submitted only to that RPO. Joint invention disclosures are disclosures relating to the same invention where the inventors involved work for different RPOs and where each inventor has separately disclosed their invention to their employing institution. Any subsequent IP protection and commercialisation is usually undertaken by the RPO that is best placed to lead, under an arrangement with the other RPO called an Inter-Institutional Agreement (IIA). Figure 5 shows the number of sole and joint invention disclosures by RPO type in 2016.

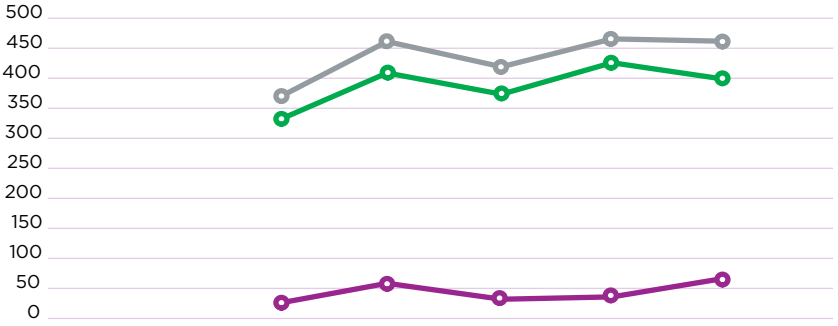
**Figure 5:** Invention disclosures in 2016 by RPO type




| | University | Institute of Technology | Specialist Institute | State Research Body |
|---|---|---|---|---|
| Joint | 43 | 3 | 3 | 12 |
| Sole | 284 | 88 | 20 | 8 |

In 2016, 87% of disclosures were sole disclosures (400) and 13% of disclosures were joint (61).

**Figure 6:** Invention disclosures, 2012–2016




| | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Sole | 346 | 404 | 381 | 420 | 400 |
| Joint | 27 | 58 | 42 | 45 | 61 |
| Total | 373 | 462 | 423 | 465 | 461 |

10 Non-responders: IADT & IT Sligo

## 2016 success story

# Smart Stadium from multi-party collaboration

### Added value from the TTO:

- Business planning
- Contract negotiation
- Intellectual property
- Collaboration agreement
- Licensing
- Relationship management

### Underpinning Funding Sources include:

- Enterprise Ireland (EI)
- Science Foundation Ireland (SFI)

A national test-bed for the Internet of Things (IoT) technologies was established at Croke Park in 2014. This 'Smart Stadium' is aimed at driving IoT research and technology deployments in real-life environments and at accelerating R&D within companies active in the space in Ireland. The project started as a collaboration between Intel Ireland and Dublin City University with Microsoft joining the collaboration in 2015 providing their Azure cloud infrastructure. There is now a pipeline of SMEs using the facilities to test their products all of whom are collaborators or customers of Intel and/or Microsoft.

IoT is a strategic priority for Intel worldwide and the company has seen significant IoT leadership from Ireland with, for instance, its first Quark™ technology designed and developed here. Intel Labs Europe is headquartered here with an IoT focus, along with other functions that have significant 'Wearables' platform and IoT solutions R&D.

*"The Croke Park test bed enables a broad and value based collaboration to push the boundaries of innovation within the Smart Stadium context, critically it provides an open platform that allows enterprises of all sizes to co-innovate for people experience and business value,"* Brian Quin, Director European R&D Ecosystem, Intel Labs.

The collaboration drew on DCU's long and established track record in IoT research, more recently including research at the SFI-funded Insight Centre. The project accessed DCU background IP in IoT technologies, machine learning, machine vision and chemistry, which was licensed by Invent DCU – the Technology Transfer Office at DCU. Invent DCU also supported the establishment of the project through project scoping, marketing, bringing in consultancy advice and more.

As a by-product of the project, DCU has seen increased engagement with companies active in the IoT space interested in R&D collaborations. Furthermore, the project has strengthened the relationship between DCU, Intel, Microsoft and Croke Park with further research projects in discussion.

The Smart Stadium is an on-going project. Phase two began in early 2017 with renewed investment from both Intel and Microsoft in addition to new test-bed infrastructure being deployed.

"We were delighted to actively support this highly ambitious project and to work with Croke Park, Intel and Microsoft to plan how to create an environment to help ambitious SMEs bring new innovations to market."

**Richard Stokes,**
Director of Innovation at DCU.

CROKE PARK intel Microsoft

# 6 Patent activity

A patent confers upon its holder, for a limited period, the right to exclude others from exploiting (making, using, selling, importing) the patented invention, except with the consent of the owner of the patent.

A patent is a form of "industrial property", which can be assigned, transferred, licensed or used by the owner. Filing a patent application with a national patent office is the first step in seeking protection for the invention and establishes a priority date for the invention.

Not all applications are filed initially with the Irish Patent Office as patent applicants often prefer to file direct in territories where the invention may be commercialised, or direct with the European Patent Office (EPO). Filings are also made with the UK IP Office (UKIPO) to expedite the official "search" relating to the application so that the RPO has a better understanding of patentability and claims required at the end of the priority year. This early search can also point the way for the applicant to potential competitors and licensees. The results of this process give applicants greater confidence in deciding whether to pursue, abandon or alter the patent application.

## 6.1. Initial patent filings

To understand the level of new IP being protected, in cases where initial patent applications were filed for the same invention in more than one jurisdiction only one priority patent application filed is counted in the year of application. On this basis, the number of new patent filings made in 2016 was 116[11]. This appears to be a consistent trend.

**Figure 7:** Priority patent applications over the past five years

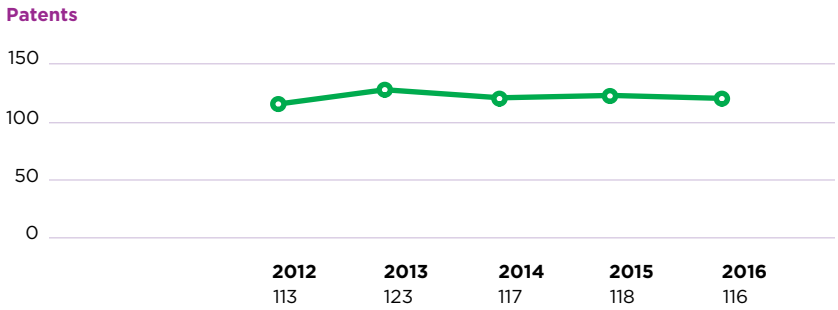
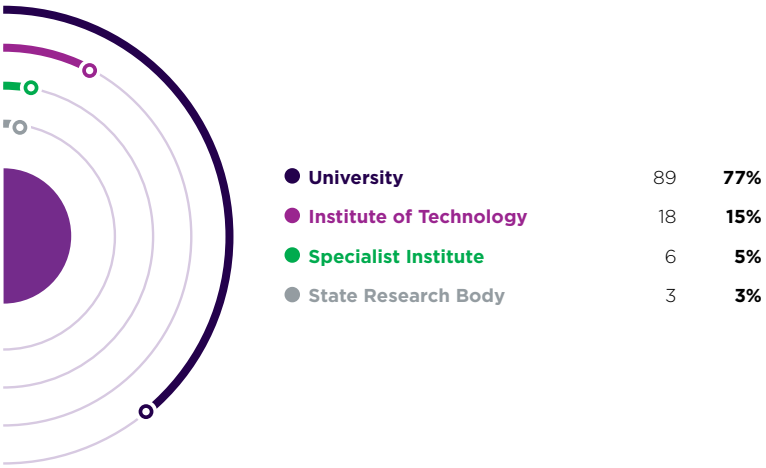



Figure 8 shows a similar split to previous years with the University sector accounting for three-quarters (77%) of all priority patent applications made by RPOs in 2016 (74%, 2015). The Institutes of Technology accounted for 15% of the filings made (17%, 2015). The Specialist Institutes and State Research Bodies were responsible for the remaining 8% of filings.

**Figure 8:** Number of priority patent applications in 2016 by RPO type



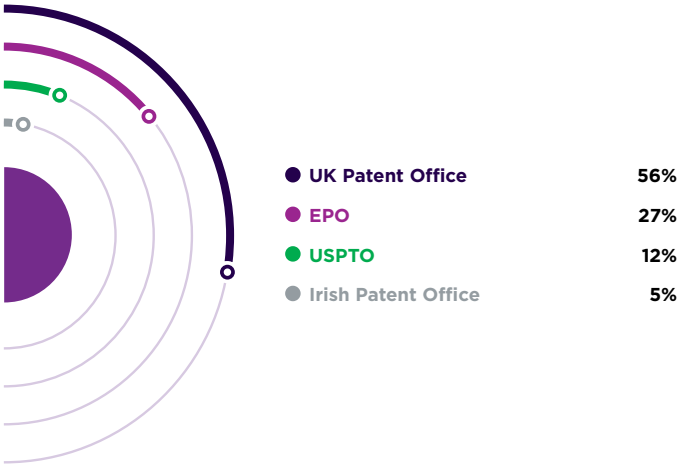

11 Non-responders: IADT & IT Sligo

# 6 Patent activity (continued)

### 6.0.2. Patent filing jurisdictions

The choice of priority patent filing territories is diverse. The UK IPO is the favoured jurisdiction with 56% of initial priority fillings made in 2016 (43%, 2015). The EPO is next with 27% (23%, 2015). The level of priority filings made in the Irish patent office has been similar over the past three years at around 5% of RPO total filings. Figure 9 shows this breakdown.[12] [13]

**Figure 9:** Initial priority patent filing jurisdictions 2016




## 6.2. PCT applications and nationalisation

The Patent Cooperation Treaty (PCT) makes it possible to seek patent protection for an invention in many countries simultaneously by filing an international patent application. The PCT application can take its priority date from an initial national filing and so a PCT application is usually made 12 months after the first filing.

The 24 RPOs reporting in this survey[14] on the number of initial filings progressing to PCT recorded that of the 118 initial filings made in 2015, 46 (39%) were progressed to PCT applications in 2016. This is down on the 55% progression in 2015. This is not necessarily a negative finding. It may be due to various factors including that patent applications are frequently filed in the jurisdiction in which they will be prosecuted and do not require the PCT route and that there may either be a high bar imposed by the TTO to moving a provisional filing to PCT or that there is insufficient patenting budget. The low conversion rate within the IoTs may also have affected this figure. The trends will need to be mapped over several years to better understand the underlying reasons.

All universities progressed some initial filings to PCT during 2016 and the range was 25-50%. Only two IoTs reported progressing patent applications to PCT and the range was 35-66%. Of the remaining eight that reported no progress to PCT this year, only two IoTs[15] filed patent applications in the previous year, between them filing three applications.

Eighteen months after a PCT application has been filed, it must be nationalised in individual countries and regions selected from those previously designated in international applications. This is a costly procedure and patent applications are often licensed prior to this stage. Where they are not yet licensed, the RPO will only progress to this stage if the invention shows significant commercial promise. The data on national filings relate to such filings made in the name of the RPO and which may be paid for by the RPO or by the licensee (by way of the licence contract). In 2016, 36 PCT applications entered the national phase (48, 2015). Most these nationalised applications (64%) were made by the University sector (six universities) whilst four IoTs accounted for the 31% of nationalised patent applications.

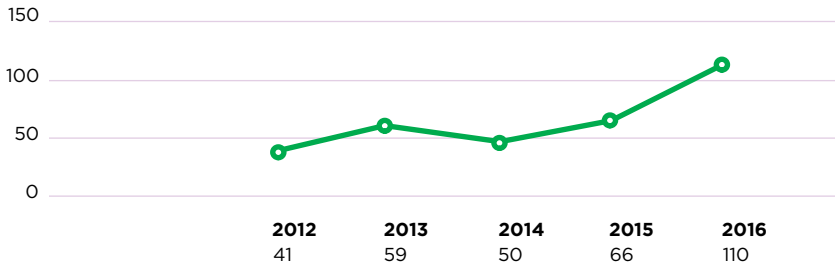
**12** Non-responders: IADT & IT Sligo
**13** Three patent flings are excluded from Figure 10 as they were filed directly into National phase
**14** Non-responders: IADT & IT Sligo
**15** AIT and LIT

# 6 Patent activity (continued)

## 6.3. Patents granted

The total number of patents granted in 2016 was 110, up 67% on the previous year (66, 2015). Most these patents (91%) were granted to inventions from the University sector (80%, 2015). Patent grant depends on the complexity of prosecution within the relevant patent office. The data therefore do not lend themselves to linking back to original filing. For the purpose of this analysis, patents granted in each territory in the year are counted even if they are related to the same original patent filing. The five-year trend in the number of patents granted from 2012 to 2016 is shown in Figure 10.

**Figure 10:** Number of patents granted each year, 2012–2016




## 6.4. RPO patent portfolio

The number of patent families owned by the RPOs at the end of 2016 was 662[16]. This has increased from 511 in the previous year. The biggest share of the portfolio is held by the universities, which together hold 88% of the RPO patent estate (84%, 2015). This may reflect the maturity of the university TTOs. A patent family may include patent applications or granted patents that derive from the same original filing.

## 6.5. Reimbursement of patent costs

Returns to the question asking for information on reimbursement of patent costs by licensees or assignees were received from 23 of the 24 RPOs responding to this survey[17]. Of those, just six said that they could achieve some reimbursement of patent costs from licensees in 2016. This ranged from under €1,500 (2) to over €300,000 (1).

**16** Non-responders: IADT & IT Sligo
**17** Non-responders: IADT & IT Sligo, no submission WIT

# 7 Licensing of rights

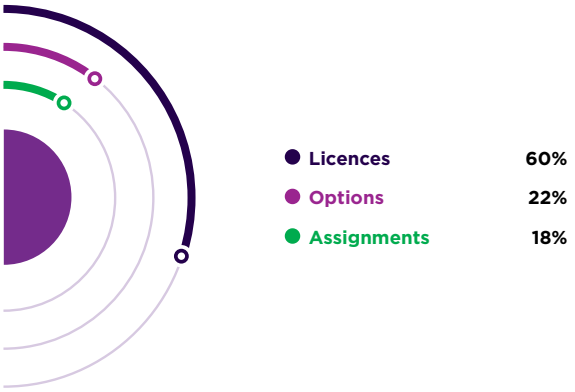
Information was provided on Licences, Options and Assignments (LOAs) for all types of intellectual property generated in the RPOs, including copyright, know-how, patents and trademarks.

- A **Licence** is an agreement between an RPO and one or more third parties, whereby intellectual property rights are transferred for the purpose of commercialisation. The RPO retains ownership of the intellectual property but permits the licensee to exploit it in accordance with contractual terms and conditions.
- An **Option** agreement is one in which the RPO grants a potential licensee or assignee a period of exclusivity during which it can decide whether it may wish to take a licence to the intellectual property and negotiate the terms of a licence agreement. The option period may include evaluation of the IP by the potential licensee (including assessing the technology). This is called an Option & Evaluation agreement.
- An **Assignment** is an agreement transferring ownership of intellectual property rights from the RPO to a third party.

## 7.1. Licences, Options and Assignments (LOA)

The total number of Licences, Options and Assignments executed by RPOs has dropped by 10% in 2016 from 2015 but remains ahead of the 2014 figure. In 2016, 186 LOAs were signed (206, 2015; 168, 2014)[18]. Licensing remains the dominant route to transfer rights, at 60% of all LOAs signed (50% in 2015). Options accounted for 22% of LOAs signed (29%, 2015). Despite the IP Protocol preferring that Assignments are used only in limited cases, they account for 18% of the LOAs signed at 34 Assignments in 2016 (43 in 2015). The breakdown is shown in Figure 11.

**Figure 11:** LOAs by type 2016




The five year trends across Licensing, Options and Assignments can be seen in Figure 12.

**Figure 12:** Total number of Licences, Options and Assignments executed, 2012–2016

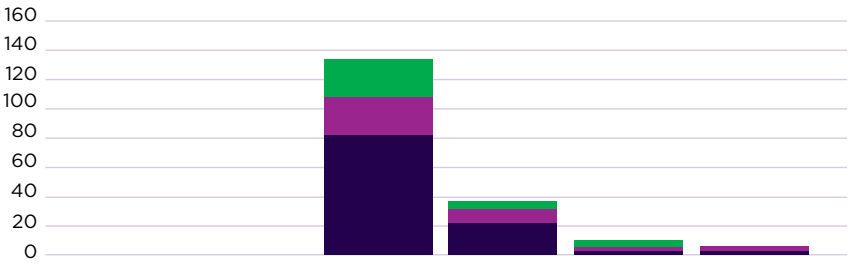

| | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Licences | 55 | 103 | 97 | 104 | 111 |
| Options | 24 | 27 | 36 | 59 | 41 |
| Assignments | 8 | 9 | 35 | 43 | 34 |
| Total | 87 | 139 | 168 | 206 | 186 |

18 Non-responders: IADT & IT Sligo

# 7 Licensing of rights (continued)

A breakdown of licensing type by RPOs in Figure 13 shows that the University sector executed most LOAs (72%) in 2016 (64%, 2015) and that 61% of university IP transactions were licence. Licensing also dominated the IoT sector at 64% of the total LOAs.

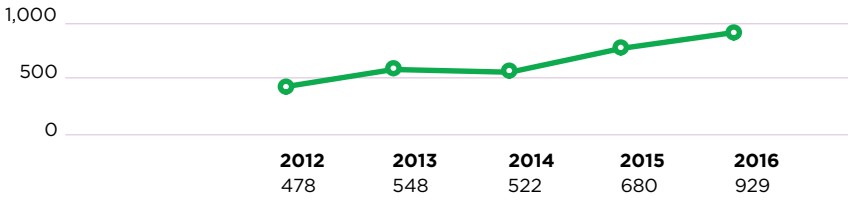
**Figure 13:** Type and number of Licensing, Options and Assignments executed in 2016 by RPO type




| | University | Institute of Technology | Specialist Institute | State Research Body |
|---|---|---|---|---|
| Assignments | 26 | 4 | 4 | 0 |
| Options | 26 | 9 | 3 | 3 |
| Licences | 82 | 23 | 3 | 3 |

The total number of LOA agreements active at the end of 2016 was 929, up 37% on the previous year (680, 2015), of which 78% were in the University sector (76%, 2015). Figure 14 shows how the cumulative portfolio of active agreements has been steadily increasing in the past five years.

**Figure 14:** Total current Licence and Assignment portfolio, 2012–2016




| 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|
| 478 | 548 | 522 | 680 | 929 |

## 7.2. Types of IP licensed

Figure 15 shows the types of intellectual property that were the subject of licence agreements during 2016[19]. More than one piece of IP may be licensed within one agreement e.g. software plus know-how. This year, the category "other" includes biological materials, video and know-how.

**Figure 15:** Underpinning IP

| | |
|---|---|
| **Patented IP** (granted patent or patent application) | **23%** |
| **Software** (excluding copyright) | **33%** |
| **Copyright** (excluding software) | **9%** |
| **Trade mark** | **0.5%** |
| **Trade secret** | **19.5%** |
| **Research materials** | **4%** |
| **Other** | **11%** |

Trends over the past five years are shown in Figure 16 which indicates an overall rise in software and copyright licensing. Patent IP as an underpinning source of licensing appears to be declining. When taken together with the increase in software and copyright licensing this suggests an increased activity in those sectors, such as ICT, that do not depend on patented IP.

**19** Non-responders: IADT & IT Sligo

## 2016 success story

# Licensing and collaboration deliver new technology, new markets and new jobs


### Added value from the research institution:

- Contract negotiation
- Intellectual property
- Collaboration agreement
- Licensing
- Post-licence management

### Underpinning Funding Sources include:

- Enterprise Ireland

Waterford Technologies is an email archiving and file management company. Licensing Waterford Institute of Technology IP and collaborating with the Telecommunication Software & Systems Group (TSSG) at the institute, the company was able to develop a new state-of-the-art technology in 2015 that has since been a game-changer for the company. New features include cloud based architecture, client self-service design and multi-tiered subscription model. This has allowed Waterford Technologies access to the largest providers of storage – Microsoft and Google – where previously the door was closed.

Access to these strategic partners resulted in the company being able to pitch and win much larger clients. This, in turn, has given rise to new product sales in 2016 both to existing clients and to a significant number of new clients in new geographies of the UK and India. The demand has meant that the company now has a growth expansion plan, with 2.5 FTE joining the company in 2016 and further recruits planned for 2017. Significantly the hires are into Waterford where previously all development took place offshore.

The TTO at Waterford Institute of Technology played a pivotal role, including supporting the collaboration arrangements and funding proposal with the company, protecting and licensing background and foreground intellectual property and providing post-licence management. The TTO engaged with the project team throughout the collaboration, funded through an Enterprise Ireland Innovation Partnership award, to ensure smooth running and that the work-package deliverables were met.

On completion of the project, the TTO and the company agreed a licence package that involved two separate licences with significantly differing terms. This flexible approach was tailored to suit the company's complex business model.

*"We were very impressed by the skills and professionalism of the TSSG team, the speed with which they engaged with us and how they understood our product, our business requirements and directions we wished to go in with the 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 further expand this partnership in the future."* Lorcan Kennedy, CTO at Waterford Technologies.

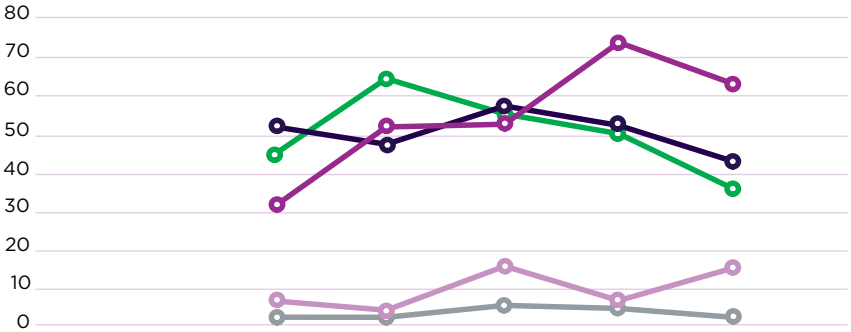
"The TTO worked tirelessly with both the company and ourselves (the team at TSSG) to understand the IP and create a set of agreements which worked for all parties"

**Martin Tolan** of the TSSG at Waterford Institute of Technology

WATERFORD TECHNOLOGIES

# 7 Licensing of rights (continued)

**Figure 16:** Type of intellectual property in LOAs, 2012–2016




| | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Patented IP | 52 | 49 | 58 | 52 | 44 |
| Software | 32 | 53 | 53 | 74 | 63 |
| Trade secret | 46 | 64 | 56 | 50 | 37 |
| Copyright | 8 | 5 | 17 | 8 | 17 |
| Design rights | 2 | 2 | 5 | 4 | 0 |

## 7.3. Licensees

Figure 17 shows the types of organisations with which agreements were made in 2016[20]. Most LOAs (72%) were transacted with SMEs (59% in 2015).

**Figure 17:** Licensee/assignee by company size

| | |
|---|---|
| SME | 72% |
| Large company | 2% |
| MNC | 26% |

The percentage of LOAs signed with Irish companies was 80% (69%, 2015). Of those, 81% were with Irish SMEs. Of the non-Irish companies, LOAs were predominantly executed with MNCs (68%).

## 7.4. Material Transfer Agreements (MTAs)

A further type of agreement is a Material Transfer Agreement, under which the institution transfers tangible research materials to another entity, and the recipient uses the materials for their own research purposes. The agreement specifies the rights of the provider and the recipient with respect to the materials and any derivatives. MTAs may be granted to or received from a commercial entity or another research organisation. Frequently, the transfer is out to a company by way of a licence agreement. 129 out-going MTAs to companies were signed in 2016 (138, 2015)[21]. Most of the MTAs (94%) were reported by the University sector (81%, 2015).

**20** Non-responders: IADT & IT Sligo
**21** Non-responders: IADT & IT Sligo

# 7 Licensing of rights (continued)

## 7.5. Products on the market

Of previous licences from the Irish RPOs, 26 led to market launches of products or services in 2016 (38, 2015; 30, 2014)[22]. Of these, 11 (42%) were from five universities and 10 (38%) were from seven Institutes of Technology. Five of the product launches based on IP licenced by one Institute of Technology were for different products from one underpinning technology licence and two launches were related to one underpinning technology licence from a university.

## 7.6. A deeper dive into products launched in 2015

A review, commissioned by KTI, was undertaken by Technopolis to look into the new products and services that came onto the market in 2015 based on licences from Irish RPOs as reported in the AKTS2015.

The available and validated data from the AKTS 2015 identified 36 products derived from RPO licences, launched by 35 companies in 2015. The bulk of these (83%) were based on licences to Irish companies. Over half of these companies (21) had been spin-outs from RPOs.

Once IP has been transferred, the RPO may not be aware of the contribution of their IP to the products or services offered by licensees, particularly when the IP leads to improvements in existing products, rather than the development of a completely new product line. Therefore, the number returned will be an underestimate of the contribution made by licences from RPOs to new launches.

When classified by Research Prioritisation areas, as for the previous two years, the bulk of the licensees are in the ICT sector (42%). A further 28% were in the Health, Med Tech and Sustainable Food sectors. However, a significant number fall outside of these classification themes.

Looking at the underpinning intellectual property, software appears to be more prevalent at 38% (26%, 2014) whilst patent rights fell to 20% (33%, 2014). Copyright and Design Rights accounted for 12% of the IP that underpinned licences.

**22** Non-responders: IADT & IT Sligo

# 8 Company creation

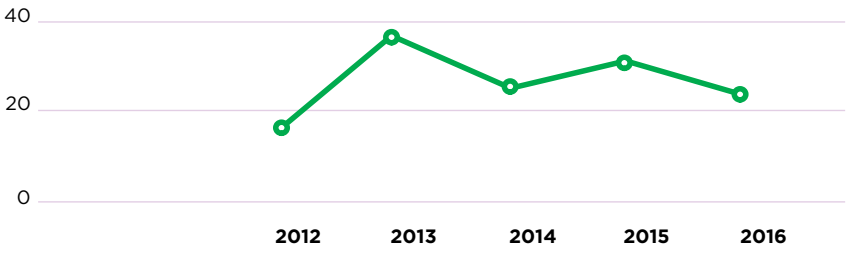
Information was provided on the number of spin-out and start-up companies established from RPOs in 2016. Sustainability of spin-out companies was also studied.

- A **Spin-out** is an incorporated entity which at the time of formation was dependent on the exploitation of specific intellectual property rights of the RPO. The rights to the company can be linked to a specific researcher who was within the RPO at the time of company formation and who would be considered an academic founder. The RPO will hold equity in the Spin-out and/or has issued the company with a licence to the IP.
- A **Start-up** is a company formed by staff or students in the RPO not based on knowledge or intellectual property generated by the RPO and where there is no formal IP licence or equity share with the RPO.

A total of 26 new companies were spun-out from 12 of the RPOs in 2016 (30, 2015)[23]. Whilst this represents a 13% decrease on the previous year, where numbers are low the deviation appears more pronounced. Of these, 19 (73%) were from the University sector and six (23%) from the Institute of Technology sector. Two Spin-outs were formed jointly between RPOs (UCC and NUIG, UCC and Teagasc). There were 55 Start-ups reported, by four universities and five IoTs[24]. As Start-ups are created independently from the RPOs, they will be under-reported in this survey.

Figure 18 shows the number of Spin-outs established in the five-year period from 2012 to 2016 which have a licence agreement from the RPO and/or an equity share.

**Figure 18:** Spin-outs established 2012–2016




The aggregate number of Spin-out companies in which an RPO holds equity or share options, at the end of 2016, was 161 (159, 2015). The University sector accounts for 83% of this portfolio.

## 8.1. Active Spin-out companies

An Active Spin-out companies is defined as an RPO-created Spin-out company that is at least three years post-formation (three years since being reported as an RPO Spin-out) and, as at the end of the reference year, has at least one paid employee and has raised equity and/or has booked sales revenue. It is an incorporated entity which at the time of formation was dependent on the exploitation of specific intellectual property rights of the RPO. The RPO will have executed a licence to the Spin-out for the IPR and/or will hold equity in the Spin-out.

There were 119 Active Spin-outs reported at the end of 2016 that were at least three years post-incorporation, up from the 110 reported in the AKTS2015[25]. Of these, 97 were from the University sector (82%) with 18 coming from the Institutes of Technology sector (15%). This is consistent with the previous year. The distribution is shown in Figure 19.

**23** Non-responders: IADT & IT Sligo
**24** Non-responders: IADT & IT Sligo; no submission: MU, UL, LYIT
**25** Non-responders: IADT & IT Sligo

# 8 Company creation (continued)

**Figure 19:** Active Spin-outs at end of 2016 that are three or more years post-incorporation

| | | |
|---|---|---|
| **University** | 97 | **81%** |
| **Institute of Technology** | 18 | **15%** |
| **Specialist Institute** | 3 | **3%** |
| **State Research Body** | 1 | **1%** |

### 8.1.1. A deeper dive into the Active Spin-outs reported in AKTS 2015

The data on Active Spin-out companies provided to the AKTS 2015 were explored further as a part of a review undertaken on behalf of KTI by Technopolis. The review also looked at data on those Spin-outs that achieved a successful exit such as a trade sale to capture further impacts from RPO Spin-outs.

Of the 110 Spin-out companies reported by the RPOs as being active three or more years post formation, one was a joint Spin-out from two RPOs and had been counted twice. The adjusted number is 109. During 2015, seven of the Active Spin-outs had been acquired by another company and five of them remained as trading subsidiaries.

Active Spin-outs predominate in the ICT (35%) and Health and Med Tech (29%) sectors.

All but one the Active Spin-outs are located in Ireland, often remaining near their founding institution. Of these companies, the study found that 23 (21%) are trading in 22 overseas markets, with the US as the most recorded market.

Many of the companies have accessed more than one type of intellectual property to underpin their business. Patented technology constituted 45% of underpinning RPO licences and software a further 25%, which remains consistent with the previous year.

Examining the year of registration of each of the 109 Active Spin-outs shows that the majority of companies are less than five years old (44%, 48 companies.) Almost one-third (31%, 34 companies) are between six and ten years old. Approximately 6% are between 20 and 30 years old and the oldest-recorded Active Spin-out, Cylon Controls, was formed in 1985 from UCD.

Between them, RPO Spin-out companies that remained active in 2014 provided employment for an estimated 1,080 people, up 16% on the previous year's study (930). This figure was derived from a variety of public data sources.

### 8.1.2. Company incubation

All Higher Education Institutes (HEIs – universities and Institutes of Technology) have an associated incubator facility in which early stage companies can develop. In addition to space for the company, services offered to the incubated company include advice on IP, networking events and access to professional services. According to the 23 RPOs[26] that returned data the total number of incubator clients at the end of 2016 was 734 (754, 2015). The majority were based in IoT incubators (542) with 174 in university incubators and a further 18 companies supported in the NCAD, NCI and Teagasc incubators. A total of 227 new companies entered HEI incubators and 198 exited during the year.

**26** Non-responders: IADT & IT Sligo; RCSI does not have an incubator

## 2016 success story

# From research ambition comes job creation


### Added value from the research institution:

- Company formation support
- Entrepreneur in Residence programme
- Contract negotiation
- Intellectual property strategy
- Licensing

### Underpinning Funding Sources include:

- Enterprise Ireland
- Environmental Protection Agency
- Horizon 2020
- Irish Research Council

"We received a lot of support from the university Technology Transfer Office and have found it to be a rewarding experience on many levels."

**Alan Phelan,**
CEO Nucleus Ventures Group

NVP Energy (NVPE) was formed in 2013 to commercialise a cost-saving wastewater treatment technology developed from a research project at NUI Galway led by Professor Vincent O'Flaherty and his team. The technology was developed from long-term investment in research at NUIG.

"*This project goes back nearly ten years. The research project started off with a dream that this kind of technology could be developed and the research was very productive and went well in an academic sense. To see it leave the lab and be applied at full scale is very exciting and that's really where the commercial expertise and engineering expertise helped complement our science, helped us scale it up.*" – Professor Vincent O'Flaherty.

Through NVPE's further development and deployment of the technology, NVPE developed a modular wastewater treatment system. The system, manufactured off site, can dramatically reduce operating costs and generate energy as a by-product in the form of exceptionally high quality biogas to generate heat or electricity on site. This offers NVPE's customers a compelling pay back averaging 3 years. Key target markets for the company are the global food & drinks industry and global municipal wastewater industry. NVPE has been successfully operating its first full-scale solution in the meat processing site of ABP Food Group since 2016, with a number contracts with other companies starting in 2017.

The technology transfer office at NUIG was closely involved from the start, helping Professor O'Flaherty to identify where the valuable IP might lie and to secure funding from Enterprise Ireland to develop a prototype. A key step was the introduction to Alan Phelan, Entrepreneur in Residence in the office at the time, who saw the commercial potential and started the company, obtaining a licence to the underpinning IP.

NUIG has additional projects ongoing with the company that have been funded by the Irish Research Council. On the back of progress to date NVPE has expanded its workforce to 12 people. It secured a series of grants in Ireland, the UK and from Horizon 2020 and has been awarded a number of accolades including the SEAI Sustainable Energy Award and Shell Springboard Award. These grants and awards have had a positive impact on NUIG's reputation as a leader in the field of wastewater treatment research. Gaining from the experience with NVPE, Professor Vincent O'Flaherty has now spun out another company from the university.

NVP ENERGY

## 2016 success story

# Student Led Spin-out: Personal ID goes Digital


### Added value from the TTO:

- Company formation support and mentoring
- Contract negotiation
- Intellectual property strategy
- Licensing

### Added value from the research institution:

- Financial support
- Product test bed
- Access to entrepreneurship programmes

### Underpinning Funding Sources include:

- Enterprise Ireland
- Trinity Provost's Fund

"It helped that the licence template that we used was provided by Knowledge Transfer Ireland and is publicly available to prospective licensees."

**Graham McMullin,**
Senior Operations Manager, Trinity TTO

iDly Systems

iDly Systems Ltd is a software company providing digital identification services for organisations that allows them to issue digital ID cards to mobile devices. The company was founded in April 2016 from student-led research carried out at Trinity College Dublin and has gone from strength to strength in its first year.

The technology will shortly be in operation at two universities, enabling over 30,000 students to access a range of campus facilities and student services via their smartphones. Plans are also underway to supply to other national and international universities and the company has already secured deals to provide identity software to a range of organisations, from political parties to nightclubs. In April 2017, iDly launched a Digital Organ Donor card, in partnership with the Irish Kidney Association. The initiative was positively received and resulted in thousands of new users of the service.

The IP underpinning the technology is software, known as the 'Trinity Digital Student ID'. When the success of the ID within Trinity became apparent, the students sought ways to commercialise their work. Following discussions with a number of advisors, they decided to partner with the Technology Transfer Office at Trinity.

*"The benefits of the collaboration were enormous. Without Trinity's support in terms of funding, expertise and time from so many people we never would have been able to get this project off the ground. Trinity really gave us the guidance to take what we had as an idea and bring it through to a product"* - Finn Murphy, Founder at iDly Systems.

The TTO worked closely with Finn Murphy, who went on to found the company, supporting him through the processes of company formation, licensing IP and ongoing product development. The TTO brought expertise encouraging the development of the concept into a minimal viable product that could be trialled with the student body at Trinity and guiding the company through the terms of the IP licence and the ramifications of those terms. This invited discussion and refinement of the company's business model.

Trinity College has provided additional support for the company through access to the Blackstone LaunchPad mentorship programme and the summer accelerator and micro-seed program, LaunchBox. This support, together with backing from the TTO and introductions to the alumni network, has been pivotal in iDly securing funding and developing their idea and product.

iDly is in the process of raising additional funding from Enterprise Ireland and private investors and plans to grow the current a team of three to seven during 2017.

# 9 Revenue generation from licensing and spin-outs

Revenue generation from licensing IP or from the realisation of spin-out equity may be considered a proxy for success. However, it is important to put revenue generation in context.

The objective of commercialisation by RPOs is to support business innovation and competitive advantage. This, in turn, should lead to the development of new services and products for the benefit of society and the economy."

The relationship between business and entrepreneurs with RPOs is more sophisticated than simplly aquiring rights. Value is added through the other interactions that enterprise has with the RPOs, such as access to expertise through research contracts and consultancy.

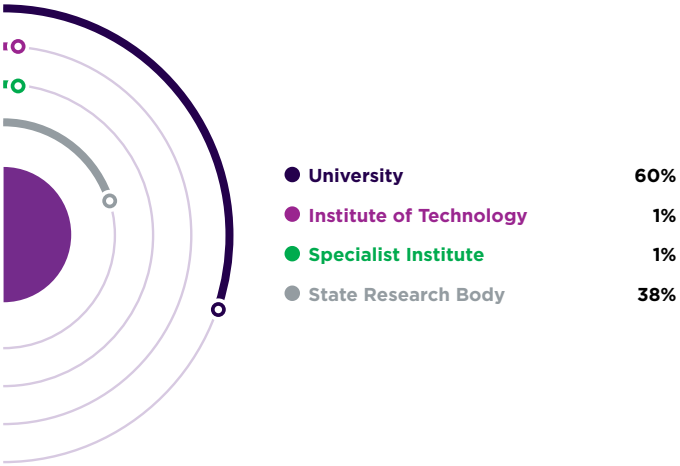
That said, revenue generation by the Irish RPO system tends to be lower than in many other countries. This is due to several factors including timing of licensing and appetite of the company. It can take many years for commercial prospects to yield revenue returns, either via royalties on product sales or through realisation of equity investment. During this process the company will invest significantly in development and, in the case of a spin-out, it may undergo several rounds so further investment and dilution of the original equity stake. The original IP or technology licensed into the company will usually only be a small part of the eventual value of the developed product. RPOs may be compelled to license IP early, before real value has been developed as the RPO is often unable to take patent applications beyond PCT stage and so early rights to new IP are often granted at this stage. Many IP rights also arise from a research collaboration between the RPO and a company and the IP is often required to be transferred at no or low cost resulting in a high proportion of revenue-neutral assignments. The increase in the number of assignments would bear this out (section 7.1). As the overall philosophy of the RPO in negotiation will be to see that the IP and technology can be transferred to a company so that it has the ability to be developed further to benefit society and the economy, that may mean deferred income and/or terms that assist early stage companies.

## 9.1. Licence revenue

The revenue from all types of know-how and IP (patents, copyright, designs, material transfer agreements, confidentiality agreements, plant breeder rights, etc.) before disbursement to the inventor or other parties was surveyed. Revenue includes licence issue fees, annual fees, royalties, option fees and milestones, termination and cash-in payments.

All but one of the 24 RPOs returning data to the AKTS this year could provide a figure for licence income[27]. All six universities that returned data reported revenue from licensing whilst only four out of the 12 IoTs reporting in this survey generated licence income. From the data provided, the aggregate revenue from licensing in 2016 was €2.7 million (€5.6 million, 2015; €1.8 million, 2014). The larger figure in the previous year was due to a few, very significant deals. Most licence income (95%) was related to the licensing by the universities.

**Figure 20:** Licence revenue by RPO sector 2016




## 9.2. Revenue from equity and dividends in spin-out companies

The realisation of equity is unpredictable, depending on external factors such as the maturity of the spin-out and market forces. Three RPOs (university and IoT sectors) realised revenue from the sale of spin-out company equity in 2016. One university achieved a dividend return in the year. The total revenue from equity sale and dividends was just over €3 million (€2.9 million, 2015; €1.4 million, 2014).

**27** Non-responders: IADT & IT Sligo; Maynooth University unable to provide information for logistical reasons

# 10 Use of facilities and equipment

Many companies do not have specialist facilities, equipment and expertise in their use in-house and access to these via RPOs can provide a real boost to company R&D.

Information on company use of RPO facilities and equipment is patchy because in most cases this is managed at the local level, for example by a School or Research Department, and not tracked centrally. Feedback has been that such data are extremely difficult to obtain and yet, where it has been tracked by some RPOs, the indication is that this is an area in which State investment in the RPO infrastructure is providing value to industry.

Of the 25 RPOs that responded to the survey, 21 could supply information and, of these, seven said that there were no contracts executed for the use of facilities or equipment in 2016[28]. A total of 848 contracts were reported by 14 RPOs (1068, 2015: 17 RPOs). The majority of these (94%) are accounted for by the four universities that returned data.

Ten RPOs reported revenue generation. The total gross revenue reported was €1.9 million. This suggests a decline in revenue over the past three years. However more RPOs returned data in the previous year (17 in 2015). As these data are not robust, due to lack of central recording, it is unwise to read too much into the results.

**28** Non-responders: IADT & IT Sligo; no submission from MU, NUIG, UCC

# 11 Summary of commercialisation revenue

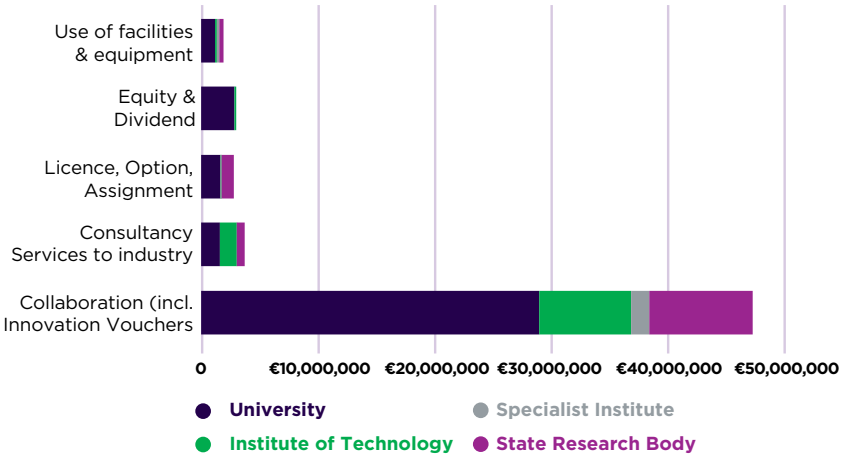
It was a bumper year for commercialisation revenue from dividends and equity sale, at over €3 million, due to specific company-related events. A further €2.7 million was achieved from licensing.

Together dividends, equity realisation and licensing accounted for 32% of the overall commercialisation revenue. However, industry engagements (Collaborative Research, Innovation Voucher projects and Consultancy Services) accounted for 87% of the total industry/commercial revenue in the year.

**Figure 21:** Revenue from commercialisation activities


The data presented in Figure 21 exclude research income from State or other non-profit research funding sources e.g. research funding agencies, charities.

**Figure 22:** Revenue breakdown by source and RPO type



# Appendix 1
# Year of foundation of TTO/ILO

| University | |
|---|---|
| Dublin City University | 2007 |
| Maynooth University | 2005 |
| NUI Galway | 2005 |
| Trinity College Dublin | 1987 |
| University College Cork | 1982 |
| University College Dublin | 2003 |
| University of Limerick | 2005 |

| Specialist and State Research Organisations | |
|---|---|
| National College of Art and Design | 2013 |
| National College of Ireland | 2011 |
| Royal College of Surgeons in Ireland | 2007 |
| **Marine Institute** | – |
| Teagasc | 2011 |

| Institutes of Technology | |
|---|---|
| Athlone Institute of Technology | 2008 |
| Cork Institute of Technology | 2009 |
| Dublin Institute of Technology | 2007 |
| Dundalk Institute of Technology | 2012 |
| Galway-Mayo Institute of Technology | 2008 |
| Dun Laoghaire IADT | 2012 |
| Institute of Technology Blanchardstown | 2000 |
| Institute of Technology Carlow | 2008 |
| **Institute of Technology Sligo** | – |
| Institute of Technology Tralee | 2009 |
| Institute of Technology Tallaght | 2000 |
| Limerick Institute of Technology | 2008 |
| Letterkenny Institute of Technology | 1998 |
| Waterford Institute of Technology | 2008 |

# Appendix 2 Summary data by RPO

Selected data relating to the returns made by the 24 RPOs are presented in tables A1-C2. Where an RPO was unable to return data, the entry is greyed out.

The data cannot be viewed as league tables of performance. Activity and outcomes depend on a complex range of factors which include the RPO mission, activity and nature of the research. For example, one RPO may be more focused on working with many local companies on small-scale projects whilst another larger RPO may have a greater breadth and depth of research in an area that lends itself to a more national or international engagement and to the creation of IP. Other factors include the resourcing to support KT activity and how long a TTO/ILO has been in existence. It should be recognised that some of the information requested had to be obtained from different departments within the RPO and not all data may be captured with the same level of detail.

## A1: Research expenditure, research agreements and consultancy 2016: University, Specialist and State research organisations

| | Research expenditures (€) (less block grant) in the reference year | Industry | Number of collaborative research agreements with industry | Number of innovation voucher project agreements with industry | Number of consultancy services agreements with industry | Total number of collaboration, innovation voucher and consultancy services agreements with industry |
|---|---|---|---|---|---|---|
| **University** | | | | | | |
| Dublin City University | €35,700,000 | €2,356,200 | 84 | 20 | 1 | 105 |
| Maynooth University | €22,838,428 | €228,384 | 66 | 4 | 2 | 72 |
| NUI Galway | €52,886,545 | €3,152,038 | 61 | 10 | | 71 |
| Trinity College Dublin | €90,972,152 | €4,548,608 | 136 | 10 | 5 | 151 |
| University College Cork | €96,350,000 | €10,598,500 | 41 | 21 | 3 | 65 |
| University College Dublin | €81,780,000 | €4,178,958 | 89 | 19 | 44 | 152 |
| University of Limerick | €30,206,110 | €3,624,733 | 67 | 10 | 6 | 83 |
| **Specialist and State Research Organisations** | | | | | | |
| National College of Art and Design | €167,214 | €56,852 | 10 | 5 | 4 | 19 |
| National College of Ireland | €125,000 | €0 | 0 | 11 | 0 | 11 |
| Royal College of Surgeons in Ireland | €17,794,663 | €1,423,573 | 20 | 1 | 0 | 21 |
| Marine Institute | €4,700,000 | €0 | 0 | 0 | 0 | 0 |
| Teagasc | €40,785,000 | €8,768,775 | 22 | 18 | 156 | 196 |

# Appendix 2 Summary data by RPO (continued)

## A2: Research expenditure, research agreements and consultancy 2016: Institutes of Technology

| | Research expenditures (€) (less block grant) in the reference year | Industry | Number of collaborative research agreements with industry | Number of innovation voucher project agreements with industry | Number of consultancy services agreements with industry | Total number of collaboration, innovation voucher and consultancy services agreements with industry |
|---|---|---|---|---|---|---|
| **Institutes of Technology** | | | | | | |
| Athlone Institute of Technology | €3,156,805 | €378,817 | 10 | 40 | 141 | 191 |
| Cork Institute of Technology | €13,411,406 | €2,588,401 | 19 | 70 | 84 | 173 |
| Dublin Institute of Technology | €15,100,000 | €755,000 | 20 | 17 | 49 | 86 |
| Dundalk Institute of Technology | €1,300,000 | €0 | 11 | 17 | 0 | 28 |
| Galway-Mayo Institute of Technology | €1,733,763 | €100,558 | 6 | 15 | 2 | 23 |
| **Dun Laoghaire IADT** (Nil Return) | | | | | | |
| Institute of Technology Blanchardstown | €528,760 | €84,602 | 2 | 4 | 0 | 6 |
| Institute of Technology Carlow | €2,090,887 | €157,444 | 8 | 62 | 9 | 79 |
| **Institute of Technology Sligo** (Nil Return) | | | | | | |
| Institute of Technology Tralee | €2,056,459 | €224,154 | 2 | 14 | 6 | 22 |
| Institute of Technology Tallaght | €1,794,095 | €235,923 | 3 | 3 | 34 | 40 |
| Limerick Institute of Technology | €1,686,861 | €84,343 | 9 | 26 | 0 | 35 |
| Letterkenny Institute of Technology | €860,000 | €43,000 | 5 | 22 | 0 | 27 |
| Waterford Institute of Technology | €16,745,628 | €1,071,720 | 30 | 103 | 195 | 328 |

# Appendix 2 Summary data by RPO (continued)

## B1: IP and IP transactions 2016: University, Specialist and State research organisations

| | Total number of invention/ software disclosures received during the year (sole and joint) | Total number of new patent applications filed during the year | Previously filed priority patent applications filed progressed to PCT in year % | Total number of patents granted in year | Total number of patent families owned by the RPO at year end | Total number of Licensing, Options and Assignments executed (LOAs) | Market launches of products or services in year based on RPO licence |
|---|---|---|---|---|---|---|---|
| **University** | | | | | | | |
| Dublin City University | 35 | 14 | 33 | 16 | 119 | 30 | 0 |
| Maynooth University | 12 | 5 | 25 | 2 | 10 | 7 | 1 |
| NUI Galway | 54 | 10 | 33 | 9 | 110 | 11 | 0 |
| Trinity College Dublin | 53 | 13 | 47 | 53 | 116 | 28 | 3 |
| University College Cork | 65 | 12 | 42 | 7 | 72 | 22 | 2 |
| University College Dublin | 65 | 21 | 50 | 8 | 92 | 22 | 3 |
| University of Limerick | 43 | 14 | 40 | 5 | 62 | 14 | 2 |
| **Specialist and State Research Organisations** | | | | | | | |
| National College of Art and Design | 5 | 4 | 0 | 1 | 0 | 0 | 0 |
| National College of Ireland | 3 | 0 | 0 | 0 | 0 | 2 | 0 |
| Royal College of Surgeons in Ireland | 15 | 2 | 0 | 3 | 20 | 8 | 1 |
| Marine Institute | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Teagasc | 20 | 3 | 66 | 1 | 21 | 6 | 4 |

# Appendix 2 Summary data by RPO (continued)

## B2: IP and IP transactions 2016: Institutes of Technology

| | Total number of qualified invention/ software disclosures received during the year (sole and joint) | Total number of new patent applications filed during the year | Previously filed priority patent applications filed progressed to PCT in year % | Total number of patents granted in year | Total number of patents families owned by the RPO at year end | Total number of Licensing, Options and Assignments executed (LOAs) | Market launches of products or services in year based on RPO licence |
|---|---|---|---|---|---|---|---|
| **Institutes of Technology** | | | | | | | |
| Athlone Institute of Technology | 5 | 0 | 0 | 0 | 0 | 5 | 0 |
| Cork Institute of Technology | 20 | 3 | 0 | 1 | 12 | 5 | 1 |
| Dublin Institute of Technology | 39 | 11 | 35 | 4 | 23 | 11 | 5 |
| Dundalk Institute of Technology | 2 | 0 | 0 | 0 | 1 | 2 | 2 |
| Galway-Mayo Institute of Technology | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Dun Laoghaire IADT** (Nil Return) | | | | | | | |
| Institute of Technology Blanchardstown | 0 | 0 | 0 | 0 | 1 | 2 | 1 |
| Institute of Technology Carlow | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Institute of Technology Sligo** (Nil Return) | | | | | | | |
| Institute of Technology Tralee | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Institute of Technology Tallaght | 0 | 0 | 0 | 0 | 2 | 3 | 0 |
| Limerick Institute of Technology | 4 | 0 | 0 | 0 | 0 | 1 | 0 |
| Letterkenny Institute of Technology | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Waterford Institute of Technology | 9 | 4 | 66 | 0 | 1 | 7 | 1 |

# Appendix 2 Summary data by RPO (continued)

## C1: Spin-out companies, incubation & use of facilities 2016: University, Specialist and State research organisations

| | Number of spin-outs established during the year | Number of staff or student start-ups established during the year | Number of Active spin-outs in existence at the end of the year | Number of companies supported within the incubator in year | Number of contracts with companies for use of facilities and equipment at the RPO |
|---|---|---|---|---|---|
| **University** | | | | | |
| Dublin City University | 1 | 10 | 10 | 24 | 13 |
| Maynooth University | 2 | | 12 | 20 | |
| NUI Galway | 5 | 5 | 12 | 36 | |
| Trinity College Dublin | 3 | 14 | 26 | 11 | 557 |
| University College Cork | 4 | 10 | 10 | 23 | 120 |
| University College Dublin | 3 | | 18 | 31 | |
| University of Limerick | 2 | | 9 | 29 | 109 |
| **Specialist and State Research Organisations** | | | | | |
| National College of Art and Design | 0 | 0 | 1 | 1 | 0 |
| National College of Ireland | 1 | 1 | 0 | 15 | 4 |
| Royal College of Surgeons in Ireland | 0 | 0 | 2 | | 0 |
| Marine Institute | 0 | 0 | 0 | 0 | 0 |
| Teagasc | 1 | 0 | 1 | 2 | 15 |

# Appendix 2 Summary data by RPO (continued)

## C2: Spin-out companies, incubation & use of facilities 2016: Institutes of Technology

| | Number of spin-outs established during the year | Number of staff or student start-ups established during the year | Number of Active spin-outs in existence at the end of the year | Number of companies supported within the incubator in year | Number of contracts with companies for use of facilities and equipment at the RPO |
|---|---|---|---|---|---|
| **Institutes of Technology** | | | | | |
| Athlone Institute of Technology | 0 | 3 | 0 | 28 | 0 |
| Cork Institute of Technology | 2 | 5 | 1 | 75 | 1 |
| Dublin Institute of Technology | 2 | 0 | 11 | 37 | 5 |
| Dundalk Institute of Technology | 1 | 1 | 2 | 21 | 0 |
| Galway-Mayo Institute of Technology | 0 | 0 | 0 | 47 | 11 |
| **Dun Laoghaire IADT** (Nil Return) | | | | | |
| Institute of Technology Blanchardstown | 0 | 0 | 1 | 72 | 0 |
| Institute of Technology Carlow | 0 | 1 | 1 | 22 | 2 |
| **Institute of Technology Sligo** (Nil Return) | | | | | |
| Institute of Technology Tralee | 0 | 0 | 0 | 36 | 1 |
| Institute of Technology Tallaght | 0 | 0 | 0 | 37 | 3 |
| Limerick Institute of Technology | 0 | 0 | 0 | 87 | 1 |
| Letterkenny Institute of Technology | 0 | 5 | 0 | 51 | 0 |
| Waterford Institute of Technology | 1 | | 2 | 29 | 6 |

# Appendix 3 List of Research Performing Organisations (RPOs)

Those not returning data for 2016 in red

| Reporting Sector | Institution |
|---|---|
| **University** | University College Dublin |
| | Dublin City University |
| | University College Cork |
| | National University of Ireland Galway |
| | Maynooth University |
| | Trinity College Dublin |
| | University of Limerick |
| **Institute of Technology** | Dublin Institute of Technology |
| | Waterford Institute of Technology |
| | Cork Institute of Technology |
| | Athlone Institute of Technology |
| | Institute of Technology Blanchardstown |
| | Institute of Technology Carlow |
| | Dundalk Institute of Technology |
| | Dun Laoghaire Institute of Art, Design & Technology |
| | Galway-Mayo Institute of Technology |
| | Letterkenny Institute of Technology |
| | Limerick Institute of Technology |
| | Institute of Technology Sligo |
| | Institute of Technology Tallaght |
| | Institute of Technology Tralee |
| **Specialist Institute** | National College of Ireland |
| | National College of Art and Design |
| | Royal College of Surgeons in Ireland |
| **State Body Sector** | Marine Institute |
| | Teagasc |

# Appendix 4 Glossary

**Active Spin-out**
An Active Spin-out is an RPO-created spin-out company that is at least three years post-formation (three years since being reported as an RPO spin-out) and, as at the end of the reference year, has at least one paid employee and has raised equity and/or has booked sales revenue. It is an incorporated entity which at the time of formation was dependent on the exploitation of specific intellectual property rights of the RPO. The RPO will have executed a licence to the spin-out for the IPR and/or will hold equity in the spin-out. (Excludes start-ups).

**Assignment**
Contract transferring ownership of right in IP to a third party.

**Collaborative Research agreement**
Contractual arrangement covering Collaborative Research programmes where the RPO and company work together on a research project of mutual interest. Funding may be solely from the company or may be part-funded by the company with some level of co-funding from government sources.

Characteristics of collaborative research with industry: *The purpose of collaborative research is the generation of new knowledge. Typically, there will be an expectation of publication although the project may be governed by aspects of confidentiality. Intellectual property may be created and how the company benefits will be determined in the collaboration agreement and will depend on the contribution to the project made by the company.* (Excludes contract services, consultancy, academic collaborations and research grants).

**Consultancy Services agreement**
Contractual arrangement covering Consultancy Services projects where the RPO provides professional-level work to an external client organisation through an academic, researcher or other member of RPO staff in exchange for a commercial fee. The work is specified (or agreed) by the client against deliverables agreed with the RPO.

Characteristics of consultancy services: *The purpose of consultancy is not typically the generation of new knowledge, rather it draws on existing knowledge. There will usually be no expectation of publication, results will be confidential and will be transferred to the client. The type of work might typically involve one or more of the following: advice; analysis; production of a report. Projects will generally be of a short term.* (Excludes collaborative research and research grants).

**Equity**
Shareholding in a legal entity.

**FTE**
Full Time Equivalents – People working part-time are only included for the fraction that they are employed.

**Incubator**
A dedicated facility on the RPO campus in which early stage companies are housed and supported (pre- and post-formation). The facility may offer desk space, laboratory space or a mix of both.

**Invention disclosure**
The invention disclosure is the first actual recording of potential new intellectual property (IP). The researcher/inventor and TTO/ILO will complete an Invention Disclosure Form (IDF) which is a written, signed and dated record. The IDF contains basic information, *including supporting data*, which helps to evaluate and subsequently, potentially, protect and commercialise the intellectual property.

**ILO**
Industry Liaison Office – the team responsible for managing KT services, including intellectual property management, licensing, partnering with industry and the creation of new companies.

# Appendix 4 Glossary (continued)

**Joint invention/software disclosure**
Simultaneous reporting of an Invention Disclosure for the same invention or software to more than one RPO that has been created jointly by more than one RPO via the TTO/ILO.

**KT**
Knowledge transfer – the sharing of expertise, capability, technology and intellectual property between the research base and industry or the public sector with the aim of developing new or improved products, processes and services that deliver societal and economic benefit.

**Large Company:**
A company which is based in one country only and which has more than 250 employees and has either an annual turnover greater than €50M or an annual Balance Sheet total greater than €43M.

**Large Company Irish:**
A Large Company which is based in Ireland

**Licence**
A contract under which IP rights are transferred from one party to another for the purpose of commercialisation.

**LOA – Licence, Option or Assignment**
A contract under which IP results are transferred, or agreed to be transferred, from one party to the other for the purpose of commercialisation.

**MNC**
A multi-national corporation that has its facilities and other assets in at least one country other than its home country. Such companies have offices and/or factories in different countries and usually have a centralized head office where they co-ordinate global management.

**MNC Irish**
An MNC which has its HQ based in Ireland and/or which has a significant R&D presence in Ireland.

**Non-commercial entity**
Public sector organisation or charity.

**Option**
A contract under which the RPO grants a potential licensee a period of exclusivity during which it can decide whether it may wish to take a licence to the intellectual property and negotiate the terms of a licence agreement. The option period may include evaluation of the IP by the potential licensee (including assessing the technology). This may be called an Option & Evaluation agreement.

**PCT**
Patent Cooperation Treaty – the Treaty makes it possible to seek patent protection for an invention simultaneously in each of a large number of countries by filing an "international" patent application.

**Priority filing**
The first filing of a patent application which will establish a priority date from which all national patents will derive. Depending on patent strategy the priority filing may be done as a provisional application or national patent application or regional or international (PCT) patent application.

**Reference year**
The twelve-month reporting period from January 1st to December 31st.

# Appendix 4 Glossary (continued)

**Research grant**
An academic grant not involving industry. An award to an RPO by a research funding agency (e.g. government agency, charity) to perform a programme of research with the intention of disseminating the research results and in which an industry party is not involved. Typical research funders may include; SFI, ERC, Wellcome Trust etc.

**RPO**
Research Performing Organisations – universities, Institutes of Technology and other research institutions funded primarily by public funds. Also referred to as PRO (Public Research Organisations).

**SME**
Has less than 250 employees and has either an annual turnover not exceeding €50m or an annual Balance Sheet total not exceeding €43M.

**SME Irish**
SME which has its head office in Ireland.

**Sole invention / software disclosure**
An Invention Disclosure for an invention or software created by one RPO and reported to that RPO via the TTO/ILO.

**Spin-out**
A spin-out company is an incorporated entity which at the time of formation was dependent on the exploitation of specific intellectual property rights of the RPO. The rights to the company can be linked to a specific researcher who was within the RPO at the time of company formation and who would be considered an academic founder. The RPO will hold equity in the spin-out and/or has issued the company with a licence to the IP.

**Start-up**
Company formed by staff or students from the RPO not based on knowledge or IP generated by the RPO and where there is no formal IP licence or equity share with the RPO.

**TTO**
Technology Transfer Office – the team responsible for managing KT services, including intellectual property management, licensing, partnering with industry and the creation of new companies.

# Notes

KTI
Knowledge Transfer Ireland
Where Research & Business Connect

**KTI Knowledge Transfer Ireland**
Enterprise Ireland
The Plaza
East Point Business Park
Dublin 3

**T** +353 (0)1 727 2000
**E** kti@knowledgetransferireland.com
**W** knowledgetransferireland.com

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