2015 Annual Review of Agenda 2020

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Executive Summary

This document evaluates Science Foundation Ireland's performance in 2015 against the objectives and targets set out in its Agenda 2020 strategy. Most of these targets are likely to be reached; some have been reached already.

Agenda 2020 is the Science Foundation Ireland strategic plan for 2013-2020. Agenda 2020 has four primary objectives as follows:

A. Science Foundation Ireland to be the best science funding agency in the world at creating impact from excellent research and demonstrating clear value for money invested
B. Science Foundation Ireland to be exemplar in building partnerships that fund excellent science and drive it out into the market and society
C. Science Foundation Ireland to have the most engaged and scientifically informed public
D. Science Foundation Ireland to represent the ideal modern public service organisation, staffed in a lean and flexible manner, with efficient and effective management

The strategic plan aims to ensure that government investment in science is beneficial, both in terms of societal and economic impact, and in provision of trained expertise to the labour market. Each primary objective has a number of ambitious targets with associated supporting key performance indicators (KPIs). These objectives are evaluated on a semi-annual basis in order to ensure that the ambitious targets are largely being met.

We summarise some highlights of 2015 achievements:

- Ireland had its best ever year for ERC awards in 2015.
- More EU grant awards have been made to Irish researchers than in recent years.
- Four Strategic Partnerships awards with industrial partners will have been made by end 2015.
- The Competitive Partnerships award, in partnership with Pfizer, will result in three awards being offered this year. The Competitive Partnerships award, in partnership with the Irish Cancer Society, resulted in one award being made in 2015.
- The 12 SFI Research Centres continue to perform at a high level and have been expanded through successful Spoke applications. The Research Centres now have 252 formal legal research collaborations, 115 of which are with MNCs, and 116 of which are with SMEs. These figures are in stark contrast to the 20 formal legal collaborations across the entire Irish research system in 2011 before the Research Centres Programme. The Research Centres attracted €59m of EU Horizon 2020 funding in 2015.
- Three reports, including two externally commissioned, by Amarach and Millward Brown are positively informing our outreach, aiding us in segmenting and targeting specific audiences and geographical areas of need
- Events at the Ploughing Championships and Science Week have drawn huge public interest, with general event footfall up on last year.
- Science coverage has increased during the period. Science Foundation Ireland and RTE agreed a science programming partnership.
- Public consultations such as the Open Policy Debate on Measuring Impact from Publicly Funded Research and events held as part of the Science Foundation Ireland Annual Summit were well supported.

- In terms of augmenting levels of expertise in strategic emerging research areas in Ireland, four Targeted Research Professorships will have been offered in 2015.
- Ireland has maintained its position in bibliometric rankings of repute, advancing to 14th position (based on data from Thomson Reuters InCites database).
- The cost of Science Foundation Ireland administration as a % of its total budget fell to 1.6%.

Science Foundation Ireland is making good progress towards meeting the ambitious goals laid out in Agenda 2020. This is demonstrated by the numerous success stories presented in this document, and also by the vast majority of KPI targets which are on course to be met or surpassed.

Illustrating Impact:

Ireland is ranked eighth in the world for innovation

Global Innovation Index, 2015.
https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2015-v5.pdf

Part 1: Key Performance Indicators (KPIs)

In this document, we follow the structure of the Agenda 2020 strategy. Sections discuss progress on each pillar's constituent objectives in conjunction with an update on the status of the related KPIs. Since many of the key developments are relevant to several of the objectives, we present the key developments subsequently in order to avoid unnecessary duplication. Finally, planned and suggested future actions are included in Appendix 1.

The most recent information available has been used; the data is from 2015 unless otherwise indicated. Details of Science Foundation Ireland programmes and awards are up-to-date; data arising from the Science Foundation Ireland Research Outputs exercise will be from 2014. 2015 Research Outputs data will be available in Q2 2016

Pillar A: To be the best science funding agency in the world at creating impact from excellent research and demonstrating clear value for money invested

A: Invest in research excellence in areas identified by National Research Prioritisation Exercises (discussed in detail on pages 19-23)

KPI	Baseline	Status in 2014	Current Status [2015]	Target
A1.3.1 Proportion of SFI expenditure in the areas identified in the 2012 Report of the Research Prioritisation Steering Group, and/or in areas of demonstrable potential economic impact for Ireland, and/or in areas of significant partnership with major research entities, and/or to support the development of young researchers	99% [2012]	99.3% [2014]	98.4% [2015]. Four ERC support grants were classified as non-NRP.	100% by 2015
A1.3.2 Ireland's place in international bibliometric rankings of repute	20 [2011]	17 [2014 to date][1]	14 [Nov 2015]	Remain inside Top 20 for period to 2020
A1.3.3 Presence of a top-tier international prizewinning scientist (e.g. Nobel Prize, Fields Medal European Science Prize, Lasker Prize) leading an SFI-funded team in Ireland	0	1 (Rank prize – Professor Eoin O'Reilly)		1 by 2015
A1.3.4 The winning of a prestigious international prize (e.g. Nobel Prize, Fields Medal, European Science Prize, Lasker Prize) by an SFI researcher/team	0	1 (Rank prize – Professor Eoin O'Reilly)	1; Werner Blau (TCD)-Nanosmat Prize 2015.	1 by 2020
A1.3.5 The level of early-career research support	€4.9 million or ~3.2% of total spend [2012]	€11.6 million or 7.6% of total spend [2014]	€6.6m to date (7.6m projected 2015 spend); 7.6% expenditure to date in 2015	50% increase by 2015 €7.4m per annum from 2015-2020

[1] This figure was calculated using Essential Science Indicators[SM] (Thomson Reuters). Countries that achieved particular distinction based on their papers published in Thomson Reuters-indexed journals were ranked based on cites per paper.

KPI	Baseline	Status in 2014	Current Status [2015]	Target
A1.3.6 The number of European Research Council awards secured by SFI researchers	3 SFI-funded[2] of 7 Starting Grant winners, 2 of 2 Advanced Grant winners, totalling €8.4 million [2011]	One Starter, one Consolidator and two Proof of Concept grants were awarded, totalling €3.9 million [2014] There was a delay (changeover from FP7-H2020), meaning many 2014 grants were awarded in 2015	3 SFI-funded of 10 Starting Grant winners, 4 SFI-funded[2] of 7 Consolidator Grant winners, 4 Proof of Concept grants, totalling €13.1 million	SFI researchers to secure €20 million per annum from the ERC by 2016; the equivalent of 3 ERC Advanced, 4 ERC Consolidator and 5 ERC Starting grants
A1.3.7 The attraction to Ireland of leading iconic scientists	0	1 [Professor Robert Bogdan Staszewski 2014]	4 awards in 2015 offered	Average 1 per year to 2020
A1.3.8 Increased representation of women in Science, Engineering and Technology (SET) in Ireland	19% Female Award Holders [2008-2012]	21% Female award holders [2013]	20% Female award holders [2014]. However, SFI early career initiatives (e.g. SIRG) and university Athena Swan initiatives should increase # of eligible female faculty in 2-3 years' time	25% of SFI award holders by 2020 Increased employment of women in Irish based SET industries – 10% increase from 2013 baseline.

A: Invest in SFI's translational research capability to enhance the progression of research from discovery to delivery (discussed in detail on pages 24-25)

KPI	Baseline	Status in 2014	Current Status [2015]	Target
A2.3.1 Proportion of invention disclosures, patents, licences and spin outs recorded by Enterprise Ireland that are linked to SFI research	Not yet Calculated (after RO 2015)	123 Invention Disclosures 73 Patents 27 Licence Disclosures 4 Spinouts [2013]	82 Invention Disclosures, 44 Patents, 18 Licence Disclosures, 1 Spinout [2014]	Double the 2011-2015 average by 2020

[2] SFI-funded refers to those that held significant PI-like awards in the year of or preceding the application. Totals show the euro value sum of ERC awards of SFI-funded Researchers only.

A2.3.2 Ireland's level of public-private co-publications	25.8 [2012]	34.4 [2013]	34.4 [2015] not updated by EU recently, checked IUS report 2015	50 publications per million population by 2020

A: Invest strategically in a set of centres that have the excellence and scale to be recognised internationally and act as attractors of international research talent and international capital (discussed in detail on pages 25-26)

KPI	Baseline	Status in 2014	Current Status [2015]	Target
A3.3.1 Number of internationally recognised research centres of scale in Ireland	0	12	12 [2015] 12 Research Centres have been funded of larger scale than initially envisaged. A new call will be run in 2016.	15 by 2016
A3.3.2 Major non-exchequer investment into such centres – for example from corporate R&D entities and international funders such as EU	0	46% reported. Figure doesn't include last 5 Centres; large initial SFI investment and little time for them to acquire external investment, artificial dip in 2015 figures. Recalculated for all 12 Centres, the figure for 2014 would be 25.5%	€58m from Non Exchequer sources, mostly EU, €39m from industry, 232 separate industry investments 35% (33.27% incl Spokes) to date[3]. Figure now includes 12 Centres.	Minimum of 50% of overall centres' funding by 2020

[3] The results of this KPI are calculated by forecasting to the end of the Research Centre Award; i.e. how close are we getting to the final target that investment by industry + non-exchequer funding is 50% of the overall centre budget by 2020

A: Drive increased hiring of SFI-trained researchers by Industry (discussed in detail on pages 26-28)

KPI	Baseline	Status in 2014	Current Status [2015]	Target
A4.3.1 % SFI trainees moving to industry as a first destination	25% of leavers [2009-2011]	17% [2013]	20% [2014]. Eventual destination 36% via LinkedIn tracking [2015]	50% by 2020.

Pillar B: To be the exemplar in building Partnerships that fund great science and drive it out into the market

B: Build Strategic Partnerships (discussed in detail on pages 29-32)

KPI	Baseline	Status in 2014	Current Status [2015]	Target
B1.3.1 Joint funding instruments with key agencies (Irish and International) and companies aligned to Agenda 2020	With agencies: €1.4m or 0.9% of spend [2012] With companies: €0.0m [2012]	With agencies: €1.6 million or 1.1% of spend [2014] With companies: €1.14 million or 0.74% of total spend [2014]	With agencies: €3.51 million or 3.99% of spend [2015 to date] With companies: €2.29 million or 2.60% of spend [2015 to date]	A measurable increase in the joint funding instruments by 2020

KPI	Baseline	Status in 2014	Current Status [2015]	Target
B1.3.2 Relationships developed with Ireland's international strategic partners, as identified Government policy	122 academic collaborations and 12 non-academic collaborations on average per annum [2010-2012]	220 academic collaborations (104 with the US and UK, 116 with ISCA countries) 78 non-academic collaborations (72 with the US and UK, 6 with ISCA countries) [RO-2013]	185 Academic Collaborations (118 with the US and UK, 67 with ISCA countries) 356 non-academic collaborations (302 with the US and the UK, 54 with ISCA countries) [RO-2014]	Demonstrable increase in collaborations with these partners in 2020
B1.3.3 Level of leadership roles in major European initiatives, in particular Horizon 2020	22 leaders on average per annum [2009-2011]	35 EU leadership roles [2013]	15 EU leadership roles [RO-2014]	Double the number of initiatives led by SFI funded awardees to 260 initiatives over the 7 year period (37 per year)

B: Diversify the Funding Sources for Ireland's Scientific Base (discussed in detail on pages 32-34)

KPI	Baseline	Status in 2014	Current Status [2015]	Target
B2.3.1 Research income secured by SFI researchers from international funding entities such as the EU	€60m on average per annum [2008-2011]	€54 million [2013]	€34 million [2014]	Double the average figure between 2008-2011, to €120m per annum by 2020

KPI	Baseline	Status in 2014	Current Status [2015]	Target
B2.3.2 Major test beds established in Ireland	0	1 (Connect RC)	2: INFINITE (EMC, Vodafone, CIX). Galway Bay Cabled Ocean Energy Testbed & Observatory (MaREI/UCC, SEAI, SmartBay, DCU).	Average of one major new test bed per year from 2014 onwards
B2.3.3 Funding profile of SFI researchers	60% dependent [2011]	35% dependent, 65% independent	39% dependent, 61% independent [2014]	Reduce to 30% the number of SFI researchers that rely on SFI for the majority of their funding by 2020
B2.3.4 Partnership funding with industry	0 Not Applicable [2012]	1 (Pfizer)	Pfizer competitive joint partnership: Irish Cancer Society competitive joint partnership: 1 proposal funded in 2015. 4 Strategic Partnership Awards..	Co-fund at least one partnership per year to 2015 and at least 2 per year from 2016-2020

Pillar C: To have the most engaged and scientifically informed public (discussed in detail on pages 35-37)

KPI	Baseline	Status in 2014	Current Status [2015]	Target
C1.3.1 Increased coverage of SFI and science by the media- for example, in news coverage, in documentary coverage, and in entertainment and children's programmes	TV series: **Baseline**: 0 [2012] Traditional media: **Baseline**: 606 newspaper articles on average per annum [2009-2012] New media: **Baseline**: 1,316,028 Discover/SFI webpages visits 21,397 various account holders [2012]	TV Series: 1 Traditional media: To date 550 newspaper articles referencing SFI New media: To date 392,165 Discover/SFI website visits; 73,033 unique visits	TV Series: 3 + SFI RTE partnership Traditional media: To date 773 newspaper articles referencing SFI (1st Jan-30th Nov 2015) New media: 489,039 Discover/SFI website visits; 182,652 unique visits.	By 2014, the presence of at least one science programme /series in the peak schedule of the national broadcaster, annually. Double the 2009-2013 average level of SFI coverage (as a proxy for mainstream science) in traditional media by 2020, and establish measurable presence in new media/online space
C1.3.2 Level of take-up of STEM subjects at secondary school and third level	Secondary Level: 221,919 [2007-2011] Third Level: 26% [2007-2011] 29% [2012]	Secondary Level: 243,442 [2014] Third Level: 31%	Secondary Level: 252,753 [2015] Third Level: 30% [2015]	Arrest decline observed over 2007-2011 and subsequently drive a measurable increase

Pillar D: To represent the ideal modern public service organisation, staffed in a lean and flexible manner, with efficient and effective management (discussed in detail on pages 38-39)

KPI	Baseline	Status in 2014	Current Status [2015]	Target
D1.3.1 Cost of administration	3.87% (€7.9m/€205 m) [2012]	2% (€9m/€465m) [2014]	1.6% (€6.7M/ €431M) [2015]	Below 5% annually
D1.3.2 Efficiency of grant review and management process (time-to grant and time-to-manage metrics)	Average of 7 months, 18 days [2012]	Average of 6 months and 15 days [2014]	Average of 5 months and 29 days [2015]	To be in the top quartile by 2015 by international benchmarks. (*No official benchmarks exist, but average time to grant, H2020, ERC (EU), NIH, NSF (USA), Wellcome, BBSRC, EPSRC (UK) and NSERC (Canada) is approx. 7 months and 8 days.)*

KPI	Baseline	Status in 2014	Current Status [2015]	Target
D1.3.3 Attractiveness of SFI as an employer and employability of SFI staff	Internships: **Baseline**: 2 [2012] SFI Roles: **Baseline**: >50 applicants per role [2013] Leavers: **Baseline**: 4 of 8 leavers to senior roles [2012]	Internships: 6 [2014] SFI Roles: ~90 applicants for Director of Programmes role (19 shortlisted), 2 secondments ([2014] Leavers: 2 of 2 leavers to senior roles [2014]	Fellowships: 6 [2015] SFI Roles: 1 x SPO (Pre-Award, 39 applicants) 1x HR (4 applicants) and 5 x Centres Post-Award SPOs, hired on secondments (app # not available) Leavers: 2 leavers to senior roles, 2 leavers to management roles, [2015].	Example: >4 internships /year from 2013 >2 secondments per year from 2014 >one placement by international funding agencies from 2014
D1.3.4 Develop a concordat to support research integrity	0	Concordat developed	Concordat developed	Developed by 2013 National Policy Statement On Ensuring Research Integrity In Ireland is published on the IUA website http://www.iua.ie/wp-content/uploads/2014/06/National-Policy-Statement-on-Ensuring-Research-Integrity-in-Ireland-2014.pdf

KPI	Baseline	Status in 2014	Current Status [2015]	Target
D1.3.5 Developed audit of SFI funded HEIs to include areas such as research integrity, compliance with legal, ethical and licensing obligations, IP integrity, transparent, robust and fair processes to deal with allegations of research misconduct	Not Applicable	Ongoing	Ongoing, questionnaire has been circulated to the HEIs	Conducted by 2014

Action plan focussing on at-risk targets

Here we present a short list of examples of ongoing and future actions which Science Foundation Ireland will undertake in order to better succeed in the KPI targets presented above. The focus is on areas for which the KPI targets are at risk of not being met.

A1.3.3 Presence of a top-tier international prizewinning scientist (e.g. Nobel Prize, Fields Medal European Science Prize, Lasker Prize) leading an SFI-funded team in Ireland
A1.3.4 The winning of a prestigious international prize (e.g. Nobel Prize, Fields Medal, European Science Prize, Lasker Prize) by an SFI researcher/team
An increase in prize winner numbers would be welcome. We should bear in mind that Ireland's history of State funding for scientific research dates from the late 1990s, which is recent by international standards.

- The Research Professorship Programme is recruiting world class scientists to Ireland.
- Explore possibility of re-opening the Walton Programme and/or including a budget line in the Research Centres for Walton/STTF type programmes.
- Investigate the various prizes that exist internationally and determine if there are Science Foundation Ireland researchers who should be nominated for these prizes.

A1.3.6 The number of European Research Council awards secured by SFI researchers
Increased numbers of higher quality proposals being submitted to the ERC Advanced Grants scheme is the critical remaining action item for Irish ERC performance. Science Foundation Ireland will continue its ERC Support and Development schemes to incentivise participation in all of the ERC's schemes. We will encourage Irish HEIs to recruit outstanding ERC applicants from other countries (either funded or deemed fundable) utilising the Science Foundation Ireland ERC Development and revamped Support Scheme. Suitable applicants in the Irish system, for example in the Science Foundation Ireland Research Centres, will also be targeted to apply.

A1.3.7 The attraction to Ireland of leading iconic scientists

Targeted Research Professorship awards have been offered in 2015; one was made in 2014. A number of other potential candidates are being assessed. The Future Research Leaders Award, to be implemented in 2016, addresses the need to attract leading scientists at an earlier career stage. Stars matter and an excellent researcher will rapidly attract talented young people from around the world to work with them. In terms of recruitment of Science Foundation Ireland Research Professors, take home pay can be a big obstacle - this is caused by a combination of the salary cap and high taxation and is currently managed under the Departures Framework. This often does not work as desired, perhaps due to the higher levels of personal taxation in Ireland.

A1.3.8 Increased representation of women in Science, Engineering and Technology (SET) in Ireland

There are a number of initiatives being pursued that may enhance the numbers of eligible female applicants in HEIs; TCD and UL have acquired Athena-Swan Bronze awards and other institutions are planning to apply. The SIRG measure taken, where HEIs can put forward a maximum of six male candidates but up to twelve applicants in total, have been effective: 46% of applicants to SIRG in 2015 were female by comparison with 27% in the previous call. Additionally, this will hopefully have an influence on potential applicants to more senior awards (CDA, IvP) in future years as careers progress. The Science Foundation Ireland Diversity group is considering future actions with respect to encouraging gender balance in other Science Foundation Ireland programmes. Targets are being set with regard to the use of female reviewers. Science Foundation Ireland is introducing unconscious bias training for its staff and reviewers in 2016. A training provider has been selected, and Science Foundation Ireland staff will be trained in February 2016; this will act as a pilot training session permitting refinement of the remote training to be provided to Science Foundation Ireland international reviewers.

A2.3.1 Proportion of invention disclosures, patents, licences and spin outs recorded by Enterprise Ireland that are linked to SFI research.

Various workshops have been organised this year, including a Founder's Forum workshop with FI funded founders of tech start-ups and a meeting of the most successful SFI PIs who have successfully commercialised their research. These produced key learnings, recommendations for improving existing programmes etc. A workshop on IP was also held, and the TIDA Get Started Technology course had over 60 participants this year. These resulted in several recommendations, including suggested support for strategic development of patent portfolios. Science Foundation Ireland will consider how to further several of these recommendations. The establishment of Knowledge Transfer Ireland and the expansion of many HEI TTO offices will assist Science Foundation Ireland in furthering this agenda.

A2.3.2 Ireland's level of public-private co-publications

Science Foundation Ireland has expanded funding of high quality partnerships through the Research Centres, Spokes and Partnership programmes where collaborations are more likely to yield public-private co-publications. However, the EU statistics centre responsible for measuring this metric on a country-wide basis has not updated their figures since 2012. Science Foundation Ireland is considering measuring co-publication of its own output via the Research Outputs 2015 exercise.

A4.3.1 % SFI trainees moving to industry as a first destination

Science Foundation Ireland is continuing to expand initiatives such as the Industry Fellowship. Funding of TIDA, which covers commercialisation of research and industry interactions as part of its remit, is ongoing; this programme is being independently assessed this year. Various showcasing of research talent to industry style events have been held this year. Expansion of the Centres and Partnerships will no-doubt have the welcome side effects of introducing more researchers to industry partners. However, researcher tracking by both Science Foundation Ireland and TCD suggest that first destination employment is often academic; but after 7 years, a majority of PhD graduates are working in the private sector. In the light of these data, this KPI may be sub-optimally worded and may be better worded as "% of SFI trainees moving to industry within 7 years of obtaining their PhD". This will be considered in any revision of Agenda 2020 but in line with best practice with strategy policy documents, no KPI will be altered except to make it more stretching until there is an official revision or review of Agenda 2020. Science Foundation Ireland will be intensifying monitoring of team leavers/SFI alumni to reflect the increased need to report on human capital outputs of research grants. The establishment of career support centres for postdoctoral researchers may be a key influence in this regard. Enterprise Ireland and the IDA have been requested to promote the Industry Fellowships to their client companies.

B1.3.3 Level of leadership roles in major European initiatives, in particular Horizon 2020

Recommendations here include increasing the budget for supporting grant programmes and ERA-Nets/JPIs, and increasing the budget for support by the HEIs. HEIs are expanding research offices to offer H2020 support. Science Foundation Ireland, through the recently created European Affairs team, is supporting the leveraging of funding for Science Foundation Ireland researchers through participation in European initiatives, such as ERA-Nets, Joint Programming Initiative, ESFRI etc.. The 2015 Science Foundation Ireland Investigators Programme (IvP) Call was launched in Q1 2015. Proposals were required to align with topics encompassed by the Industrial Leadership and Societal Challenges Pillars of H2020. The 62 applicants that made it to Round 2 of the selection process have been offered a H2020 Catalyst Award, supporting preparations for H2020 consortium building and other activities carried out in preparation for H2020 applications.

B2.3.1 Research income secured by SFI researchers from international funding entities such as the EU

As stated earlier, Ireland has improved its success rate in H2020 markedly. Recommendations for B1.3.3 apply to this KPI also.

Part 2: Detailed review of SFI's progress against its Key Performance Indicators

Pillar A: To be the best science funding agency in the world at creating impact from excellent research and demonstrating clear value for money invested

A: Invest in research excellence in areas identified by National Research Prioritisation Exercises

The vast majority of Science Foundation Ireland funding, over 98%, was allocated to National Research Priority Areas (NRP); areas of demonstrable potential economic impact for Ireland; areas of significant partnership with major corporate or research entities; and/or to support the development of young researchers. Exceptions mainly related to ERC support grants for ERC awardees in areas not directly aligned with the NRPs. Support for excellence in attracting ERC funding is an important national objective with positive economic impact for Ireland, and also supports fulfilment of the national target for Horizon 2020 drawdown of €1.25bn by 2020.

The Science Foundation Ireland Investigators Programme 2014 resulted in 23 awards, seven of which were made in collaboration with the Department for Employment and Learning Northern Ireland (DEL NI). The 2015 Science Foundation Ireland Investigators Programme (IvP) Call was launched in Q1 2015. Proposals were required to align with topics encompassed by the Industrial Leadership and Societal Challenges Pillars of H2020. A number of Government departments and funding agencies are involved collaboratively; co-funding partners include DEL NI, Teagasc, the Geological Survey of Ireland (GSI), the Marine Institute (MI), the Environmental Protection agency (EPA) and the Irish Research Council. IvP will address vital research questions, expand STEM career opportunities in Ireland, and prompt success in subsequent H2020 applications. The 62 applicants that made it to Round 2 of the selection process have been offered a H2020 Catalyst Award, supporting preparations for H2020 consortium building and other activities carried out in preparation for H2020 applications. IvP applications are currently under review, with awards to be made in the early part of 2016.

Ireland's place in international bibliometric rankings of repute

Science Foundation Ireland calculates Ireland's place in bibliometric rankings on a 6 monthly basis; our placing will vary slightly from month to month. Ireland is currently ranked 14th, based on Thomson-Reuters InCites[4] data. Subject areas of excellence in which we are performing well include Nanotechnology, in which we are ranked 2nd in the world, Immunology; Agricultural Sciences and Materials Science, for which we are ranked 3rd; Animal and Dairy Science, 4th; Chemistry, 5th; Mathematics, 5th; Computer science, 7th; Microbiology, Neuroscience and Behaviour, 9th; Molecular Biology and Genetics, 12th; and Basic Medical Research, 14th.

[4] https://incites.thomsonreuters.com/#/analytics

International Prizewinners

Prof. Werner Blau from TCD won the 2015 Nanosmat Prize at the Nanotechnology conference in Manchester, and Professor Fergus Shanahan, who is the 2015 recipient of the Irish Society for Immunology Public Lecture Award

Prof Katherine (Kate) Fitzgerald, Professor of Medicine at the University of Massachusetts Medical School, was presented with the 2015 Science Foundation Ireland St. Patrick's Day Science Medal by An Taoiseach, Mr Enda Kenny in Washington D.C. on March 16th 2015. The St. Patrick's Day Medal is a Science Foundation Ireland award for distinguished Irish scientists, working in the USA, who have continued to positively impact upon the research landscape within Ireland.

Illustrating Impact:

Dr Werner Blau, Professor of Physics of Advanced Materials in Trinity College Dublin's School of Physics, and Principal Investigator at AMBER, has been awarded

Illustrating Impact:

Professor Geraldine Boylan and Professor Louise Kenny were awarded the Science Foundation Ireland Joint Researchers of the Year 2015 at the SFI Science Summit. The award was presented by Minister for Skills, Research and Innovation, Damien English TD to an audience of 300 researchers in attendance. Professor Geraldine Boylan and Professor Louise Kenny, the joint Directors of INFANT, are global leaders in reducing the burden of disease and disability associated with the period just before and after birth.

We congratulate the above researchers. This KPI target refers to top tier prizewinners leading Science Foundation Ireland teams; as such we consider that it has not yet been met. Science Foundation Ireland will continue its efforts to meet this target using programmes such as Research Professorship and the to-be-launched Future Research Leaders. Consideration will be given to launching a programme which would enable such prizewinners to undertake long-term research visits to Ireland.

Early career research support

Science Foundation Ireland continues to support early career development, through programmes such as SIRG, CDA, PIYRA (now replaced by Future Research Leaders), and Industry Fellowship. The scope of SIRG has been expanded to facilitate the participation of more female applicants, as described above. The new Future Research Leaders award has been designed to attract leading expertise from abroad and will be launched in early 2016. The projected spend on these early career programmes is €7.6m; higher than the €7.4m per annum target for the 2015-2020 period. With active calls for both SIRG and CDA and the imminent introduction of the Future Research Leaders Award, levels of support will increase in 2016.

Illustrating Impact:

Stephen Dooley (SIRG award 2013, UL): Dr Dooley has been approached by the newly formed Clean Combustion Research Centre at King Abdullah University of Science and Technology, Saudi Arabia to join their team as a funded collaborator. Dr. Dooley was awarded $348,000 over 4 years in order to contribute to their program on "Fuels for Advanced Combustion Engines".

ERC Awardees

Science Foundation Ireland supported investigators have had an exceptionally successful year with respect to ERC awards. The 2014-2015 calls saw three SFI-funded awardees out of 10 Starting Grant winners, four SFI-funded awardees out of seven Consolidator Grant winners and four Proof of Concept grants, totalling €13.1 million. Calculations based on Ireland's *juste retour* figure, and correcting for the cohort of ERC awardees outside of Science Foundation Ireland's remit, would give targets of between €12-15m for this KPI per year. €20m per year in ERC funding from SFI-funded researchers is thus ambitious. It is noteworthy that this KPI was not met this year even though 2015's Irish performance in the ERC was, by some distance, the best ever. Increased national performance in the ERC Advanced Grant would significantly increase the chances of meeting this KPI target.

Attracting Overseas Talent

The new Future Research Leaders and Research Professorship awards are intended to attract investigators to Ireland in order to set up research groups, particularly in areas in which there may be gaps in indigenous expertise (e.g. Advanced Manufacturing) or to strengthen emerging areas of national priority. Currently there are a few mismatches between the demands in the Irish economy and current areas of research strength. The recruitment of research leaders to build capacity and to catalyse research activities in key sectors is vital for attracting FDI, leverage of European Union research funding under Horizon 2020, and maintaining Ireland's place in international rankings. At a senior level, the Science Foundation Ireland Research Professorship Programme is the primary mechanism for the recruitment of top tier research talent to Ireland. The recruitment of such star researchers will also enhance Ireland's reputation as an international centre of research excellence. Science Foundation Ireland has funded a Research Professor award in 2014, awarded to Prof. Robert Bogdan Staszewski, who specializes in the Internet of Things, and collaborates significantly with industry, for example Analog Devices and Xilinx who are contributing to his salary. Four further awards have been offered in November 2015 in the areas of Advanced Manufacturing (two awards), Immunology, and Medical Devices. Fifteen applications are under review in areas including Medical Devices, Manufacturing, Digital Platforms, Biomedical Engineering, Energy and Agri-Food.

Gender balance in research

In recognition of the under-representation of women in many areas of science world-wide (mathematics, engineering, physical sciences and ICT in particular), a diversity working group has been continuing its work within Science Foundation Ireland and a number of initiatives have been implemented in order to increase both the proportion of female reviewers assessing proposals submitted to Science Foundation Ireland, and to increase the proportion of female award holders. The 2015 SIRG call included a doubling of the number of applicants (from 6 to 12) that each HEI was able to put forward, so long as a maximum of 6 applicants were male. Four HEIs put forward the maximum number of 12 applicants under this scheme. Overall, 46% of applicants to the 2015 SIRG call were female by comparison to 27% in the previous call.

Illustrating Impact:

Certain groups, including girls and those from disadvantaged backgrounds are under-represented in STEM related careers. SFI funded outreach programmes such as the Science Zone at the St. Patrick's Festival Big Day Out, the Midlands Science Festival and Girls Hack Ireland are intended to counteract underrepresentation. The Science Zone reaches over 40,000 people and places science in the everyday conversations and lives of families. Similarly, the Midlands festival is particularly aimed at a community and region with a low progression rate to STEM third level courses. Girls Hack Ireland organises weekend events for young girls to meet and identify with young female mentors and learn key coding skills.

The Athena-Swan Charter is a UK initiative which endeavours to address the under-representation of women and minorities in senior positions in British academia (an issue also pertinent within the Irish system). The scheme is run by the Equality Challenge unit. Initially adopted by 10 British universities, Athena Swan awards have now been taken up by over 150. A number of years ago, Science Foundation Ireland offered funding to WiSER (Women in Science and Engineering Research). This group was run within TCD and offered mentorship programmes and courses to female researchers. The existence of WiSER allowed application to EU equality programmes of a similar nature; TCD was successful in gaining EU FP7 funding for INTEGER (INstitutional Transformation for Effecting Gender Equality in Research), which aimed to address institutional underrepresentation of women via institutional policy change level. Participating institutions included TCD, Siauliai University in Lithuania, and the CNRS in France; monitoring visits from NSF Advance (USA) and Athena-Swan (UK) were incorporated. This initiative led to negotiation by Irish HEIs in order to allow them to participate in Athena-Swan. A number of Irish universities submitted applications to the scheme in 2015; the University of Limerick and Trinity College Dublin have received Bronze Awards. Renewal of this scheme is dependent on continued progress, meaning that it is in the best interests of participating institutions to continue with reform.

Science Foundation Ireland has targeted an increase in female award holders to 25% in 2020. The current number of female award holders is 20% in 2015. Science Foundation Ireland runs a number of schemes intended to address gender inequality issues, in addition to modifications to the 2015 SIRG call (mentioned above). The ICA scheme is run as part of the Investigators Programme. Anyone who has taken a prolonged absence of more than 12 weeks since 2007 (including maternity leave) is eligible. The ICA programme offers general research grants, which can include the financing of teaching buyout for those returning from a career break. The Advance grant was offered in 2014. The aim of this programme was to support researchers returning to work after an absence from the workforce for a number of years, as well as those who had been on maternity leave(s). The initiative allowed return to work in a research lab for a two year period. Links to industry were included in the funding proposal; the aim was to improve the employment prospects of the candidate at the end of the two year period. Part time work from 50% of time upwards was permitted. Mentors (PIs) could be of either gender. This programme is currently being re-evaluated as the primary aim of attracting those with long term absences from the workforce was not optimally achieved. However, Science Foundation Ireland plans to introduce further programmes addressing diversity in the future. Science Foundation Ireland is introducing unconscious bias training for its staff and reviewers in 2016. A training provider has been selected, and Science Foundation Ireland staff will be trained in February 2016; this will act as a pilot training session permitting refinement of the remote training to be provided to Science Foundation Ireland international reviewers. In 2015 Science Foundation Ireland applied to join the GENDER NET ERA-Net consortium. GENDER NET is a transnational research policy initiative funded by the European Commission, designed to address the common challenges still facing European research institutions in achieving gender equality in research and innovation. Cumulatively, Science Foundation Ireland is optimistic that the 25% target will be met in 2020; the effects of our funding initiatives, allied to the enthusiasm of the HEIs with regard to participation in Athena-Swan, should have a significant and positive effect on the numbers of potential female applicants.

Illustrating Impact:

Fatima Gunning (Career Development Award, 2013, Tyndall): "The award enabled visibility of expertise, know-how and infrastructure available, which was fundamental in the application for a collaborative research project for H2020 (TIPS). TIPS was successfully awarded and commenced in February 2015".

A: Invest in SFI's translational research capability to enhance the progression of research from discovery to delivery

> ***Illustrating Impact:***
>
> *HeyStaks – a spin-out company from the SFI INSIGHT Centre- was co-founded by Prof Barry Smyth in 2010, and is to create 20 jobs as part of a major €1.5m investment in partnership with Digicel. HeyStaks offers smartphone behaviour analysis.*
>
> *Iconic Translation Machines Ltd., spun out by CNGL (now ADAPT), raised €400k in seed funding earlier this year and will create 15 jobs as a result. Iconic Translation provides cloud-based translation solutions to language service and translation companies.*
>
> *https://www.insight-centre.org/content/insight-spin-out-heystaks-create-20-jobs-after-%E2%82%AC15m-investment*
>
> *http://www.irishtimes.com/business/technology/iconic-translation-to-create-jobs-after-raising-seed-funding-1.2293737*

82 Invention Disclosures, 44 Patents, 18 Licence Disclosures and 1 Spinout were linked to Science Foundation Ireland research funding (data were obtained from the 2014 Research Outputs and verified by Knowledge Transfer Ireland (KTI)). In this case, the baseline for this target cannot yet be calculated; results from the 2015 Research Outputs exercise are required; these will be collated in Q2 2016. The target involves doubling the 2011-2015 average in terms of the proportion of invention disclosures, patents, licences and spin outs recorded by Enterprise Ireland that are linked to Science Foundation Ireland research (prior to 2011, these data were not collected by Enterprise Ireland or Science Foundation Ireland).

Science Foundation Ireland was a key stakeholder in Startup Gathering 2015 in October 2015. The agency hosted two events, the TIDA Pitch off and the Science Foundation Ireland Founders Forum. Science Foundation Ireland also provided considerable support to the initiative through its membership on the National Steering Group and Communications Steering Committee. The TIDA (Technology Innovation Development Award) Programme provides funding for commercialisation of novel research findings. Funding runs for a year, including attending the "Get Started Technology Programme"; a comprehensive nine day course run by the DCU Ryan academy. Approximately 60 people attended the courses in 2015. The TIDA course is designed to assist budding scientific entrepreneurs with the commercialization of a product; topics include entrepreneurial skills/mindsets, access to funding (venture capital, bank loans etc), IP and licencing, legal aspects of setting up a start-up, shareholdings, project management and associated plans, pitching your idea to investors, sales etc. Attendees included TIDA awardees and/or their team members and new Science Foundation Ireland staff and Fellows. The timetable included a "pitch off" competition, where attendees were able to practice pitching to investors. These pitches were assessed by a judging panel. Eight finalists were chosen to present again in the "Pitch-Off" competition, run as a part of the Start-Up Gathering in 2015. Judges included representatives of investors and industry; results were widely publicised in the national media.

> ***Illustrating Impact:***
>
> *Lisa Helen, a PhD researcher from Tyndall, won the TIDA Pitch-Off Competition for her work on a 'smart needle to determine needle to nerve proximity'. Using sensors, the device detects when the needle is close to or has hit a nerve, thereby reducing the likelihood of injecting into the nerve, which can cause serious, temporary or permanent nerve injury. Ms. Helen has had subsequent discussions with a medical device company and has given invited presentations to venture capitalists.*

The Founders Forum was organised as a "think-in" for researchers who have founded or co-founded an Irish spinout enterprise to share their experiences and discuss policies and challenges for start-ups in Ireland. Representatives from the research community who have been heavily involved in spinning out companies spent time in sharing ideas that could help to capitalise on successes in the innovation space. The forum focused on two main topics of discussion – 'Embedding Entrepreneurial Thinking in the Irish Research Ecosystem' and 'Enabling Entrepreneurial Endeavour'. This event marked the beginning of Startup Gathering 2015, helping to showcase Ireland's innovation ecosystem to the world.

Illustrating Impact:

Shane Ward (TIDA 2012, UCD): "The progress of the BOSCA project so far has led to a commitment from UCD, Carton Brothers Chickens and Shimmer to continue the research and to manufacture enough BOSCA units for the characterisation of at least 50 poultry houses. The potential for patents and copyrighting of Intellectual Property in the BOSCA project is being discussed in depth with NOVA-UCD". BOSCA uses wireless technology to monitor environmental conditions within chicken barns, resulting in animal welfare and production improvements.

Science Foundation Ireland also organized an intellectual property workshop, bringing together a number of Irish investigators who had been successful in protecting and commercializing intellectual property arising from research. An informal, invitation only workshop was assembled, including individuals who were identified as the top patent filers, and individuals who had a track record in commercializing research, from amongst the Irish HEI research community. The aim of the event was to learn from those with first-hand experience as to what does and does not work in the current research environment. Suggestions for change were also solicited.

Ireland's level of public-private co-publications has not changed from 2014, for the reason that this metric has not been updated by the EU statistics analysis centre who produced the 2012 data in the first place. This was supposed to be updated on a two yearly basis. Science Foundation Ireland will investigate measurement of this metric itself from publications submitted to Research Outputs 2015; this will not generate figures for Ireland as a whole, however, so will not be entirely equivalent to the prior EU statistic. Updating this will be important as 2015 EU reports are still using the 2012 figures. This metric should have risen, given the increased emphasis on industry collaboration by Science Foundation Ireland, and the establishment of the Centres and Partnerships programmes.

A: Invest strategically in a set of centres that have the excellence and scale to be recognised internationally and act as attractors of international research talent and international capital

Agenda 2020 included as an objective the establishment of a cohort of research centres. The impetus behind this initiative was to provide a concentration of expertise in specific strategic areas, and to provide resulting major scientific and economic impact for Ireland. 12 Science Foundation Ireland Research Centres of scale and excellence have been established with an investment of €355m from Science Foundation Ireland and a further €190m from Industry Partners committed over the next 6 years. These 12 Centres are focused on strategic areas of importance to Ireland covering Pharma, Big Data Analytics, Medical Devices, Nanotechnology / Materials, Marine Renewable Energy, Food for

Health / Functional Food, Perinatal Research, Applied Geosciences, Software, Digital Content and Telecommunications. A further Research Centres Call is planned in 2016, which should bring the number up to the planned 15-20 Centres. The existing Centres have been further supported via additional funding for 9 major projects through the Science Foundation Ireland Spokes 2013-15 programme to a cumulative value of €23m.

> ***Illustrating Impact:***
> *The APC Microbiome Institute launch took place in August 2015 with the announcement of 50 additional hi-tech jobs in Cork. APC was originally funded by SFI in 2003 and is one of the recently-designated SFI Research Centres. The new jobs have arisen largely from the capacity of APC to attract new industrial partnerships. The APC Microbiome Institute partners with Janssen, Abbvie, and 6 other global corporations with a broad footprint in Ireland accounting for in excess of 7,000 jobs. In addition, APC has established partnerships with 9 other international companies with no prior relationship with Ireland.*

As of November 2015 the Centres have collectively signed 252 research agreements, including 115 with MNCs and 116 with SMEs. These signed contracts represent an industry commitment of over €61m, with 50% of this being cash. The Centres have also assisted their industry partners to compete for EU Horizon 2020 funding and have excelled in terms of success in European competitions; 8 investigators recently awarded ERC grants are associated with a Science Foundation Ireland Research Centre, while 9 have been partners in successful H2020 bids.

Finally, most targets with respect to non-exchequer funding are being met; the Centres have secured €59m in H2020/EU funding and, as above, €31m cash committed from industry. The amount of industry in-kind contribution has likely been under-reported due to Science Foundation Ireland's focus on industry cash contributions. The in-kind contributions are currently being monitored but the long term focus is on cash. The total amount of funding from non-SFI sources represents 35% (33.27% including Spokes) of money received by the Centres to date. Given that all of the Centres are recently established and that 5 have only been running since the beginning of this year, this represents an impressive achievement. The Agenda 2020 target is 50% by 2020.

> ***Illustrating Impact:***
> *Prof Louise Kenny, the director of the SFI INFANT Centre, has developed a diagnostic test for early detection of pre-eclampsia (funded by an SFI PI award). The discovery will lead to significant improvements in the health of mothers and babies. IP was developed and licenced to a UCC spin-out company Metabolomics Diagnostics. Louise Kenny has supported investor pitches with the company's CEO resulting in their recent success in securing €750,000 of investment from SOS Ventures, AIB Seed Capital Fund and Enterprise Ireland HPSU.*

A: Drive increased hiring of SFI-trained researchers by Industry

Human capital is one of the most significant impacts of publicly funded scientific research (Science Foundation Ireland Open Policy Debate, 2015). The provision of scientifically trained expertise to the jobs market and economy is a vital output resulting from Science Foundation Ireland funding. The Expert Group for Future Skills Needs (EGFSN) estimates that skills shortages are significant in ICT and are beginning to emerge in mathematics, physical sciences, chemistry, some sub-disciplines of engineering and areas of life sciences required by the biopharmaceutical industry (e.g. biochemistry,

protein analysis and purification). Fifty percent of work permits issued to non-EU nationals are within the ICT area, while another 25% are issued to health care professionals including doctors.

Postgraduate training and upskilling (e.g. PhD degrees and postdoctoral fellowships) of most STEM (science, technology, engineering, mathematics) professionals would be covered by the remits of Science Foundation Ireland and the HRB. The demand for researchers in STEM areas is projected to increase. Initiatives such as the R&D Knowledge Box tax incentive introduced in Budget 2016, allowing a corporation tax rate of 6.25% for firms engaged in R&D activities within Ireland (the UK rate is 10%) are likely to raise demand for appropriate expertise. Department of Jobs, Enterprise and Innovation projections indicate that the number of researchers employed by the private sector may reach 35,000-40,000 in 2020. The IDA projects a 20% increase in R&D activity to 2020.

The Science Foundation Ireland is tracking the destinations of trainees as closely as possible, via the annual Research Outputs exercise, tracking of Science Foundation Ireland alumni (people previously funded from a Science Foundation Ireland grant to their PhD or postdoctoral supervisor) and jobs market monitoring. Science Foundation Ireland initiatives such as the Centres Programme and the Strategic Partnerships involving industry will increase the numbers of trainees who will have spent PhDs or postdoctoral fellowships directly engaging with industry; the private sector may therefore regard these trainees as more attractive employees.

Illustrating Impact:

"The SFI Industry Fellowship Award gave me the perfect chance to experience the industry world and decide if it was a world I would see myself being part of. I spent a year in the R&D department of a big pharmaceutical company and learnt a lot of things and thought the environment was thrilling. After the fellowship I was offered a job in the company and I am now a Senior Research Scientist"

2013 Industry Fellowship Recipient

Science Foundation Ireland programmes such as TIDA, which incorporates a commercialisation course, and the Industry Fellowship, which funds one year placements with industry, should increase the employability of trainees from these programmes. Industry Fellowships have placed over 60 Industry Fellows with over 50 companies; 35 were offered in 2015. Many such placements have resulted in permanent offers of employment; the Industry Fellowship can also be used to work with suitable industry partners on the commercialisation of innovations resulting from research. Science Foundation Ireland plans to expand the number of Industry Fellowships.

The Agenda 2020 target states that 50% of previous Science Foundation Ireland trainees should be entering industrial employment as a first destination by 2020. The current figure is 20%, up from 17% in 2014. While this figure does not look at present as if the target for 2020 will be met, there are significant reasons for optimism:

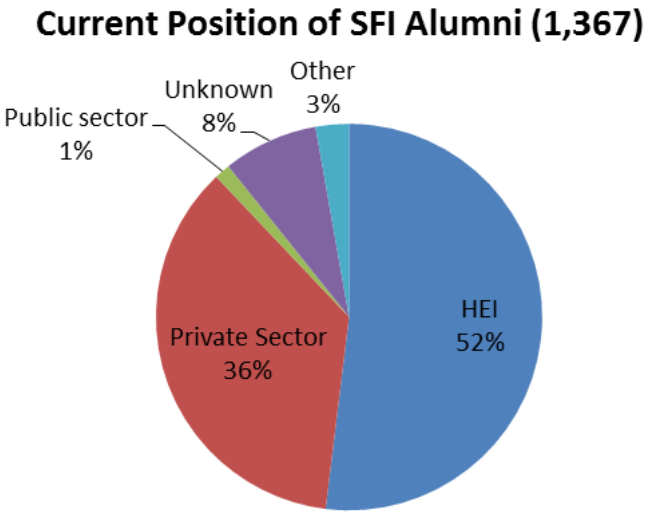
Illustrating Impact:

Ireland is ranked second in the EU in terms of share of total employment in knowledge-intensive activities (20.1 %) and first in the share of knowledge-intensive services in total exports (78.6 %).

https://ec.europa.eu/research/innovation-union/pdf/state-of-the-union/2014/iuc_progress_report_2014.pdf
DG Research and Innovation – Analysis and monitoring of national research policies unit
Eurostat, OECD, IUS 2014, UN

- Research carried out by TCD and LinkedIn shows that 58% of graduates take up initial employment in academia. There are many reasons for this, including further training/experience.

- Four years ago, Ireland was in recession; the unemployment rate was 15%. The pharmaceutical industry was feeling the effects of the so called “patent cliff”. Recruitment agents indicate that the jobs market in life sciences areas has only begun picking up this year, although skills shortages in ICT and, to a lesser extent, physical sciences, were evident earlier. Given recent Government tax breaks intended to revitalise private sector R&D in Ireland (many pharmaceutical MNCs were traditionally locating manufacturing, not R&D, here), it is possible that demand for trainees may increase sharply.
- The first destination of trainees may not be the correct metric to be measuring. The TCD/LinkedIn research suggests that while 58% remain in academia initially, over a seven year period, 63% eventually are employed by industry. The mean time to move to private sector employment was quoted as 2.7 years. Similarly, data from the Science Foundation Ireland LinkedIn Alumni Tracking exercise shows that 36% of Science Foundation Ireland alumni are currently working in the private sector, with 48% funded from 2005-10 grants in industry compared with 30% of those working on grants funded between 2011 and 2015. An eventual destination of employment in industry may be a more meaningful metric than initial destination.



Pillar B: To be the exemplar in building Partnerships that fund great science and drive it out into the market

B: Build Strategic Partnerships

Science Foundation Ireland has been highly successful at building strategic partnerships in 2015. Science Foundation Ireland partnerships take two broad forms; the partnerships where companies and academic groups submit a joint proposal to Science Foundation Ireland for funding (Strategic Partnership Programme), and the Competitive Joint Partnership Programme, where a company, in collaboration with Science Foundation Ireland, puts out a call to the scientific community to address specific problems. Pfizer and Science Foundation Ireland put out a Competitive Joint Partnership call in 2014, from which five projects were funded. Another joint call was issued in 2015; three awards have been made in 2015. This partnership is cited globally within Pfizer as an outstanding initiative.

Illustrating Impact:

Ross McManus (PI award 2009, TCD): "Our work funded largely by SFI over the years, has allowed us to be part of many multinational genomics projects in the last decade. This was an important factor in securing our recent joint funding from Pfizer for ankylosing spondylitis register in Ireland (with Dr Finbar O'Shea of St. James's Hospital)."

Science Foundation Ireland partnered with the Irish Cancer Society to release a Competitive Joint Partnership call in 2014, from which one project was funded in 2015. The new national clinical research network, called Blood Cancer Network Ireland, is a virtual clinical research network that will offer early stage clinical trials to blood cancer patients in Ireland. This exciting new collaborative cancer research initiative will provide Irish blood cancer patients with the opportunity to be among the first in the world to test new, potentially life-changing, drugs and treatments. The total award is in the amount of €2.5m (including overheads).

With respect to the Strategic Partnership awards, four of these will be announced by the end of 2015. Strategic Partnership awards involve industry contributions that match the direct costs awarded by Science Foundation Ireland Energy Systems Integration Partnership programme (ESIPP) led by Professor Mark O'Malley UCD, will receive €5.5 million from Science Foundation Ireland, coupled with €5.5 million from five industry partners - AIB, EirGrid, Ervia, Glen Dimplex, ESB and a philanthropic contribution from Mr David O'Reilly, former Chairman and CEO of Chevron Corporation, and current Chair of the UCD Energy Institute Board. The consortium will work with 17 industry collaborators. Energy Systems Integration (ESI) is a multidisciplinary area ranging from science, engineering and technology to policy, economics, regulation and human behaviour, is coming to the fore in the planning, design and operation of the global energy system. ESI seeks to optimize the energy system and other large scale infrastructures, in particular water, by leveraging the synergies across all scales and pathways (i.e. electricity, fuels & heat).

Prof Shane O'Mara, TCD has been awarded funding from Science Foundation Ireland and Alkermes (Prof Kingston Mills, TCD Immunology, has been awarded funding from Science Foundation Ireland and Abbvie (); they will work on biomarkers and drug targets for autoimmune and other immune-mediated diseases.

Opportunities to allow Irish Scientists in Science Foundation Ireland Research Centres to work with international research centres of repute to strengthen international competitiveness have been developed. Two strategic partnerships of this sort have been funded via the US-Ireland partnership. The first award is between Connect and IPIC in the Republic of Ireland, the University of Ulster in Northern Ireland and the NSF engineering research centre CIAN in the USA. The second involves SSPC and UL partnering the pharmaceutical research centre CSOPS (Rutgers University in the US) and the Queen's University Belfast School of Pharmacy.

Illustrating Impact:

Catherine Godson (US-Irl 2008, UCD): As part of an international consortium who comprise the global leaders in investigating the genetics of diabetic nephropathy [and other complex metabolic diseases] we have had unprecedented access to tools, technologies, data and intellectual resources which have greatly expanded our collaborative network.

Agreements with UK funding agencies have produced joint funding opportunities; the UK agencies are the Royal Society, the Wellcome Trust and the BBSRC. This action will build complementary research competence for Ireland and Irish companies. Three prestigious early career fellowships were made in 2015, under the SFI-Royal Society University Research Fellowship scheme. These awards made by the royal society in competition with applicants across the UK demonstrate the excellence in Ireland. Similarly, 3 awards were made under the SFI-HRB-Wellcome Trust Partnership, which has been extended for another 5 years, and now incorporates investigator, seed and collaborative awards, and the WT Centres scheme. A new partnership has been established with the BBSRC; the first call will issue in January 2016. This scheme allows the BBSRC to support UK applicants, while Irish applicants will be funded by Science Foundation Ireland. This partnership will increase collaboration between Ireland and the UK, and will enable Irish researchers to access and utilise UK facilities. As previously stated, seven awards out of 23 under the Investigators Programme (IvP) were made in conjunction with partners in Northern Ireland. A partnership with the EPSRC is under discussion. The US-Ireland partnership allows applications from partners in Ireland, Northern Ireland and the USA to be assessed by the NIH or NSF; Science Foundation Ireland and agencies in Northern Ireland, such as DEL, fund the Irish/NI researchers, following success in NIH or NSF competitions.

Science Foundation Ireland signed agreements with funding agencies from Brazil, to cement future collaborations between researchers in Brazil and Ireland. Similar partnerships in China and Japan are in discussion.

APC, one of the Science Foundation Ireland Research Centres announced its upgraded status within UCC as the APC Institute and the creation of 50 additional hi-tech jobs in Cork. The new jobs have arisen largely from the capacity of APC to attract new industrial partnerships via Science Foundation Ireland Spokes Programme awards in partnership with companies such as Abbvie and Janssen. LERO, the Irish Software Engineering Research Centre, has recently signed an agreement with the European Space Agency, worth €300,000. The challenge they are addressing is to isolate components of the flight control software, such that failure of one component doesn't lead to knock-on failures of other components.

The Network of Centres of Excellence in Neurodegeneration (COEN) is an international initiative involving research funders in the UK (Medical Research Council), Canada (Canadian Institutes of Health

Research), Germany (DZNE), Belgium (Flanders, VIB), Ireland (Health Research Board / Science Foundation Ireland), Italy (Ministry of Health), Slovakia (Slovak Ministry of Education, Science, Research and Sport), Spain (ISCIII) and France (ANR). A COEN Pathfinder Call was launched in 2015, which seeks to address the need for innovative research to underpin new approaches to therapeutic intervention in neurodegenerative disorders. Teams are expected to build links between at least two centres of excellence in two partner countries. Trinity College Institute of Neuroscience, the 3U Partnership, the NCBES Galway Neuroscience Centre, Cork Neuroscience Centre and the UCD Centre for Neuroscience have been nominated as Irish CoEs for this call. SFI have funded a proposal under this initiative of €204k to Dr Cora O'Neill, UCC, for a project entitled "Therapeutic targeting of impaired Lysosomal flux in Alzheimer's disease."

The Agenda 2020 target for KPI B1.3.1 requires a demonstrable increase in joint funding instruments to 2020. The 2012 baseline allocated €1.4m in partnerships with international agencies and none to partnerships with industry. In 2015, funding for partnerships of various types was €5.8m in total (€2.29m of this was in partnership with industry).

Results from Research Outputs 2014 indicate that Science Foundation Ireland researchers have engaged in 185 academic collaborations (118 with the US and UK, 67 with ISCA countries) and 356 non-academic collaborations (302 with the US and the UK, 54 with ISCA countries) in 2014, the year for which the most recent data are available. The target requires a demonstrable increase in collaborations with these partners in 2020 from baseline figures, which are listed as 122 academic and 12 non-academic collaborations on average from 2010-12.

Fifteen EU leadership roles were listed in Research Outputs 2014. The target in this regard is cumulative, requiring a total of 260 initiatives over the 7 year period. 35 initiatives were listed in 2015, bringing the total to date to 50. However, the figures may be artificially lower than they should be, owing to administrative delays caused by the switch-over from FP7 funding (2007-2013) to Horizon 2020 in 2014. The research outputs are, owing to data collection requirements, collected once a year in the year after the one being assessed. Recent data from the Research Centres, in particular, would suggest that the 2015 picture may be more optimistic; 12 leadership roles in H2020 initiatives have been noted for the Centres in 2015 to date.

Illustrating Impact:

Ireland's success in H2020 bids to date has exceeded successes in FP7 in monetary terms; current drawdown rates average €2.8M per week, whereas FP7 drawdown rates averaged €1M per week (first interim report_H2020).

(http://www.universityworldnews.com/article.php?story=20151029192346710#.VjcI55ka3bI.email

B: Diversify the Funding Sources for Ireland's Scientific Base

EU funding is a key indicator of the health of the Irish scientific system; ERC and H2020 awards are highly competitive and require both innovative and collaborative skills. The pre-existing Framework 7 funding programme was replaced with the Horizon 2020 research programme in December 2013.

Horizon 2020 supports initiatives in which consortia of research funding agencies, from across Europe and beyond, collaborate to fund research in areas of common strategic importance. Such joint programming serves to pool Europe's R&D resources to tackle major challenges that can't be

addressed as effectively by individual national research programmes. The 2 primary mechanisms for joint programming are Joint Programming Initiatives (JPIs) and European Research Area Networks (ERA-Nets). JPIs in which Ireland is involved include Neurodegenerative Disease Research, Agriculture, Food Security and Climate Change, Healthy Diet for a Healthy Life (HDHL), Climate, Water Challenges for a Changing World and Healthy and Productive Seas and Oceans.

Science Foundation Ireland, the Department of Agriculture and the HRB are actively engaged in the JPI HDHL; a partnership of research funding agencies from across Europe and beyond who are working together to address the major societal challenge of healthy lifestyles and nutrition. SFI funded a JPI HDHL: Nutrition and Cognitive Function award for Professor John Cryan of the APC Research Centre. SFI funded €499k of a total funding of €2.5m with the balance coming from funders in France, Germany, Italy, Holland and the UK for a project entitled "A Menu for Brain Responses Opposing Stress Induced Alterations in Cognition". In addition, under the JPI HDHL: Intestinal Microbiomics call, SFI has agreed to double its original commitment and fund two proposals. The Irish parties in these European consortia are Professor Paul O'Toole (APC & UCC) and Professor Douwe Van Sinderen (APC & UCC) with SFI's contribution being €500k in each case.

ERA-Nets (European Research Area Networks) are transnational initiatives in which funding agencies from across Europe and beyond work together to run joint funding activities in research areas of common strategic importance. ERA-Nets differ from JPIs in that they are initiated by ERA-Net calls in the Horizon 2020 work programme to which consortia of research funding agencies (ERA-Net consortia) submit ERA-Net proposals. If approved by the Commission, the ERA-Net consortium forms an ERA-Net which runs joint transnational calls and other transnational activities. The first joint call run by an ERA-Net is 33% co-funded by the European Commission.

Science Foundation Ireland is actively engaged in ERACoSysMed (ERA-Net on Systems Medicine), a collaboration of 14 research funding bodies to support transnational research on systems medicine. The ERA-Net will fund projects that demonstrate the feasibility and socio-economic benefits of systems biology approaches in clinical research and medical practice. In 2015, SFI funded the Irish component of a proposal entitled "OxyUC"; the award was made to Prof. Cormac Taylor of UCD and Prof. Jochen Prehn of RCSI. OxyUC is a partnership between Irish, German, and Belgian researchers. Science Foundation Ireland's contribution was €450k. As was mentioned above, €130k in top-up funding from the EU will also flow to the Irish researchers.

Science Foundation Ireland is committed to supporting H2020 wins through a number of initiatives; a cross-departmental and high level Strategic Projects Group facilitates Big Bids. Increased involvement in further ERA-Net calls are crucial in initiating and maintaining Irish engagement in the most successful cross European partnerships. A Brussels Events Fund of up to €50,000 per application is being run through the Conferences and Workshops Scheme. This fund will enable conferences to be held in Brussels to influence European policymakers and H2020 roadmaps, as was done by the Insight Research Centre in the Brussels launch of their "Towards a Magna Carta for Data" discussion document.

The Investigators Programme in 2015 was aligned in areas of common interest with H2020; these proposals are currently under review. The call was run in partnership with other research funders: Teagasc, the Geological Survey of Ireland, the Irish Research Council, the Environmental Protection Agency, the Marine Institute, and the Department for Employment and Learning in Northern Ireland.

Science Foundation Ireland has offered 62 H2020 Catalyst awards in Q4 2015; these are intended to support preliminary activities that seek to build EU consortia & teams for future H2020 applications. Preliminary activities include workshops, symposia and face-to-face meetings with potential consortium partners. Initiatives of previous years, including EU grant managers within each Research Centre and the co-ordination of applications to the IUA Marie Skłodowska-Curie Actions, remain in place.

The ESFRI Roadmap was launched in 2014, with submissions to the scheme open until March 31st, 2015. The marine infrastructure and therapeutics manufacturing areas were selected to submit from Ireland to the ESFRI Roadmap; these proposals are currently under review. The first proposal, Research Infrastructure in Therapeutics Manufacture - IgNITE, is co-ordinated by the SSPC SFI Research Centre, with NIBRT and PMTC. The network comprises partners from 7 member states (Austria, Belgium, the Netherlands, Germany, Finland, UK and Ireland) and is intended to provide multi-scale facilities as test-beds for pharmaceutical and biopharmaceutical (therapeutics) manufacturing. The proposal addresses the complete manufacturing process - scientific, engineering, regulatory and supply chain. The second network; Marine Renewables Infrastructure Network for Emerging Energy Technologies – MARINERG-I, is co-ordinated by the MaREI Centre, with partners from 6 member states (Belgium, Denmark, France, Ireland, UK, Germany). This proposal is intended to improve testing facilities to accelerate the development of marine renewable energy, including wave energy and tidal energy facilities, water turbine test centres and data archive facilities. Submissions with respect to smart farming (precision agriculture) are also under consideration.

The target for research income secured by Science Foundation Ireland researchers from international funding entities such as the EU has been set at €120m per annum; double the 2008-2011 average of €60m per annum. The national target over seven years has been set at €1.25 billion; this works out at €178 million per annum. The H2020 budget was originally set at €80bn, but its current status is somewhat unclear. The Head of the European Commission, Jean-Claude Juncker, has made cuts to this budget; its current status is approximately €75bn. Regarding Ireland's *juste retour* figure, 1.2% of this is €900m, or €129m per annum. We note that the remit of Science Foundation Ireland funded researchers is considerably narrower than that of H2020, which includes funding for arts, humanities and social sciences (AHSS) in addition to STEM, and will also fund applied research, including in industry, at more advanced technology readiness levels (TRLs) than Science Foundation Ireland. Therefore this KPI is ambitious. Four Irish universities (NUIG, UCC, UCD, and TCD) have been listed amongst the top 50 Horizon 2020 performers for the first time, an impressive achievement. The independent study ranked organisations by the EU contribution received, and by the total number of projects awarded. As SFI Research Centres have no legal status, their achievements are included in those of the host institutions, who are the legal entities applying to the EU.

A further target concerns the establishment of major test-beds in Ireland. EMC, Vodafone and cloud computing provider the Cork Information Exchange, have invested in INFINITE, an industrial platform intended to enable testing of the Internet of Things; providing technology for testing of machine-machine communications. The SFI Research Centre MaREI (Marine Renewable Energy Ireland) is directly involved in a further test-bed; the Galway Bay Cabled Ocean Energy Testbed & Observatory (MaREI/UCC, SEAI, SmartBay, DCU). Science Foundation Ireland contributed significantly to the funding of this infrastructure in a previous infrastructure call. This is a fully licenced ¼ scale test site for devices that convert marine energy to electricity.

Illustrating Impact:

SFI supports the SmartBay initiative. The primary focus of SmartBay is to support the translation of technology research from a laboratory environment to a real world environment. In addition to support from the Marine Institute and SEAI, SmartBay has received funding from the HEA under the PRTLI Cycle V, and more recently from SFI, for the installation of a fibre-optic and power subsea cable enabling underwater deployment of devices in an environment which is unique in Europe. SmartBay provide trial and validation facilities for developers of novel marine sensors, ocean energy devices and those seeking to develop marine focused data analytics and services.

Assessment of the funding profile of Science Foundation Ireland researchers reveals that 39% are currently dependent on Science Foundation Ireland for their funding, while 61% are independent. The Agenda 2020 target is set at 30% dependent by 2020. A final KPI relates to partnership funding with industry. This target has been exceeded; one partnership a year is suggested by the target, while, in 2015, four strategic partnerships with industrial partners will have been funded; the Competitive Joint Partnership Call with Pfizer has resulted in the funding of three further proposals; and the Competitive Joint Partnership Call with the Irish Cancer Society resulted in the funding of one proposal.

Pillar C: To have the most engaged and scientifically informed public

In order to provide a benchmark against which progress towards this aim can be measured, a number of pieces of research were carried out on behalf of the EPE programme during 2015.

Research conducted in 2015 by Millward Brown on behalf of Science Foundation Ireland illustrates that 92% of the Irish public agree that "young peoples' interest in science, technology and engineering is essential for our future prosperity". In addition the research found that 81% of the general public agreed that scientific research makes a direct contribution to the prosperity of Ireland's economy. Compared to the European average Ireland is ahead both in terms of how informed we are of R&D in STEM and how interested we are in STEM R&D; however, we lag behind countries such as New Zealand. This suggests that improvements could still be made in terms of further public engagement with science, which could then increase participation in STEM in the long run.

Further research focussed on identifying the areas of low STEM public engagement intervention by Science Foundation Ireland funded initiatives – either through Science Foundation Ireland Discover funded projects or through the Science Foundation Ireland funded research centres. The research identified the counties of Leitrim, Carlow, Monaghan, Roscommon, Cavan, Louth, Clare and Kerry as

low STEM intervention areas and these were specially identified in the Science Foundation Ireland Discover Programme Call in 2015. The 18-35 age cohort was also identified as having low STEM intervention initiatives.

The research conducted by Amarach Research on behalf of Science Foundation Ireland's Smart Futures programme found that the single most important issue for young people choosing a course at third level relates to how they think they will "fit in" – 62% of students indicated that this was more important than career prospects or entry requirements.

In terms of outreach to the public, national television schedules are extremely important. Hence, a key aim of Agenda 2020 was to expand coverage of science (and Science Foundation Ireland) by the media – for example, in news coverage, documentaries and in entertainment and children's programming. A key initiative, the SFI / RTÉ Initiative, was announced in June 2015. Under this initiative, RTÉ and Science Foundation Ireland will provide grant funding for the development of television programming related to science, technology, engineering and maths (STEM) that has broad audience appeal. Science Foundation Ireland will award funding of €500,000 through a number of initiatives over a 12 month period in order to develop programming. Three TV series aired this year acknowledged Science Foundation Ireland; perhaps the most important is Insiders, which is airing at 5pm on Wednesdays for 10 weeks during the autumn. Insiders explores the "wow science behind the cool events and venues that kids love" and is aimed primarily at 8-12 year olds. The second series of Brain Freeze, which won the Kids' Choice Award for Animation in 2015 is co-funded by CBBC, RTE and SFI (through the Science Foundation Ireland Discover Programme Call) and runs as part of RTE's Swipe TV programme in the afternoons. A reception hosted by Dara O'Briain was held in November to mark the success of Brain Freeze. A deal has been signed for its international distribution with Aardman Rights, who so far have done deals with Discovery Asia, ABC Kids in Australia as well as broadcasters in France, Finland, Israel, Sweden, Norway and Italy with more territories set to come on board soon. The four-part documentary series on the work of the Crumlin children's hospital also acknowledged Science Foundation Ireland as a partner.

Illustrating Impact:

The All Ireland Linguistics Olympiad (AILO) challenges secondary school students to test their minds against the world's toughest problems in logic, language and linguistics. The event is organised by the SFI funded ADAPT Centre. Students must develop their own strategies for solving complex problems in unfamiliar languages. An Irish student, Luke Gardiner from Gonzaga College, Dublin, won a bronze medal at International Linguistics Olympiad in Blagoevgrad, Bulgaria in July 2015. Luke Gardiner is now putting his problem solving abilities to work, studying Mathematics at university.

The Science Foundation Ireland Discover Programme Call funds projects with the aim of developing and extending capacity in the STEM education and public engagement sector in Ireland. Applications are internationally peer reviewed and competitively awarded. Over 40 awards are currently in place, including RTE (for Insiders), the Science Gallery, SciFest, Engineers Ireland Steps Programme, WIT for Maths Week, Scouting Ireland, various HEIs and SFI Research Centres, the RDS and CoderDojo. 37 additional awards under the 2015 call were notified in November 2015 and a partnership meeting will be held in Q1 of 2016. As part of its role in guiding the STEM education and public engagement sector,

Science Foundation Ireland Discover produced an online Evaluation Toolkit for use by funded projects. The development of further toolkits are planned for 2016.

Smart Futures is a government-industry initiative providing information about careers in science, technology, engineering and maths (STEM) to students, teachers, guidance counsellors and parents in Ireland; aiming to promote technology, engineering and energy, ICT, pharma and medical devices as potential career options amongst secondary school students. Smart Futures is a joint partnership between Science Foundation Ireland (as part of SFI Discover) and Engineers Ireland STEPS. The website www.SmartFutures.ie has been redeveloped and an accompanying volunteer management system (CRM) also launched in 2015; 1,232 Smart Futures volunteers are now listed on the CRM. 11 Science Foundation Ireland STEM careers roadshows took place in Institutes of Technology across the country as part of SciFest between 27th March and 15th May 2015. Approximately 2,750 secondary school students were in attendance and directly engaged with talks from people working in research and industry.

Smart Futures has piloted a small number of engagement activities in collaboration with other partners in the STEM area with a vested interest in promoting STEM to young females and students from disadvantaged areas. Smart Futures worked with the Trinity Access Programme to encourage DEIS schools to sign up for free STEM career talks from trained volunteers in the Dublin region. A partnership with Science Gallery Dublin was set up to deliver STEM career talks and content for their COOLEST JOBS event for secondary school students which operates in conjunction with the TCD Access programme. Smart Futures worked with the Student Slingshot Academy to reach TY students (particularly females) by providing resource materials on career choices and giving students access to STEM role models. A hands-on event was organised with the GirlsHackDublin event in DCU, supporting coding workshops for young females, with parents also present on the day. Smart Futures is continuing to look for opportunities to engage students, parents and guidance counsellors over the coming year.

A key event on the Science Foundation Ireland Discover calendar is the organisation and coordination of Science Week in November each year. The 20th Science Week took place from 8th – 15th November 2015. In 2014 the Edinburgh International Science Festival team was commissioned to evaluate the regional Science Week Festivals which are directly funded by Science Foundation Ireland Discover. A number of recommendations from their report were implemented in 2015 with further developments planned for 2016 and beyond. During Science Week 2015, over 50 roadshows were hosted by libraries and third level institutes around the country. Eight regional Science Week festivals took place across Dublin, Sligo, Mayo, Galway, Limerick, Cork, Waterford and the Midlands. These festivals also hosted the newly developed public engagement content from the Science Foundation Ireland Research Centres. During Science Week five STEM career roadshow events took place (two in universities and three in libraries); these were expected to reach approximately 550 students. Collaboration has continued to grow between stakeholders and partners with vested interests in increasing the number of STEM graduates in Ireland, particularly among the following groups: ICT Ireland / Irish Software Association; PharmaChem Ireland; IDA Ireland; Higher Education Authority (HEA); Irish Computer Society (ICS) and Connecting Women in Technology (CWIT). It is estimated that around 250,000 people interacted with Science Week events and media coverage was particularly strong this year, including mentions of Science Week and additional content broadcast during the RTE Weather segments after the 9 o'clock news for the duration of Science Week.

Science Foundation Ireland is partnering with the RDS – DCU continuous professional development (CPD) initiative aimed at primary school teachers. This will now scale-up through a partnership under Science Foundation Ireland's Discover Programme worth €440,000 over the next two years, to which Science Foundation Ireland Discover will contribute just over €220,000. RDS STEM learning is intended to integrate open ended problem solving activities into the classroom, allowing children to learn about science through child led enquiry. All participants report that this programme has made a big difference in helping children's thinking skills; over 90% said it had an impact on exploring students' ideas of science.

Illustrating Impact:

Google's RISE programme aims to support organisations that encourage girls and underrepresented students in extracurricular computer science programmes. Lero, the SFI funded Irish Software Research Centre, has been named by Google as one of the global winners of the 2015 RISE Awards. LERO plans to use its $17,000 award to promote and organise computing summer camps at the University of Limerick aimed specifically at female secondary students from the age of 14 upwards.

Science Foundation Ireland hosted an exhibit at the National Ploughing Championships (22nd – 24th September) 2015. Comprising of a variety of Research Centres workshops and shows, smartphone microscopes make and take workshops, Discover Funded Project: the Physics Buskers and shows from Scientific Sue. Almost 2000 smartphone microscopes were made during workshops, in addition to this almost 50 additional shows and workshops were offered over the 3 days through Centres content and Scientific Sue. The shows and workshops were developed with researchers from the Science Foundation Ireland Research Centres following a series of training sessions throughout the summer and designed to engage the public with the research of the centre.

Pillar D: To represent the ideal modern public service organisation, staffed in a lean and flexible manner, with efficient and effective management

Science Foundation Ireland has reviewed a number of management related practices in 2015. A new series of 6 Core Values have been introduced for all staff. These comprise Excellence (delivering what we promise and exceeding expectations), Passionate (we genuinely care about every aspect of what we do and are totally committed to the individual, the organization and the community), Collaborative (working together for science in society, working together for each other), Respect (we value everybody within and outside the organization, for their time, views and commitment to achieving Science Foundation Ireland strategy), Progressive (we are an innovative, dynamic and visionary funding agency) and Integrity (we do the right thing).

The Science Foundation Ireland Fellowship Scheme awarded six fellowships in 2015, for postdoctoral fellows to gain work experience within Science Foundation Ireland. This scheme runs for two years, is a successful form of early career support for scientists and has a 100% record of subsequent employment to date. Prior Science Foundation Ireland fellows have gained employment in diverse areas, including Science Foundation Ireland itself, HEI research offices and the Wellcome Trust. The attractiveness of Science Foundation Ireland as an employer is underscored by the fact that there were 39 applicants for a Scientific Programme Officer position advertised in the spring.

Average time-to-grant for 2015 was calculated at just under six months, an improvement on the previous year (albeit slightly skewed by the relative absence of large grant programmes reviewed in 2015). International benchmarking of this timing, placing it in comparison with other granting agencies worldwide, is challenging as other agencies only publish guideline time-to-grant times; information with regard to the types of programmes funded and numbers of grants assessed is not available. Most UK granting agencies publish guideline times of approximately six months, as does NSERC in Canada. The NSF and NIH quote 9-10 months as an average time, while the ERC aims for a target of 8 months. Science Foundation Ireland's 2015 figure is at the shorter end of the scale.

A concordat to support research integrity has been developed by a number of stakeholders including Science Foundation Ireland and has been published on the IUA website. An audit process of Science Foundation Ireland funded HEIs to include areas such as research integrity, compliance with legal, ethical and licensing obligations, IP integrity, and transparent, robust and fair processes to deal with allegations of research misconduct has been developed. A questionnaire has been circulated to the HEIs for completion before the end of 2015.

Part 3: Other significant developments in 2015

Science Foundation Ireland is broadly happy with progress made in 2015. As always, with any seven year plan, additional topics of interest arise after the strategic plan has been drawn up and targets set. In recognition of this, we provide a summary here of significant developments of interest which don't fit into the existing KPIs but are nevertheless important in pursuing excellence and impact in funding of scientific research.

Showcase opportunities for industry engagement with Ireland's research system

A number of promotional industry engagements have been held this year. Science Foundation Ireland supported the Innovation Showcase 2015, which was held with Enterprise Ireland and IDA in the Convention Centre on December the 8th. The Showcase highlighted the wide range of supports available for engagement with Irish researchers. An updated Directory of Research Centres and Technology Centres, detailing the range of supports available to facilitate collaboration with the research community was published.

Illustrating Impact:

Ireland is ranked 12th globally and 7th in Europe, according to the Global Innovation Index.

Ireland is the most globalised nation in Europe and its entrepreneurs are the most educated; 74% have some variety of post-secondary education.

Source: http://thegedi.org/2016-global-entrepreneurship-index/

A number of additional events are listed below

- In April 2015 Science Foundation Ireland, in partnership with the Irish Software Innovation Network (ISIN), delivered a briefing session on Science Foundation Ireland research and the Science Foundation Ireland funding mechanisms available to support collaboration between industry and academia at IBEC offices. The event was attended by ISIN members and other industry representative bodies.
- Science Foundation Ireland provided a briefing session on Science Foundation Ireland research and the Science Foundation Ireland funding mechanisms available to support collaboration between industry and academia to members of the Microelectronics Industry Association (MIDAS) on March 26th
- A briefing session for members of the Professional Services was hosted by Science Foundation Ireland in October. This session informed attendees on Science Foundation Ireland funded research and industry facing programmes which may be of interest to the audience's clients.
- Science Foundation Ireland had a presence at two key conferences during October and November – Enterprise Ireland's Med in Ireland which took place in October and the IRDG annual conference which took place in November.
- Science Foundation Ireland hosted a Research and Innovation session focusing on challenge based research funding during the Global Irish Economic Forum. This event was attended by industry representatives who are members of the diaspora as well as Irish based industry leaders.
- A briefing session on the Longitude Prize was hosted by Science Foundation Ireland in November. The Longitude prize encourages collaboration between industry and academia and this event presented an opportunity to bring members of the academic community working in the scientific area associated with the prize together with industry reps and clinicians.

Enhancing Ireland's International Reputation

Science Foundation Ireland continues to work closely with IDA on a number of specific upcoming itineraries into Ireland by high profile companies. The agency also supports the Enterprise Ireland/IDA overseas offices through the provision of briefing material on research strengths and introductions to targeted contacts.

Science Foundation Ireland, as part of the St. Patrick's Day programme of activities in Washington D.C. hosted an event to showcase research in Ireland. The event was attended by all 12 Science Foundation Ireland Research Centre Directors who delivered short pitches on their research. Science Foundation Ireland worked in strong partnership with Enterprise Ireland for the event which was aligned to the Business Leaders Lunch to which Science Foundation Ireland invited over 100 guests, many of whom were key industry contacts and targets for the Research Centres. The event also provided an opportunity to develop Centre to Centre collaborations between Science Foundation Ireland Research Centres and NSF Engineering Research Centres under the US Ireland R&D Partnership Programme.

Science Foundation Ireland participated in the St. Patrick's Day programme in Copenhagen which included attendance at Ministerial meetings and the Ambassador's reception.

The Science Foundation Ireland St. Patrick's Day Medal is awarded annually to a distinguished Irish scientist, engineer or technology leader living and working in the USA. Awards are made to distinguished scientists in the US who have demonstrably assisted researchers in Ireland in academia or industry. Prof Kate Fitzgerald, an immunologist and Professor of Medicine at the University of Massachusetts, was awarded this medal in 2015. The medal was awarded by An Taoiseach, Mr. Enda Kenny.

Research Excellence, with Impact

Early in 2014, Science Foundation Ireland and the Office of the Chief Scientific Adviser to the Prime Minister of New Zealand, as part of their work with the Small Advanced Economies Initiative, led in the publication of a document entitled "Broadening the Scope of Impact: Defining, assessing and measuring impact of major public research programmes, with lessons from 6 small advanced economies". The document endeavours to capture the diverse impacts of scientific research and ways of measuring these impacts. Science Foundation Ireland's impact evaluation framework has been fully aligned to this and extensive training in relation to writing impact statements has been provided to researchers. The Science Foundation Ireland impact framework identifies 6 pillars of impact: economic; health and wellbeing; natural capital and built environment; policy and public services; future capacity and skills; and societal and international. There are also three cross cutting themes; creating new products, processes, policies or behaviours; improving the efficiency and efficacy of existing practice, and research to improve resilience or sustainability.

While the impact agenda within Science Foundation Ireland is well developed, we recognise that it must continue to evolve in line with international best practice as well as practicality. To ensure that Science Foundation Ireland and the research community have a common understanding of the requirements and relevance of impact reporting, Science Foundation Ireland invited its researchers and key administrators to an Impact Workshop at the Science Foundation Ireland Annual Summit in November 2015. A panel of experts, including members of the Irish research system, talked to various

aspects, challenges and opportunities of impact assessment and questions and commentary from the audience was openly welcomed.

Open Policy Debate on Measuring Impact from Publicly Funded Research

In the context of the "Broadening the Scope of Impact" document, Science Foundation Ireland hosted an Open Policy Debate on Measuring Impact from Publicly Funded Scientific Research to which a broader audience of stakeholders was invited. This included economists, researchers, research funders, policy analysts, industry representatives, research centre directors, higher education vice presidents for research, politicians, public and civil service staff. Prof Mark Ferguson and Mr David Moloney (Assistant Secretary at the Department of Public Expenditure and Reform) gave opening talks to set the scene and two panels of eminent international and local experts discussed key aspects of impact measurement with the participative audience with a view to determining what more Ireland could do to deliver and measure impact from public funding of research. A key conclusion was that the most critical output is human capital. This conclusion reinforces the value of Science Foundation Ireland's research funding and resulting training in areas which are currently experiencing skills shortages.

Public consultations

A number of consultations were held this year. Two interactive sessions were held as part of the annual Science Summit in Kilkenny, incorporating feedback from Science Foundation Ireland funded investigators with regard to the Science Foundation Ireland programme mix required to meet the needs of Ireland's research ecosystem, and with respect to challenge-based funding.

Science Foundation Ireland hosted a sectoral breakout session at the Global Irish Economic Forum, held in Dublin Castle in November 2015. The session was entitled "Research and Innovation - The future of challenge based research funding in Ireland". The session drew on the collective expertise of the audience to identify a sample of specific global and national challenges which Ireland can and should address. Participants considered how a challenge based research funding model could be implemented in Ireland. The aim is that the findings of this session will contribute to the national policy dialogue on research funding.

Science Policy and Innovation PhD programme

In recognition of the need to research aspects of science policy more fully than might be possible within Science Foundation Ireland itself, Science Foundation Ireland funds a Government of Ireland Scholarship Scheme - Science Policy and Innovation, in partnership with the IRC and HEA. This allows research into policy concerning the impact of public funding of research, development and innovation.

Three projects were funded in 2014, while 4 PhD scholarships were awarded in 2015. These research projects report progress annually to, and interact with, a distinguished international steering committee.

Review of Peer Review procedures

Science Foundation Ireland recognises that evaluation of programmes and procedures is a key requirement, both for quality assurance and also to inform the continuation and development of existing and new funding mechanisms. Therefore, the Science Foundation Ireland Board commissioned an evaluation of Science Foundation Ireland Peer Review Procedures in order to carry

out necessary quality control on this aspect of operations. An international panel was appointed in order to review programme evaluation procedures. The panel engaged directly with a number of stakeholders including Science Foundation Ireland Executive Committee members, Science Foundation Ireland Programme Managers, applicants to IvP2013 (both successful and non-successful), Research Body VPs of Research and Science Foundation Ireland Review Panel Chairs.

Overall, the panel was impressed by the quality and integrity of the peer review procedures employed by Science Foundation Ireland and concluded that they are fair, professional and in keeping with international standards of peer review. The use of exclusively international reviewers was deemed necessary, given the small size of the Irish scientific community. A number of minor areas of potential improvement were also identified. Science Foundation Ireland has evaluated the report and will respond to actionable points by 2016.