



2014 Review of Agenda 2020

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Executive Summary

In *Agenda 2020*, Science Foundation Ireland (SFI) set out its strategic plan for the period 2013-2020. The strategy has four primary objectives:

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

A number of ambitious targets were identified as were the supporting actions required for the realisation of each target. As with any long-term plan there is a need to continually monitor and evaluate each of the objectives to ensure their relevance and that the right actions are in place to deliver on the ambitious targets set. This review provides a detailed appraisal of the progress made in 2014.

During 2014, SFI has continued the implementation of this strategic plan, with the aim of ensuring that the State's investment in scientific research delivers positive impact for the Irish economy and society. In addition to drawing on relevant and available data sets¹ to inform the progress of our investment with regard to Key Performance Indicators (KPIs), 2014 has seen a number of opportunities realised, such as leveraging the State's investment through the establishment of major partnerships with industry, charities, national and international funding bodies. Specifically, SFI and Pfizer, the latter being one of the world's premier research-based pharmaceutical companies, have come together under a public private partnership (PPP) that will provide opportunities for new biotherapeutic breakthroughs in Ireland. SFI have also partnered with the Irish Cancer Society with a view to jointly funding collaborative research in Ireland to focus on unmet medical needs within the area of cancer. Furthermore SFI has established partnerships with the Department for Learning, Education and Innovation in Northern Ireland and the Royal Society in the UK. SFI have also funded a number of bespoke partnerships with individual companies and consortia of companies through the SFI Research Centres.

A key objective of *Agenda 2020* is to develop a set of world-leading, large scale research centres that will provide major economic impact for Ireland. In 2014, along with continuing to support the seven SFI Research Centres, SFI has funded five new Research Centres at a cost of €155 million over 5 years, matched by cash and in kind commitment from industry of €90 million. SFI has continued to support the 7 SFI Research Centres established last year and has additionally recently allocated funding for four major projects through the SFI

¹ Data Collated through SFI's Data Management System, SESAME (Feb 1st 2013 – Jan 31st 2014)

Spokes 2013 programme, resulting in a provisional allocation of €4.5 million by SFI complemented by an indicative contribution of €2.7 million in cash from industry.

Another key development has been the support and development of excellent early career researchers with the allocation of €23 million to 40 early career researchers through the SFI Starting Investigator Research Grant (SIRG) and Career Development Awards (CDA). SFI also continues to support excellence in early career development through the prestigious SFI President of Ireland Young Researcher Award (PIYRA) programme. Furthermore, SFI launched the SFI Advance Award in 2014 and continued to support the SFI Industry Fellowship and the SFI Internship programme. €1.75 million was allocated to the Advance Award funding 10 awards and €2.2 million was allocated to the Industry Fellowship funding 27 new industry-academia partnerships. Taken together, this suite of programmes offers a range of career broadening opportunities for both developing and early career researchers.

With the launch of the EU €80 billion Horizon 2020 Research Programme in December 2013, SFI has implemented a number of initiatives to encourage and support its research community in maximising their drawdown of H2020 funding. SFI has provided each Research Centre with a supplement award for an EU Grant Manager position. These individuals are to be based within the SFI Research Centres where they will provide the resources required to successfully engage and leverage funding from Horizon 2020. Furthermore, SFI has partnered with the Irish Universities Association (IUA) and hired an EU Grant Manager to specifically coordinate applications from SFI funded Research Centres to the IUA Marie Skłodowska-Curie Actions. SFI also operates its European Research Council (ERC) Support and Development Programmes, both of which provide support to the community both to develop research programmes to win ERC funding and also to support successful ERC awardees. In addition, SFI has taken a leadership role in EU funding and has participated in a €5.5 million transnational call for Biomarkers in Nutrition and Health through the EU Joint Programming Initiative '*A Healthy Diet for a Healthy Life*' and has also partnered with 11 countries in the Systems Medicine ERANET COFUND application to Horizon 2020.

The 14 National Research Priority areas contribute both to the economic strength of the nation and the sustainability and improvement of the quality of life for Irish citizens. SFI recognises that the awareness, support and understanding of the public of developments and research in STEM have become increasingly important. The mission of the SFI Discover Programme is to catalyse, inspire and guide the best in STEM education and public engagement. The SFI Discover Programme Call supports and develops the STEM education and public engagement sector in Ireland by investing in capacity in this area and by exploring and encouraging novel means of public engagement and communications. A number of new outreach programmes were funded during 2014 using the Discover Open call which had an international assessment panel. Last year's Science Week, organised by SFI Discover, had over 800 events attended by over 250,000 people.

In this document, we follow the structure of Agenda 2020. 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.

The most recent information available has been used. Unless otherwise indicated, data are from 2014. Details of SFI programmes and awards are up-to-date; data arising from the SFI Census will be from 2013. 2014 Census data will be available in Q2 2015.

Conclusions

This review presents numerous success stories. SFI is making strong progress towards Agenda 2020's objectives. Agenda 2020 is however an ambitious strategy; the KPI targets therein are deliberately stretching and will likely not all be fully attained. To the extent that such at risk targets are under SFIs direct control, SFI have and will plan additional actions to address these in 2015 and beyond. To the extent that such at risk targets are not under SFIs direct control, SFI will try to influence others to implement the appropriate future actions.

During 2014, SFI continued the approach taken in 2013 of devoting a significant portion of its funding to the SFI Research Centres Programme. The outputs and achievements of the 12 Research Centres will thus be central to successfully achieving Agenda 2020. The Post-Award Team correspondingly is intensively monitoring and supporting the Centres; this activity will be retained as one of the highest priorities of the Post-Award Team. The seven Centres funded in 2013 are presently fully established and productive; many of their already achieved accomplishments are included throughout this document.

The importance of Horizon 2020 and other international funding programmes is recognised by Agenda 2020; this importance is reflected in many of Agenda 2020's KPI targets. Progress is being made. There have been very strong, albeit interim, results from Ireland based applicants to the ERC Starting and Consolidator schemes. SFI's support activities for Horizon 2020 will continue; for example, Prof Mark Ferguson has initiated a cross departmental and very high level Strategic Projects Group which will target big wins in Horizon 2020.

Successfully translating research outputs to market ready products and services will be required to achieve meaningful economic impact. SFI's suite of programmes to enhance these activities (TIDA, Research Centres, Industry Fellowship) will continue. Desirable systemic improvements include ensuring that sufficient funding is available from sources other than SFI to protect, where necessary, the valuable intellectual property generated through SFI awards.

In recognition of the need for Ireland to build research capacity in key areas of economic importance, SFI has consulted with the seven Irish Universities. The resultant areas, aligned with national and institutional strategic priorities, are where the recruitment of eminent

research professors will be targeted. Research Professors with world class research profiles will help to develop emerging areas of strategic opportunity. To this end, SFI will in 2015 fund several awards in the SFI Targeted Research Professorship Programme.

The Strategic Partnerships Programme has been a key success for SFI in 2014; partnerships have been created with Pfizer Biotherapeutics; the Irish Cancer Society; and the Karlsruhe Institute of Technology. SFI intends to build on these successful outcomes and further enhance the Strategic Partnerships Programme in 2015

In 2015 SFI will be growing both investment and activity in the education and public engagement area in particular in enabling engagement activity within the 12 SFI Research Centres, the broadening of support for broadcast programmes and a comprehensive programme to support the 20th celebrations of national Science Week. As part of these celebrations SFI will develop a clear picture of the contribution of STEM industry to the Irish Economy over the past 20 years and the projected skills deficit within the sector for the foreseeable future. Public consultations will be held to evaluate public awareness of science.

Notwithstanding these areas targeted for improvement, SFI is making good progress towards meeting the ambitious goals laid out in Agenda 2020. This is demonstrated by the numerous success stories in this document, and also by the vast majority of KPI targets which are on course to be met or surpassed.

Review of SFIs Key Performance Indicators (KPIs)

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

Invest in research excellence in areas identified by National Prioritisation Exercises

The potential of the academic base to support economic and societal growth has transformed Ireland in recent years. The country's international standing in delivering research outputs has grown steadily. The pursuit of excellence must be maintained and, as resources are limited, they have to be targeted at areas more likely to deliver economic and social benefit for Ireland. The 2012 Report of the Research Prioritisation Steering Group identified 14 priority areas (NRP areas) for Ireland to focus its research investment on. SFI

Illustrating Impact:

Ireland is ranked 11th out of 143 economies in the Global Innovation Index 2014

also funds research in areas where potential economic impact is clearly demonstrable and provides funding to support the development of young researchers. SFI funding policies continuously reflect national science, technology and innovation policy as it develops.

Investing in excellent and impactful research projects under the NRP remained a priority for SFI in 2014 and SFI remains on track to meet most of its targets under this objective, with over 99% of SFI expenditure now in areas of national priority, areas of demonstrable potential economic impact for Ireland, areas of partnership with major research entities and areas to support the development of young researchers. In September this year, the SFI Research Centres programme resulted in the investment of €155 million over 5 years by SFI, matched by industry commitment of €90 million, in five new SFI Research Centres of excellence in areas of national importance closely aligned to industry and enterprise needs, job opportunities and societal goals.

The Investigators Programme, which was launched in 2013, funded 36 proposals in 2014 at a total cost of €47 million. Applicants to this call were invited to apply for funding in areas aligned with at least one of the NRP areas.

Research excellence is driven by the presence of top-tier researchers in the country. There are two KPIs directly relating to this; A1.3.3 and A1.3.7. In June 2014 SFI launched the Research Professorship

Illustrating Impact:

Ireland is the most R&D efficient country in the EU, extracting the top percentile innovation output from a below average public expenditure on R&D

*DG Research and Innovation – Analysis and monitoring of national research policies unit
Eurostat, OECD, IUS 2014, UN*

Programme, a recruitment initiative to attract iconic researchers to Ireland which was run as a targeted call. Following consultation with the Irish Universities Association (IUA), a list of targeted areas (themes) for this call was developed focusing particularly on areas of mutual opportunity where the current density of outstanding scientists in Ireland is low. These included Manufacturing (Advanced Manufacturing/Manufacturing Competitiveness), Bio-manufacturing, Smart Cities, Energy, Marine, ICT (Incorporating Data analytics, management, security & privacy, visualisation and data science), Digital Platforms, Content and Applications, Connected Health, Medical Devices & Medical Technologies, Ageing, Agrifood (incorporating Sensory Food Science, Sustainable Food Production and Food Security) and Climate Change. This has resulted in the appointment of Prof. Robert Bogdan Staszewski a world renowned engineering researcher, to lead a cutting-edge research programme to increase Ireland's capability as a global centre for the 'Internet-of-Things', to University College Dublin. Professor Staszewski has been awarded €5 million in funding under SFIs Research Professorship Programme. The appointment is also supported by Analog Devices and Xilinx. Professor Staszewski brings to the role an impressive track record of combining leading academic research with the development and commercialisation of technology. This appointment through the Research Professorship Programme will ensure that SFI remains on track in terms of attracting leading iconic scientists to Ireland (KPI A1.3.7). However, the additional KPI (KPI A1.3.3) with the specific target of attracting a top-tier international prizewinning scientist by 2015 is less likely. Attracting leading scientists through the Research Professorship Programme, with a particular focus on recruiting an international prizewinning scientist to lead an SFI team will be a focus for future years.

Illustrating Impact:

Professor Eoin O'Reilly (Tyndall National Institute) was awarded the prestigious 2014 Rank Prize for Optoelectronics. Professor O'Reilly is the first ever Irish recipient of the Rank Prize;

Research excellence in Ireland has been highlighted through the winning of prestigious prizes by Irish scientists. The prestigious 2014 Rank Prize for Optoelectronics was

awarded to Professor Eoin O'Reilly, the Head of Theory, Modelling and Design at the Tyndall National Institute. Professor O'Reilly, the first ever Irish recipient of the prize, received the award for his pioneering work on strained-layer laser structures, which underpin all optical fibre communications, from long-haul to local-area networks (LANs), and act as power sources for optical amplifiers – making undersea networks possible. Professor Barry O'Sullivan, a Director of the INSIGHT Centre for Data Analytics, was awarded the 2014 Distinguished Service Award from the International Association for Constraint Programming. OxyMem, a spin-out from UCD, won both the overall 'Innovation of the Year' Award at the 2014 Irish Times InterTradeIreland Innovation Awards and the Overall Excellence in Intellectual Property Award at the Intellectual Property (IP) Awards 2014. OxyMem was also shortlisted for the sixth annual Academic Enterprise Awards. It was the only Irish company

shortlisted for these awards, which recognise spin-out companies coming from universities and public research institutions.

Illustrating Impact:

Three prominent Irish scientists received the 2014 Nature Award for Mentoring in Science at Science Foundation Ireland's 2014 Summit. Nature hosts these annual awards to champion the importance of mentoring and inspiring a generation of young scientists. Cliona O'Farrelly (TCD) and Martin Clynes (DCU) were jointly presented with the lifetime achievement award and €5,000 each. Cormac Taylor (UCD) received the mid-career award and €10,000 prize.

Professor John Boland, a Principal Investigator at AMBER made a world-first breakthrough in the area of material mechanics. He developed a simple, robust approach to measure one of the most fundamental engineering properties – the Poisson's Ratio – on the nanoscale. This discovery will have a huge impact on the development of flexible electronics, wearable technology and implantable devices.

Supporting young researchers in Ireland is a mechanism for retaining the top emerging talent within the research system. The SFI Starting Investigator Research Grant (SIRG) Programme was launched in 2013 and provides an opportunity for early-career-stage investigators to carry out independent research. The SFI Career Development Award (CDA) was launched for the first time in 2013. It supports early- and mid-career researchers who already hold a salaried, independent research post and who are looking to expand

their research activities. Funding decisions were made on the SIRG and CDA programmes in April of 2014 with €23 million allocated to 40 talented researchers. The President of Ireland Young Researcher Award (PIYRA) is SFI's most prestigious award to recruit and retain outstanding researchers to conduct cutting-edge research. PIYRA was launched as a rolling call in 2014; despite a number of strong applications, no awards were made in 2014. Early career researchers are also supported through the Industry Fellowship programme and Advance Award Programme which were both run in 2014. €2.2 million was allocated to the Industry Fellowship while €1.75 million was allocated to the Advance Award.

Ireland continues to demonstrate its ability to perform excellent research on an international scale. Ireland continues to rank highly with regards to the number of international citations² its publications receive in various subfields and is ranked: 1st in Immunology, 1st in Animal and Dairy Science, 3rd in Nanotechnology, 4th in Computer Science, 6th in Materials Science, 6th in Microbiology and 9th in Neuroscience. Thomson Reuters published a list of the most Highly Cited Individuals 2014. This list comprises over three thousand of the most influential researchers. Only highly cited papers were considered for this list. 11 Irish researchers were included in this list, including 7 researchers who have received funding from SFI; Desmond Higgins, Luke O'Neill, John Cryan, Jonathon Coleman, Colin O'Dowd Henry Curran and Michael Zaworotko.

² InCites: Average Citations per document for period 2003-2013 for OECD countries

Irish researchers have also performed well at a European level in 2014. The number of Irish applicants to ERC grant programmes was strong. There was a 33% increase (48 in total) in Irish applications to the Starting Grant. In December the ERC approved Starting Grants to 6 Irish researchers worth over €8 million. It is the largest number of ERC Starting Grants to be awarded to Irish-based Researchers in one year and compares to two awards approved in 2013. Under the Consolidator Grant there was a 67% increase in applications through to Stage 2. The first increase in submissions to the Advanced Grant was observed since 2011, there was a 47% increase in submissions.

Associated KPIs:

KPI	Baseline	Current Status [2014]	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]	100% by 2015
A1.3.2 Ireland's place in international bibliometric rankings of repute	20 [2011]	17 [2014 to date] ³	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	0	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 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]	50% increase by 2015 €7.4m per annum from 2015 to 2020

³ This figure was calculated using Essential Science IndicatorsSM (Thomson Reuters). Countries that achieved particular distinction based on their papers published in Thomson Reuters-indexed journals were ranked based on cites per paper.

<p>A1.3.6 The number of European Research Council awards secured by SFI researchers</p>	<p>3 SFI-funded* of 7 Starting Grant winners, 2 of 2 Advanced Grant winners, totalling €8.4 million [2011]</p> <p>*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.</p>	<p>6 ERC Starting Grant approved valued at over €8 million [2014]</p>	<p>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</p>
<p>A1.3.7 The attraction to Ireland of leading iconic scientists</p>	<p>0</p>	<p>1 [Professor Robert Bogdan Staszewski 2014]</p>	<p>Average 1 per year to 2020</p>
<p>A1.3.8 Increased representation of women in Science, Engineering and Technology (SET) in Ireland</p>	<p>19% Female Award Holders [2008-2012]</p>	<p>21% Female award holders [2013]</p>	<p>25% of SFI award holders by 2020</p> <p>Increased employment of women in Irish based SET industries – 10% increase from 2013 baseline.</p>

Invest in SFIs translational research capability to enhance the progression of research from discovery to delivery

Illustrating Impact:

Ireland ranked 1st in the world when measuring FDI and Technology transfer.

World Economic Forum – Global Competitiveness Report 2014

Over the past decade, Ireland has built a quality research capability; now is the time to more aggressively develop the translational part of the discovery-to-delivery continuum. In the past, SFI has not supported such research directly. However, with the maturing of many SFI investments, the concentration of research into priority areas, and the erosion of the boundary between basic and applied

research, it is now timely to engage in more direct support across the entire spectrum of scientific research and innovation.

In October 2013 an amendment to the SFI Act was passed by Government. The new amendment enables the Foundation to fund “applied research”, in addition to “oriented basic research”, thus allowing SFI to bring research outcomes closer to market through increased commercialisation, the development of new products and the generation of new services and technologies.

The 2013 SFI Census provides information on pre-commercial outputs for that year which included 73 patents (54 patents filed, 11 patents awarded and 8 patents exploited), 27 licensed technologies, 4 spinout companies and 123 Invention Disclosures. Agenda 2020 sets an ambitious target to double the 2011-2015 average of pre-commercial outputs by 2020. To this end SFI launched a number of Industry facing programmes in 2014

Illustrating Impact:

The SRC Clique has developed valuable technology, which was licensed in 2013 by the Dublin-based social media company Storyful. Storyful was bought by Rupert Murdoch’s News

Gabriel Leen (UL) has licenced pressure sensor technology for use in vascular applications to Pointec Medical Ltd., an Irish SME specialising in Medical Device coatings;

including the Industry Fellowship Programme and the Advance Award. These programmes aim to bridge the gap between academia and industry. In 2014, €2.2 million was awarded to the Industry Fellowship Programme to fund 27 academia-industry partnerships. €1.75 million was awarded to the Advance Award to fund 10 new projects. SFI continued to work closely with Enterprise Ireland in 2014 on the commercially focused Technology Innovation Development Award (TIDA). Awards made under this programme aim to realise a greater economic impact from the state investment in oriented basic research. The TIDA programme funds commercially relevant applied research and allows awardees to develop commercial expertise within their laboratories. The TIDA programme call was launched in March 2014 and 63 awards were funded at a cost of €7.4 million.

Illustrating Impact:

Justin Holmes has demonstrated a new cleaning technology for femoral implants manufactured by Depuy. He is predicting that, if implemented, the plant could save €1.4 million p.a.

Kevin M Ryan (UL) has developed a new nanotechnology, that will double the life of a smartphone, laptop or electric vehicle battery even after being charged and discharged over 1,000 times. This breakthrough means the research team could be tapping into a market estimated to be worth US\$53.7bn by 2020.

The APC spin-out company Atlantia Food Clinical Trials Ltd was launched in 2013 and employs 16 staff (full and part-time). The company has signed 9 contracts to date worth over €1 million.

The Research Centres programme and Spokes programme both serve to promote and develop links between academia and industry. The funding of 5 new Research Centres in 2014, bringing the total of Research Centres to 12 and the addition of 4 new Spokes to the existing Research Centres, have significantly increased the number of industry partners working with SFI researchers. The new Research Centres include 123 industry partners while the four new Spokes projects include approximately 14 industry partners. Closer links

to industry enhance the progression of research from discovery to delivery.

Associated KPIs:

KPI	Baseline	Current Status [2014]	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	123 Invention Disclosures 73 Patents 27 Licence Disclosures 4 Spinouts [2013]	Double the 2011-2015 average by 2020
A2.3.2 Ireland's level of public-private co-publications	25.8 [2012]	34.4 [2013]	50 publications per million population by 2020

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

A key objective of SFI's Agenda 2020 is to develop a set of world-leading, large-scale research centres that will provide major economic impact for Ireland. SFI Research Centres link scientists and engineers in partnerships across academia and industry to address crucial research questions; foster the development of new and existing Irish-based technology companies; attract industry that could make an important contribution to Ireland and its economy; and expand educational and career opportunities in Ireland in science and engineering.

Illustrating Impact:

In 2013 alone, CLARITY CSET, one of the founders of the INSIGHT Research Centre, published 130 peer reviewed scientific papers including 43 journals and 88 international conference papers; they presented their work at more than 100 events including more than 11 keynote presentations. In addition one of their co-PIS was named as a 2013 IEEE fellow;

APC carried out a study in conjunction with the Irish Rugby Football Union revealing that exercise and associated dietary changes influence gut microbial diversity.

Researchers in AMBER developed a new method of producing industrial quantities of high quality graphene. This research has been highlighted by the highly prestigious Nature Materials publication as a global breakthrough. Described as a wonder material, graphene has a multitude of potential applications including advanced food packaging; foldable touch screens for mobile phones and laptops; faster broadband and batteries with dramatically higher capacity than anything available today.

The SFI Research Centres Programme Call was first launched in 2012. Following extensive merit review, seven new Research Centres were funded and commenced operations in June 2013. At the time of writing the Research Centres are almost 18 months old; the following highlights cover 2013 only (unless otherwise stated). The total investment committed by SFI was €157.5 million in direct costs over a six year period; an additional €37.6 million cash and €65.3 million in-kind committed from industry accompanied this investment. The primary objective of the Research Centres is to deliver significant economic and social impact to Ireland. The

Research Centres have secured €18 million in non-exchequer, non-commercial funding in 2013. This is mainly as a result of success in winning 28 new EU FP7 awards, three of which are led by the Research Centres. Three new ERC awards were secured by Research Centre professors; Profs John Boland, Martin Albrecht and Valeria Nicolosi. A significant amount of time was spent by the Research Centres in 2014 on strengthening engagement with industry. To date 143 contracts with industry partners have been signed by the Research

Illustrating Impact:

28 new EU-FP7 awards have been secured by Research Centre PIs since the start of the Centres programme in June 2013, for example, within the Graphene FET Flagship (AMBER), Marie Curie programmes (AMBER, MaREI and APC) and the Cooperation, Research for the SMEs and Energy programmes (AMBER, MaREI, APC);

INSIGHT developed Ireland's first national Open Data Portal, which was launched this year. Open data has the potential to drive more effective decision-making and efficient service delivery, spur economic growth, and empower citizens to take an active role in improving their own communities. This national Open Data Portal contains over 418 datasets from 45 public bodies.

Centres which represents a total cash and in-kind commitment of €14 million and €21 million respectively. In terms of commercialisation, 25 Enterprise Ireland Commercialisation Awards have been won by the Research Centres along with the signing of 9 licensing agreements. Funding was provided by SFI to the centres to fund an EU grants

manager to co-ordinate Horizon 2020 activity. The Research Centres currently employ 501 people with a total of 609 positions expected to be filled by the end of 2014.

The SFI Spokes call was launched in 2013 as a vehicle to enable the addition of new industrial and academic partners and projects to an SFI Research Centre, thus allowing the Centre to expand and develop in line with new research priorities and opportunities. Spokes awards will be important in the sustainability and development of the Research Centres as they will retain their ability to do cutting-edge research of relevance to new and existing industry partners. Four Spokes proposals were funded in 2013 including the area of Advanced Biopharmaceutical Manufacturing. This will involve a total investment by SFI (€4.5 million) and industry (€2.7 million cash and €1.3 million in-kind) and includes approximately 14 industry partners.

The second SFI Centres Programme call was launched in 2013. After an extensive review for scientific excellence and impact, a decision was made to fund five new Research Centres due to the excellent quality of the proposals. The new funding has been competitively awarded in areas of national importance closely aligned to industry and enterprise needs, job opportunities and societal goals. The five SFI Research Centres will be involved in over 165 industry collaborations with partners ranging from multinationals to SMEs and including Intel, Google, Microsoft,

Illustrating Impact:

Prof. Frederic Dias of MaREI has been recognised for his research on ocean waves by the French Academy of Sciences, who have awarded him their grand prize. Prof. Dias was recently involved in a publication with Met Éireann focusing on the topic of rogue waves and tsunamis, which echoed findings of the latest IPCC report on climate change.

I-PIC has recently performed well in H2020, having secured over €2.2 million in funding. Of 11 proposals submitted 4 were funded, giving them a 36% success rate.

Medtronic Vascular Galway Ltd, Xilinx, Huawei and many more. The following Research Centres will commence operations in Q1 2015 at a cost of €155 million over 6 years (2015-2020) to SFI, matched by industry commitment of €90 million:

- **ADAPT** - Global digital connectivity enables enterprises, communities and individuals to share information and communicate globally at incredible speed, in enormous volumes, across the world's languages and over an ever-increasing number of devices. ADAPT's research will fundamentally change the way in which enterprises, communities and individuals can engage globally in real time. ADAPT will enhance efficiencies and global reach for industry partners in key priority sectors for Ireland, including ICT, localisation, financial services, eCommerce, media, entertainment and games, life sciences, eLearning, digital culture and humanities.
- **CONNECT Centre for Future Networks & Communications** - The key challenges that face society all drive the need for new and varied forms of networked services. These include mobile Internet, connected health, smart agriculture, smart grids and metering, and environmental monitoring services. The CONNECT Centre focuses on future broadband, cellular and Internet-of-Things networks on which all of these services will be enabled; thereby growing the economy and supporting society at large.
- **CÚRAM Centre for Research in Medical Devices** - As the global population ages, one in three people are expected to be over 65 by 2050, with the potential financial burden for healthcare expected to rise. CÚRAM is engaged in research to radically improve health outcomes for patients by developing innovative implantable 'smart' medical devices to treat major unmet medical needs. This research will position Ireland as the leader in developing medical device technologies which will provide affordable transformative solutions for chronic diseases.
- **iCRAG Centre for Research in Applied Geosciences** - Geoscience underpins the discovery of raw materials, water and energy resources that are critical to the world's economy. With increasing demand and diminishing supply, focused innovations in geoscience are of paramount importance globally. Ireland is home to Europe's largest zinc mine, untapped hydrocarbon resources in challenging North East Atlantic deep water environments, and a diverse geological framework with important untapped seabed and groundwater resources. The iCRAG centre will carry out research to find and harness these resources whilst protecting the environment.
- **LERO The Irish Software Research Centre** - Software is everywhere and key Irish industry sectors such as manufacturing, medical devices, financial services, cloud computing, analytics, and smart cities depend on it. LERO's research mission is to replicate the success of traditional software engineering in the context of large-scale,

pervasive, physically-integrated, highly interconnected, evolving, and continuously-available systems, in which the boundary between design-time and runtime is disappearing.

Associated KPIs:

KPI	Baseline	Current Status [2014]	Target
A3.3.1 Number of internationally recognised research centres of scale in Ireland	0	12	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% [2013]	Minimum of 50% of overall centres' funding by 2020

Drive increased hiring of SFI-trained researchers by Industry

Illustrating Impact:

Ireland ranked 18th in terms of Human Capital and Research.

Global Innovation Index 2014

One of the primary reasons that the Government invests in scientific research is to upskill the nation's human capital. People with high levels of training and skills are an ingredient in ensuring innovation is delivered, leading to higher value products and services, and improved living standards. SFI investments deliver 4th level graduates, the majority of whom are expected to secure/establish employment in high-tech companies and, to a lesser extent, in the public service, while a significant minority will stay within the system to support and refresh the academic community. Over this decade SFI aims to ensure that half of the human capital it develops is employed within the private sector and non-academic public sector. This is a challenging target, given that the latest figures show that the majority of team leavers in 2013 have remained in academic positions. SFI launched a number of programmes in 2014 aimed at enhancing the migration of researchers to the private sector through the provision of industry relevant training and experience.

Illustrating Impact:

The SSPC has enhanced the reputation of the pharmaceutical industry in Ireland through improved processing techniques and industry relevant activities. This is supported by Industry's continued involvement with the SSPC.

Roche Corporate, partners with SPPC, made a decision to retain its plant in Ireland while shutting other plants internationally. They attribute the decision to the Irish sites operational excellence, it's highly skilled workforce and its on-going ability to demonstrate innovative R&D capacity as a result of engagement with SSPC. The direct economic impact of this has been the retention of 400 high value jobs in Ireland.

The Industry Fellowship Programme and Advance Award Programme were both launched in 2014. These programmes each serve to support the career development of both established and early career researchers. The SFI Industry Fellowship Programme aims to facilitate exchanges between academia and industry to stimulate excellence through knowledge transfer and training. €2.2 million was allocated to the SFI Industry Fellowship Programme to fund 27 new industry-academic partnerships. A

second call was held in December 2014 with a much broader pool of eligible applicants; this will permit an increased number of awards to be made (in Q1/Q2 2015), with a corresponding increase in the number of academia-industry linkages. This should result in an increased number of trainees of this programme moving to industry as a first destination, improving the associated KPI A4.3.1.

The Advance Programme was launched in February and seeks to fund women returning to, or wishing to remain in, high quality research careers and to undertake industry-facing

research projects in eligible research bodies. The expectation is that the Advance awardees will collaborate closely with at least one of the academic mentor’s industry facing partners and, following completion of the award will be in a position to secure STEM employment in industry or the public sector. A total of €1.75 million was allocated to fund 10 Advance awards. The SFI Research Centres also serve to link scientists and engineers in partnerships across academia and industry. Five new SFI Research Centres were funded in 2014 along with 4 Spokes projects. Both the Centres and Spokes promote and develop academia-industry partnerships which serve to provide industry-relevant training and contacts to the researchers.

Associated KPIs:

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

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

Build Strategic Partnerships

Successful entities collaborate, partner and network. They identify other entities whose agendas are synergistic and work together with them to generate multiplier effects, and deliver results that far outstrip what the individual entities would deliver on their own. SFI is committed to leveraging its investment and capability to the maximum extent possible. The partnership model is an efficient and effective means of doing this. SFI aims to strategically identify and target entities with the potential to generate multiplier effects that contribute to the delivery of its objectives.

2014 has been an important year for developing key partnerships to ensure that SFI maximises the return on State investment. In 2014, SFI announced four major partnerships and is on target to meet all of its targets under this objective.

Illustrating Impact:

A partnership between Dr Albert Ruth (UCC) and the Karlsruhe Institute of Technology was funded under the Strategic Partnership programme. It aims to develop a compact instrument for the detection of trace gas on board commercial flights.

The SSPC was awarded the Partnership Alliance of the Year Award at the Pharma Industry Awards 2014. The award recognises the SSPC for its outstanding national and international industry-academia, inter-industry, and inter-academia collaborations between its 22 industry partners, 9 research performing organisations and 12 international academic collaborators, within the pharmaceutical sector.

In January, the Irish Minister for Jobs, Enterprise and Innovation, Richard Bruton TD and the Employment and Learning Minister for Northern Ireland, Dr. Stephen Farry MLA, signed a ground-breaking collaborative agreement which allows researchers in Queen's University Belfast and the University of Ulster to participate as full academic partners in awards made under SFI's well-established Investigators Programme. The 2014 SFI Investigators Programme was launched in February and will support collaborative projects involving universities from both jurisdictions to undertake internationally peer-reviewed, leading edge, discovery and fundamental research.

In February, SFI announced a unique Public Private Partnership with Pfizer which aims to promote new biotherapeutic breakthroughs in Ireland, through academic-industry collaboration. The SFI-Pfizer Biotherapeutics Innovation Award Programme supports highly competitive, collaborative research projects between Pfizer and Irish academics with the objective of identifying biopharmaceutical candidates directed against novel disease targets or pathways of interest. Five projects were approved for funding at a total cost of €1.9 million to SFI.

In April, the Irish Cancer Society and SFI announced a partnership that aims to support the establishment of a new Collaborative Cancer Research Centre (CCRC). The CCRC will establish valuable partnerships with industry and healthcare organisations to drive research towards the development of new approaches and advances that will help reduce the economic and social burden of cancer in Ireland. The Centre will provide a foundation for better integration of cancer research and care for the benefit of patients and the public.

In June, the Royal Society and SFI announced the signing of a historic new collaboration agreement. The agreement sees both institutions partner on a University Research

Illustrating Impact:

INFANT is currently well on the way to being a Waters Centre of Innovation. In March 2014 a new partnership was announced to develop biomarker test for spontaneous preterm birth with Waters Corporation and INFANT.

X-Celeprint Ltd., an industry partner of the iPIC Centre, has located its headquarters in Ireland within the Tyndall Institute, where the lead iPIC researchers are based. It is anticipated that X-Celeprint will generate from 10-20 technical and licensing jobs in Ireland during the next two to three years.

Fellowship Scheme which will provide Ireland's best and brightest young scientists with a unique opportunity to be awarded a prestigious research fellowship by the Royal Society alongside the best early career researchers from the UK.

The existing partnership between SFI, the HRB and Wellcome Trust continues to pay dividends to Irish researchers. Two awards have recently been made to Irish

Investigators through this partnership. Notably, Irish researcher, Professor Shane O'Mara has been announced as the first ever Irish-based scientist to be awarded a Senior Investigator Award, under this partnership, receiving €1.2 million to carry out research on understanding how interactions between differing brain areas support normal memory.

The ongoing SFI Strategic Partnership Programme remains open on a rolling basis and aims to support initiatives of scale with strong potential for delivering economic and societal impact to Ireland. A partnership, between Dr. Albert Ruth (UCC) and the Karlsruhe Institute of Technology in Germany, has been funded at a cost of €300,000. The collaboration entitled "A new cavity enhanced trace gas absorption detector for CARBIC" aims to develop a compact ultra-sensitive instrument for the detection of trace gas on board commercial flights.

In order to maximise funding secured from European initiatives, SFI has played a leadership role in EU Joint Programming Initiatives (JPIs) in 2014. SFI led the preparation of the €5.5 million transnational call for Biomarkers in Nutrition and Health (BioNH) through the EU Joint Programming Initiative 'A Healthy Diet for a Healthy Life' (JPI HDHL). Two Irish participants were funded under this call. SFI has also partnered with 13 countries in the transnational call 'Cross Disease Analysis of Pathways' in the JPI on Neurodegenerative Diseases. Both of the proposals with Irish participants were deemed fundable. Further to

this, SFI has also partnered with 11 countries in the Systems Medicine ERANET Co-Fund application to Horizon 2020, which was favourably evaluated. SFI has committed to providing €0.58 million to the Systems Medicine Co-Fund call which will be launched through this initiative in Q1 2015. This aligns with Irish strength in SFI funded Systems Biology Ireland CSET and a wider community that has been very successful in securing significant funding from FP7.

Associated KPIs:

KPI	Baseline	Current [2014]	Status	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]		A measurable increase in the joint funding instruments by 2020
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) [2013]		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]		Double the number of initiatives led by SFI funded awardees to 260 initiatives over the 7 year period (37 per year)

Diversify the Funding Sources for Ireland's Scientific Base

Top-quality research that is scientifically excellent and that brings direct economic and social benefits should have multiple sources of support. Equally, large research projects require a level of funding that can realistically be met only by multiple investors. Evidence of scientific excellence is supported by the winning of funding from international sources such as the ERC and in the coordination of EU projects. Evidence of impact potential lies in attracting partnership requests from major international companies or investors. A diversified income stream is thus an indicator of both relevance and quality. It also contributes to the

sustainability of the system and enhances its capability of delivering strategic goals, as a broad funding base is inherently more stable. A broad funding stream also ensures the resilience and efficiency of individuals and the continued development of research careers.

Illustrating Impact:

Metabolomics Diagnostics, a spin out company based on INFANTs IP for detecting pre-eclampsia early in pregnancy, has been successful in a recent VC round of funding.

Dr Colm J. Ryan has been awarded a Sir Henry Wellcome Postdoctoral Fellowship worth €300,000 over four years to work in Systems Biology Ireland (SBI) at University College Dublin. Dr Ryan is the first recipient of this prestigious award, funded under the SFI-HRB-Wellcome Trust Biomedical Research Partnership, to be hosted in an Irish laboratory.

In Agenda 2020, SFI has set a number of ambitious targets for its community to lead and win in Horizon 2020, the EU Framework Programme for Research and Innovation with a budget of approximately €80 billion. In addition, the Irish Government has set a national target for Ireland to draw down a total of €1.25 billion in Horizon 2020. SFI is currently in the process of rolling out its strategic plan which it expects will maximise the draw down of funding from Horizon 2020 by SFI award holders. €54 million in funding was secured

by SFI funded researchers from EU sources in 2013. SFI recognises that the following KPIs are stretching.

In 2014, SFI has played a leadership role in EU Joint Programming Initiatives (JPIs) in order to maximise funding secured from European initiatives. Two Irish participants were funded under the SFI-led €5.5 million Biomarkers in Nutrition and Health (BioNH) call through the EU JPI 'A Healthy Diet for a Healthy Life.' Irish participants were also deemed fundable

Illustrating Impact:

Professor Shane O'Mara was announced as the first ever Irish-based scientist to be awarded a Senior Investigator Award under the SFI-HRB-Wellcome Trust Biomedical Research Partnership, receiving €1.2 million to carry out research on understanding how interactions between differing brain areas support normal memory.

Many of SFI's industry facing awards including AMBER/CRANN, APC, CLARITY/INSIGHT enjoy international recognition as world leaders in their respective fields

under the 'Cross Disease Analysis of Pathways' call in the JPI on Neurodegenerative Diseases in which SFI partnered with 13 countries.

SFI recognises the key role that the SFI Research Centres will play in leading and winning major international funding initiatives. Each Research Centre has been required to agree with SFI its strategy for engaging with Horizon 2020 and to provide SFI with a set

of realistic targets. In order to facilitate their engagement in Horizon 2020, SFI has provided the Research Centres with a supplement award for an EU Grant Manager at a total cost of

approximately €4 million over 5 years. In addition, SFI have funded an additional EU Grant Manager, in partnership with the IUA whose role is to disseminate EU funding information to the research community, to assist in the development of applications to Marie Skłodowska-Curie Actions (MSCA).

SFI continues to run its European Research Council (ERC) Support and Development Programmes which collectively provide support to the community both to develop research programmes to win ERC funding and also to support successful ERC awardees. To date approximately €5.3 million has been allocated to a total of 16 awards under these programmes. These programmes are deemed to be the best in their class as evidenced by Dr. Graeme Horley being invited to present details of these programmes to an ERC workshop in November 2014.

Progress has been made on the major testbed KPI target. The Connect Research Centre includes €650k for integration of the existing testbeds into a major testbed / demonstrator, in addition to €360k for a Testbed Manager position to manage the testbed.

The first round of Horizon 2020 ERC calls were launched in late 2013 and early 2014. Calls include the Starting, Proof of Concept, Consolidator and Advanced Grants. Progress with the 2014 calls has been excellent to date. The Starting Grant programme saw a significant increase in applications (48 in total, a 33% increase). Eight Starting Grant awards were approved by the ERC in December 2014 – six in areas under SFI’s remit valued at over €8 million. Irish applications to the Consolidator Grant saw a 67% increase in applications through to Stage 2. The 39.5% success rate at Stage 1 is well above the call average. Applications to the Advance Grant increased by 47%, the first increase in submissions since 2010. While SFI is actively encouraging and supporting the participation of Irish researchers in Horizon 2020, the targets set are hugely ambitious and require the coordination of all national stakeholders. Horizon 2020 remains a central focus for SFI in 2015. While the target of doubling the average income secured by SFI researchers is currently at risk of not being met (red indicator), it is important to note that all the Research Centres are relatively new and as they expand and gain recognition their ability to secure external funding will increase.

Associated KPIs:

KPI	Baseline	Current [2014]	Status	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]	million	Double the average figure between 2008-2011, to €120m per annum by 2020

B2.3.2 Major test beds established in Ireland	0	1 (Connect RC)	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	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)	Co-fund at least one partnership per year to 2015 and at least 2 per year from 2016-2020

To have the most engaged and scientifically informed public

Science and technology play an increasingly important role in addressing the economic, social and environmental problems faced by the world today. That role needs the support and active engagement of the public who fund the work and are the ultimate beneficiaries of it. An engaged public is one that understands the role of science, can judge between competing priorities and arguments, encourages young people to take STEM subjects, and feels that it has the most appropriate level of engagement with, and influence upon the researchers. The SFI Discover Programme, launched in 2014, seeks to promote the awareness and engagement of the Irish public with science, technology, engineering and mathematics (STEM). In 2014 SFI Discover has provided funding to a number of programmes that support and develop the education and outreach STEM sector in Ireland. These programmes explore and encourage novel means of public engagement and communications. Thirty-three new projects were approved under the SFI Discover Programme with a direct audience reach of 402,975.

Illustrating Impact:

Last year's Science Week (2013) had over 800 events attended by over 250,000 people. Events were run within schools, libraries and third level institutes and were largely driven by volunteer event organisers with support from SFI Discover by the way of the Science Week website its resources, PR, supply of roadshows and merchandise.

Many of the larger industry facing awards have vibrant and influential E&O programmes including: LERO's computer science education for children and teachers which has culminated in the adoption of a new computer science curriculum; and APC's Alimentary Adventures, an inflatable tunnel which mimics the human digestive system.

Key highlights from the SFI Discover funded projects in 2014 include the production of a primetime television series (The Science Squad) which looked at a range of science and technology research areas from drug developments and innovative medical diagnostics, to space research and agricultural advances in Ireland. The series captured the enthusiasm of those working in the broad area of scientific research around the country. It also highlighted how this research will affect the public by meeting those whose lives have already been directly affected by the work or for whom the very latest developments will have a huge impact. SFI Discover also funded the UNBREAKABLE TOUR, a Cinema and School Outreach Tour which involves bringing the film Unbreakable on tour around Ireland to schools, businesses, offering regular and

special screenings with a focus on inspiring people to think about the possibilities of science and technology. The film features the research and adoption of science and technology by athlete Mark Pollock in his rehabilitation after a spinal injury.

Illustrating Impact:

Shane Bergin won the European Commission's Marie Skłodowska-Curie award for communicating science in a fun way to mentor the next generation. The award celebrated his communication of physics through interactive posters entitled "DART of Physics" on Dublin's DART. This outreach activity involved 50 scientists and 300 students.

SFI Discover coordinated Science Week 2014 which included providing a series of interactive science shows and workshops to libraries and other local bodies around the country during Science Week. These fun and engaging shows were available to local primary and post primary school children. For Science Week 2014, 165 shows were available throughout the country. In addition to this SFI supported six Regional Science Festivals in Cork, Galway, Sligo, the Midlands, Waterford and Mayo. These festivals offered a range of science shows, workshops and talks throughout the week. For

Science Week 2014 the seven SFI Funded Research Centres ran a series of exciting events across Cork, Limerick, Dublin and Galway including family open days, making the world of research accessible to the public; workshops; public lectures and film nights. In previous years Science Week was solely funded through the SFI Discover programme. The funding of this year's Science Week has evolved to include funding through partnerships which represents a strong example of leveraging exchequer funding.

Illustrating Impact:

The BT Young Scientist Exhibition took place in January of this year with an estimated 45,000 people visiting the exhibition over the 3 days. It was the 50th anniversary of the event. SFI's presence at this year's event was increased with Smart Futures, Discover Primary Science and various SFI Research Centres displaying Education and Outreach activities. The APC Alimentary Adventure, an exciting new inflatable 8m long walk-through tunnel, which mimics the human digestive system, was a main feature of the stand.

Professor Fergus Shanahan, Director of APC, was featured on the BBC 2 Horizon programme "Allergies: Modern Life and Me." The show examined the lives of two modern, allergic families to discover how their bacteria have been impacted by their lifestyles, and why it's making them allergic.

SFI is a strategic partner with the Festival of Curiosity, Dublin's annual festival of science and culture, with a mission to create a culture of curiosity in Dublin and Ireland. The Festival featured a series of events including science talks, demonstrations, workshops, interactive theatre and film screenings. The Festival brought together children, family members, scientists, artists and the public in an integrated festival of science and culture and increased awareness of the importance of 'science' and its contribution to the economy and culture of Ireland.

The Smart Futures initiative, a new three year plan to deliver and increase the uptake of Science, Technology, Engineering and Maths (STEM) subjects, was launched in 2014. Ultimately the new strategy aims to deliver a 10% increase in the uptake of STEM subjects by students at second and third level by 2016.

The programme has trained a total of 929 volunteers to date, delivering visits to 427 schools in the 2013/14 academic year and reaching over 13,000 students. SFI-funded researchers participated in a number of education and public engagement activities in 2013, including 1457 media interviews and interactions, giving 775 public lectures and demonstrations and visiting 763 primary and secondary schools. Over 500 Irish primary schools will receive the Discover Primary Science and Maths (DPSM) Awards of Science and Maths Excellence.

Associated KPIs:

KPI	Baseline	Current Status [2014]	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	<p><u>TV series:</u> Baseline: 0 [2012]</p> <p><u>Traditional media:</u> Baseline: 606 newspaper articles on average per annum [2009-2012]</p> <p><u>New media:</u> Baseline: 1,316,028 Discover/SFI webpages visits 21,397 various account holders [2012]</p>	<p><u>TV Series:</u> 1</p> <p><u>Traditional media:</u> To date over 900 newspaper articles referencing SFI</p> <p><u>New media:</u> To date 392,165 Discover/SFI website visits; 73,033 unique visits</p>	<p>By 2014, the presence of at least one science programme/series in the peak schedule of the national broadcaster, annually.</p> <p>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</p>
C1.3.2 Level of take-up of STEM subjects at secondary school and third level	<p><u>Secondary Level:</u> 221,919 [2007-2011]</p> <p><u>Third Level:</u> 26% [2007-2011] 29% [2012]</p>	<p><u>Secondary Level:</u> 243,442 [2014]</p> <p><u>Third Level:</u> 26%</p>	<p>Arrest decline observed over 2007-2011 and subsequently drive a measurable increase</p>

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

SFI is a young organisation with an organisational structure that is unique within the Irish public service. SFI's core scientific staff is employed on a contract basis: this ensures that the organisation has the flexibility to respond quickly to changes in science and technology. It is a lean organisation that can be a model template for the Irish public service. Operational excellence is a core value of the organisation and SFI requires top-class performance from its staff, using a model of high turnover and high employability. SFI has built an excellent reputation for transparency and accountability in its operations. SFI monitor, promote and audit international best practice in areas such as Research Integrity.

Illustrating Impact:

Ireland ranked 3rd in EU Member States performance in Human Resources.

Innovation Union Scoreboard 2014

Earlier this year, SFI launched the SFI Internship Programme 2014. This programme aims to provide successful candidates with the opportunity to develop their career through experiencing and participating in first-hand, the diversity of activities carried out by a funding agency. SFI is keen to be part of a framework that can enable researchers to seek and secure

diverse career opportunities in areas such as industry, research funding and administration. For those individuals interested in these types of careers, the internship programme provides an opportunity to develop key skills which may assist them in securing these types of roles. For research office staff, SFI offers the opportunity for Research Bodies to learn more about the administration of research funding in an open and transparent environment.

In 2014 SFI has worked towards meeting the targets outlined in Agenda 2020. In June of this year, the National Policy Statement on Ensuring Research Integrity in Ireland was launched. The policy statement was developed by the Irish Universities Association (IUA) in collaboration with other organisations including SFI, the Health Research Board (HRB), the Higher Education Authority (HEA) and the Royal Irish Academy (RIA). This policy statement requires these organisations to carry out their research to the highest standards of integrity so that partners and other stakeholders, and the international research community may have full confidence in the Irish research system.

Illustrating Impact:

Ireland ranked 8th in Open and Effective Research Systems.

Innovation Union Scoreboard 2014

An editorial this year in Nature entitled "Integrity Mentors" congratulated SFI on the inclusion in the strategic document, Agenda 2020, of an external audit to scrutinize research integrity. Ireland's "evident determination to sustain best practices" was noted and it was

highlighted that it is timely that the Mentoring Awards are recognising Irish scientists this year.

Associated KPIs:

KPI	Baseline	Current Status [2014]	Target
D1.3.1 Cost of administration	3.87% (€7.9m/€205m) [2012]	2% (€9m/€465m) [2014]	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]	To be in the top quartile by 2015 by international benchmarks
D1.3.3 Attractiveness of SFI as an employer and employability of SFI staff	<u>Internships:</u> Baseline: 2 [2012] <u>SFI Roles:</u> Baseline: >50 applicants per role [2013] <u>Leavers:</u> Baseline: 4 of 8 leavers to senior roles [2012]	<u>Internships:</u> 6 [2014] <u>SFI Roles:</u> ~90 applications for Director of Programmes role. <u>Leavers:</u> 2 of 2 leavers to senior roles [2014]	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	Developed by 2013
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	Conducted by 2014

Key Developments in 2014

Partnerships

- A North/South research collaboration agreement has been established between SFI and the Department for Employment and Learning Northern Ireland (DELNI) which will allow Queen's University and the University of Ulster researchers to participate for the first time as full academic partners in SFI's Investigators Programme, funded by DELNI.
- A unique Public Private Partnership has been established between SFI and Pfizer that aims to promote new biotherapeutic breakthroughs through academic-industry collaboration.
- The Royal Society and SFI announced the signing of a historic new collaboration agreement which will provide Ireland's best and brightest young scientists with a unique opportunity to be awarded a prestigious research fellowship by the Royal Society alongside the best early career researchers from the UK.
- SFI and the Irish Cancer Society have agreed a partnership to fund a world-leading Cancer Research Centre that will develop new insights into cancer and deliver new approaches to treatment.
- Two awards have recently been made to Irish investigators through the SFI-HRB-Wellcome Trust Partnership.
 - Professor Shane O'Mara was announced as the first ever Irish-based scientist to be awarded a Senior Investigator Award under the SFI-HRB-Wellcome Trust Biomedical Research Partnership, receiving €1.2 million to carry out research on understanding how interactions between differing brain areas support normal memory.
 - Dr Colm J. Ryan has been awarded a Sir Henry Wellcome Postdoctoral Fellowship worth €300,000 over four years to work in Systems Biology Ireland (SBI) at University College Dublin. Dr Ryan is the first recipient of this prestigious award, funded under the SFI-HRB-Wellcome Trust Biomedical Research Partnership, to be hosted in an Irish laboratory.
- SFI in collaboration with the Irish Research Council (IRC) launched a call for postgraduates in the ST&I policy field through the 2015 Government of Ireland Postgraduate Scholarship (GIPS) Scheme.
- A partnership between Dr Albert Ruth (UCC) and the Karlsruhe Institute of Technology was funded under the SFI Strategic Partnership Programme which aims to develop a compact instrument for the detection of trace gas on board commercial flights.
- The SSPC was awarded the Partnership Alliance of the Year Award at the Pharma Industry Awards 2014. The award recognises the SSPC for its outstanding national and international industry-academia, inter-industry, and inter-academia

collaborations between its 22 industry partners, 9 research performing organisations and 12 international academic collaborators, within the pharmaceutical sector.

- In March 2014 a new partnership was announced to develop biomarker test for spontaneous preterm birth with Waters Corporation and INFANT.

Supporting the Development of Early Career Researchers

- A total of €23 million has been allocated to the SIRG and CDA Programmes to fund 40 awards. In addition, a total of 12 awards have been added to a reserve list and will be considered for funding before the end of 2014.
- Success of the SFI Internship Programme continues with five new interns hired in 2014, two in the Performance Improvement team, two in the Post-award team, one in the Pre-award team and one EU coordinator.
- A total of €1.75 million was allocated to the Advance Award to fund 10 awards providing early career and established female researchers with an opportunity to remain in or return to high-quality research and in particular, to undertake further industrially relevant training.
- €2.2 million was allocated to the SFI Industry Fellowship Programme to fund 27 new industry-academia partnerships facilitating exchanges in both directions between academia and industry to stimulate excellence through knowledge transfer and training, thus building critical mass in areas of strategic importance for Ireland and enabling economic and societal challenges to be tackled.
- A Reception at Áras an Uachtaráin in March was hosted by President Higgins for the three 2013 PIYRA recipients.

European Activities – FP7 and Horizon 2020

- €54 million in funding was secured from EU sources in 2013.
- Seven SFI Research Centres have been provided with a total of eight EU Grant Managers amounting to an investment of approximately €4 million over five years.
- SFI in partnership with the IUA have hired an EU Grant Manager to specifically coordinate applications to the IUA Marie Skłodowska-Curie Actions.
- There was a 33% increase in Irish applications to the ERC 2014 Starting Grant, with eight awards approved, six in areas under SFI's remit.
- SFI continues to run the ERC Support and Development Programmes with several applications under review. A total of 16 awards have been made in these programmes to date⁴ at a cost of approximately €5.3 million to SFI.
- SFI wrote a €5.5 million transnational Biomarker call in the JPI *A Healthy Diet for A Healthy Life* that was launched in April 2014. Proposals to this call have been reviewed and the Peer Review and Call Steering Committee meetings took place on

⁴ Awards made from 2012 to date

the 25th and 26th of September. Two of the proposals will be funded, the second of which has two Ireland based partners.

- SFI has partnered with 13 countries in the transnational call *Cross Disease Analysis of Pathways* in the JPI on *Neurodegenerative Diseases*. Proposals to this call have also been reviewed and the Peer Review and Call Steering Committee meetings took place on the 16th and 17th of September. Two of the proposals deemed fundable include Irish partners. One of the proposals can be funded while funding gaps exist for the other proposal.
- SFI partnered with 11 countries in the Systems Medicine ERANET COFUND application to Horizon 2020. On the 3rd of September 2014, The European Commission (EC) reported that this proposal was positively evaluated and will be funded.

Research Excellence, with Impact

- SFI-funded Professor Eoin O'Reilly (Head of Theory, Modelling and Design, at the Tyndall National Institute) was awarded the prestigious 2014 Rank Prize for Optoelectronics. Professor O'Reilly is the first ever Irish recipient of the Rank Prize.
- A 2014 Nature editorial entitled "Integrity Mentors" congratulated SFI on the proposed execution of an external audit to scrutinize research integrity. The development of this audit is included as a Key Performance Indicator (KPI D1.3.5) in the strategic document, Agenda 2020.
- A total of €47 million has been invested in 36 research projects through the SFI Investigators Programme. The research projects will support 200 researcher positions and involve more than 62 companies. A further five proposals deemed fundable (scientifically excellent and with demonstrable impact) have been placed on a reserve list due to budgetary restrictions and will be considered for funding before the end of 2014.
- Prof. Robert Bogdan Staszewski has been recruited under the Targeted Research Professorship. Prof. Staszewski is an IEEE Fellow and will carry out research in the fields of Engineering and Network and Communications Systems.
- Professor Barry O'Sullivan, the Director of the INSIGHT Centre for Data Analytics, has been awarded the 2014 Distinguished Service Award from the International Association for Constraint Programming.
- OxyMem, a UCD spin-out, has been shortlisted for the sixth annual Academic Enterprise Awards.
- Professor John Boland, a Principal Investigator at AMBER made a world-first breakthrough in the area of material mechanics. He developed a simple, robust approach to measure one of the most fundamental engineering properties – the Poisson's Ratio.
- Three prominent Irish scientists received the 2014 Nature Award for Mentoring in Science at the Science Foundation Ireland's 2014 Summit. Nature hosts these annual

awards to champion the importance of mentoring and inspiring a generation of young scientists. Cliona O'Farrelly (TCD) and Professor Martin Clynes (DCU) were jointly presented with the lifetime achievement award and €5,000 each. Cormac Taylor (UCD) received the mid-career award and €10,000 prize.

- Professor John Boland, a Principal Investigator at AMBER made a world-first breakthrough in the area of material mechanics. He developed a simple, robust approach to measure one of the most fundamental engineering properties – the Poisson's Ratio – on the nanoscale. This discovery will have a huge impact on the development of flexible electronics, wearable technology and implantable devices.

Highlights relating to the SFI Research Centre Programme

- SFI have funded five new Research Centres at a cost of €155 million over five years complemented by €90 million from industry. The new centres are in the thematic areas of Future Networks and Communications (CONNECT), Digital Platforms, Content and Applications (ADAPT), Software (LERO), Geosciences Underpinning Sustainable Economic Development (ICRAG) and Medical Devices (CURAM).
- Four Spokes proposals have been approved for funding with a provisional allocation of €4.5 million by SFI complemented by €2.7 million cash and €1.3 million in-kind from industry.
- In April 2014, Thomas Swan Ltd. announced an exclusive agreement with AMBER PI Jonathan Coleman to manufacture high quality graphene products by an exciting new process (liquid exfoliation) developed by researchers at Trinity College Dublin.
- In March 2014, a new partnership was announced between INFANT and Waters Corporation to develop a biomarker test for spontaneous preterm birth.
- Three prestigious ERC awards (including Proof of Concept awards) have been won by PIs within AMBER, SSPC and MaREI, bringing to Ireland over €4.5 million in ERC funding.
- Several EU-FP7 awards have been secured by Centre PIs since the start of the SFI Research Centres programme in June 2013, for example within the Graphene Flagship (AMBER), several Marie Curie programmes (AMBER, MaREI and APC) and the Cooperation, Research for the SMEs and Energy programmes (AMBER, MaREI, APC).
- More than 100 Intellectual Property (IP) agreements with the Centres' industry partners have been signed.
- X-Celeprint Ltd., a wholly-owned subsidiary of holding company XTRION N.V., and an industry partner of the iPIC Centre, has located its headquarters in Ireland within the Tyndall Institute, where the lead iPIC researchers are based.
- INSIGHT developed Ireland's first national Open Data Portal, which was launched this year. This national Open Data Portal contains over 418 datasets from 45 public bodies.

- Metabolomics Diagnostics, a spin-out company based on INFANT's IP for detecting pre-eclampsia early in pregnancy, has been successful in a recent Venture Capital (VC) funding round.
- Lero won over €400,000 in industry commitments for software modernisation programmes.
- INFANT has recently won an €800k Defined Intervention trial project from the HRB for a project in the area of treatment for severe foetal growth restrictions.

Enhancing Ireland's International Reputation

- SFI funded researchers have 1,955 academic collaborations (572 Irish, 858 European and 525 with the Rest of the World).
- In 2013 SFI researchers published approximately 2,237 scientific papers, 40% of which were co-authored with international colleagues.
- In a review of citation data⁵ Ireland ranks highly for international scientific citations in various subfields: Ireland is ranked 1st in Immunology, 3rd in Nanotechnology, 4th in Computer Science, and 6th in Materials Science.
- In April 2014, representatives from Irish and UK Government, SFI, the Royal Society, the Wellcome Trust, UK Research Councils and members of the scientific community gathered at the Royal Society in London to celebrate scientific links between Ireland and the UK.
- Dr. Garret A. FitzGerald was presented with the inaugural St. Patricks Day Science Medal at an SFI hosted event in Washington D.C.
- 11 Irish researchers were included in the Thomson Reuters list of highly cited individuals, 7 of which have received funding from SFI. Their papers rank among the top 1% most cited for their subject field and year of publication, earning them the mark of exceptional impact.
- The National Policy Statement on Ensuring Research Integrity in Ireland was launched. The policy statement was developed by the Irish Universities Association (IUA) in collaboration with other organisations including SFI.
- SFI and the Science and Innovation Group of the Small Advanced Economies Initiative (SAEI) produced a framework document on evaluating and assessing impact.

Enterprise Development, Economic Recovery and Job Creation

- SFI has 451 active award holders and supports a total of 2,656 individuals with more than 50% of these positions considered as high value jobs.
- The seven SFI-funded Research Centres alone currently employ 472 individuals with a target of 602 employed individuals to be reached over the course of the awards.

⁵ InCites: Average Citations per document for period 2003-2013 for OECD countries

- SFI researchers have secured an additional €125 million in external funding in 2013 which will translate into approximately 520 high value jobs.
- SFI award holders reported a total of 2,064 non-academic collaborations with 1,016 organisations in 2013; 984 of these collaborations and 529 organisations are attributed directly to SFI awards.
- SFI researchers report an engagement with 510 organisations in Ireland which are estimated to employ 81,464 people.
- Pre-commercial outputs arising from SFI-funded research last year (2013) included 73 patents (54 filed, 11 awarded and 8 exploited), 27 licensed technologies and 4 spinout companies.
- The SFI/EI Technology Innovation Development Award (TIDA) Programme was again launched with the aim of realising greater economic impact from prior investment in oriented basic research. 62 awards were funded by SFI at a cost of €7.3 million.
- A new brochure entitled “*Ireland - Your Partner in Science*” was published and presented at the IDA (Industrial Development Authority) Ireland National Conference by the SFI Director General.
- SFI has provided support (funding) to conferences and workshops involving approximately 5000 national and international delegates, which took place during 2014 and which will give rise to an estimated economic benefit to the Irish economy of over €4 million (based on Bord Fáilte multiplier effects). Several additional large scale conferences have also been funded by SFI to take place in future years.

Education and Public Engagement

- Launch of the Smart Futures initiative – a new three year plan to deliver an increase in the uptake of Science, Technology, Engineering and Maths (STEM) subjects. Ultimately the new strategy aims to deliver a 10% increase in uptake of STEM students at second and third level by 2016. The programme has trained a total of 929 volunteers to date, delivering visits to 427 schools in the 2013/14 academic year and reaching over 13,000 students.
- SFI-funded researchers participated in a number of education and public engagement activities in 2013, including 1457 media interviews and interactions, giving 775 public lectures and demonstrations and visiting 763 primary and secondary schools.
- Thirty-three new projects were approved under the SFI Discover Programme with a direct audience reach of 402,975. This audience varies to include students at primary, post primary, parents, teachers and the general public.
- Two new appointments were made through the Centres programme and based in SFI – Head of Education and Public Engagement (EPE) and Senior Executive, EPE. This investment is aimed at consolidating all outreach activities within SFI, both in relation to the SFI Discover programme and funded outreach activities within

national research centres. This will ensure that EPE activities across all funded areas are efficient, collaborative and designed for greater national impact.

- The SFI Discover Programme Strategy and Objectives was approved in June 2014. This document outlines the vision, mission and objectives for Science Foundation Ireland's (SFI) Education and Public Engagement (EPE) programme, namely SFI Discover.
- Over 500 Irish primary schools will receive the Discover Primary Science and Maths (DPSM) Awards of Science and Maths Excellence.
- SFI Discover provided funding to New Decade to produce a primetime television series that will investigate some of the most exciting and ground breaking research projects currently underway in Ireland.
- SFI Discover funded the UNBREAKABLE TOUR, a cinema and school outreach tour which involves bringing the film Unbreakable on tour around Ireland to schools and businesses, with a focus on inspiring people to think about the possibilities of science and technology.
- SFI Discover will coordinate Science Week 2014 which includes providing a series of interactive science shows and workshops to libraries and other local bodies around the country during Science Week.
- SFI is a strategic partner with the Festival of Curiosity, Dublin's annual festival of science and culture, with a mission to create a culture of curiosity in Dublin and Ireland.
- For Science Week 2014 the seven SFI Research Centres ran a series of exciting events across Cork, Limerick, Dublin and Galway including family open days, making the world of research accessible to the public; workshops; public lectures and film nights.
- The BT Young Scientist Exhibition took place in January of this year with an estimated 45,000 people visiting the exhibition over the 3 days. It was the 50th anniversary of the event. SFI's presence at this year's event was increased with Smart Futures, Discover Primary Science and various SFI Research Centres displaying Education and Outreach activities. The APC Alimentary Adventure, an exciting new inflatable 8m long walk-through tunnel, which mimics the human digestive system, was a main feature of the stand.
- Professor Fergus Shanahan, Director of APC, was featured on the BBC 2 Horizon programme "Allergies: Modern Life and Me." The show examined the lives of two modern, allergic families to discover how their bacteria have been impacted by their lifestyles, and why it's making them allergic.