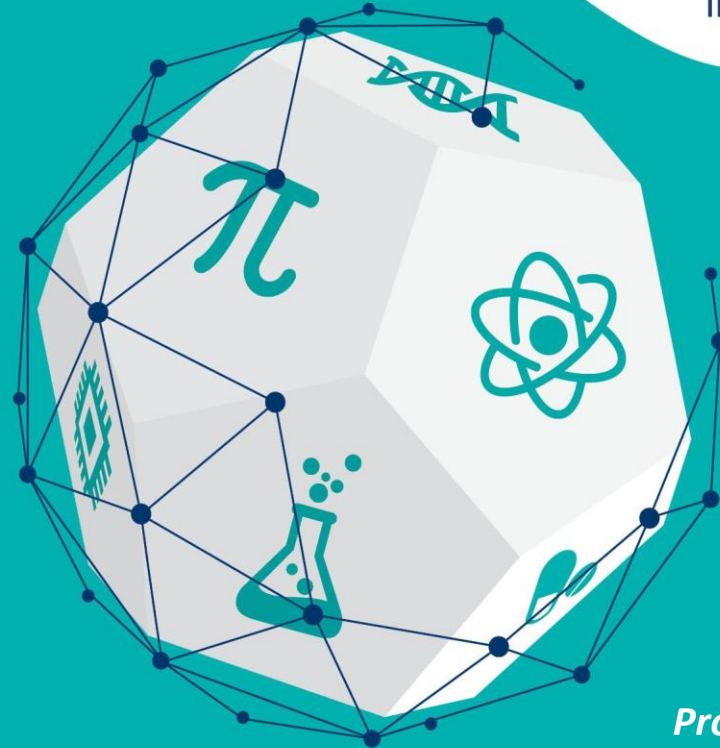


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SCIENCE SUMMIT 2018



Monday 12th November 2018
Ballsbridge Hotel, Dublin 4

*Professor Mark Ferguson
Director General, Science Foundation Ireland
& Chief Scientific Adviser to the Government of Ireland*

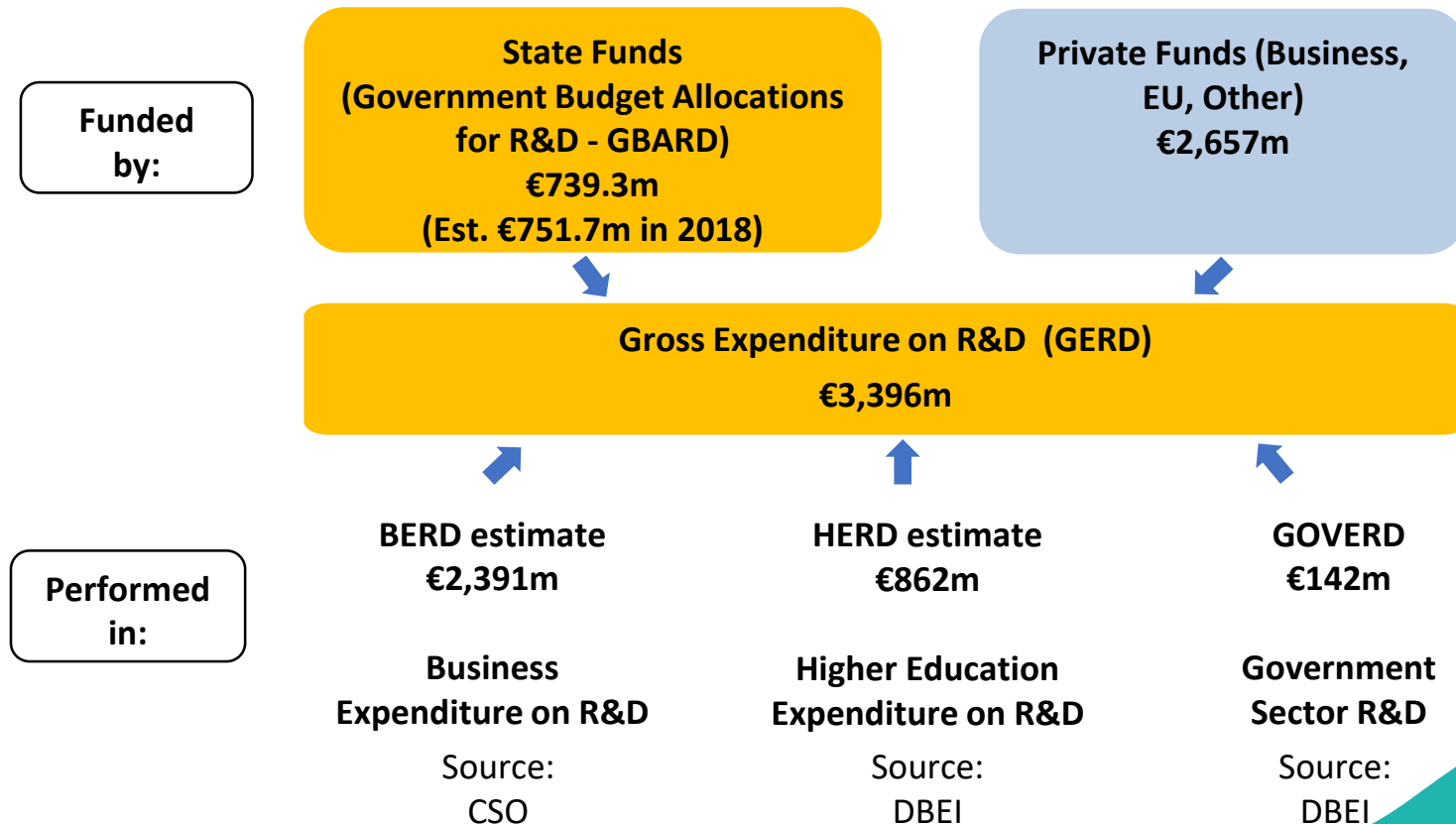
Structure of address

1. National R&D budget, expenditure, personnel figures, trends and international comparisons
2. SFI 2019 budget and programme portfolio
3. Ireland's international standing
4. Internal organisation of SFI and new SFI Strategy Development
5. Some highlights from the past year including ongoing programmes
 - Research Centres
 - Challenge Based Funding
 - PhD Programmes
 - Individual Led Research
 - International
 - Horizon 2020
 - Education & Public Engagement



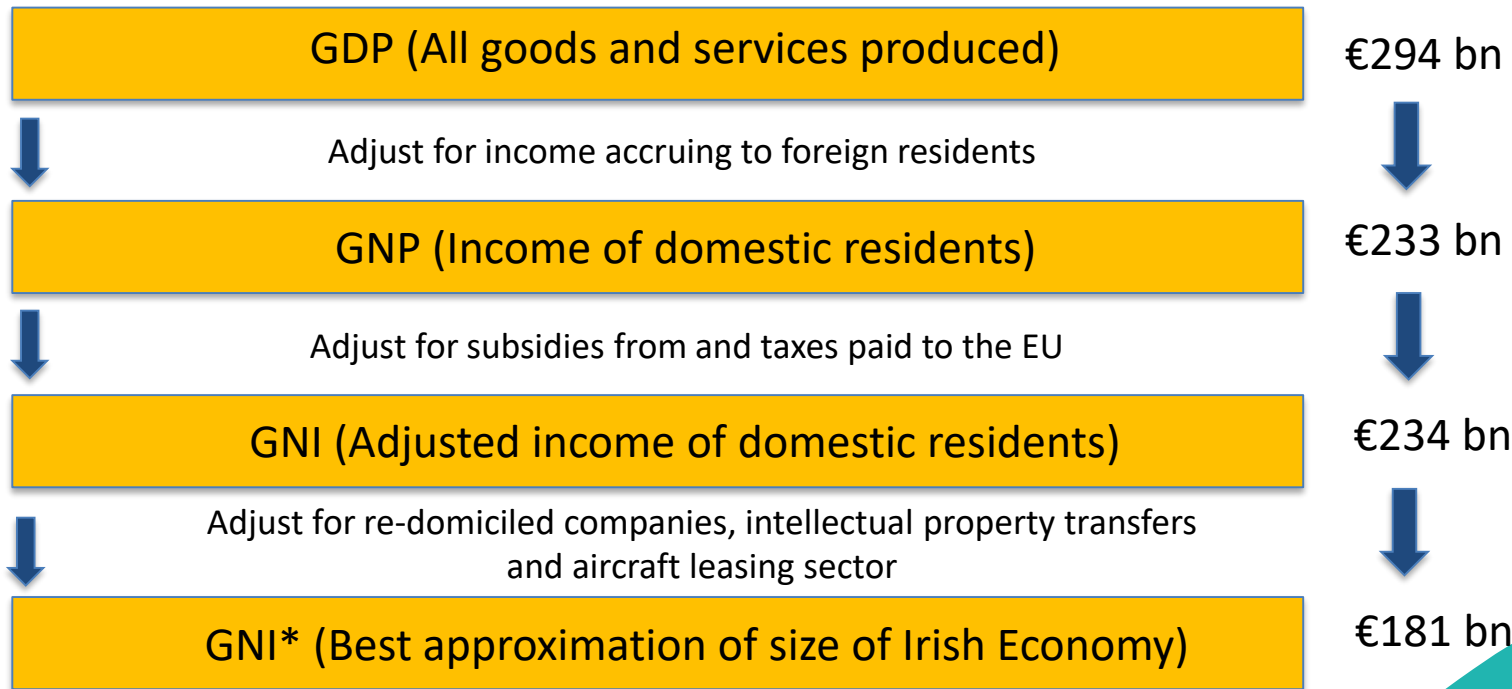
DBEI Report, October 2018

The Irish National R&D Budget 2017



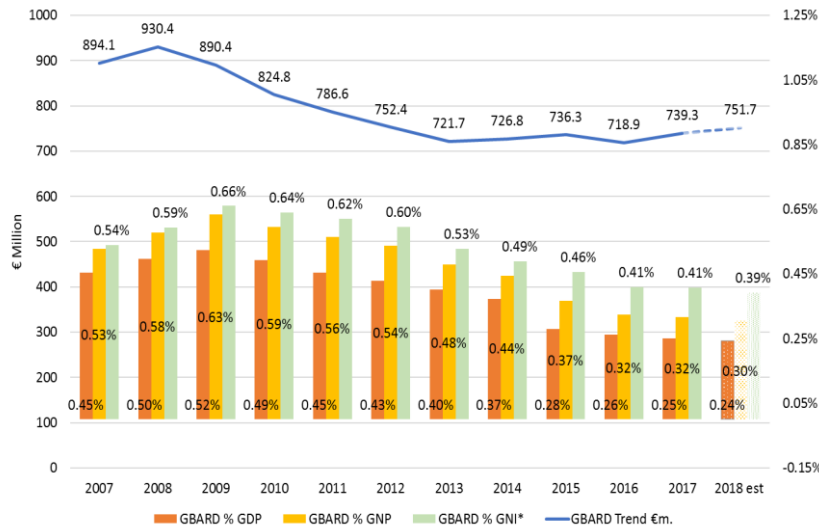
National Economic Terms

From GDP to GNI*

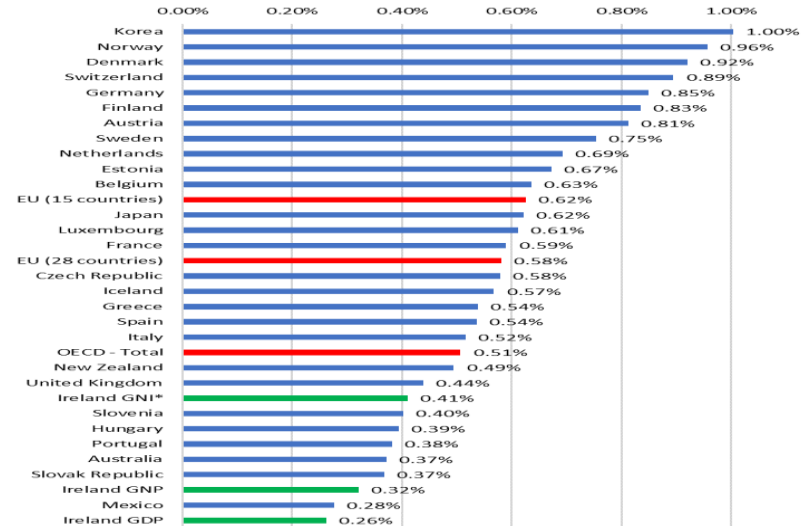


2018 Irish Government budget allocations for R&D reduced from 2008, modest increase from 2013, and are below the EU and OECD averages as a % of GDP, GNP and GNI*

GBARD - Government R&D Budget (€m) and as % of GDP/GNP/GNI*, 2007-2018

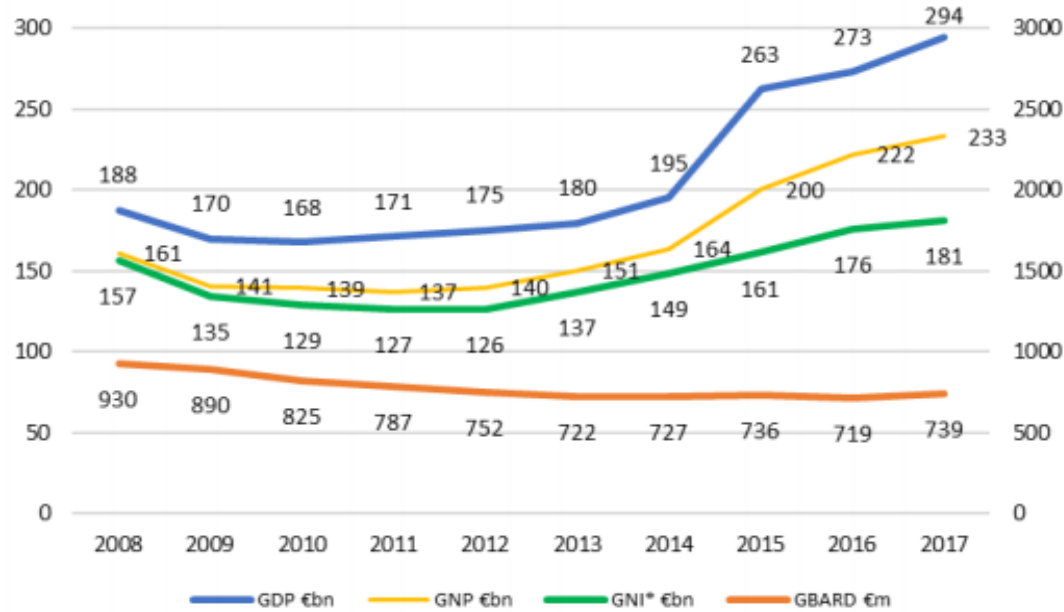


International Comparison – Civil (excludes Military) GBARD as % of GDP & GNP/GNI* for Ireland, 2016



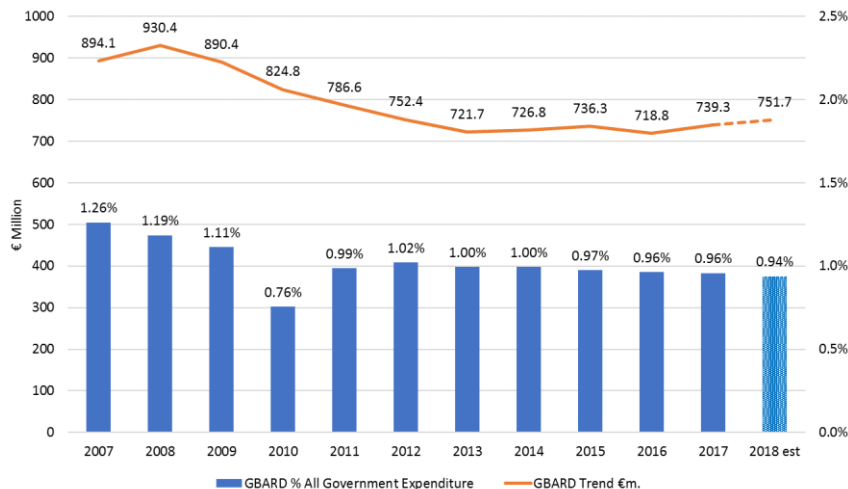
Source: OECD

From 2013 Irish Government budget allocations for R&D have not kept pace with growth of the Irish economy as measured by GDP, GNP and GNI*

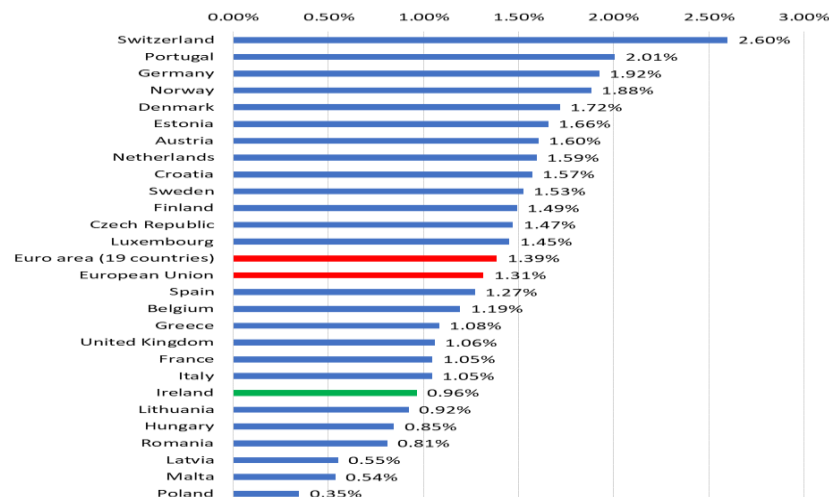


Irish gross budget allocations for R&D are static at about 1% of total Government expenditure from 2012-2018 and below the EU average of 1.3%

GBARD as a % of Total Government Expenditure, 2007-2018



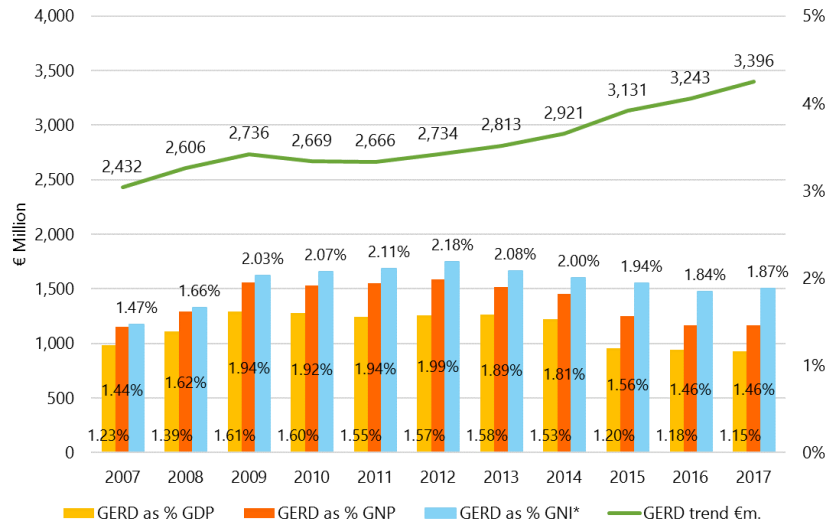
International Comparison - Civil GBARD as a % of Total Government Expenditure, 2016



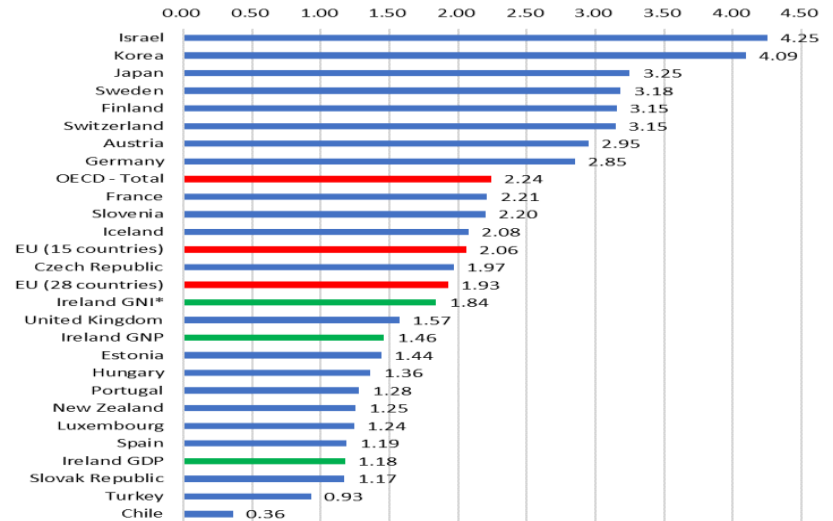
Source: Eurostat

Irish gross expenditure on R&D rising from 2012 – 2017 in absolute terms but falling as a % of GDP / GNP / GNI* and below the OECD and EU averages

Gross Expenditure on R&D (GERD) and as a percentage of GDP/GNP/GNI*, 2007-2017



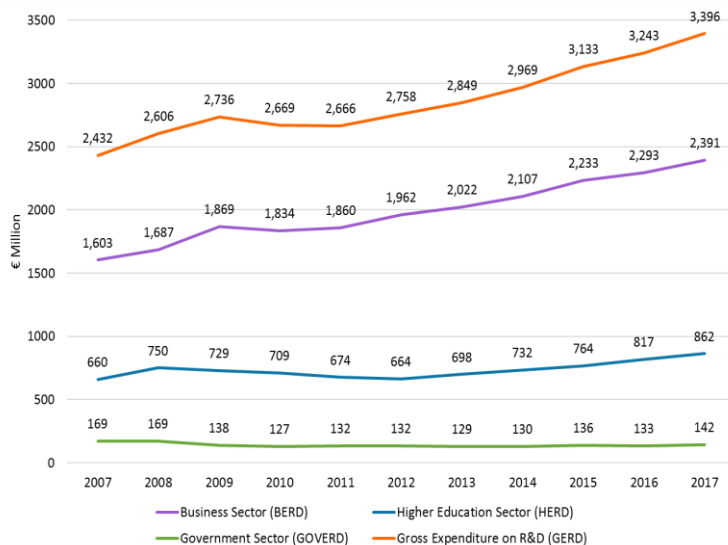
International Comparison - Civil GERD as % of GDP & GNP/GNI* for Ireland, 2016



Source: OECD

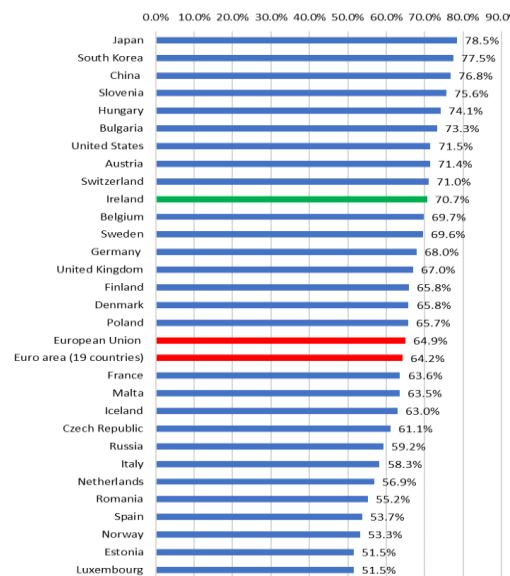
The growth of gross Irish R&D expenditure from 2012 – 2018 is mostly in the business sector which contributes to about 70% - above the EU average of 65%

Gross Expenditure on R&D (GERD) by Sector, 2007-2017



BERD and HERD figures for 2017 are estimates

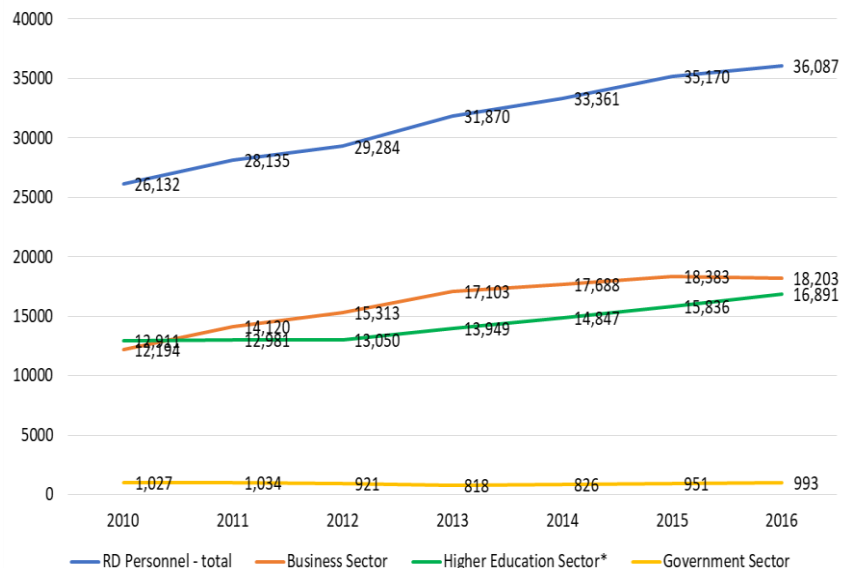
International Comparison – Share of GERD performed in Business Sector, 2016



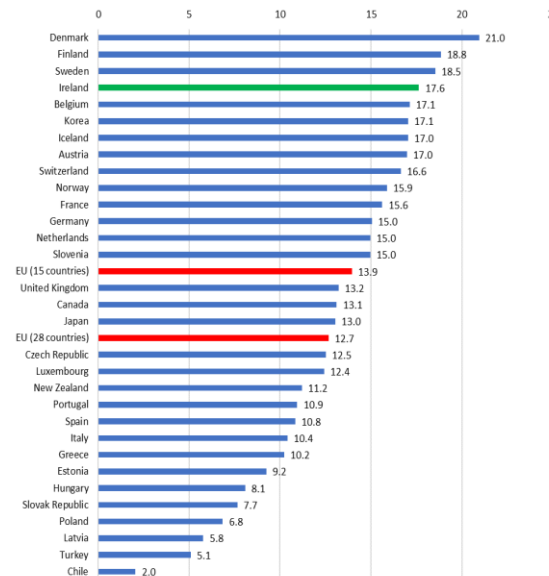
Source: OECD

The growth in R&D personnel (researchers, technicians, support staff and doctoral students) from 2010 – 2016 is mostly in the business and higher education sectors. Ireland is the 4th highest ranking country in the OECD with 17% of the employed population in R&D.

R&D Personnel (FTE) in Ireland by Sector, 2010-2016



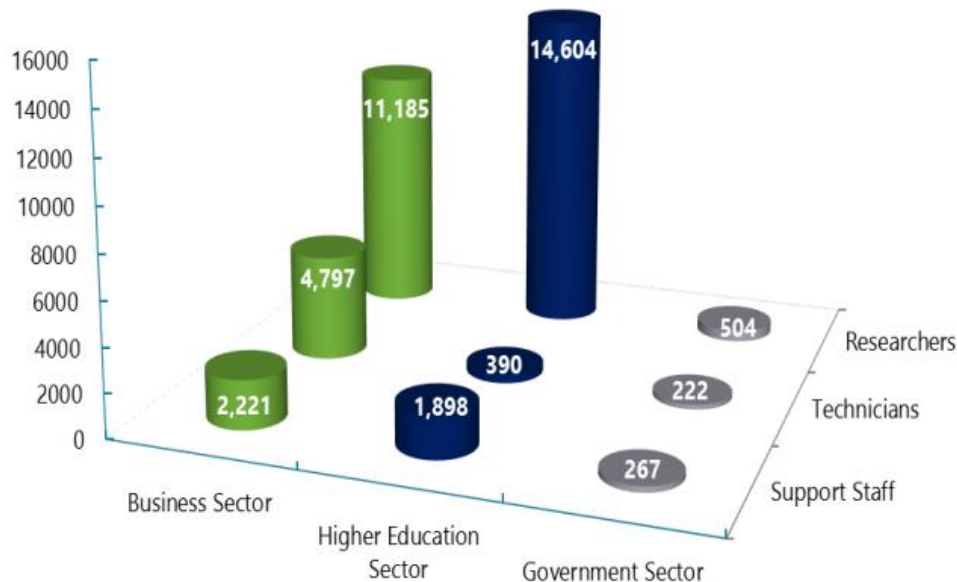
International Comparison - R&D Personnel per Thousand Employed, 2016



Source: OECD

With a high percentage of the Irish employed population in R&D, why have we not achieved higher government allocations for R&D comparable to other countries in the top 6: Denmark, Finland, Sweden, Belgium, Korea ?

R&D personnel (FTE's) by sector and occupation - 2016



Key messages from national statistics

1. Most R&D expenditure in Ireland is in the commercial sector
2. Irish business expenditure on R&D rising and above EU average
3. Irish Government budget allocations for R&D below 2008 levels, below EU and OECD averages as a % of GDP, GNP and GNI* and have not kept pace with the growth of the economy
4. Growth in R&D personnel from 2010 in the business and HEI sectors
5. Ireland is the 4th highest ranking country in the OECD with 17% of the employed population in R&D

Government Expenditure on R&D 2018 (by funder)

■ Department of Business, Enterprise and Innovation (DBEI)
23.946m

■ Science Foundation Ireland (SFI) 172.250m

■ Enterprise Ireland (EI) 95.778m

■ IDA Ireland 55.5m

■ Higher Education Authority (HEA) 155.531m

■ Irish Research Council (IRC) 34.050m

■ Dept of Agriculture, Food and the Marine (DAFM) 24.629m

■ Teagasc 57.439m

■ Bord Iascaigh Mhara (BIM) 15.365m

■ Marine Institute 8.769m

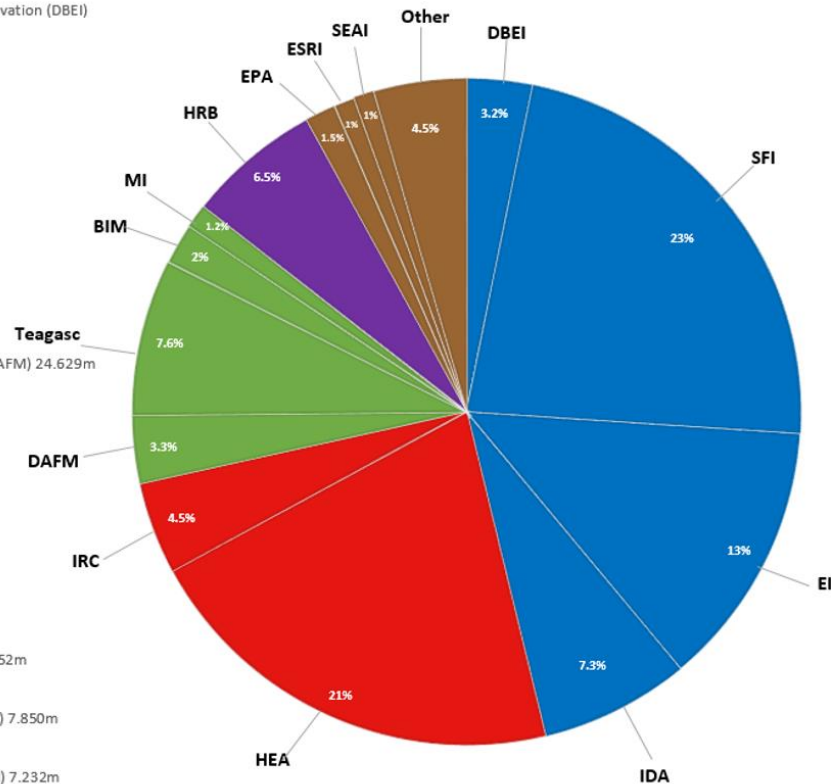
■ Health Research Board (HRB) 48.537m

■ Environmental Protection Agency (EPA) 11.352m

■ Economic and Social Research Institute (ESRI) 7.850m

■ Sustainable Energy Authority of Ireland (SEAI) 7.232m

■ Others 33.935m

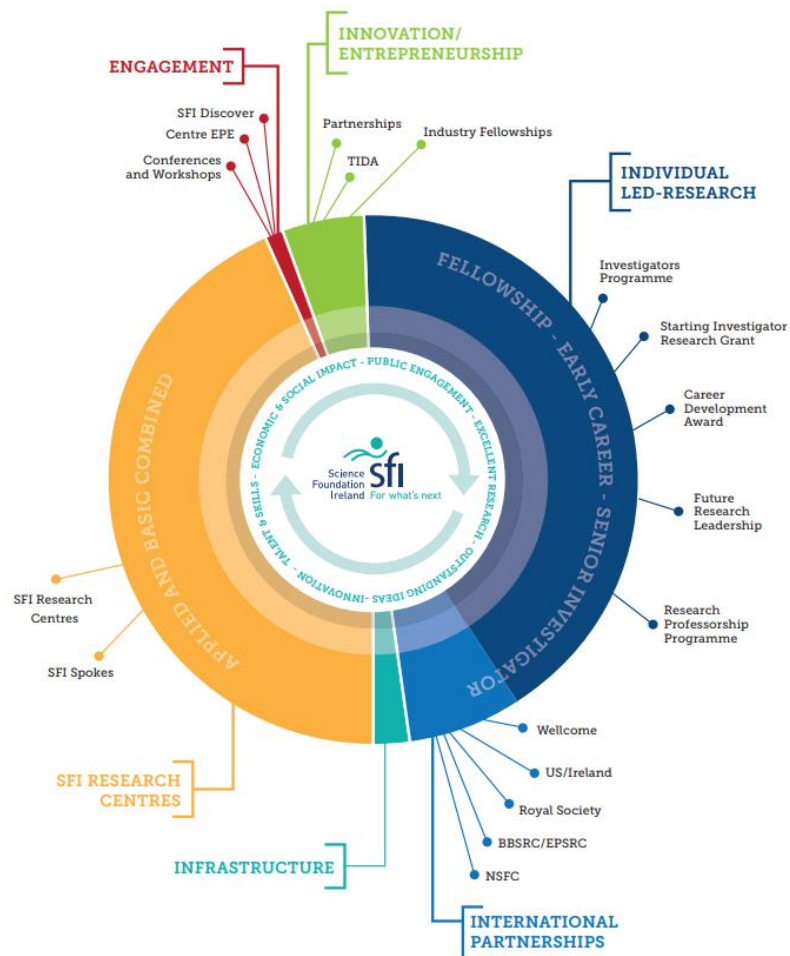


DBEI 49% DES 25% DAFM 12% DH 6.5% Others 7.5%

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SFI Portfolio



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Science Foundation Ireland Budget for 2019

€172.25M as for 2018

- + €10M for new PhD Studentship Scheme – Centres for Research Training (in addition to €5M in 2018)
- + €5M towards Phase 2 Funding for 6 SFI Research Centres (and additional €5M in 2020)
- + €1M for Strategic Partnerships with Industry

Existing Commitment to multi-annual funding of:

IvP, SIRG, CDA, Partnerships Programme, SFI Research Centres, Research Professorships, Future Research Leaders, International Partnerships (US Ireland, Wellcome, Royal Society, BBSRC, EPSRC, NSFC)

Approx. €150M

Proposed new calls in 2019 for individual researchers

- **Wellcome Trust**
- **US Ireland**
- **Royal Society**
- **EPSRC**
- **NSF**
- **SFI Research Professorship**
- **President of Ireland Future Research Leaders**
- **SFI Industry Fellowship**
- **Revamped Investigators Programme (IvP)**

New awards in 2019 (programmes ongoing)

- **SFI Research Infrastructure**
- **Phase 2 funding of 6 SFI Research Centres**
- **PhD programme – Centres for Research Training**
- **Challenge Based Funding**

Ireland's Global Standing: Citation Analysis

Ireland 11th place in global rankings for the overall quality of scientific research – moving up 26 places in only 13 years

Field specific global excellence:

1st for Animal and Dairy

1st for Immunology

2nd for Nanotechnology

2nd for Agricultural Sciences

4th for Molecular Biology and Genetics

5th for Materials Sciences

6th for Neuroscience and Behaviour

6th for Basic Medical Research

7th for Mathematics

8th for Chemistry

8th for Microbiology

Ireland ranked 10th in the world by the Global Innovation Index 2018

Citation Analysis: % of publications in the top 1%

Country	Funder	# Documents in Web of Science	Documents in the Top 1%
Ireland	All	154,578	1.59%
Ireland	Science Foundation Ireland	14,661	2.54%
USA	All	8,489,771	1.76%
USA	NSF	457,581	2.82%
USA	NIH	698,000	2.88%
Denmark	All	267,823	2.41%
Singapore	All	201,478	2.08%
UK	All	2,341,194	1.78%
Finland	All	214,411	1.71%
New Zealand	All	152,308	1.69%
Israel	All	254,092	1.56%
China	All	3,298,910	0.93%
EU	European Research Council	49,575	4.71%

IRELAND: From 1980 - 2002, for any funder, the % of publications in the top 1% is **1.02%**.

Therefore the overall system has improved – with a disproportionate impact from high quality SFI-funded publications

10 SFI funded researchers are in the 2017 list of highly cited researchers (top 1% in the world) produced by Clarivate Analytics

Source: Incites, Thomson Reuters 2003-2017

Internal organisation of SFI: Directors

Strategy & Transformation: Deputy Director General, Dr Ciarán Seoighe

Science for the Economy: Director, Dr Siobhan Roche

Science for Society: Director, Dr Ruth Freeman
(Interim Director, Margie McCarthy)

Finance, Policy & Operations: Chief Operations Officer, Donal Keane

Internal organisation of SFI: Heads of Functions

Strategy & Transformation

Strategy: Dr Peter Clifford

International: Dr Michael Ryan

Communications: Alva O'Cleirigh

Finance, Policy & Operations

Finance & Grants: Joan Hynes

Policy: Dr Marion Boland

Chief Information Officer: Eric Dowdall

Science for the Economy

Research Centres: Dr Kevin Walsh

Enterprise Partnerships: Dr Aisling McEvoy

Science for Society

Individual Led Research: Dr Roisin Cheshire

Challenge Research: Dr Lisa Higgins

Education & Public Engagement: Margie McCarthy

SFI Highlights 2018

Individual Led Research

Res Prof: 3 awards
IvP: 7 awards from 2017 Reserve List
FRL: 2 awards (2 on reserve list)
US-Ireland: 5 Investigator led awards, 1 Centre to Centre
SFI-HRB-Wellcome Trust Partnership: 2 Investigator + 2 SEED awards
SFI - Royal Society Research Fellowship: 1 award
NSF China: 8 awards
SIRG: 20 Awards before end of 2018
TIDA: 38 Awards before end of 2018

Strategic Partnerships

1 award with SFI/industry cash co-investment of ~€6.3M

SFI Discover

€4.4 million for 41 public engagement and education initiatives

SFI Research Centres

17 Centres with **>690** signed-contracts to date bringing **€81M** cash commitment from industry, with an additional **€85M** of in-kind contributions.

€165M of NENC Funding to date

2x New Spoke awards with total SFI/industry co-investment of ~€9M

6 Centres secured **Phase 2** funding.

Industry Fellowships

36 awards made, 58% with SME partners
 Total SFI investment of ~ €3.3M

Research Infrastructure

2018 call : first awards made Q4 2018

Prioritised, Approved Reserve list maintained until end of 2019

17 SFI Research Centres

ADAPT	Centre for Global Digital Content and Engagement
AMBER	Advanced Materials and BioEngineering Research Centre
APC	APC Microbiome Institute
BEACON	Circular Bioeconomy Research Centre
CONNECT	Future Broadband, Cellular and Internet of Things networks
CONFIRM	Smart Manufacturing and Industrial Automation Research Centre
CÚRAM	Centre for Research in Medical Devices
Future Neuro	Neurological Diseases Research Centre
iCrag	Irish Centre for Research in Applied Geosciences
I-Form	Advanced Manufacturing Research Centre
INFANT	Irish Centre for Fetal and Neonatal Translational Research
INSIGHT	Centre for Data Analytics
IPIC	Irish Photonic Integration Research Centre
LERO	Irish Software Research Centre
MaREI	Marine and Renewable Energy Ireland
SSPC	Synthesis & Solid State Pharmaceutical Centre
VistaMilk	Precision (Smart) Agriculture Research for Dairy

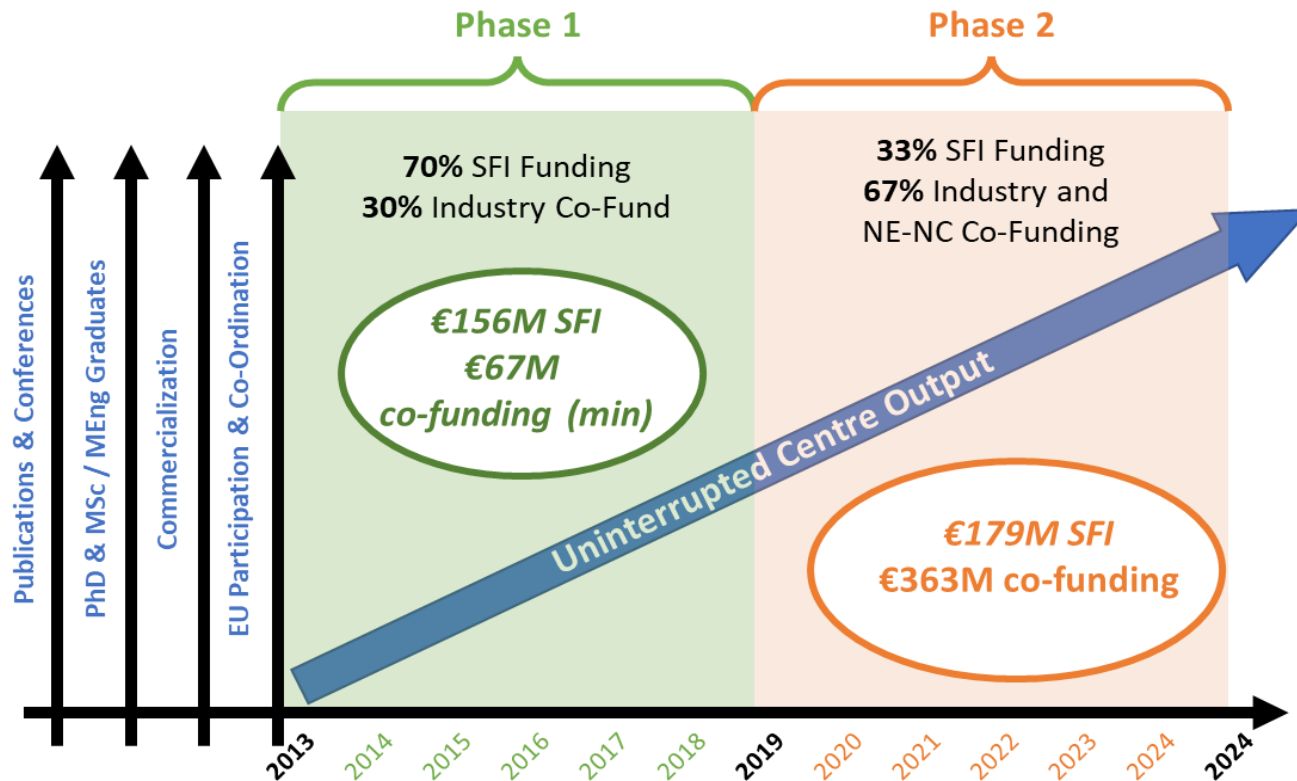
Software
Pharma
Nanotechnology
MEDICAL DEVICES
Geosciences
Digital Content
Additive and Smart Manufacturing
Neurological Diseases
Telecommunications
PERINATAL RESEARCH
Bioeconomy
Nano Materials
Functional Foods
PHOTONICS
Dairy
BIG DATA
Marine and Renewable Energy

SFI Research Centres performing well

Cumulative reporting of first 12 Centres up to June 2018

Key Performance Indicators	Target	Result	Result/Target	Category
Journal Publications	3,842	6,089	159%	Academic
Conference Publications	3,035	3,682	121%	
MSc / MEng Graduates	158	101	64%	Human Capital
PhD Graduates	459	701	153%	
% Trainee departures with industry as first destination	37%	36%	97%	European Participation
Participations in major EU initiatives	266	275	104%	
Coordinations in major EU initiatives	82	76	93%	
ERC awards granted	28	22	79%	
Funding from non-exchequer, non-commercial sources	€185,625,000	€161,484,743	87%	Industry Co-Fund
Cash in Bank (Minimum Target)	€32,325,120	€49,965,631	155%	
% Industry cost share (Cash)	10%	15%	155%	
% Industry cost share (Total)	30%	37%	124%	Entrepreneurial
EI Commercialisation Awards	185	298	161%	
Licence Agreements	136	158	117%	
Spin-Out companies formed	27	23	85%	

Research Centres Growth in Phase 2



Fintech Fusion Spoke

- The research will focus on three main areas – **payments** (PayTech), **insurance** (InsureTech) and **regulation** (RegTech) to accelerate the impact of ICT technologies on these sectors.
- Brings together:
 - **13 industry partners** including Pramerica, Deutsche Börse, Fidelity Investments, Microsoft, Gecko Governance, FINEOS and Zurich
 - **6 academic institutions**
 - **3 SFI Research Centres:** Lero, INSIGHT and is led at the ADAPT Research Centre by Prof. John Cotter.



€4.8M Fintech Spoke

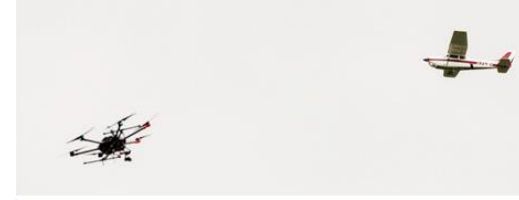


U-Flyte Drone Partnership



€6.3m U-Flyte Drone Partnership *Drone operations*

- **SFI Strategic Partnership** between Maynooth University & key industry collaborators including Airbus, Irelandia Aviation, Intel
 - Testbed: **Waterford Airport**



September 2018

Ireland's **first** "shared airspace" flight demonstrations with a *U-Flyte Drone* and a *Cessna 172* at Waterford Airport



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Challenge Based Research

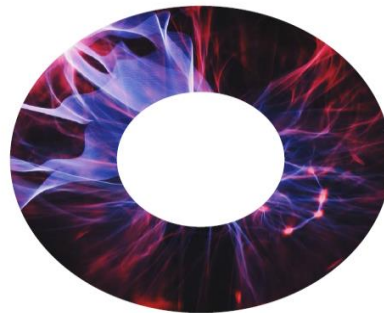
Top Down

- Consultation with industry, government departments, international funders
- Challenge identification and curation
- Co-funding from industry / charity/ other government departments

Aim to launch in 2019, with awards in 2020

Bottom Up

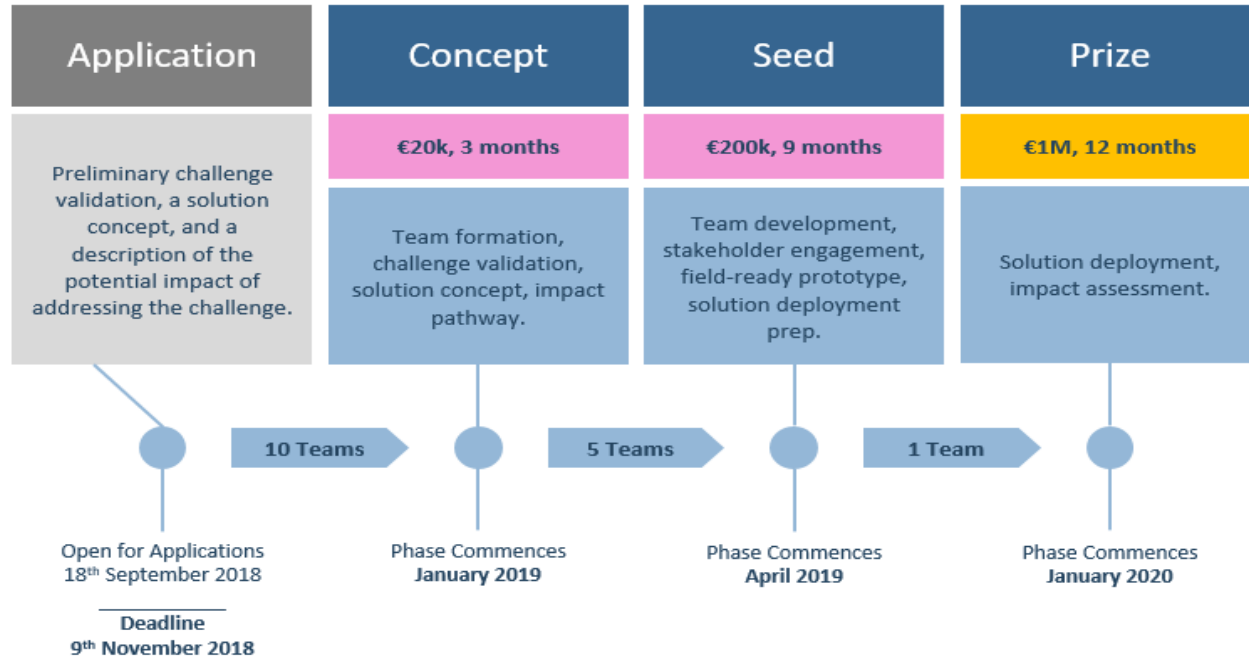
**Open for
new ideas**
SFI Future
Innovator Prize



sfi.ie/funding

Launched September 2018

SFI Future Innovator Prize



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SFI Centres in Research Training (CRT)

- €100M investment in training of approx. 600 postgraduate research students to create **talent pipeline for the research and innovation sector** in Ireland
- Centres for Research Training will build on research excellence to train **cohorts of future research leaders** with the skills and knowledge required to address the challenges of an ever-changing work environment (collaboration across HEI's for efficiency and effectiveness)
- Close **engagement with enterprise** in design and delivery of training programmes
- **World-class training programmes** will include enterprise-relevant discipline-specific and transversal skills
- **Student placements** in enterprise, other non-academic establishments, or in the groups of international collaborators.
- Thematic area: **Data and ICT Skills for the Future**
- Review ongoing: **Decision Q1 2019**



SFI PhD Programmes – Supporting the Talent Pipeline

EPSRC SFI Centres for Doctoral Training Partnership



EPSRC

Engineering and Physical Sciences
Research Council

Key aim:

To foster the development of PhD training collaborations between UK and the SFI Research Centres

Key features:

- SFI Research Centres - up to 5 students per cohort for 5 cohorts
- Students registered at ROI Research Body, will conduct research in ROI, but will undertake much of the CDT training programme in the UK
- UK students may also undertake elements of programme in ROI

Status:

- **Review ongoing; Decision Q4 2018**

Individual Led Research

Supporting Early Stage Researchers



SIRG awardee Colin Clarke acquired funding through the Marie Skłodowska-Curie European Industrial Doctorate network providing multidisciplinary training to 11 early stage researchers through interaction with some of Europe's most innovative SMEs.



Annette Byrne (CDA holder) led an international team of scientists in a bid to secure Horizon 2020 funding for the "COLOSSUS" project - Advancing a Precision Medicine Paradigm in metastatic Colorectal Cancer.



FRL awardee Lydia Lynch was selected for Women on Walls, a multi-award winning campaign with Accenture and Royal Irish Academy that seeks to make women leaders visible.



CDA holder Andrew Kellett published results on the first ever evidence of opiate-nucleic acid binding interactions.

Individual Led Research

Supporting early stage researchers



Royal Society URF holder Morgan Fraser co-authored a paper in Nature journal, announcing the discovery of electromagnetic radiation associated with a gravitational wave source



Martin O'Halloran (CDA Holder) has secured an ERC Starting Grant and 3 ERC Proof of Concept awards.



FRL awardee Tomás Ryan hosted “Schrödinger at 75—The Future of Biology”, an international meeting. to mark the 75th anniversary of a series of visionary public lectures entitled “What is Life?” by Nobel laureate, physicist Erwin Schrödinger.



CDA holder Annie Curtis published insights into how the body clock controls the inflammatory response.

Individual Led Research

Recruiting Leaders -Research Professorship Call 2018

- **Revised Call launched in 2018**
- **Supporting recruitment of researchers with demonstrated success in ERC schemes;**
- **Embedding the next generation of ERC award holders into Ireland's research bodies by providing competitive initial funding and the potential for further support following ERC success;**
- **Opportunity for active ERC awardees to take up a joint appointment, with working time divided between the host institution for their ERC award and an eligible Research Body in Ireland**
- **Increased support of Gender Initiatives**
- **Record Number of EOIs has been received by SFI in 2018**

Research Infrastructure call 2018

- Call launched in February 2018
- Key Objective – facilitation of inter- and intra-institutional sharing of national infrastructure, especially with Institutes of Technology.
- 2 categories;
 - Category A – H2020 Research Infrastructure Integrating Activities – Advanced Communities aligned bids
 - Category B – Strategic Research Infrastructure.
- Minimum request of €500,000 direct costs for each application.
- Prioritised list of fundable applications valid for 2018 and 2019.
- Review ongoing: Decision Q4 2018

SFI International Partnerships in 2018



US-Ireland: 5 NSF collaborative awards
US-Ireland: 1 C2C NSF Award
NSF ICORPS @ SFI: 13 applications under review
NSF-GROW: 2 awards



2 ERANets, 4 awards
1 Joint Programming Initiative, 1 award
1 Joint Technology Initiative, 1 award



国家自然科学基金委员会
National Natural Science
Foundation of China

SFI- NSF China partnership:
8 awards commenced in 2018



SFI-HRB- Wellcome Partnership:
2 Investigator Awards
2 Seed Awards



Royal Society-Science Foundation
Ireland University Research Fellow
1 New URF award
9 URF Enhancement Awards
2 URF Research Grants



EPSRC Standard Research Grants Programme - 13 proposals under review
EPSRC-CDT – 24 proposals advanced to interview

Ireland and Horizon 2020

Total draw down -

€612M (Oct 2017: €474M)

Successful proposals -

1,522 (Oct 2017: 1,154)

Sector Success

- Higher Education €317M
- Companies €233M
- Public sector, etc. €60M

Success rates

Finland

13.0% proposals

10.9% funding

Denmark

14.8% proposals

12.7% funding

Ireland

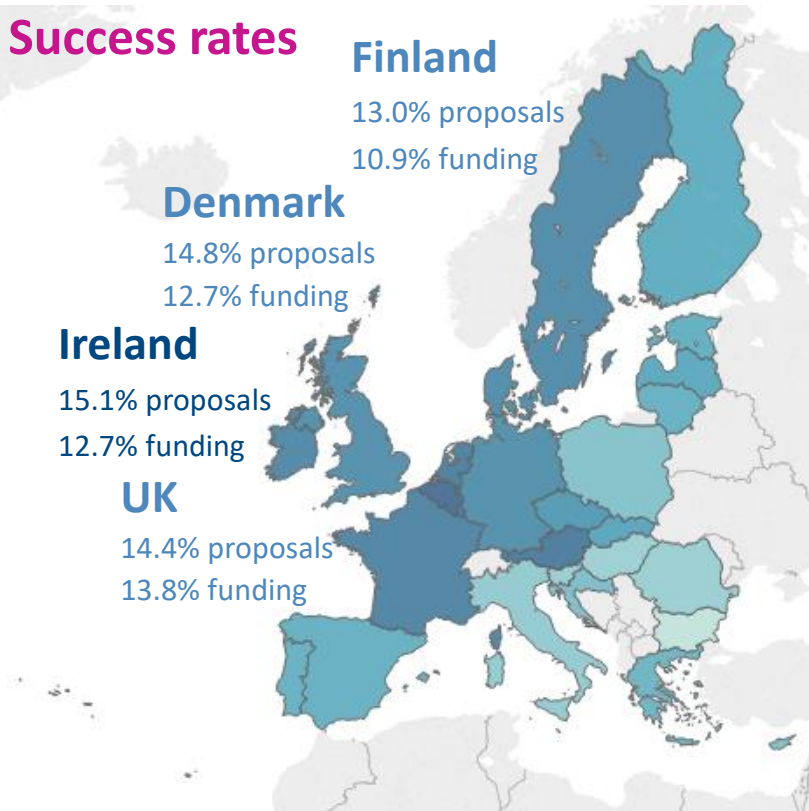
15.1% proposals

12.7% funding

UK

14.4% proposals

13.8% funding



Irish researchers from academia and industry continue to excel

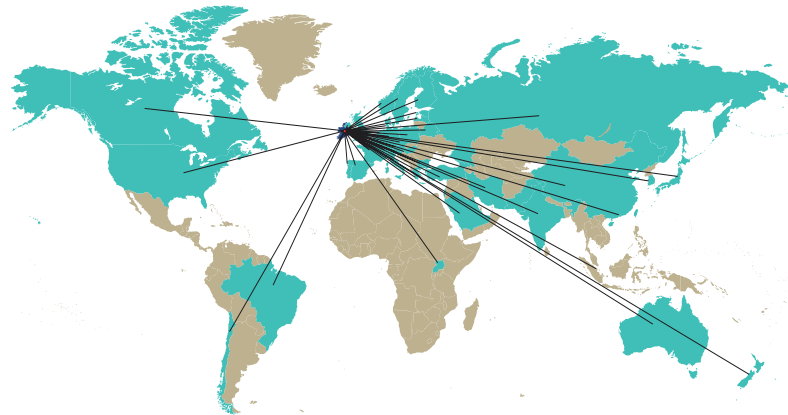
5 Projects
Over €5m each
18 Irish partners

2 Projects
Over €10m
each
7 Irish partners

Wins to date > €1m
181 projects
321 IE participants

2019 will be about extending our reach and impact internationally

- **International partnerships** - industry, philanthropy
- **Brexit** - deepen existing alliances with the UK; diversification through new alliances with other Member States
- **Recruitment** - Identify and facilitate star researchers to relocate
- Continued support of **EU applications and successes**
- **Enhance** SFI's influence abroad



SFI has established its first overseas presence – US West Coast

Industry

- Broaden partnerships with industry
- Deepening existing collaborations

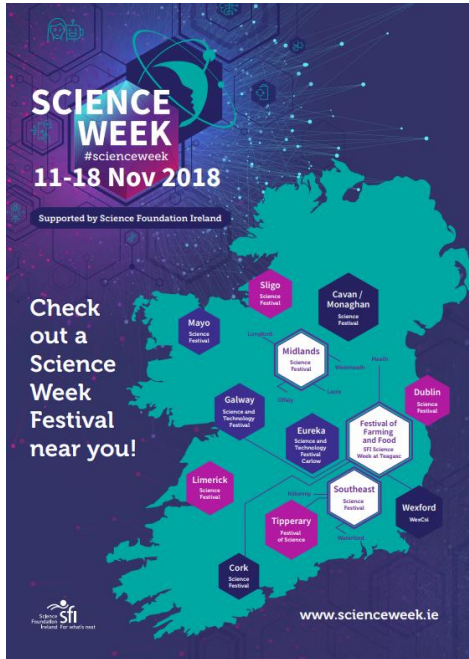
Philanthropy

- Identify & create impactful funding partnerships

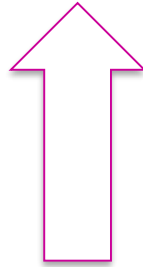
Research Professorships & Future Research Leaders

- Identify & facilitate star researchers to relocate

Education and Public Engagement



Science Week 2018
grows regional activity
and diversity of reach



Researcher-
Led EPE
activities
grow 60%
from 2016



Stressed

Wed, 23rd May & Thurs, 24th May 2018

SFI/RTÉ '*Stressed*' series
reached peak audiences
for slot time and skewed
towards young women

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Education and Public Engagement



640 Primary Schools Nationwide received an **SFI Discover Science and Maths Award**.



SFI Discover Centre Network brochure distributed to all primary schools nationwide highlighting informal STEM engagement opportunities for schools in over 50 centres nationwide including Dublin Zoo and Irish National Stud.

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Thank You



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