2016 Annual Review of Agenda 2020

Table of Contents

Executive Summary

This document evaluates Science Foundation Ireland's performance in 2016 against the goals and objectives set out in its Agenda 2020 strategy.

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 twice every year in order to ensure that the ambitious targets are being met.

We summarise some 2016 highlights:

- In the SFI Research Professorship programme in 2016, six awards were made. Science Foundation Ireland has never before achieved six Research Professorship awards in one year.
- Ireland has improved its position in bibliometric rankings, advancing to 10th position globally.
- Bibliometric analysis shows Science Foundation Ireland research publication outputs on a par with NSF and NIH research.
- Science Foundation Ireland is the first European funding agency to implement the National Science Foundation (USA) Innovation Corps scheme for entrepreneurial training.
- Science Foundation Ireland has partnered with the National Natural Science Foundation of China; a call will launch in 2017.

This document clearly demonstrates that Science Foundation Ireland is making excellent progress towards meeting the ambitious goals laid out in Agenda 2020.

Review of Science Foundation Ireland's progress on its Agenda 2020 Goals

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

Innovation 2020

Innovation 2020 is the government's five-year strategy on research and development, science and technology. Innovation 2020 sets out the roadmap for continuing progress towards the goal of making

Ireland a Global Innovation Leader, driving a strong sustainable economy and a better society. Innovation 2020 commits to increasing public and private investment in research to reach Ireland's intensity target of 2.5% of GNP by 2020. As of Budget 2017, the current level of investment in R&D is 1.6% of GNP.

Achieving the 2.5% target is of the utmost importance: Ireland is under-investing in this area relative to others and our success and reputation as a knowledge economy are at stake. From Innovation 2020:

> *A knowledge-based economy requires sustained investment in innovation to continue to maintain and attract high-quality foreign direct investment (FDI). Competition for FDI is intense: research, development and innovation (RDI) investments not only embed existing FDI operations and employment but pave the way for future investment, job creation and export growth.*

Through their higher levels of R&D investment, competitor countries are widening the gap between themselves and Ireland.

These levels of investment have been noted internationally. The European Commission's country-specific recommendations document comments:

> *The shift in government expenditure has also affected public sector support to R&D and innovation, which was below 2007 levels in 2014.*

A relevant recommendation from the document:

> *Enhance the quality of expenditure, particularly by increasing cost-effectiveness of healthcare and by prioritising government capital expenditure in R&D and in public infrastructure, in particular transport, water services and housing.*

The achievements outlined in this document should not distract from the need for increased funding of R&D. This need is demonstrated by the number of applications for Science Foundation Ireland funding, the low success rates of Science Foundation Ireland's core programmes, and the annually increasing reserve lists of projects deemed excellent by reviewers but unfunded due to lack of funds. Science Foundation Ireland strongly endorses Innovation 2020 and the need for increased investment in R&D.

A1: Invest in research excellence in areas identified by National Research Prioritisation Exercises

The vast majority of Science Foundation Ireland funding, over 99%, 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.

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. As of November 2016, Ireland was ranked 10th, based

on Thomson-Reuters InCites[1] data. Subject areas of excellence in which we are performing well include Nanotechnology, in which we are ranked 1st in the world; Animal and Dairy Science, 2nd; Chemistry, 3rd; Immunology, 3rd; Materials Science, 3rd; Agricultural Sciences, 3rd; Mathematics, 4th.

We present an analysis of Thomson Reuters data regarding various countries' and funders' % of publications in the top 1% of all publications as measured by citations. The table uses the time range 2003 to 2016. The results indicate that Science Foundation Ireland funded researchers are of comparable quality to those funded by the NSF and the NIH.

% of publications in the top 1% of all publications as measured by citations

Country	Funder	# Documents in Web of Science	**Documents in the Top 1%**
USA	All	7,628,277	**1.74%**
UK	All	2,079,720	**1.75%**
New Zealand	All	134,292	**1.70%**
Singapore	All	171,345	**2.03%**
Israel	All	227,063	**1.50%**
Finland	All	187,873	**1.63%**
Denmark	All	232,099	**2.38%**
Ireland	All	133,713	**1.54%**
China	All	2,729,495	**0.9%**
Ireland	Science Foundation Ireland	11,852	**2.41%**
All	European Research Council (ERC)	37,475	**4.82%**
All	NSF	365,378	**2.7%**
All	NIH	596,566	**2.9%**

For historical perspective, if we take Ireland from 1980 – 2002 (any funder), the result is 1.02% publications in the Top 1%. As a result of Science Foundation Ireland's activities, an additional **1.39%** of papers appear in the Top 1%.

International Prize Winners

Irish research scientist Professor Cormac Taylor is to receive the 2017 Takeda Distinguished Research Award from the American Physiological Society. The Takeda Distinguished Research Award of the APS Gastrointestinal & Liver Physiology Section recognizes an outstanding investigator who is internationally recognised for his/her contribution to research.

Professor Tom Brazil of the SFI Research Centre Connect was elected as President of the IEEE Microwave Theory & Techniques Society. This is the first time that a person from Ireland has been elected President of an IEEE Society.

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

A major international artificial intelligence group, the European Association for Artificial Intelligence, has appointed Professor Barry O'Sullivan (UCC) as its deputy president. Professor O'Sullivan is a Director for the INSIGHT SFI Research Centre.

Professor of Biochemistry, Luke O'Neill (TCD) has been elected a Fellow of the Royal Society. Professor O'Neill has received several major grants from Science Foundation Ireland; his 2013 Investigator Award studying inflammatory diseases is in progress.

The associated KPIs indicate that renewed effort may be required. Science Foundation Ireland are considering the use of the Research Professorship scheme to, in the wake of Brexit, create joint appointment schemes between Ireland and the UK. Such a scheme could recruit Nobel and other international prize winners to Ireland.

Science Foundation Ireland Prize Winners

Dr. Craig Barrett and Professor Séamus Davis were presented with the 2016 Science Foundation Ireland St. Patrick's Day Science Medal by Minister Charles Flanagan, Ireland's minister for Foreign Affairs and Trade. 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. This year, for the first time, the medal is being presented to two recipients, each leading figures in their respective industry and academic communities.

Seven awards celebrating Science Foundation Ireland researchers' contributions to Science, Technology, Engineering and Maths were announced at the annual Science Foundation Ireland Science Summit:

Science Foundation Ireland Researcher of the Year: Professor Barry O' Sullivan, UCC, Director INSIGHT SFI Research Centre.

Science Foundation Ireland Early Career Researcher of the Year: Professor Valeria Nicolosi, TCD, AMBER SFI Research Centre, and Dr Martin O'Halloran, NUIG, SFI Starting Investigator Research Grant (SIRG).

Science Foundation Ireland Industry Partnership Award: AMBER SFI Research Centre, TCD & Merck

Science Foundation Ireland Entrepreneurship Award: APC Ltd - Professor Brian Glennon and Dr Mark Barrett, UCD, SFI SSPC Research Centre.

Science Foundation Ireland Outstanding Contribution to STEM Communication: Dr Sabina Brennan, TCD.

Science Foundation Ireland Best Reported Impact: Dr Emmeline Hill, UCD.

Science Foundation Ireland Research Image of the Year: Andrea Zanetti, UCD.

Early career research support

Science Foundation Ireland funded awards in both SFI Starting Investigator Grant (SIRG) and SFI Career Development Awards (CDA) in 2016, representing significant support for early career researchers. In total, 51 awards were offered across both programmes. We note that review panels recommended funding significantly more of these proposals than was possible to fund; these additional recommended proposals were placed on reserve lists for consideration at end of 2016.

2016 also saw the launch of the SFI Future Research Leaders programme, attracting a new generation of research leaders to Ireland. This prestigious programme has seen significant interest; eleven applications are currently under review.

ERC

The Royal Irish Academy hosted the 57th Plenary Meeting of the European Research Council (ERC) from 10-12 October 2016 in Dublin, Ireland. The Royal Irish Academy with sponsors, including Science Foundation Ireland, also arranged a high level public interview and stakeholder discussion with the ERC President, Professor Jean Pierre Bourguignon on 12th October. Professor Bourguignon offered his thoughts on how Ireland can maximise its success at the ERC. Key learnings include:

- Other advanced countries (such as Germany and France) are experiencing challenges in attaining ERC Advanced Grants.
- Recruitment schemes such as the SFI Research Professorship, which attract Advanced Grant calibre researchers to relocate to Ireland, offer a strong chance of eventual ERC Advanced Grant success.
- Science Foundation Ireland's ERC support schemes are at the forefront of national support initiatives across Europe

This event also included a panel session showcasing the impact of ERC funded research on Irish society, including Director General Professor Mark Ferguson and Science Foundation Ireland funded Professor Valeria Nicolosi.

Currently we see a 68% increase in Ireland's ERC success under Horizon 2020 when compared with FP7. The 18 awards won in 2014, added to nine in 2015 and three so far in 2016 mean that under Horizon 2020 we are already approaching the total that were won across the whole of the FP7 era from 2007-2013 (35 awards in total). Earlier-career researchers continue to do extremely well (over 13% of applicants to completed calls to the Starting Grant and Consolidator Grant schemes from 2014 to 2016 have been funded), while those applying to the Advanced Grant are faring less well, at only a very moderate 3% success rate. Increased efforts by Science Foundation Ireland and other Irish stakeholders will be required to increase Advanced Grant success. The associated KPI target reinforces he need for more STEM ERC success.

Attracting Overseas Talent

SFI's Research Professorship programme attracts outstanding research talent to Ireland. 2016 was the most successful year to date for the SFI Research Professorship programme; six awards were made. Several of these are in areas directly related to Ireland's economy; specifically, two of the awards are in the domain of Advanced Manufacturing.

Science Foundation Ireland held a very successful launch of the SFI Future Research Leaders programme, discussed further in the Early Career Research Support Section above.

Gender balance in research

Science Foundation Ireland's Gender strategy was revised in 2016 and has been published on the Science Foundation Ireland website. The new strategy fully incorporates the recommendations from the HEA Review on Gender Equality in Higher Education, for example the requirement for research bodies to have an Athena Swann Bronze Institutional Award within three years (and a Silver Award within seven years).

This new strategy focusses on three strands:

1) Gender equality across Science Foundation Ireland education and public engagement initiatives
2) Female representation within the Science Foundation Ireland funded portfolio and Science Foundation Ireland review panels.
3) Ensuring that gender perspectives are integrated into the research content of Science Foundation Ireland-funded research programmes.

The Performance Improvement Division in Science Foundation Ireland has analysed Science Foundation Ireland's gender data. Some initial conclusions are:

- Currently, 1 in every 4 applications to Science Foundation Ireland is from a female researcher. HEA gender disaggregated data for 2015 indicates that the Science Foundation Ireland female application rate is largely in line with the gender breakdown across the STEM academic sector where 30 percent of academics are female.
- Science Foundation Ireland's early career programmes are more gender balanced than the Science Foundation Ireland average. Science Foundation Ireland's late career programmes display the most gender imbalance.
- Early Career Researchers (CDA and SIRG) have roughly half the combined budget of SFI Investigator Programme (IvP); Science Foundation Ireland budgets are more heavily skewed towards programmes for established academics. HEA data indicates that there are many more eligible CDA and SIRG applicants than IvP applicants.
- Women are as competitive as men in terms of their Science Foundation Ireland funding success rate i.e., ~30%. The issue of lower female representation in the Science Foundation Ireland portfolio thus has more to do with lower submission rates, resulting from lower female representation in the community.
- HEA data shows that female STEM academics are predominantly at the early career stage. This data indicates that if Science Foundation Ireland is to achieve and surpass its revised gender target of 30% female awardees, this will require **increased numbers of awards in early career programmes**.
- Extending gender balance incentives to institutional nominations is critical for making progress towards gender parity in programmes where a cap on submission is applied.

The above analysis, in addition to the large reserve lists (mentioned above) in both SIRG and CDA in 2016, suggest that increasing Science Foundation Ireland's budget for early career programmes would

have an impact on gender balance. Similarly, launching the proposed Science Foundation Ireland PhD programme should also have an effect on gender balance.

Science Foundation Ireland has provided incentives to increase the number of female applicants to the SIRG Programme. Previously, applications to the SIRG programme were capped at five applications per research body, with no reference to gender balance. In 2015, the cap was raised to 12 provided no more than six of the applications made per research body were from male applicants. The rationale behind this action was that female applications to the programme have been steady at around 25% for a number of years, and this is not representative of the 50% of STEM PhD graduates in Ireland who are women. In 2015, 44% of applications to the programme were women, a significant improvement. The call resulted in 20 awards, of which 55% were made to female researchers.

The associated KPI reinforces the need for Science Foundation Ireland to continue improving implementation of its gender strategy.

Internal Evaluation of the Investigator Projects Programme

The Post-Award Team in Science Foundation Ireland prepared a detailed analysis of the Investigators Project programme. The aim was to study how smaller awards for expert investigators performed compared with larger awards for expert investigators. Once corrected for the different levels of investment, the Investigators Project programme was competitive with the Investigators Award programme.

Animal ethics and clinical trials policy

In 2016, Science Foundation Ireland developed a new animal ethics and clinical trials policy in line with best practice from international funders. The policy includes the formation of links with the UK National Centre for the Replacement, Refinement & Reduction of animals in Research.

A2: Invest in Science Foundation Ireland's translational research capability to enhance the progression of research from discovery to delivery

Ireland is ranked 7th globally and 5th in Europe for innovation, according to the Global Innovation Index.

Science Foundation Ireland has launched a new pilot programme with the National Science Foundation (NSF) in the USA on their Innovation Corps (I-Corps) Programme. This world-renowned training programme will develop the entrepreneurial skills of Irish researchers. Science Foundation Ireland is the first European funding agency to partner with the NSF on this scheme.

A key objective of the pilot programme is to develop a culture of entrepreneurship amongst researchers at all career stages within Research Performing Organisations. In the first call, 25 Expressions of Interest were received.

Science Foundation Ireland has continued its support of entrepreneurship via its TIDA programme; the recent independent evaluation of TIDA indicated the value of this programme.

Impact

Science Foundation Ireland is leading in the global drive to ensure that research funding delivers economic and societal impact. Science Foundation Ireland contributed to a Digital Science publication "The Societal and Economic Impacts of Academic Research - International perspectives on good practice and managing evidence".

A3: 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

Science Foundation Ireland's Research Centres programme continues to go from strength to strength. A call to fund a new group of Research Centres was launched in 2016. Proposals are currently under review.

The SFI Research Centres have made strong progress as measured by their KPIs. Highlights include Horizon 2020 drawdown over €85m and more than €40m in committed cash co-fund from 394 industry contracts.

International scientific progress reviews of the first seven Research Centres took place. The review panels were asked to select from a number of possible outcomes ranging from 1 (Poor) to 5 (Excellent). Scores were consistently high across the board with the majority of Centres scoring between 4 and 5 in all categories. Of particular note, the panel rated the APC Research Centre as Excellent in every category. The Science Foundation Ireland Annual Report 2015 included a more in-depth discussion of these reviews.

In 2016, certain SFI Research Centres achieved noteworthy success in the Horizon 2020 Marie Sklodowska Curie Action (MSCA) COFUND scheme. These very large European funding awards were obtained by the Research Centres, leveraging Science Foundation Ireland's investment. CONNECT, ADAPT and AMBER Research Centres partnered to win €6.1m. CÚRAM was awarded €2.2m. Science Foundation Ireland and the Irish Universities Association (IUA) have partnered to support SFI Research Centres applications to MSCA; future successes are expected.

Three Centre-to-Centre partnerships have been funded in partnership with American and Northern Irish funding agencies in 2016 under the US-Ireland R&D Partnership Programme; this is a very strong result for the Centre-to-Centre strand of this programme, which was only launched in 2015.

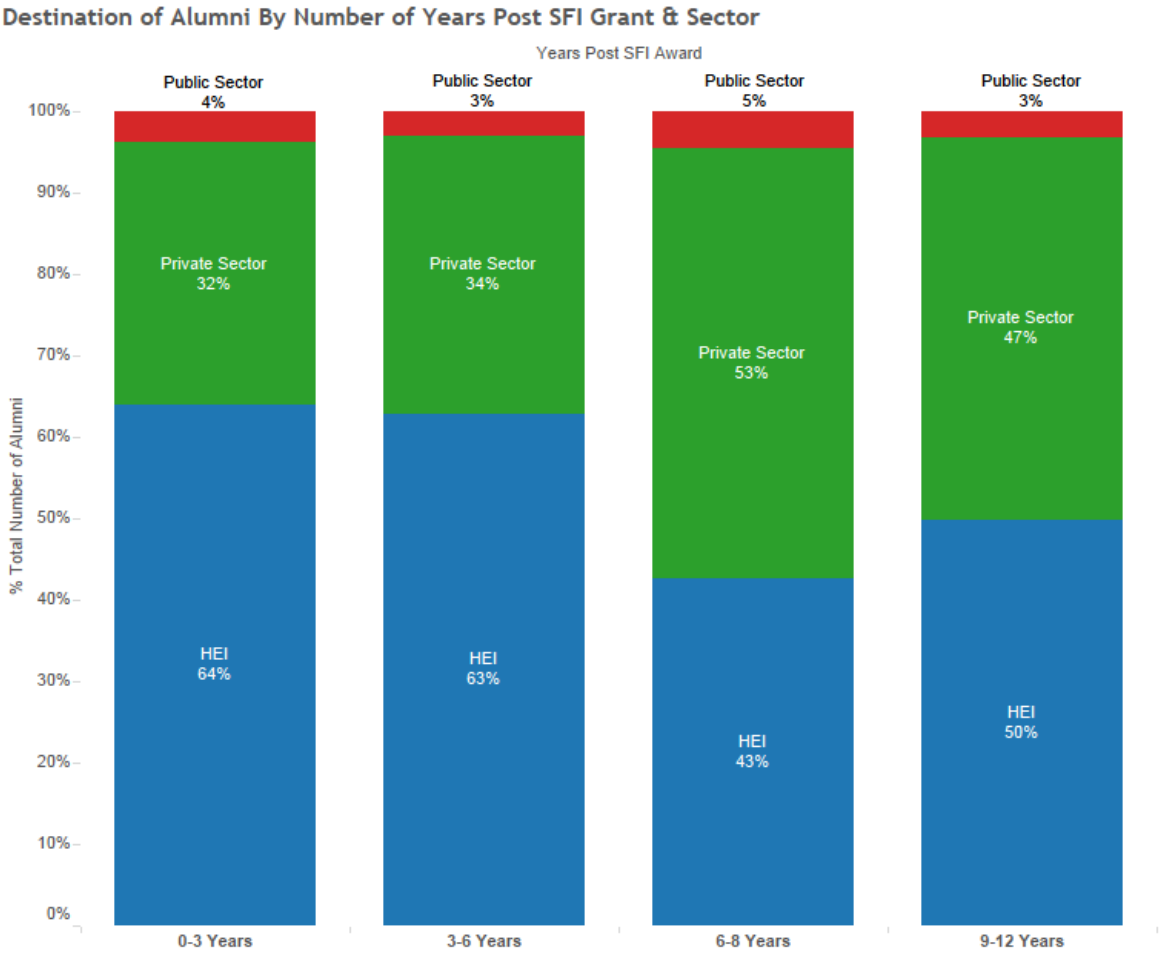
SFI has initiated a review of the governance arrangements for the Research Centres. The independent review panel is chaired by Dr Alistair Glass, previously Chairman of the Tyndall National Institute. The group will deliver a report, on schedule, in December 2016, with recommendations for best practice Research Centres governance.

A4: Drive increased hiring of Science Foundation Ireland-trained researchers by Industry

Human capital is one of the most significant impacts of publicly funded scientific research. The provision of scientifically trained expertise to the jobs market and economy is a vital output resulting from Science Foundation Ireland funding.

The Science Foundation Ireland Performance Improvement Division is tracking the destinations of trainees closely, via the annual Research Outputs exercise, and via tracking of Science Foundation Ireland alumni. Science Foundation Ireland initiatives such as the SFI Research Centres Programme and the Strategic Partnerships involving industry will increase the numbers of trainees who will have spent time during their PhDs or postdoctoral fellowships directly engaging with industry.

The first destination of trainees is important; also important are subsequent destinations. Data from the Science Foundation Ireland LinkedIn Alumni Tracking exercise shows that 53% of Science Foundation Ireland alumni, who are between six and nine years post their Science Foundation Ireland funded position, are working in the private sector.



Science Foundation Ireland has achieved international recognition of its efforts to improve intersectoral mobility. The Science Europe Working Group on Research Careers released a report on its 2015 Survey on Intersectoral Mobility. Science Foundation Ireland was the **only** funder recognised as having very strong evidence of intersectoral mobility as a strategic priority.

Ireland is continuing to build its reputation as a knowledge economy with a supply of highly educated researchers and workers. We refer to the ICT Ireland / Irish Software Association / IBEC report "Making Ireland a Global Technology Powerhouse". This report includes a quote from the influential David Marcus, Vice President at Facebook, ex-President of PayPal:

"There is really nowhere else in Europe where we can get such a talented pool of candidates that we can hire at this scale, and it has truly been a great experience for PayPal from the beginning".

The associated KPI target is not on track; however, Science Foundation Ireland has increased tracking of second and later destinations of Science Foundation Ireland-funded researchers in order to document increased hiring by industry of Science Foundation Ireland-trained researchers. We will include these latter destinations in the setting of a more appropriate KPI in the future.

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

B1: Build Strategic Partnerships

Science Foundation Ireland has continued working towards strategic partnerships between academia, industry, and philanthropy. In the strategic partnerships programme, four awards will be made in 2016 with cumulative industry cash co-investment of more than €8m. Three awards were made under the Science Foundation Ireland-Pfizer Biotherapeutics Innovation Award programme.

Science Foundation Ireland and the National Natural Science Foundation of China (NSFC) have entered into a new partnership which will support collaborative research projects between researchers in the People's Republic of China and Ireland. The programme will see successful projects receiving funding of up to €1 million from Science Foundation Ireland with the NSFC providing equivalent funding for the research elements being undertaken in the People's Republic of China. Science Foundation Ireland will act as the lead agency.

Science Foundation Ireland is the first European agency to partner with the National Science Foundation (NSF) in the USA on its Innovation Corps (I-Corps) programme. This is discussed in section A2 above.

Science Foundation Ireland has partnered with the National Science Foundation (NSF) under the Partnerships for International Research and Education (PIRE) Programme. PIRE is an NSF-wide programme that supports international activities across all NSF-supported disciplines. The primary goal of PIRE is to support high quality projects in which advances in research and education could not occur without international collaboration. PIRE will catalyse a higher level of engagement between the science and engineering communities in the United States and in Ireland.

The Biotechnology and Biological Sciences Research Council (BBSRC) and Science Foundation Ireland have entered an agreement to welcome, encourage and support research applications that cut across national boundaries involving collaborative teams led by researchers from the UK and Ireland. In 2016, the first batch of jointly funded awards were made under this scheme. BBSRC act as lead agency in this arrangement.

In Q4 2016, Science Foundation Ireland signed a partnership agreement with the Engineering and Physical Sciences Research Council (EPSRC) situated in the UK. The first calls will be launched in 2017.

Small Advanced Economies Initiative (SAEI)

The office of the Chief Scientific Adviser to the Irish Government/Science Foundation Ireland continued its involvement in this Initiative. This partnership informs Science Foundation Ireland through learnings from other similar funding agencies and government departments. Science Foundation Ireland, with the Department for Jobs, Enterprise and Innovation, and the Department of Foreign Affairs and Trade, co-hosted the SAEI principal's meeting in Dublin in September.

The countries involved are Denmark, Finland, Ireland, Israel, New Zealand, Singapore and Switzerland. All are advanced economies by International Monetary Fund standards, and are of similar scale in terms of population with around five to ten million inhabitants.

At the meeting, Science Foundation Ireland particularly showcased the Irish science and innovation system, and the SFI Research Centres. The Head of Education and Public Engagement at Science Foundation Ireland, Margie McCarthy, presented a paper at the meeting on the topic of public engagement with STEM. This paper was well received and will result in follow up work with the OECD.

B2: Diversify the Funding Sources for Ireland's Scientific Base

In addition to the funding of R&D through public private partnerships as discussed above, European funding programmes are significant sources of funding for Irish research.

Science Foundation Ireland is committed to supporting Horizon 2020 wins. Several Science Foundation Ireland staff members act as National Contact Points for various Horizon 2020 schemes. Professor. Mark Ferguson chairs a cross-departmental and high level Strategic Projects Group to drive big bids.

Science Foundation Ireland has continued its engagement with transnational European funding, joining three new Era-NETs in 2016. Of note, Science Foundation Ireland is collaborating with international funding agencies through the ERA-Healthy Diet for a Healthy Life to fund research that will identify and validate biomarkers that are modulated by diet. Following a competitive peer review process, six Irish research groups were awarded funding; this success required Science Foundation Ireland to increase its commitment to this call and resulted in 83% European Commission co-funding.

The MSCA awards have already been discussed in section A3 as significant Horizon 2020 funding obtained by the SFI Research Centres, leveraging Science Foundation Ireland's investment.

As demonstrated by the associated KPI (B2.3.1), Science Foundation Ireland should prioritise the leveraging of its funds into Horizon 2020 funding. In 2016, Science Foundation Ireland grew its European affairs team, led by Dr Michael Ryan, which is driving the required actions.

Illustrating national Horizon 2020 progress, the latest Horizon 2020 draw-down (funding) attributed **to Ireland** for the period January 2014 to September 2016 is as follows:

- Total draw-down to date: **€336m** (up from €251m earlier this year)
    - Accounts for 1.71% of total allocated H2020 budget (national target: 1.56%; juste retour: 1.2%)
- 811 applicants have been successful

- Irish success rate of 15.31% (EU Member State average: 14.13%)
- Top 50 HEI list (EU):
    - TCD 19; NUIG 48; UCD 49; (UCC 63)
- Top 50 Private companies list:
    - IBM 33 (Radisens Diagnostics 99; Intel not included for the first time)
- Main areas for national drawdown
    - Marie Sklodowska-Curie Actions Drawdown: €59.6m
    - Information & Communication Technologies €59.5m
    - European Research Council €45.8m
- Main areas for national success rate:
    - Transport €8.5m: 46%
    - Research Infrastructures €10.4m: 38%
    - Agri-Food €26m: 29%

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

In 2016 Science Foundation Ireland strongly drove increased public engagement with STEM.

Science Rising

Science Foundation Ireland implemented an extensive communications campaign: Science Rising. This campaign aims to inform, engage and explore all possibilities, economic and social, to better Ireland for our people and the impact we make on the world. Science Rising is a wide-ranging programme, engaging academic and industrial scientists, educational establishments, industry and the Irish public through partnership, information, events, competitions and awards.

Broadcast media

Through the Science Foundation Ireland-RTE partnership, three one-off documentaries, five television series and three children's television series have been aired with scientific content. There has been an increased focus on science in broadcast media, with several independently-funded pieces airing, including documentaries, 'filmed for web' features and increased news coverage from RTÉ's dedicated science correspondent.

The Science Foundation Ireland-RTE partnership will continue creating broadcast programmes, such as "Big Week on the Farm" raising the profile of STEM. Particular highlights of this partnership include:

- The "Big Week on the Farm" programme was the overall winner of the Agricultural Journalism awards for 2016.
- The "Hacked" documentary, broadcast during Science Week, was seen by over 300,000 viewers.

Smart Futures

Smart Futures promotes STEM careers to school students in Ireland. Smart Futures is gaining increasing recognition as a critical component of the national STEM support structure. Specifically, Smart Futures was explicitly recognised in the national science strategy Innovation 2020. In 2016 the Smart Futures programme was presented to a meeting coordinated by the Higher Education Authority on the coordinated output of high level ICT graduates. A Women in STEM forum was held in Science Foundation Ireland to bring together a number of groups promoting STEM to young females in Ireland, with a number of tech companies represented including DELL, IBM, Accenture and Twitter. During SciFest a Smart Futures careers roadshow took place in 11 Institutes of Technology, reaching 2,200+ teenagers.

ICT Ireland / Irish Software Association / IBEC released the report "Making Ireland a Global Technology Powerhouse". This report specifically pointed to the Smart Futures programme as a requested action for the government:

> *Continue to support the important work of Smart Futures in promoting careers in science, technology and engineering. The programmes and initiatives coordinated through Smart Futures are of real significance and achieving solid results in encouraging participation in and uptake of STEM courses.*

Science Week

Science Week took place from November 13th-20th with an estimated 800 events and 250,000 participants, across the country. These events included 10 Festivals taking place in: Cavan/Monaghan, Sligo, Mayo, Galway, Limerick, Kerry, Cork, Waterford, the Midlands. The Teagasc Festival of Food and Farming took place across Dublin, Meath, Carlow, Galway, Cork and Wexford

A number of events were coordinated by Science Foundation Ireland including: Scintillating Science with Dara O'Briain, which sold out at the National Concert Hall; The Science of World War I; Peak Performance – the Science of Sporting Success; Decoding Fashion; Science Week Tasting Menu and Microbiome event @Rustic by Dylan McGrath; The Science of Bubbleology with Scientific Sue; and Science Busking at Blanchardstown Centre. Funded Science Week events took place in the Ark Theatre, Dublinia, The National Museum, Dunsink Observatory, the Science Gallery and the Rediscovery Centre in Ballymun.

RTE provided significant coverage of Science Week through broadcast programming, the RTE Player and social media. The coverage included: a number of documentaries funded through the RTE partnership; Science Week advertising; a daily 'what's on for Science Week' feature on the RTE Player; and Science Week weather content.

SFI Discover Primary Science & Maths (DPSM)

Discover Primary Science and Mathematics (DPSM) has been running for 12 years, helping thousands of primary teachers to foster an interest in science and maths amongst children. Since 2009, over 6,000 primary teachers have availed of in-school Continuous Professional Development (CPD). The whole-school CPD programme supports more child-led inquiry-based approaches to teaching science. DPSM's ongoing collaboration with the European Space Education Research Office (ESERO) led to the inclusion of space as a theme within the CPD programme; the programme now uses space to inspire our next generation of innovators. In the 2016/17 school year, the programme will be delivered to over 100 schools, reaching 1,296 teachers who are teaching over 22,000 pupils.

An ongoing evaluation of the impact of the DPSM/ESERO CPD Programme is being undertaken by St Patrick's College, DCU and the National STEM Centre, UK. The evaluation has found that participation in the DPSM/ESERO CPD is having a positive impact on teachers' approaches to, and confidence in, teaching science. 64% of teachers participating in 2015/16 report that this was their first science in-service since they started teaching. 77% of teachers stated that participating in the programme had changed the way they teach science, while 100% of principals reported positive impact in confidence and overall change in approach to science teaching throughout their schools.

The SFI Discover Science & Maths Awards Programme is a reward system for primary schools. Recognition is achieved through the completion of STEM work to meet five criteria encouraging a whole school approach to STEM learning. There are two awards available to primary schools: a Certificate of STEM in which a minimum of two classes participate and a plaque of STEM Excellence which involves the majority of classes. In the 546 schools that received SFI Discover Science and Maths Awards in 2016, 89% of involved teachers reported an increase in school science activities; 81% of teachers reported that parents are more aware of science activities in the school; and 79% of teachers reported an increase in science engagement at the whole-school level.

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's work is guided by its Core Values:

In response to its highly educated workforce Science Foundation Ireland implemented a focussed training plan for its staff in 2016 which included a leadership development programme and other technical courses.

Science Foundation Ireland evolved its Fellowship scheme, which provides successful candidates with the opportunity to develop their career through experiencing first-hand the diversity of activities carried out by a funding agency. Science Foundation Ireland has been operating this scheme for a number of years; this experience fed into improvements to the scheme such as extending the possible duration of awards to three years. The SFI Fellowship scheme has proven to be a successful training scheme, with participants going on to jobs in NIBRT, The Wellcome Trust and the Department of Health, for example.

Science Foundation Ireland monitors its time-to grant (KPI D1.3.2). Time-to-grant for 2016 was calculated to be 5 months, an improvement on 2015's outcome which was 5 months and 29 days. 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 6 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 2016 figure compares very well with these international funders.

Key Performance Indicators (KPIs)

In this section, we follow the structure of the Agenda 2020 strategy.

The most recent information available has been used; the data is from 2016 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 2015. 2016 Research Outputs data will be available in Q2 2017.

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

A1: Invest in research excellence in areas identified by National Research Prioritisation Exercises.

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
A1.3.1 Proportion of Science Foundation Ireland 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]	98.4% [2015]. Four ERC support grants were classified as non-NRP.	99.5% in 2016 (€108.9M). 0.5% in other areas (€509k)	100% by 2015
A1.3.2 Ireland's place in international bibliometric rankings of repute	20 [2011]	14th [Nov 2015]	10th [Nov 2016] [2]	Remain inside Top 20 for period to 2020

[2] This figure was calculated using Essential Science Indicators℠ (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	End of Year Status 2015	End of Year status [2016]	Target
A1.3.3 Presence of a top-tier international prizewinning scientist (e.g. Nobel Prize, Fields Medal European Science Prize, Lasker Prize) leading an Science Foundation Ireland-funded team in Ireland	0		None as of November 2016	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 Science Foundation Ireland researcher/team	0	1; Werner Blau (TCD)-Nanosmat Prize 2015. 1 [Rank Prize 2014 – Professor Eoin O'Reilly]	1: Cormac Taylor - Takeda Distinguished Research Award from the American Physiological Society.	1 by 2020
A1.3.5 The level of early-career research support	€4.9 million or ~3.2% of total spend [2012]	€6.6m to date (7.6m projected 2015 spend); 7.6% expenditure to date in 2015	€12.7m projected 2016 spend. 12% of spend.	50% increase by 2015 €7.4m per annum from 2015-2020

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
A1.3.6 The number of European Research Council awards secured by Science Foundation Ireland researchers	3 Science Foundation Ireland-funded[3] of 7 Starting Grant winners, 2 of 2 Advanced Grant winners, totalling €8.4 million [2011]	3 Science Foundation Ireland-funded of 10 Starting Grant winners, 4 Science Foundation Ireland-funded[2] of 7 Consolidator Grant winners, 4 Proof of Concept grants, totalling €13.1 million	**2016**: 4 x ERC Awarded to Date (€4,910,818) 2 x Starting Grants 1x Proof of Concept 1x Consolidator Grant **2015**: 5 x ERC Awarded (Not reported to date) 1x Advanced Grant 1x Proof of Concept 2x Starting Grants 1x Consolidator Grant (€7,840,722.88) Ireland continues to perform acceptably at Starting Grant schemes; not so in Advanced Grants and Consolidator Grants. This is a very important AND very stretching target. Science Foundation Ireland has the ERC Development and Support schemes in place to recruit (likely) ERC holders from abroad.	Science Foundation Ireland 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

[3] 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.

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
A1.3.7 The attraction to Ireland of leading iconic scientists	0	1-5 awards in 2015	**6 Res-Professor Awards accepted** **Future Research Leaders (FRL):** 38 EOI received. 11 FRL applications currently under review.	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]	20% Female award holders [2014]. However, Science Foundation Ireland early career initiatives (e.g. SIRG) and university Athena Swan initiatives should increase # of eligible female faculty in 2-3 years' time	21% Female award holders [2015 RO] 111 of 529 award holders Female. 33.5% of all Team members are female. SIRG applicant cap incentivising female applicants resulted in 44% applications from women and 55% female awardees.	25% of Science Foundation Ireland award holders by 2020 Increased employment of women in Irish based SET industries – 10% increase from 2013 baseline.

A2: Invest in Science Foundation Ireland's translational research capability to enhance the progression of research from discovery to delivery.

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
A2.3.1 Proportion of invention disclosures, patents, licences and spin outs recorded by Enterprise Ireland that are linked to Science Foundation Ireland research	Not yet Calculated	82 Invention Disclosures, 44 Patents, 18 Licence Disclosures, 1 Spinout [2014]	80 Invention Disclosures, 33 Patents Filed / Awarded, 17 Licences, 2 spinouts [RO 2015]	Double the 2011-2015 average by 2020
A2.3.2 Ireland's level of public-private co-publications	25.8 [2012]	34.4 [2015] not updated by EU recently, checked IUS report 2015	34 Public – Private Publications per million population (European Innovation Scoreboard (2015 data) 43 [Science Foundation Ireland RO 2015]	50 publications per million population by 2020

A3: 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.

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
A3.3.1 Number of Internationally recognised SFI Research Centres of scale in Ireland	0	12 [2015] 12 SFI Research Centres have been funded of larger scale than initially envisaged. A new call will be run in 2016.	12 SFI Research Centres have been funded to date. New SFI Research Centres call in 2016. 16 pre proposals received. Eight applications are currently under review.	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	€58m from Non Exchequer sources, mostly EU, €39m from industry, 232 separate industry investments 35% (33.27% incl Spokes) to date[4]. Figure now includes 12 SFI Research Centres.	Current investment into 12 SFI Research Centres is €279k over 6 yrs. Industry commitments of €85m (€43m cash and €42m in-kind) €112m in non-exchequer, non-commercial funding up to mid 2016. Total SFI Research Centre budget is taken to be the Science Foundation Ireland contribution+ Industry+ non-exchequer, non-commercial. It is equal to €476m which is split into the following percentages Science Foundation Ireland (€279m = 59%); Industry (€85m = 18%) non-exchequer, non-commercial (€112m = 23%) Non-exchequer currently stands at 41% of the overall SFI Research Centre budget.	Minimum of 50% of overall SFI Research Centres' funding by 2020

[4] 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

A4: Drive increased hiring of Science Foundation Ireland-trained researchers by Industry.

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
A4.3.1 % Science Foundation Ireland trainees moving to industry as a first destination	25% of leavers [2009-2011]	20% [2014]. Eventual destination 36% via LinkedIn tracking [2015]	24% [RO 2015]. Eventual destination 38% via LinkedIn tracking [2016]	50% by 2020.

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

B1: Build Strategic Partnerships.

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	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: €3.51 million or 3.99% of spend [2015 to date] With companies: €2.29 million or 2.60% of spend [2015 to date]	With agencies: €3.7m or 3.4% of spend [2016 to date] With companies: €1.8m or 1.6% of spend [2016 to date]	A measurable increase in the joint funding instruments by 2020

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	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 ISCA Countries]	227 Academic Collaborations (140 with the US and UK, 87 with ISCA countries) 115 non-academic collaborations (93 with the US and the UK, 22 with ISCA countries) [RO-2014]	178 Academic Collaborations (128 with the US and UK, 50 with ISCA countries) 69 non-academic collaborations (62 with the US and the UK, 7 with ISCA countries) [RO-2015]	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]	15 EU leadership roles [RO-2014]	31 EU leadership roles [RO-2015]	Double the number of initiatives led by Science Foundation Ireland funded awardees to 260 initiatives over the 7 year period (37 per year)

B2: Diversify the Funding Sources for Ireland's Scientific Base.

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
B2.3.1 Research income secured by Science Foundation Ireland researchers from international funding entities such as the EU	€60m on average per annum [2008-2011]	€34 million [2014]	€79m [2015]	Double the average figure between 2008-2011, to €120m per annum by 2020

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
B2.3.2 Major test beds established in Ireland	0	2: INFINITE (EMC, Vodafone, CIX). Galway Bay Cabled Ocean Energy Testbed & Observatory (MaREI/UCC, SEAI, SmartBay, DCU).	10 of the Research Infastructure awards made were testbeds over €1m. We include some highlights. **1:** NUIG (Additive/subtractive manufacturing testbed –for electrically, optically and thermally – activated biomaterials) **2:** UL (Molecular Process Analytical Technology Test-Bed for Sustainable Chemical Transformations) **3:** DIAS /iCRAG (Insitu Marine Laboratory for Geosystems Research). **4:** TCD /AMBER (Additive Manufacturing Nano-Materials Facility) **5:** TCD /CONNECT (Pervasive Nation: an Ireland-wide, wireless network infrastructure to support Open Internet of Things)	Average of one major new test bed per year from 2014 onwards
B2.3.3 Funding profile of Science Foundation Ireland researchers	60% dependent [2011]	39% dependent, 61% independent [2014]	31% Dependent, 61% Independent [2015]	Reduce to 30% the number of Science Foundation Ireland researchers that rely on Science Foundation Ireland for the majority of their funding by 2020

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
B2.3.4 Partnership funding with industry	0 Not Applicable [2012]	Pfizer competitive joint partnership: 3 proposals to be funded by the end of 2015. Irish Cancer Society competitive joint partnership: 1 proposal funded in 2015. 4 SFI Strategic Partnership Programme awards will have been made by end 2015.	By the end of 2016, Science Foundation Ireland will have awarded: 7 Strategic Partnerships with industry 13 SFI Research Centres Spokes 105 SFI Industry Fellowships	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.

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
C1.3.1 Increased coverage of Science Foundation Ireland 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/ Science Foundation Ireland webpages visits 21,397 various account holders [2012]	TV Series: 3 + Science Foundation Ireland RTE partnership Traditional media: To date 773 newspaper articles referencing Science Foundation Ireland (1st Jan-30th Nov 2015) New media: 489,039 Discover/Science Foundation Ireland website visits; 182,652 unique visits. 22,000 followers on social media.	TV Series: 1 + Science Foundation Ireland RTE partnership. Three one-off documentaries, five television series' and three children's television series have been aired with scientific content, supported by Science Foundation Ireland. Traditional media: 825 newspaper articles referencing Science Foundation Ireland (1st Jan-30th Nov 2016) 1,305 online web articles. 201 radio broadcasts New media: Discover/Science Foundation Ireland website visits: 432,367 Number of visitors (users): 280,210 Total page views: 1,303,931 Average number of pages per session (visit): 2.6 Average number of returning visitors: 66% Total number of followers across all social media channels: 99,071 Social media breakdown (Followers) – Twitter: 86,698 Facebook: 8,133 Linkedin: 3,401 Flickr: 72 Instagram: 120 YouTube: 647	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 Science Foundation Ireland 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: 252,753 [2015] Third Level: 30% [2015]	Secondary Level: 272,889 [2016] Third Level: 30% [2016]	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.

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
D1.3.1 Cost of administration	3.87% (€7.9m/€205m) [2012]	1.6% (€6.7m/ €431m) [Sept 2015]	2.2% (€9.2m/ €426.2m) [end 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 5 months and 29 days [2015]	Average of 5 months in 2016	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 [2015].)*

KPI	Baseline	End of Year Status 2015	End of Year status [2016]	Target
D1.3.3 Attractiveness of Science Foundation Ireland as an employer and employability of Science Foundation Ireland staff	Internships: **Baseline**: 2 [2012] Science Foundation Ireland Roles: **Baseline**: >50 applicants per role [2013] Leavers: **Baseline**: 4 of 8 leavers to senior roles [2012]	Fellowships: 6 [2015] Science Foundation Ireland 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, one to consultancy, one to HEI faculty [2015].	Fellowships Number of applicants 25. Number of awards made 6. Science Foundation Ireland Roles for 2016. Approximately 250 highly qualified individuals applied to work in Science Foundation Ireland during 2016 and roles were filled as Scientific Programme Managers, Finance Manager, PR and Communications Executive to name a few. In response to its highly educated workforce Science Foundation Ireland implemented a focussed training plan for its staff in 2016 which included a leadership development programme and other technical courses.	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	End of Year Status 2015	End of Year status [2016]	Target
D1.3.5 Developed audit of Science Foundation Ireland 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, questionnaire has been circulated to the HEIs	Follow up on the responses to the questionnaire is ongoing with the HEIs. Procedure for quality assurance review or non-financial audit is currently being scoped by Programmes Directorate in consultation with Science Foundation Ireland's Finance and Operations Directorate and the Science Foundation Ireland internal auditor	Conducted by 2014