

**The scientific, economic and other impacts  
of Ireland's participation in the EU  
Framework Programmes**

**38<sup>th</sup> Conference of Rectors and Presidents  
of European Universities of Technology**

**13<sup>th</sup> September 2019, Budapest**

*Professor Mark Ferguson*

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

# Outline

- Science Foundation Ireland



- Ireland and EU funding



- European Innovation Council

EUROPEAN INNOVATION COUNCIL **eic**

# What Science Foundation Ireland Actually Does

- Makes **grants** to Higher Education Institutes (HEIs) in Ireland
- Based on competitive, international merit review for scientific **excellence** and **impact**
- Trains **people**
- Builds **infrastructure**
- Produces **scientific results** and technology (Research Output)
- Transfer of the **Research Output** to existing and new companies for **economic and societal impact**
- Supply of appropriately trained people along the entire **science and technology pipeline**
- **Significant industrial collaboration** attracting, anchoring and starting companies
- **Leverages** other research funding e.g. Industrial / EU / Charitable / Philanthropic / International
- Fosters high levels of **collaboration** between academia, industry, charity, disciplines, sectors, institutions, people and countries
- Operates in an **open**, **agile** and **engaged** mode with a willingness to **seize** new opportunities
- Engages the **public** to **grow scientific literacy** and citizenship

# What Science Foundation Ireland delivers for its annual **€188.25m** budget

*Research, development, innovation and a highly educated workforce will be key points of differentiation for Ireland and key drivers of our future economic success*



**1,600** Smart Futures volunteers provided STEM careers advice to over 120,000 students

**39,823** jobs in Ireland supported directly or indirectly



**4,881** scientific publications

**12 spin out companies** formed

**€230m** in leveraged non-SFI funding

**641 primary schools** received Discover Primary Science and Maths Awards

**2 million** people reached in over 1,400 events during Science Week



**1,715** collaborations with industry (including 712 MNCs, 1,003 SMEs in all regions)

**53** licensed technologies

**80** patent filings, **51** patents awarded

**2,715 international collaborations** in 74 countries



# Ireland's Standing in Global Research & Innovation

Ireland **12<sup>th</sup>** place in global rankings for the overall quality of scientific research

Field specific global excellence:

- 1<sup>st</sup> for **Immunology**
- 2<sup>nd</sup> for **Animal and Dairy**
- 3<sup>rd</sup> for **Nanotechnology**
- 5<sup>th</sup> for **Materials Sciences**
- 7<sup>th</sup> for **Microbiology**
- 8<sup>th</sup> for **Molecular Biology & Genetics**

8<sup>th</sup> for **Neuroscience and Behaviour**

9<sup>th</sup> for **Basic Medical Research**

11<sup>th</sup> for **Chemistry**



Ireland ranked **10<sup>th</sup>** in the world by the **Global Innovation Index 2018**

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

Country	Funder	# Documents in Web of Science	Documents in the Top 1%
Ireland	All	181,071	1.71
Ireland	Science Foundation Ireland	18,026	2.66
USA	All	9,659,152	1.78
USA	National Science Foundation	552,738	2.89
USA	National Institutes of Health	831,835	2.88
Switzerland	All	566,747	2.63
Denmark	All	313,829	2.47
Singapore	All	235,214	2.20
United Kingdom	All	2,682,452	1.83
Finland	All	245,252	1.78
New Zealand	All	175,858	1.76
Israel	All	288,086	1.65
China	All	4,002,157	1.06
EU	All	11,258,058	1.26
EU	European Research Council	72,787	4.82

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**

**26 SFI funded researchers are in the 2018 list of highly cited researchers (top 1% in the world) produced by Clarivate Analytics – 10 in the SFI APC Research Centre**

# Science Foundation Ireland Portfolio



# 16 SFI Research Centres



Software  
Pharma  
Neuroscience  
MEDICAL DEVICES  
Applied Geosciences  
Digital Content

Industry commitment of €235 million

Nano €434 million from SFI

MANUFACTURING SMART DAIRY

Telecoms Bio Economy Energy

Functional Foods  
FOOD FOR HEALTH

BIG DATA Marine Renewable Energy

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

# SFI Research Centres are the epitome of SFI's transformational effect on the national research system

- 16 world-leading SFI Research Centres of scale and excellence
- SFI commitment €434 million
- Industry commitment €235 million
- EU funding target of >€300 million
- 19 Research Bodies
  - All universities
  - Tyndall, RCSI, NIBRT Teagasc, Marine Institute, IOTs
- 360 Companies – 167 MNCs, 193 SMEs (736 collaborative research agreements)
- Collaboration with
  - Higher education institutions,
  - Industry
  - National and international funders



# SFI Research Centres performing well

## Cumulative reporting of first 12 Centres up to Dec 2018

An economic impact report on the AMBER SFI Research Centre for Advanced Materials, led by TCD, found that for €108 million State investment

**€505 million**

was generated in gross national output

A '15 Years of Impact' report found that APC Microbiome Ireland SFI Research Centre helps to generate €1.2 million for the Irish economy

**each week**

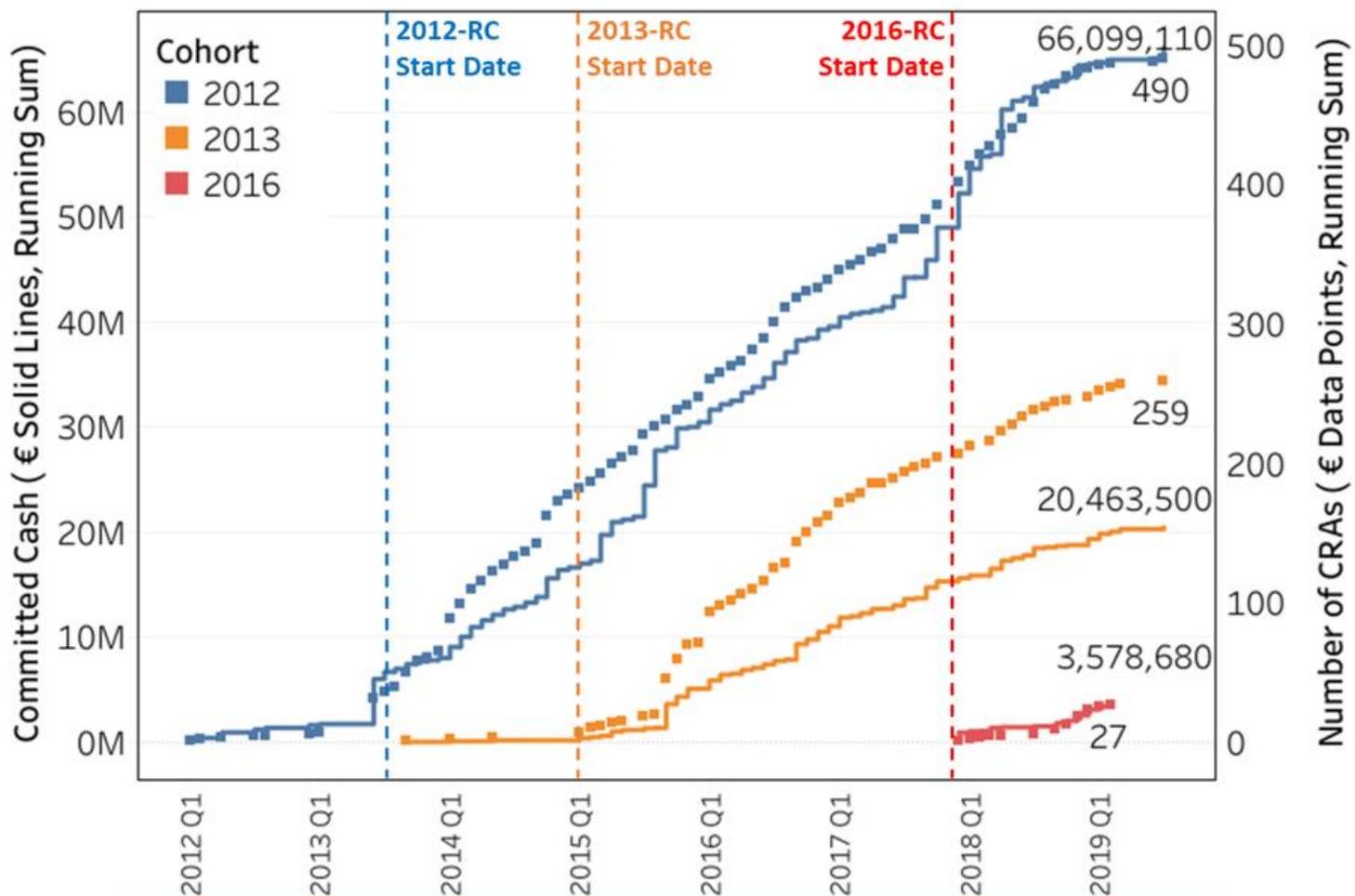
including expenditure and taxation impact.

SFI Research Centre Outputs	Cumulative to DEC-2018		
	Target	Result	Performance against target
Journal publications	4,090	7,144	175%
Conference publications	3,306	4,212	127%
MSc/MEng graduates	163	118	72%
PhD graduates	484	854	176%
% Trainee departures with industry as first destination	28%	33%	118%
Participations in major EU initiatives	285	336	118%
Coordinations in major EU initiatives	88	84	95%
ERC awards granted	29	26	90%
Funding from non-exchequer, non-commercial sources	€196,726,732	€195,865,387	100%
Cash in bank (minimum target)	€35,042,853	€61,040,554	174%
% Industry cost share (cash)	9%	17%	184%
% Industry cost share (total)	29%	43%	147%
EI Commercialisation Awards	193	324	168%
Licence agreements	145	182	126%
Spin-out companies formed	31	27	89%

**Funding Input: 1/3 SFI, 1/3 Industry, 1/3 EU. Productivity: for €1 Euro invested, €5 returned to economy**

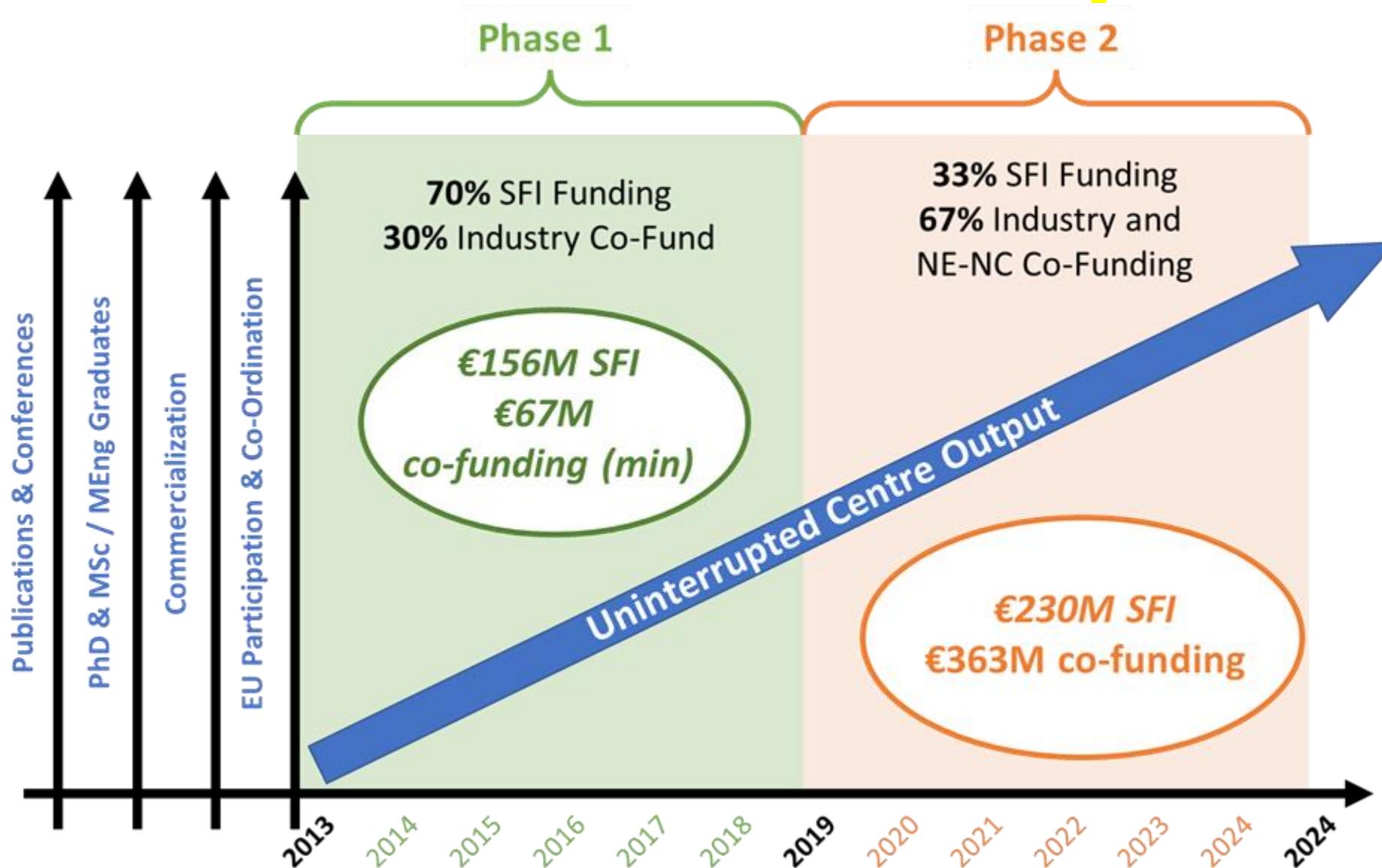
# Collaborations with Industry (legal contracts)

No. of CRAs and Committed Cash from SFI Research Centres



**776 CRAs to date, worth €90.1 million in cash commitments**

# Research Centres Growth in Phase 2 (6 of 7 RC)



# SFI Industry Fellowships

- Movement of researchers between industry & academia
- Focus on collaborative research
- Must be a research-active company
- Maximum budget of €100,000 - SFI provides salary and travel support & the company supports research costs
- Up to 12 months full-time or 24 months part-time
- Work on company research project
- Can be a company anywhere in the world
- No restrictions at the end e.g. Company can hire the Fellow, Fellow can stay overseas, Fellow can return to university etc

SFI Industry Fellowship Group <https://www.linkedin.com/groups/8201626>

# SFI Research Professors

## Attracting 'star' global research talent

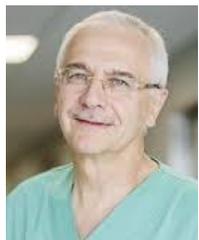
- €5M research funding from SFI for 5 year
- University pays the salary – up to €250K pa
- In strategically-important research areas for Ireland



Chemistry (pharma/energy)  
Prof. Mike Zaworotko  
University of Limerick (UL)  
Moved to Ireland from the U.S.



Electrical Eng. / Internet of Things  
Prof. Bogdan Staszewski  
University College Dublin (UCD)  
Moved to Ireland from the Netherlands



Medical devices / Clinical trials  
Prof. William Wijns  
National University of Ireland, Galway (NUIG)  
Moved to Ireland from Belgium



Quantum Materials / Quantum Technology  
Prof. Séamus Davis  
University College Cork (UCC)/ University of Oxford  
Moved to Ireland from USA



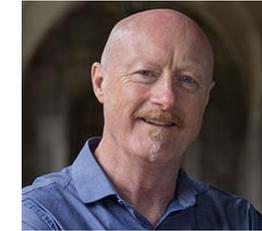
Biophotonics / Med devices  
Prof. Stefan Andersson-Engels  
University College Cork (UCC)/ Tyndall  
Moved to Ireland from Sweden



Manufacturing  
Prof. Fengzhou Fang  
University College Dublin (UCD)  
Moved to Ireland from China



Digital Platforms and Content  
Prof. Dr. Aljoša Smolić  
Trinity College Dublin (TCD)  
Moved to Ireland from Switzerland



Infectious Diseases  
Prof John Dalton  
National University of Ireland Galway  
Moved to Ireland from Queen's University Belfast.



Mining and Mineral Resources  
Prof Murray Hitzman – iCRAG/UCD  
Moved to Ireland from USA (Associate Director for Energy & Minerals, US Geological Survey)



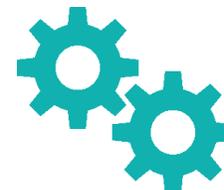
Manufacturing  
Prof. Paul Michael Weaver  
University of Limerick (UL)  
Moved to Ireland from the U.K.



Energy Technologies  
Prof. Piet Lens  
National University of Ireland, Galway (NUIG)  
Moved to Ireland from the Netherlands

# SFI Centres for Research Training (CRT)

- €100M investment in training of approx. 700 postgraduate research students to create **talent pipeline for the research and innovation sector** in Ireland
- Thematic area: **Data, Digital and ICT Skills for the Future**
- 6 new **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
- **Cohort based** involving collaboration across all HEI's in Ireland and international partners
- **Enterprise engagement** in design and delivery of training programmes (over 100 companies signed up to date)
- **World-class training programmes** will include enterprise-relevant discipline-specific and transversal skills
- **Student co-supervision and placements** in enterprise, other non-academic establishments, or in the groups of international collaborators
- First PhD Student intake – September 2019



## 6 SFI Centres for Research Training in:

- Machine Learning
- Digitally Enhanced Reality
- Foundations of Data Science
- Artificial Intelligence
- Advanced Networks for Sustainable Societies
- Genomics Data Science

***Objective: To be the best research training programme in the world, providing major opportunities for PhD students in Ireland and a rich source of outstanding graduates, who will be sought by the private and public sectors***



# Challenge Based Funding

## **Top Down**

- Consultation with industry, government departments, international funders (NESTA, DARPA, Gates Foundation)
- Challenge identification and curation
- Co-funding from industry / charity/ other government departments
- Prize: - Money (blended finance: Grant plus loan / equity investment to rapidly scale commercialisation / deployment)
  - Change in law, provisional licence, tariff, subsidy, procurement
- Launch 2019 / 2020
- Topic – Disruptive Technologies to address Climate Change

## **Bottom Up**

- SFI Future Innovator Prize - launched September 2018 - €1m
- Artificial Intelligence for Societal Good Challenge - launched June 2019 - €1m
- Zero emissions - launched June 2019 - €3m

# SFI's Brexit Strategy

1. Strengthen bilateral links with UK
  - *joint funding with UKRI (EPSRC, BBSRC), Royal Society, Wellcome Trust*
  - *joint appointments with leading UK Universities, e.g. Prof. Séamus Davis, University of Oxford/UCC*
  - *co-supervised PhD students (CRT's and CDT's)*
2. For those excellent people who are thinking of leaving, encourage their relocation to Ireland – full time or joint appointments
3. Widen and deepen links with other EU countries
  - *joint SFI / Fraunhofer centre in Microfluidics*
4. All-Ireland initiatives, e.g. research centres – ongoing discussions

# Ireland and Horizon 2020

Total draw down to date:

**€760m**

1.88% of total H2020 drawdown to date (up from 1.67% last year)

Target: 1.56%; juste retour: 1.2%

## Sector Success

- Higher Education 55%
- Companies 34%
- Public sector, etc. 11%

## Success rates

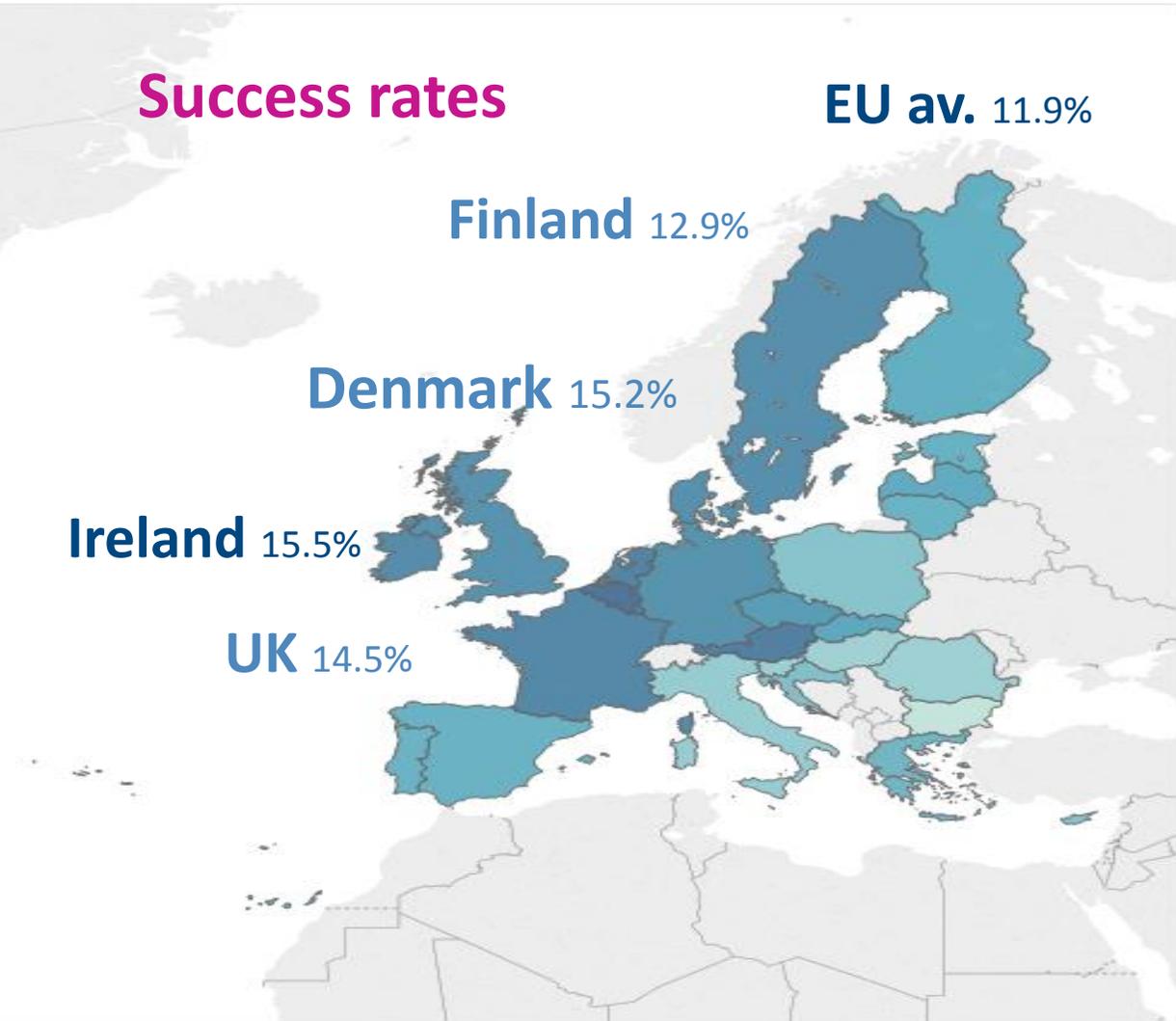
**EU av. 11.9%**

**Finland 12.9%**

**Denmark 15.2%**

**Ireland 15.5%**

**UK 14.5%**



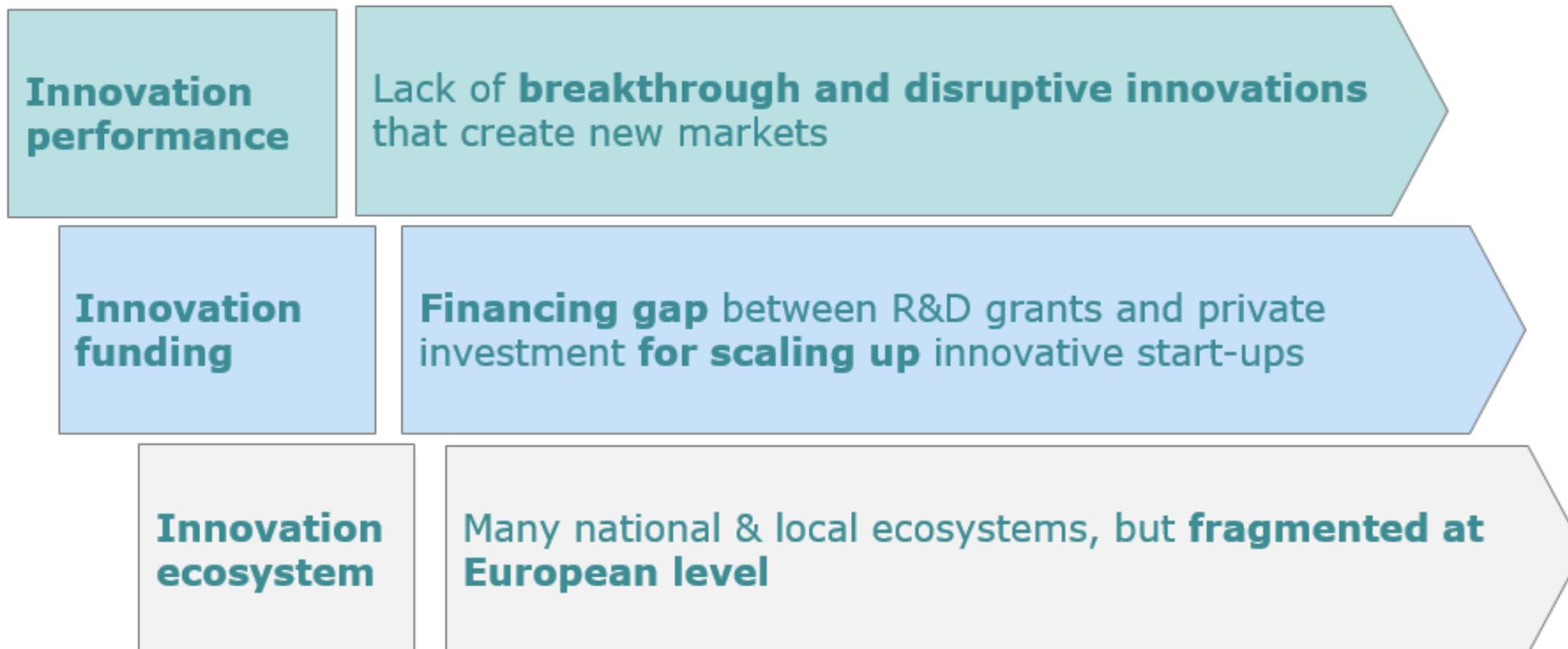
# Irish researchers from academia and industry continue to excel

**5 Projects**  
**Over €6m each**  
**23 Irish partners**

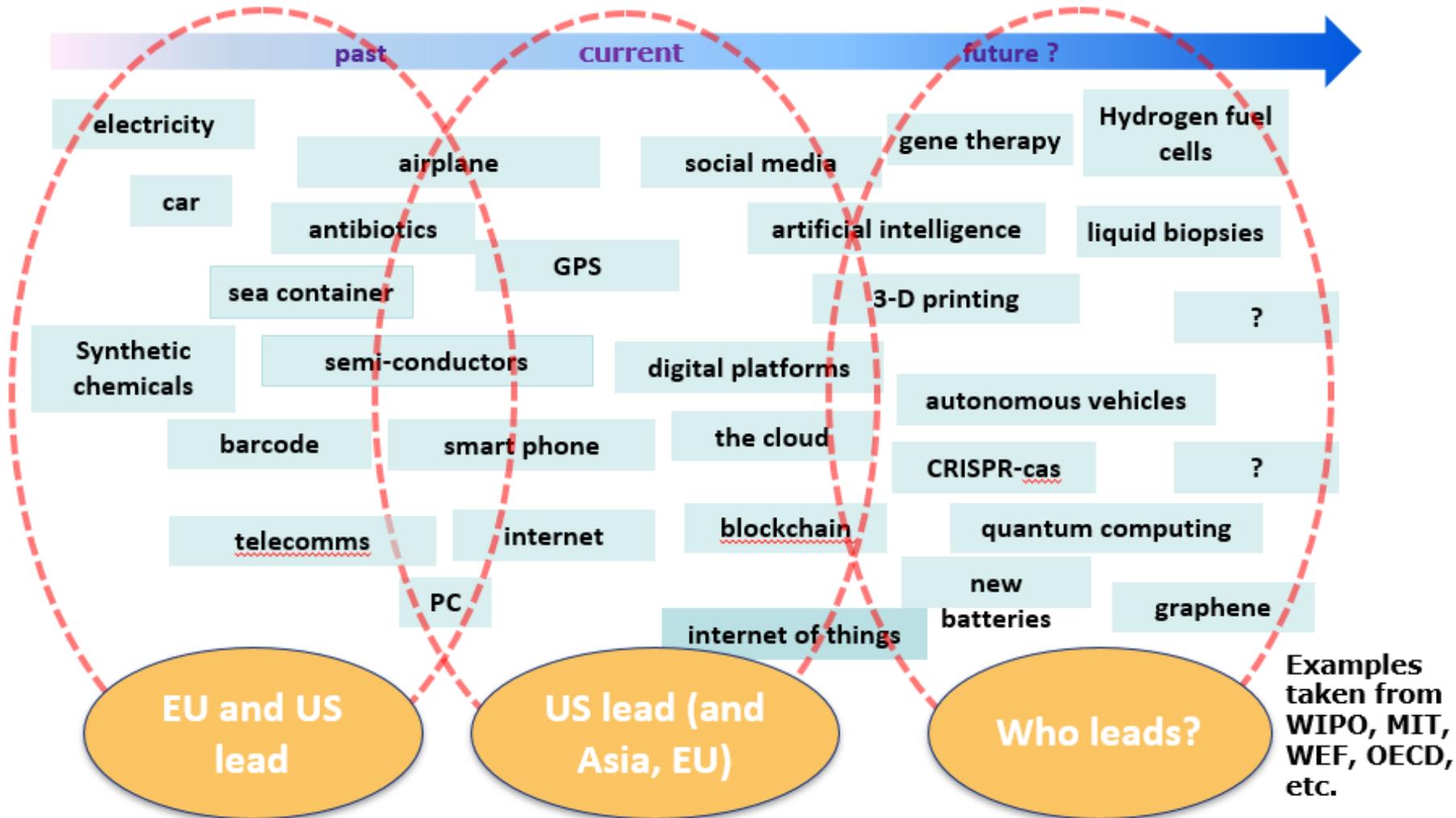
**Wins to date > €1m**  
**230 projects**  
**448 IE participants**

**2 Projects**  
**Over €10m**  
**each**  
**7 Irish partners**

## What's holding back European innovation

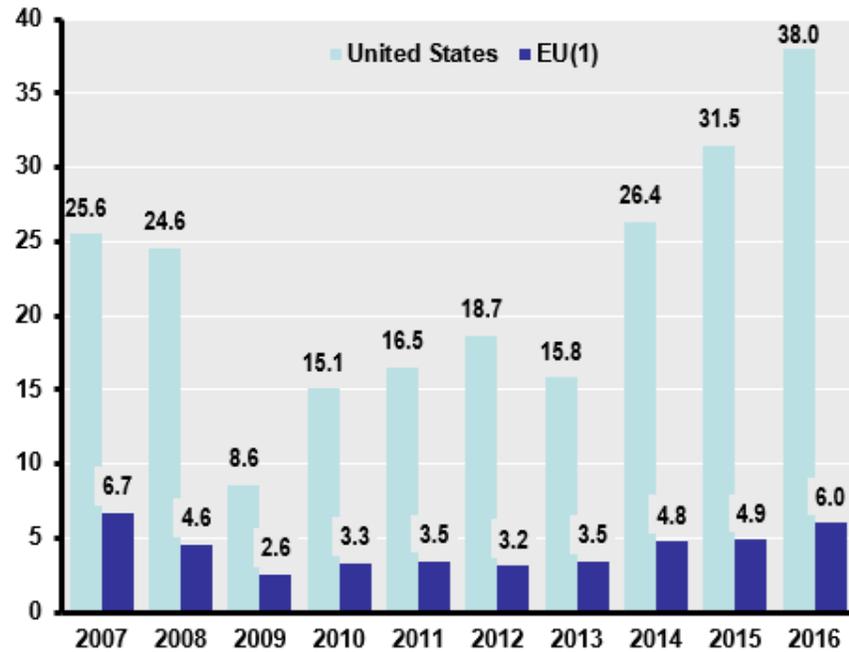


# Who will lead the next wave of breakthrough and disruptive innovation?



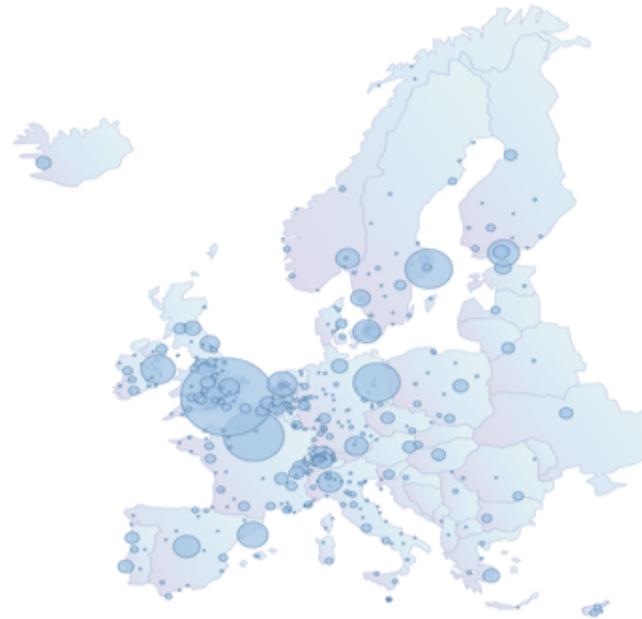
# The challenge in Europe: a financing gap coupled with a fragmented innovation ecosystem

EU start-ups have a harder time raising funding from VCs than their US counterparts...



Venture capital raised

... and a truly connected European innovation ecosystem is only starting to form now



European start-up city hubs

1 EU does not include HR, CY, MT, SI, SK

Source: Invest Europe, NVCA / Pitchbook; "Startup City Hubs in Europe" 2018 report

# The European Innovation Council

**One stop shop** for breakthrough & disruptive innovators

**Open** to all innovators, in any field, at any time  
**Highest potential** innovators selected on basis of ideas and team

**Agile funding** from idea to investment

**Pathfinder grants** for advanced research on emerging technologies  
**Accelerator funding** for innovative start-ups (<€2.5 million grant, <€15 million equity)  
**Crowding in private investment** (VC, Invest EU)

**Building ecosystems** and communities

**Access** to mentoring and advisory services and to knowledge partners (e.g. EIT)  
**Expert Programme Managers** to engage with projects and communities  
**Prizes** for breakthrough technologies

## Second phase launched in 2019

- ✓ **Increased budget of €2.2 billion** (€1.0bn in 2019; €1.2bn in 2020)
- ✓ **Introduction of pilot pathfinder**, with 6 strategic emerging technologies targeted (human-centric AI, novel medical devices, zero-emission energy generation, etc)
- ✓ **Introduction of pilot accelerator** with option to apply for blended finance (combined grant and equity)
- ✓ **New EIC Advisory Board** to bring in leading innovators for ongoing design & implementation
- ✓ **First EIC programme managers** recruited to actively engage with pathfinder projects

# Full EIC under Horizon Europe (2021-27)

- ✓ **Proposed budget of €10 billion**
- ✓ **Dedicated governance with EIC President and Advisory board**
- ✓ **More flexible rules for funding** (ability to stop or reorient, links to Invest EU) with increased role for expert **programme managers**
- ✓ **Full accelerator** funding with both grant and blended finance
- ✓ **Full pathfinder scheme** for grants in advanced research and transition activities
- ✓ **Fast track access** for Horizon grant holders (incl. European Research Council) and certified national schemes
- ✓ **Creation of EIC Forum** with Member States innovation agencies



## Find out more

[ec.europa.eu/research/eic](https://ec.europa.eu/research/eic)

 #EU\_EIC

***"[The EIC alone will not create global champions. What it will do is create a European Champions' League]"***





***Thank You***