

# HORIZON 2020 IN WALES

Annual Report  
2016



Llywodraeth Cymru  
Welsh Government

**Cronfeydd yr UE:  
Buddsoddi yng  
Nghymru**  
**EU Funds:  
Investing in Wales**



UNDEB EWROPEAIDD  
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Llywodraeth Cymru  
Welsh Government

## Foreword



I am very pleased to introduce the second annual report of Horizon 2020 activity in Wales.

Last year was eventful in many ways but as our jointly launched White Paper 'Securing Wales' Future: Transition from the European Union to a new relationship with Europe' (<https://beta.gov.wales/brexit>) makes very clear Horizon 2020 is an important EU programme for Wales. It creates economic benefits and valued partnerships and collaborations – particularly among our universities and businesses, so it is vital we continue to participate fully in Horizon 2020 and its successor programme after the UK leaves the EU.

Horizon 2020 is open for business and, as this report demonstrates, organisations across Wales are benefitting significantly from the opportunities it presents. Last October I was pleased to announce that we had achieved a significant milestone, with Welsh organisations benefiting from over €54m of Horizon 2020 funds. The importance and relevance of this investment can be seen in the many success stories covered in this report; for example, Nantgarw based SME Biocatalysts Ltd is using €0.3m of Horizon 2020 funding to advance further its position as a leading manufacturer of enzymes to support food, fragrance, diagnostics and pharmaceutical industries, while €0.7m of Horizon 2020 funds for Bangor University's INMARE project is helping to develop industrial applications, including pharmaceuticals, from marine proteins.

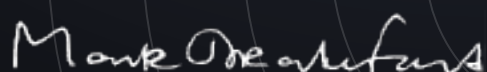
The strong performance since the last annual report, which sees the number of participations from Welsh organisations almost doubling and over €19m awarded to Wales in just 11 months, is a considerable achievement that we can build on together in the months and years ahead.

In particular, it is heartening to see the high level of participation from Welsh businesses in Horizon 2020, which together with the support for research excellence in our Higher Education institutions will help drive sustainable jobs and growth across Wales.

As Cabinet Secretary responsible for the Structural Funds, utilising these funds to help build the capacity needed to access competitive funding sources such as Horizon 2020 is a key part of our agenda. By the end of 2016 we had committed over 80% (over £255m) of the research and innovation Structural Funds in key areas of smart specialisation including the metals industry (Swansea University's IMPACT project) and compound semi-conductors (Cardiff University's ICS project). Further targeted investments will be announced in the months ahead and will help build on Wales' achievements in using EU funds in a smart, synergistic and strategic way.

There is still work to do; Horizon 2020 remains very competitive and the EU referendum has raised many uncertainties for our future. The report highlights the activity underway and the areas of strength we can build on to address these challenges. Clearly, one of our most important strengths is partnership, with many examples of cross-organisation working highlighted in this report.

Working with our partners across Wales, the UK, the EU and globally, I am confident we will continue to maximise the benefits of Horizon 2020 to help create a vibrant knowledge economy, jobs and growth across Wales.



Mark Drakeford AM  
Cabinet Secretary for Finance and Local  
Government

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## Introduction

At over €70 billion Horizon 2020<sup>1</sup> is the largest ever European Union (EU) research and innovation programme and is providing real opportunities for Welsh organisations to be at the forefront of research and innovation and to collaborate with leading organisations across Europe and the world.

Horizon 2020 is 'open for business', with successful applications made whilst the UK is part of the EU protected by the UK Government's lifetime expenditure guarantee.

It is also the Welsh Government's view<sup>2</sup> that the UK should continue to benefit from access to EU programmes such as Horizon 2020 or their successor programmes from outside of the EU.

This annual report sets out how Welsh organisations have performed so far in accessing Horizon 2020, the progress made on the Welsh Government's key objectives for Horizon 2020, and a forward look to activities in 2017.



Courtesy of PharmaMar S.A. (Spain)

Figure 1 – Bangor University has secured over €730,000 of Horizon 2020 funds as lead co-ordinator of the €7.4m INMARE project<sup>3</sup>. The project will extract microbes from extreme marine environments and apply innovative screening and optimisation techniques in order to shorten the pipeline for industrial applications. Applications could include replacement of energy-intensive chemical processes in industry, environmental clean-up technologies or anti-cancer drugs. The university is working with a significant consortium of 24 European and North American organisations.

1 The European Commission's Horizon 2020 webpages:

<https://ec.europa.eu/programmes/horizon2020/>

2 Welsh Government's White Paper, 'Securing Wales' Future':

<https://beta.gov.wales/brexit>

3 More information on the INMARE project can be seen as a case study:

<http://gov.wales/docs/wefo/publications/160309-horizon-case-studies.pdf>

# Performance of Welsh organisations

Note: This aggregated data is drawn from the European Commission's (EC) database on applicants to Horizon 2020. The data is based on signed grant agreements relating to funding calls as extracted from the EC database on 30th September 2016<sup>4</sup> and is cumulative from the beginning of the programme unless otherwise stated.

## Overall performance

Wales achieved a significant milestone this year with Welsh organisations securing just over €54 million of Horizon 2020 funding since the start of the programme.

This reflects the strong performance since the last reporting period (October 2015), which sees the number of participations from Welsh organisations almost doubling from 64 to 112; around a third of these participations were as lead co-ordinator. Similarly, the international collaborations by Welsh organisations in Horizon 2020 more than doubled, to over 1000 (see Figure 2). This increased activity attracted over €19m to Wales in just 11 months.

It is worth noting that these figures do not include the successes of organisations which carry out Horizon 2020 research in Wales but whose participations are registered in other regions, such as TWI Ltd and the Centre for Ecology and Hydrology. In the case of TWI, the company is involved in two projects in Wales amounting to €1.2m (see page 19).

Neither do the figures include Horizon 2020 funding and benefits that come to Wales through intermediaries such as banks, Innovate UK and research councils.

The UK is one of the leading countries participating in Horizon 2020. When we put Welsh success in Horizon 2020 in the context of the research and innovation base as compared to that of the UK, it is clear that Wales is largely performing in proportion to its underlying capacity. Business Expenditure on Research and Development (BERD) for Wales was £362m in 2015; this represented 2% of the UK total.<sup>5</sup> The number of researchers in Wales whose work was recognised as world-leading or internationally excellent (REF 3\* and 4\* FTEs) was 3.66% of the total for the UK.<sup>6</sup> In terms of both participations and funding allocated, Wales achieved 2.06% of the UK's share of Horizon 2020 cumulatively by the end of September 2016, in line with its underlying capacity. Given the strength of UK performance we have therefore highlighted in this report several areas where Wales has achieved 3% or more of the equivalent UK share.

4 The most recent data cut-off date available for the annual report cycle

5 Welsh Government, November 2017 <http://gov.wales/statistics-and-research/research-development-expenditure/?lang=en>

6 Research Excellence Framework 2014 [www.ref.ac.uk/results/intro/](http://www.ref.ac.uk/results/intro/)

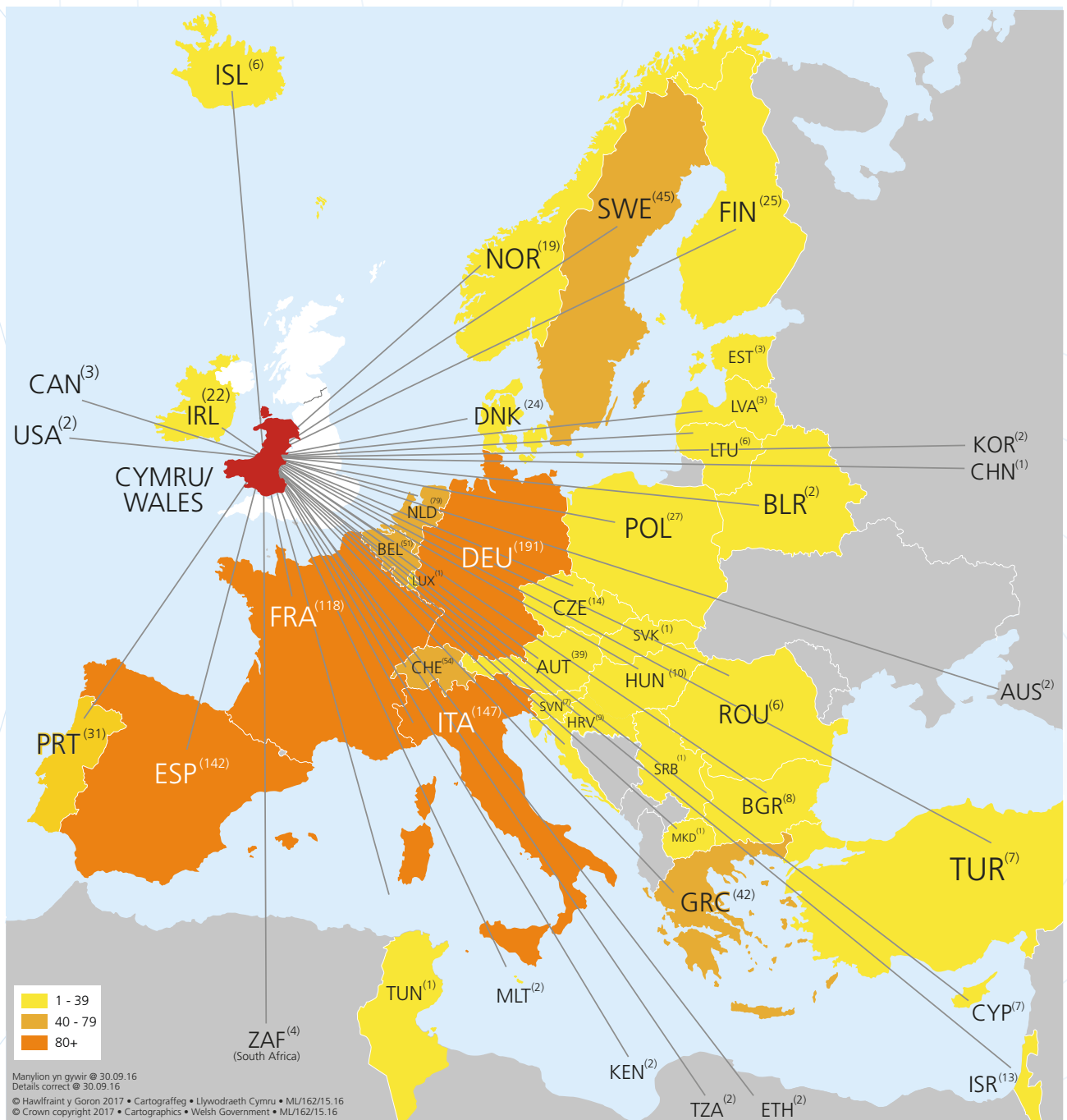


Figure 2 – International collaborations by Welsh organisations in Horizon 2020

## Performance by theme

Horizon 2020 is split into three main pillars – Excellent Science, Industrial Leadership and Societal Challenges. Wales' profile (Figure 3) is similar to the UK's (Figure 4) in that Excellent Science is the largest part

of the programme, followed by Societal Challenges and Industrial Leadership. These profiles are reflective of the strength of UK and Welsh universities in accessing the excellence pillar.

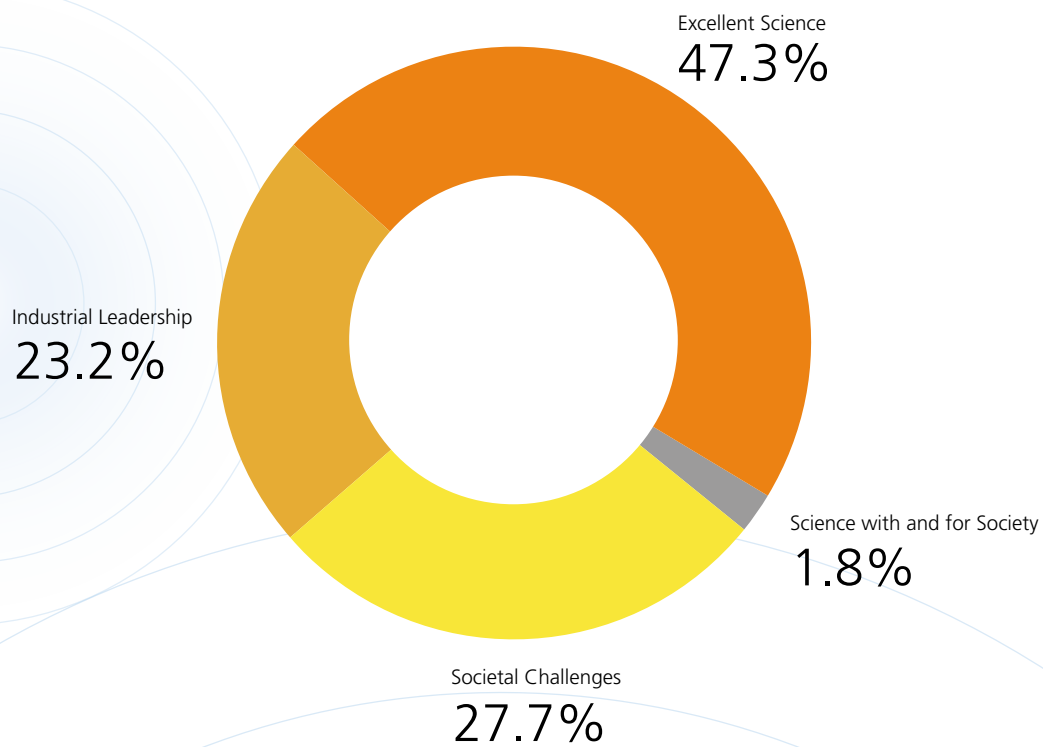


Figure 3 – Distribution of Welsh participations by main themes in Horizon 2020

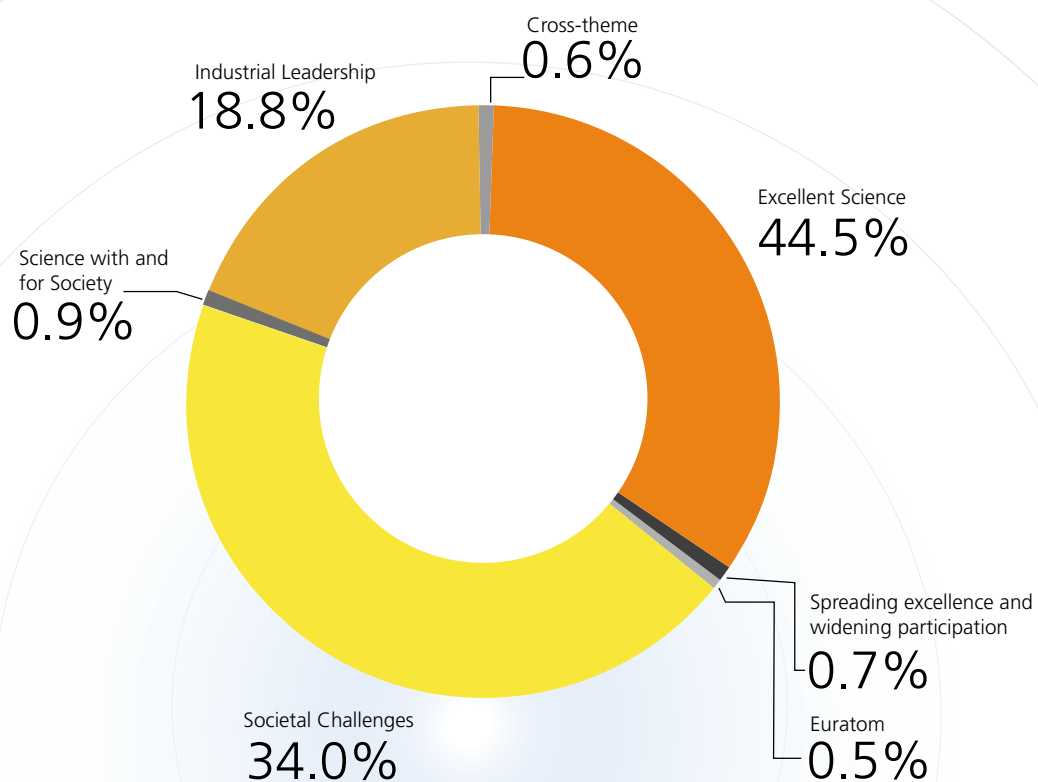


Figure 4 – Distribution of UK participations by main themes in Horizon 2020

It can be seen in Figure 5 that the profile of the main themes in Horizon 2020 for all countries is different to that of Wales and the UK. This shows the dominance of Excellent Science in Wales and the UK but it is also noticeable that Wales appears well behind Horizon 2020 in general in the

Societal Challenges; 27.7% versus 41.7% respectively. We need to be cautious when drawing conclusions from proportions but this does reflect other indicators that, with some exceptions, Welsh organisations are less successful in accessing the Societal Challenges.



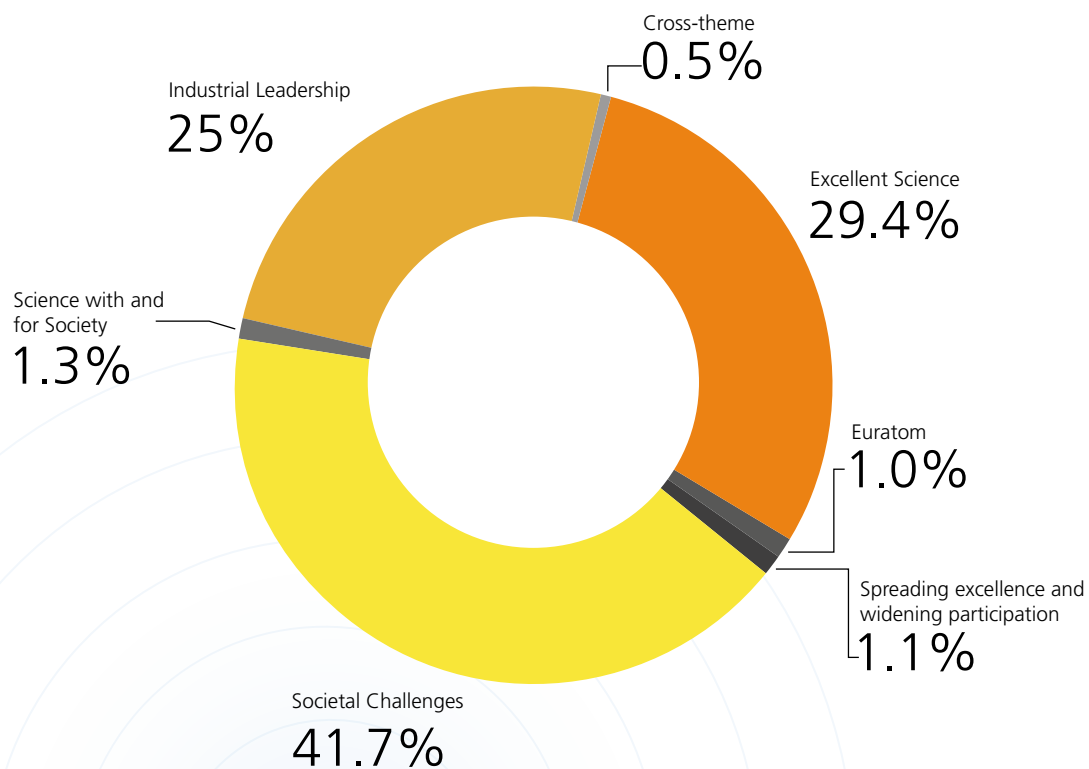


Figure 5 – Distribution of all Horizon 2020 participations by main themes

Figure 6 shows the 'top ten' performing parts of the programme in terms of the 'most participations from Wales' and Figure 7 shows the 'top ten' performing parts of the programme in terms of 'funding for Welsh organisations'. As well as the

strong performance in the excellence pillar already highlighted, there is noticeable performance in areas such as 'climate action, environment, resource efficiency and raw materials' and 'ICT', which are considered areas of smart specialisation in Wales.

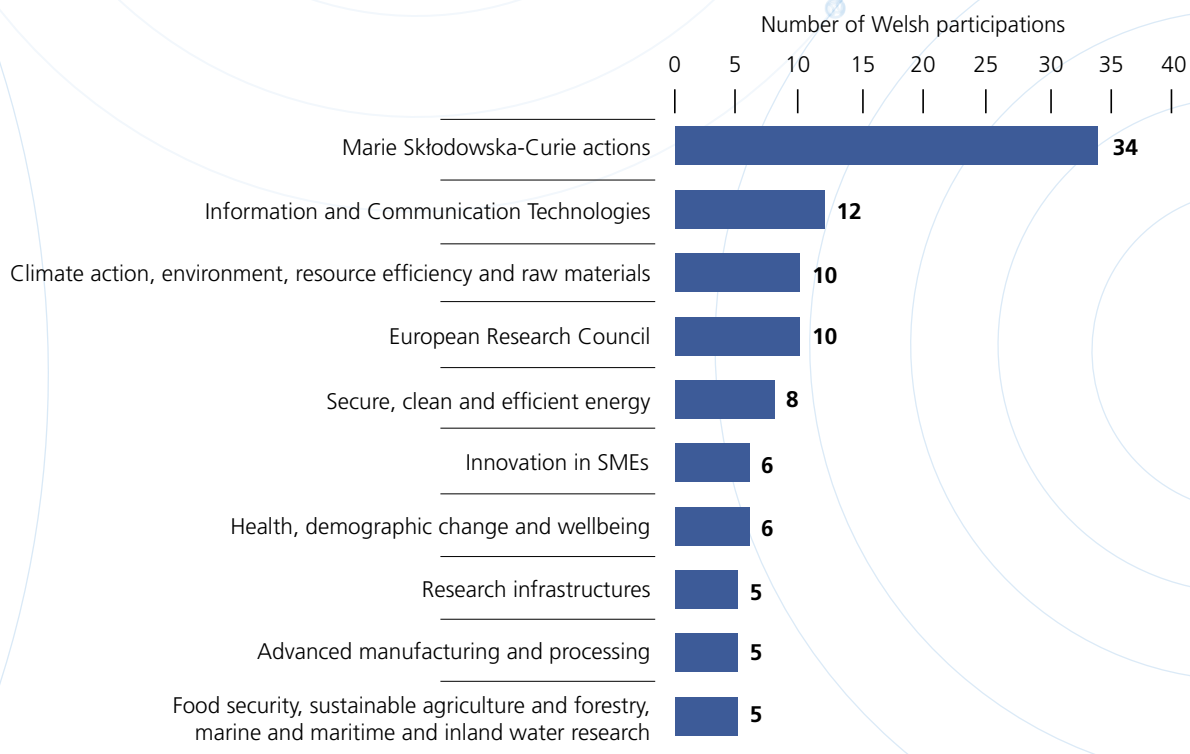


Figure 6 – Top ten highest performing areas in Horizon 2020 for Welsh organisations in terms of participations

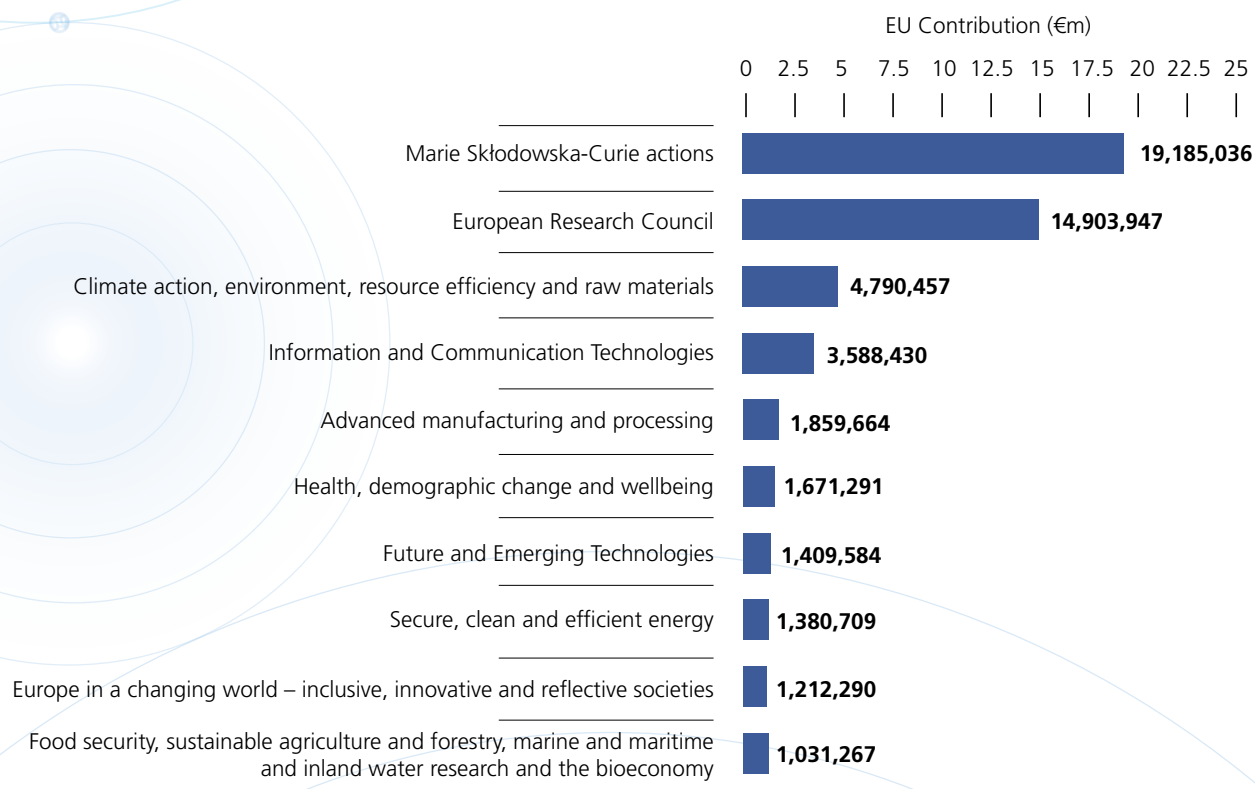


Figure 7 – Top ten highest performing areas in Horizon 2020 for Welsh organisations in terms of funding secured

As already identified it is useful to compare Welsh performance with that of the UK, albeit recognising that the UK is one of the leading countries in Horizon 2020.

Table 1 illustrates, in comparison with the UK, Wales has performed particularly well in several areas of the programme. Again it is possible to see links with known areas of smart specialisation in Wales.

Part of Programme	Welsh % of UK participations
Make scientific and technological careers attractive for young people	15.38
Innovation in SMEs	12.77
Climate action, environment, resource efficiency and raw materials	4.44
Advanced Manufacturing and Processing	3.62
Future and Emerging Technologies	2.82

Part of Programme	Welsh % of UK funding
Make scientific and technological careers attractive for young people	15.05
Climate action, environment, resource efficiency and raw materials	5.28
Innovation in SMEs	4.89
Marie Skłodowska-Curie Actions	4.38
Advanced Manufacturing and Processing	3.41

Table 1. Areas of strong Welsh performance in comparison with the UK

Table 2, in contrast, indicates that some areas of the programme are not providing significant numbers of participations or funding in Wales at this stage. Again the Societal Challenges feature. While this will

need to be monitored, there are already active Welsh strategies and investments in many of these thematic areas so performance should improve.

Part of Programme	Welsh % of UK participations	Part of Programme	Welsh % of UK funding
Biotechnology	0	Biotechnology	0
Secure societies – Protecting freedom and security of Europe and its citizens	0	Secure societies – Protecting freedom and security of Europe and its citizens	0
Smart, green and integrated transport	0.31	Smart, green and integrated transport	0.37
Europe in a changing world – inclusive, innovative and reflective Societies	0.66	Nanotechnologies	0.58
Space	0.86	Health, demographic change and wellbeing	0.71
Nanotechnologies	1.14	Secure, clean and efficient energy	0.76
Health, demographic change and wellbeing	1.46	Research Infrastructures	1.13
Advanced materials	1.59	Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy	1.29

Table 2. Examples of areas of limited Welsh success in comparison with the UK

## Performance by sector

Performance by sector in Wales (Figure 8) is very similar to the UK, with the exception of the absence of research organisation activity (7.8% in the UK) which is a known structural issue.

Both the UK and Wales differ markedly from the overall sector split in Horizon 2020 (Figure 9), reflecting the strength of higher education participation as already highlighted.

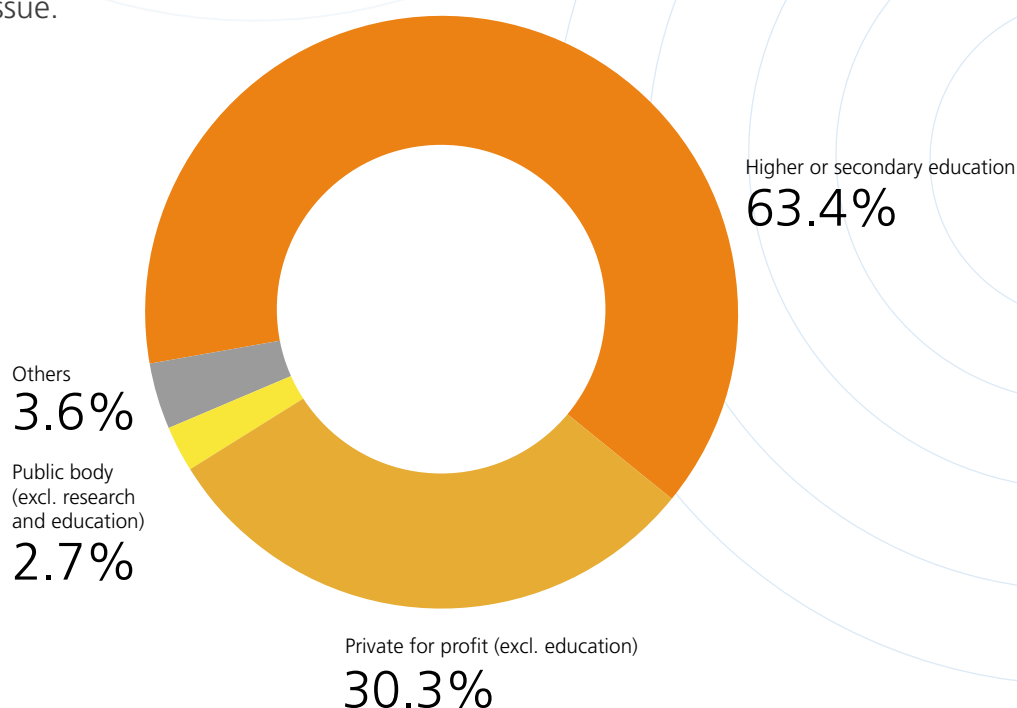


Figure 8 – Welsh participation in Horizon 2020 by type of organisation.

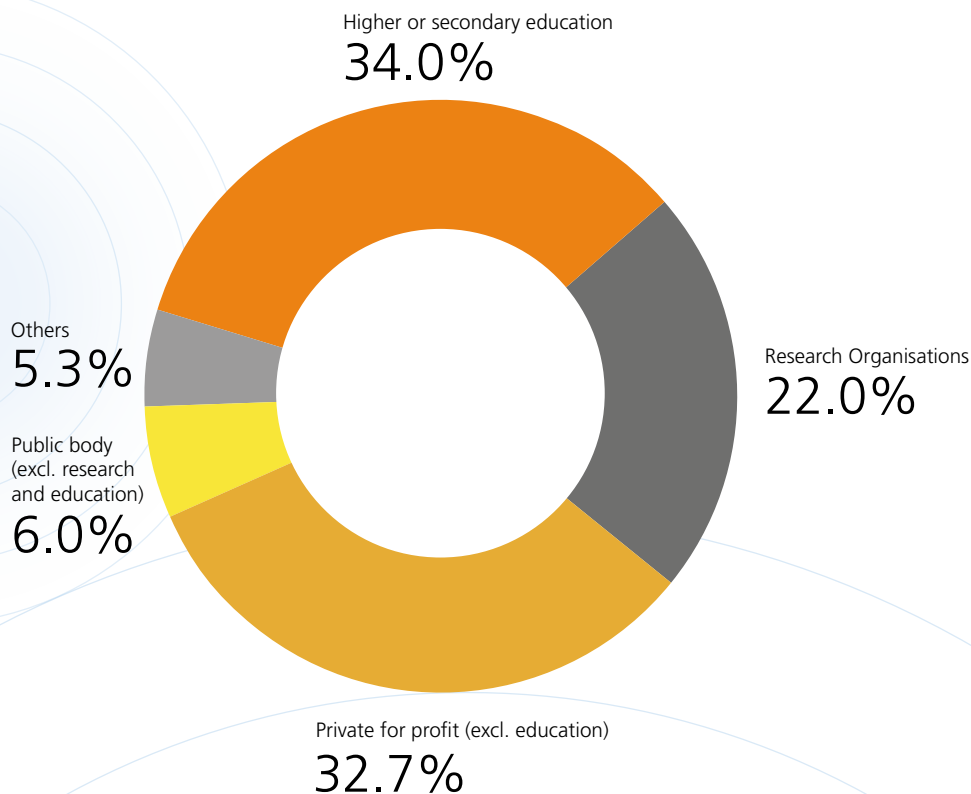


Figure 9 – Participation in Horizon 2020 by type of organisation (all countries).

## Performance of the higher education sector

The Welsh higher education sector (HE) accounts for 63.4% of Welsh participations, which is similar to the UK position (58.7%) and almost double Horizon 2020 as a whole (34.0%). Similarly, Welsh universities account for 62.5% of Welsh funding, which is similar to the UK position (64.5%) and more than Horizon 2020 as a whole (39.0%).

In comparison with UK universities, the Welsh HE sector has performed particularly well in areas such as 'Science with and for Society – Young' (14.3% of UK HE funding), 'Innovation in SMEs' (9.3% of UK HE funding) and 'Climate Action – Societal Challenge 5' (7.5% of UK HE funding).

### FOR EXAMPLE

Aberystwyth University's IMAJINE project has secured almost €5m of Horizon 2020 funds to look at regional inequalities.

The pioneering research project aims to discover new approaches for tackling inequality and promoting a fairer distribution of resources across the EU. IMAJINE is amongst the largest social science projects to be financed by Horizon 2020.

As can be seen in Figure 10, Cardiff University is the largest beneficiary of Horizon 2020 funding in Wales (featuring 19th in the UK's top 30 higher education organisations<sup>7</sup>), with not much separating Bangor, Aberystwyth and Swansea Universities. It is noticeable that the gap in performance generally reflects the West Wales and the Valleys and East Wales Structural Fund regions, demonstrating to some extent the structural issues being addressed by those funds.

<sup>7</sup> UK participation in Horizon 2020 and Framework Programme 7

[www.gov.uk/government/publications/uk-participation-in-horizon-2020-and-framework-programme-7](https://www.gov.uk/government/publications/uk-participation-in-horizon-2020-and-framework-programme-7)



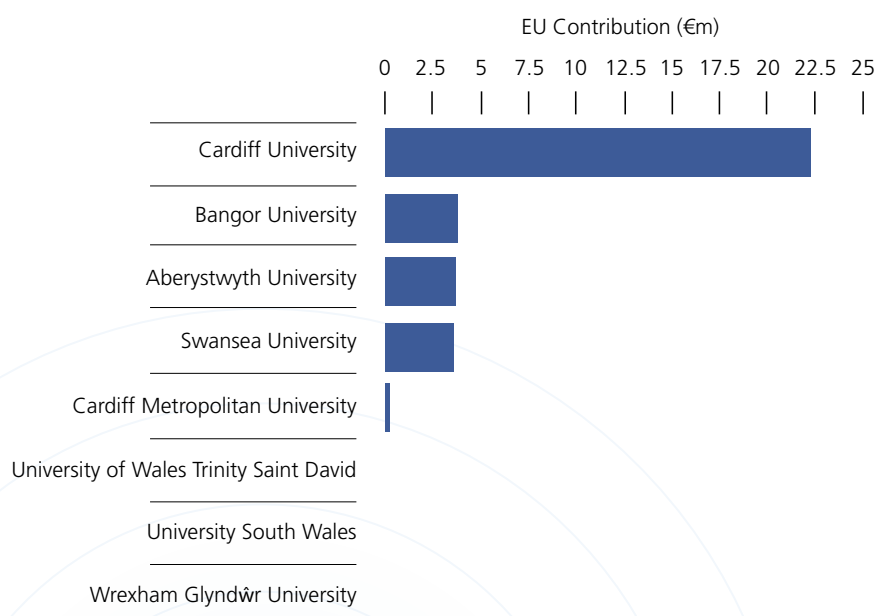


Figure 10 – Horizon 2020 funding awarded to individual Welsh universities

## Performance of the private sector

Wales has a higher proportion of private sector participations (30.3%) than the equivalent in the UK (27%) and is not far from private sector participation in Horizon 2020 as a whole (32.7%). In both the UK and Wales, private sector funding amounts to around a fifth of the total; in Wales' case this has brought in over €10m.

The private sector in Wales has performed exceptionally well in the Future and Emerging Technologies (FET) part of the programme. Three SMEs have been successful, representing 13.0% of the total FET participations by UK SMEs, and have been awarded a total of €1.186m, representing 11.9% of the FET UK SME funding.

Other areas of the programme with private companies gaining over 3% of the UK share of funding are: 'Advanced Materials', 'Advanced Manufacturing and Processing', 'Innovation in SMEs' and 'Climate action, environment, resource efficiency and raw materials'.

In the section of the programme called "Make scientific and technological careers

attractive to young students, and foster sustainable interaction between schools, research institutions, industry and civil society organisations", the only UK private sector company to participate to date is Cardiff-based Science Made Simple Limited.

In absolute funding terms, Welsh companies have been awarded over €1m for FET, ICT, Health (Societal Challenge 1) and "Climate action, environment, resource efficiency and raw materials".

### FOR EXAMPLE

Wales has had its first success in the highly competitive SME Instrument Phase 2 with €1.8m awarded to St Asaph-based SMARTKem Limited<sup>8</sup>. SMARTKem supplies high performance organic semiconductor materials that enable the manufacture of thin-film transistor (TFT) arrays for use in plastic displays and electronic applications. In addition to sites in St Asaph, Manchester and Sedgefield the company has an invaluable team based at Bangor University's Electrical Engineering Department dealing with the design, modelling and fabrication of elements of their products.

<sup>8</sup> More information on the SMARTKEM project can be seen as a case study: <http://gov.wales/docs/wefo/publications/160309-horizon-case-studies.pdf>

## Regional comparison

The comparison of Horizon 2020 performance between regions is of limited value due to the structural differences between regional research and innovation ecosystems. For some indicators, for example Horizon 2020 funding per person, Wales

appears to be performing better than several EU regions (e.g. Normandy, Galicia); similar to others (e.g. East Midlands, Aquitaine, Schleswig-Holstein); and behind some (e.g. Spanish Basque Country, Flanders).

## Application and success rates

Welsh organisations had submitted just over a thousand Horizon 2020 applications by the end of September 2016, which is around 2.7% of the UK's applications over the same period. Wales submits fewer applications than many other countries, but with leading countries such as the UK, Germany and France also in the lower end of application rates (applications per inhabitant) it may be that quantity is not the only key to success.

The overall Welsh success rate is relatively low at 11%, but for the private sector it is slightly higher (12%); the HE sector success

rate is 10%. Success rates vary greatly across the different parts of the programme and many are still affected by a small sample size at this stage of programme delivery.

There are however several areas of apparent strength: Welsh applications to the "Climate action, environment, resource efficiency and raw materials" calls have a 22% success rate, higher than the UK's 19%; Wales also does comparatively well in FET, achieving a 9% success rate, ahead of the UK's 4%.

There is now a reasonable amount of data available on Welsh performance to be able to draw some conclusions:

- Overall Wales is continuing to perform well in the very competitive Horizon 2020 programme. The increase in activity and success since the last annual report is very positive and we should look to maintain that level of improvement.
- By more than doubling the international collaborations by Welsh organisations in Horizon 2020 there should be a subsequent increase in the exchange of best practice, future partnerships and trade opportunities with consequent benefits for future success and downstream impact.
- The high level of participation and reasonable success rates of the Welsh private sector is very positive. We should look to build on these achievements by supporting and encouraging a broader range of businesses to access competitive funding such as Horizon 2020.

- It is clear that the higher education sector is contributing significantly to our overall performance and access to EU funds continues to be important for that sector both to support their research and to build the capacity to be able to seek further competitive research funding.
- There are clear thematic strengths to build upon through smart specialisation but also areas of challenge where current investments and support mechanisms will be expected to increase Horizon 2020 success in the next few years.
- Wales needs to consider its approach to the Societal Challenges pillar of Horizon 2020; greater thematic focus and better collaboration between the higher education sector and industry may be required.

The rest of this report will demonstrate how we are looking to address these issues and build on the success to date.

# Key objective: Build a 'stairway to excellence'

EU funds have given Wales the opportunity to make significant improvements to its research and innovation capacity. Figure 11 shows how key investments and support are aligned along a 'stairway to excellence', so whether you are a Welsh business exploring a potential innovation for the first time or an excellent research group looking to build an international collaboration, there

is support available. Some organisations/ individuals may not yet be ready to access competitive funding such as Horizon 2020, but the activity supported by the 'stairway' (and the other key objectives in this report) will encourage them to consider applying for funding in the medium or long term and support them when they do.

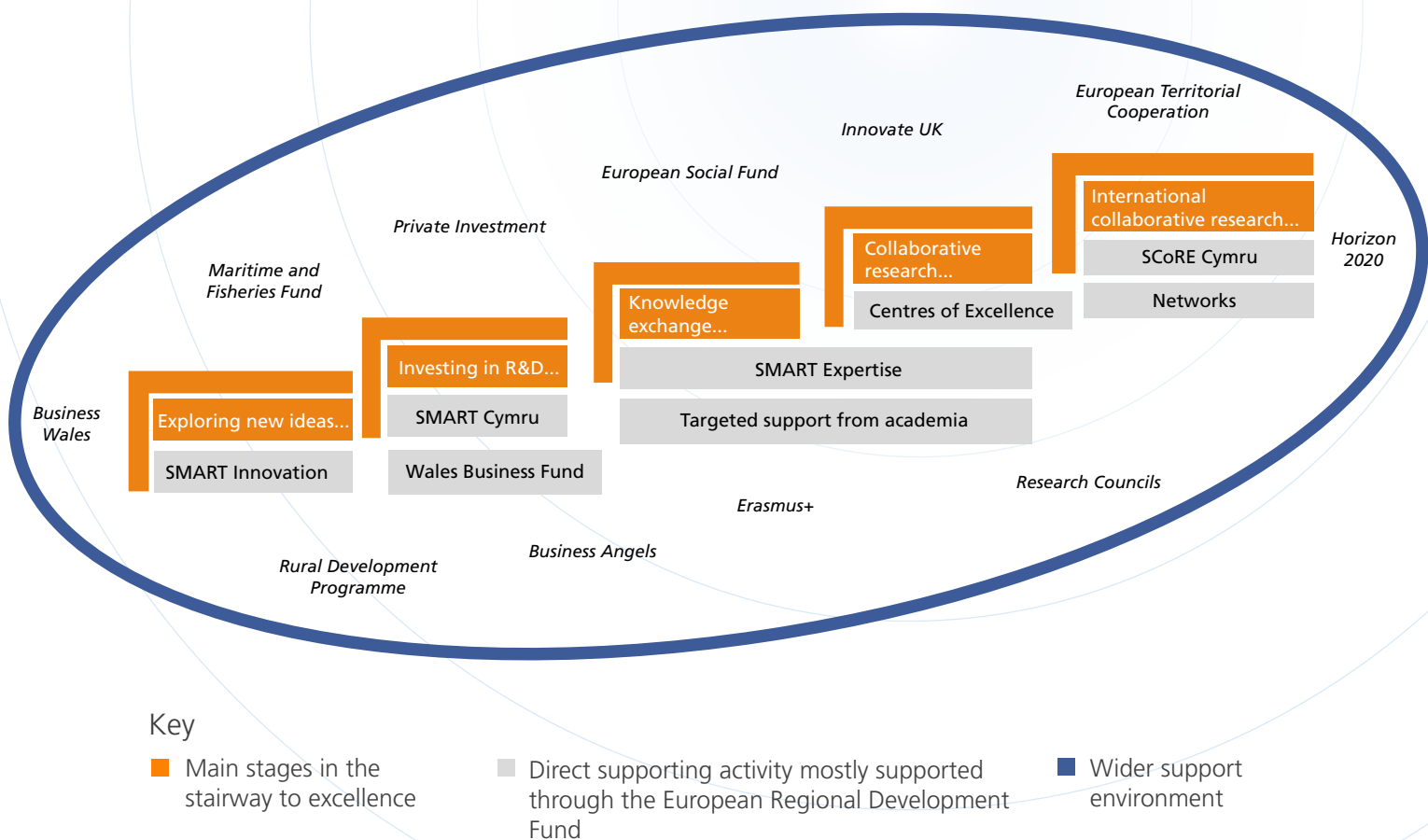


Figure 11 – The Welsh 'stairway to excellence'.



## Progress to date

There has been significant progress on this key objective with investment in the European Regional Development Fund (ERDF) research and innovation portfolio reaching £255m by the end of 2016. WEFO has ensured the mix of strategic, complementary and niche schemes add value to each other and directly target Wales' smart specialisation opportunities. Figures 17 and 18 in Annex A illustrate this portfolio approach and the progress made.

Specific investments in centres of excellence during 2016 included £17.1m ERDF for Swansea University's Computational Foundry<sup>9</sup>; £17.4m ERDF for Swansea University's IMPACT<sup>10</sup>, in partnership with Tata Steel plc; £15.2m ERDF for the Cardiff University led FLEXIS<sup>11</sup>; and £4.8m ERDF for the Swansea University led SPARC II<sup>12</sup>.

This new research capacity is expected to bring in at least £82m research income from competitive sources, including Horizon 2020.

### FOR EXAMPLE

Cardiff University is receiving €380,740 from Horizon 2020 for its role in the P2P-SmarTest project. P2P-SmarTest investigates and demonstrates a smarter electricity distribution system, involving advanced ICT, regional markets and innovative business models. In parallel, the ERDF-funded FLEXIS project, led by Cardiff University and involving the universities of Swansea, Bangor, Aberystwyth and the University of South Wales, explicitly seeks to build on existing excellence in energy systems research, including aspects of smart grids, in order to participate further in competitive funding programmes such as Horizon 2020.

There is also evidence that existing ERDF investments are delivering on their objectives, for example, Ser Cymru II has already supported 14 world-class researchers, including one Chair, in areas of smart specialisation. Further applications are currently being considered, three of which are for Chairs. The scheme is an excellent example of the synergies which can be achieved between EU funding streams with 35 fellowships already supported under the complementary scheme SIRCIW ('Strengthening International Research Capacity in Wales'), funded by Horizon 2020.

There have also been complementary investments from the European Social Fund (ESF); for example £26m for the Knowledge Economy Skills Scholarships scheme (KESS 2), led by Bangor University on behalf of the Welsh higher education sector. KESS 2 will support over 600 postgraduate students to partner with over 500 businesses in key sectors of the Welsh economy to deliver collaborative research projects.

Our universities continue to be key players in the European territorial co-operation programmes, for example:

- In the Ireland Wales co-operation programme, the €10.2m CALIN project involves universities in Swansea, Cardiff and Bangor, collaborating with Irish counterparts in the life sciences sector.
- In the North West Europe programme, Aberystwyth University are engaged in the €5.3m RE-DIRECT project working with partners in Germany, Ireland, France and Belgium to increase the efficient use of biomass waste from the management of rural landscapes.

<sup>9</sup> The Computational Foundry will be a world class centre for computational research within the heart of the Bay Campus [www.swansea.ac.uk/campus-development/phase2-current/keyprojects/computationalfoundry/](http://www.swansea.ac.uk/campus-development/phase2-current/keyprojects/computationalfoundry/)

<sup>10</sup> IMPACT – The Research Institute for Innovative Materials, Processing and Numerical Technologies, [www.swansea.ac.uk/campus-development/phase2-current/keyprojects/impact/](http://www.swansea.ac.uk/campus-development/phase2-current/keyprojects/impact/)

<sup>11</sup> FLEXIS will bring together world-leading expertise from Welsh universities to tackle some of the most pressing issues currently facing society, <http://flexis.wales/>

<sup>12</sup> SPARC II – Building Welsh research capacity for the next generation of solar photovoltaic technology: <http://cser.org.uk/research/>

There continues to be good potential for synergies with the innovation activity supported through the European Agricultural Fund for Rural Development (EAFRD) with the European Innovation Partnership (EIP) for Agricultural Productivity and Sustainability actively exploring opportunities. As for the European Maritime and Fisheries Fund (EMFF) there has been progress on potential cross-fund synergies relating to the aquaculture sector, with a related bid for ERDF funding now being considered by WEFO.

SCoRE Cymru<sup>13</sup> continued to be popular in 2016, demonstrating its important role in the

'stairway to excellence'. During the calendar year 58 applications were approved, 20 for travel costs and 38 for expertise costs, resulting in a total commitment of over £133,000. Since the inception of the scheme in May 2013, six successful SCoRE applicants have brought over €2m of Horizon 2020 funding to Wales; for example, Swansea University's MARIBE (Marine Investment in the Blue Economy) project was supported by SCoRE Cymru in its formative stages and went on to attract €170,000 to help unlock the potential of multi-use of space in the offshore economy.



Figure 12 – Swansea University's Computational Foundry, based at the Swansea Bay Campus, is backed with £17m ERDF and is expected to attract significant competitive research income to Wales.

13 SCoRE Cymru (Supporting Collaborative Research and innovation in Europe) provides grants to stimulate participation by Welsh organisations in European collaborative research and innovation programmes, particularly Horizon 2020. Funding can cover the travel and accommodation costs involved in identifying and building consortia (up to £1,000) and the cost of subcontracted expertise for developing funding proposals (up to £10,000).

## Forward look

With much of the research and innovation portfolio in place the focus will now be on ensuring schemes deliver. This is expected to lead to a significant increase in collaborative activity in Wales and beyond, with more individuals/organisations feeling ready to take the next step on the 'stairway to excellence'. There will also be a significant increase in data flowing from the research and innovation portfolio which will help to inform and target other activities; this will be explored later in this report.

Investments will also continue; WEFO has recently undertaken a call for innovative, niche proposals to complement existing schemes. The call was focused on the commercialisation of research in emerging new specialisms (a process referred to in the literature as "entrepreneurial discovery") rather than direct

research capacity, but it may well identify innovative researchers/businesses that could be supported up the 'stairway to excellence'. It is hoped that the majority of these investments will be made by the end of 2017.

There has also been unprecedented interest among Welsh partners in the Atlantic Area Programme during 2016, the outcomes of which will be known by the second quarter of 2017.

It is anticipated the investments and support highlighted above will either directly or indirectly contribute to a sustainable step change in Welsh performance in accessing competitive funding sources such as Horizon 2020 in the medium to long term; this is further evidence of the importance of regional economic funding to Wales beyond 2020.

## Building on excellence

The Port Talbot-based TWI Technology Centre has built on existing excellence to deliver success in Horizon 2020.

TWI have accessed European funded support schemes over more than 10 years to help develop their facilities and their ability to collaborate with industry and academic partners, helping to drive forward research into advanced engineering and materials.

TWI has now secured more than €1m to work on Horizon 2020 projects that are developing new technology and products to help improve the performance of rail infrastructure and offshore oil and gas production. In doing so they are working with partners in Belgium, Cyprus, Greece, Portugal, Spain and the UK.

Through the €1.8m AutoScan project, led by I-Moss NV, Belgium, the company is collaborating with European partners to develop a robotic evaluation system which will enable more frequent inspection of rail tracks and improved detection of faults and defects.

TWI is also participating in the €3m RiserSure project, led by InnoTecUK, which is developing a unique product for assessing the condition of flexible risers widely used in offshore oil and gas production. The product will improve reliability and reduce the environmental impact

of offshore production through a new sub-sea digital radiography detector.

Philip Wallace, TWI regional manager in Wales, said: "Our aim is to drive business growth and competitiveness for manufacturing and engineering organisations through research into advanced engineering and materials.

"Our collaboration in the Horizon 2020 schemes is just one example of this. TWI know-how will help fast-track innovation within these schemes and allow pioneering new products to reach commercial readiness and success."

In addition to TWI's Horizon 2020 projects, over £7m of ERDF funds are supporting the development of the company's new Advanced Engineering Materials Research Institute (AEMRI). The facility will support cutting-edge industrial research with partners in sectors including aerospace, automotive, electronics, and nuclear and renewable energy.

AEMRI has received backing from a range of global manufacturing companies and aims to generate over £12m of additional research and development investment within the next six years.



# Key objective: Increase the engagement and success of businesses

There is a recognised need for additional support for Welsh businesses to access Horizon 2020 opportunities. This support should be integrated into the wider innovation offer, ensuring businesses

receive the right support for their stage of development (the 'stairway to excellence' principle). It must also add value to existing and emerging support available in Wales, the UK and Europe.

## Progress to date

The performance of the private sector in Wales is very encouraging (see page 12), although it is recognised that we need to continue to increase the number of businesses seeking and successfully accessing competitive funding.

The Welsh Government's ERDF funded SMART schemes (SMART Innovation, SMART Cymru and SMART Expertise), worth £135m in total, provide an integrated suite of interventions that will drive the innovative behaviour needed in Wales and hence nurture the confidence needed to access funding such as Horizon 2020. This includes one-to-one support through Innovation Specialists and, where required, procured support for Welsh businesses considering Horizon 2020. The Innovation Specialists have engaged with over 1000 companies on research opportunities and have encouraged over 160 to seek competitive funding from Innovate UK and Horizon 2020.

### FOR EXAMPLE

Nantgarw based SME Biocatalysts Ltd has accessed Welsh Government support to develop its facilities and research knowledge with award winning success. It is now using €0.3m of Horizon 2020 funding to advance further its position as a leading manufacturer of enzymes to support food, fragrance, diagnostics and pharmaceutical industries with the LIPES project.

Businesses were also exposed to the collaborative research environment as higher education led ERDF schemes such as ASTUTE 2020<sup>14</sup> and BEACON+<sup>15</sup> started their delivery

phases, working directly with businesses on new products, processes and services in key areas of smart specialisation. Around £60m ERDF was invested in collaborative research schemes during 2016 alone, which will help increase such activity during 2017.

SCoRE Cymru continues to target Welsh businesses, including through higher funding rates, to help address any financial barriers to developing Horizon 2020 bids. Of the £133k committed during 2016, 71% was awarded to businesses. This includes supporting the resubmission of Horizon 2020 bids that have achieved a high evaluation score or a 'seal of excellence'<sup>16</sup> and supporting successful Phase 1 SME Instrument beneficiaries to bid for Phase 2. SCoRE Cymru also explores all opportunities to integrate with other business support including SMART Cymru and the Accelerated Growth Programme<sup>17</sup>.

The Welsh Government's Horizon 2020 Unit has ensured there has been regular interaction and exchange of information between the Welsh Government's Innovation team, Enterprise Europe Network Wales, the UK's National Contact Points and Knowledge Transfer Networks, and thematic support mechanisms such as the Life Sciences Hub and Innovation Point.

This approach has helped to identify the best route for supporting a particular business or facilitate a smooth handover when multiple interventions from different support mechanisms are appropriate – see the key objective, 'Maximise the impact of existing and emerging support' for more on this.

14 Advanced Sustainable Manufacturing Technologies (Astute 2020) website: <http://www.astutewales.com/en/>

15 The Beacon biorefining centre of excellence: <http://www.beaconwales.org/>

16 The European Commission's Seal of Excellence <https://ec.europa.eu/research/regions/index.cfm?pg=soe>

17 The Accelerated Growth Programme: <https://businesswales.gov.wales/growth/>



## Forward look

As already highlighted in this report, a significant number of research and innovation investments have been made. Most of these will directly support Welsh businesses or collaborations with business, in turn driving the behaviour needed in

those businesses to access and benefit from competitive funding such as Horizon 2020. Progress in this area will be monitored and further support mechanisms will be considered if appropriate.

## Supporting a business to excel

Newport-based SPTS Technologies can trace its origins in South Wales back to 1989.

Over the years the company has received support from the Welsh Government for research and development and property related activity and achieved Welsh Government Anchor Company status in 2013.

SPTS collaborate closely with a number of world leading research institutions which has resulted in a number of successful European and UK research and development projects. An example of which is the award winning Microneedles project<sup>18</sup> working with Swansea University's ERDF supported Centre for Nanohealth and Cardiff University.

Under the Horizon 2020 programme, SPTS has now secured over €130,000 to work on two projects aiming to break new ground in semiconductor technologies and pilot innovative new medical devices. In doing so they are working with European partners in Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Slovakia, Spain, Sweden, Switzerland and the UK.

Through the €87m PowerBase project, led by Infineon Tech. Austria AG, the company is working with partners across Europe to develop next generation compound semiconductor devices using enhanced substrates and gallium nitride for 'Smart Energy' applications'.

SPTS is also developing dry etch processes as part of the €48m InForMed project, led by Phillips Electronics Netherlands, by helping create innovative membranes that can

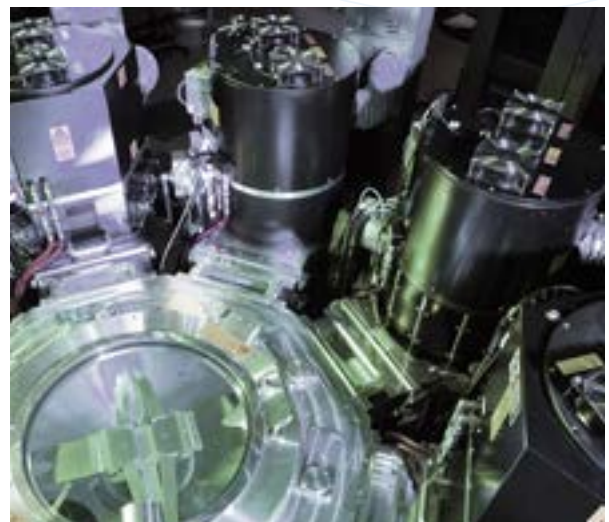
provide a better environment than silicon or glass for testing conditions like heart cell response to stimuli.

Paul Rich, Executive Vice President Technology and Operations, said:

"The funding we receive through Horizon 2020 enables us to extend our capabilities to adjacent markets and develop new applications which can benefit other industry sectors as well as identify potential new growth markets for us."

"Working collectively with key industrial and academic players in the manufacturing ecosystem also enables optimal use of European technologies and competencies."

Looking forward, the company is expected to be an important component in the emerging compound semi-conductor cluster in South East Wales, a key smart specialisation for Wales, having expressed its support for Cardiff University's £13m ERDF funded Institute for Compound Semiconductors (ICS).



<sup>18</sup> A collaborative project to develop silicon microneedle (MN) devices for specialised healthcare applications.  
<http://www.swansea.ac.uk/engineering/nanohealth/casestudies/sptstechnologies/>

# Key objective: Develop a Horizon 2020 culture and community in Wales

To deliver a step change in Welsh performance in competitive funds such as Horizon 2020, it is important we encourage and support a culture change through targeted events, training and communication activity. Welsh organisations need to understand the long-term strategic benefits of engaging with such funds despite the challenges they may face in doing so.

A community approach to pooling limited resources (e.g. for funding events and training), sharing knowledge and best practice, and working towards shared objectives will help increase the success of all Welsh organisations. It is also important to recognise that this community will extend, where appropriate, beyond Wales to include UK, European and international stakeholders/networks.

## Progress to date

The second Horizon 2020 Annual Event took place on 17 March 2016 in Cardiff, hosted by WEFO's Horizon 2020 Unit. The event highlighted many of Wales' early successes in Horizon 2020, while also providing a unique opportunity to explore strategies for success with an expert panel. There were also detailed workshops on advanced materials and manufacturing (jointly organised with Welsh Higher Education Brussels), the Eurostars Programme (jointly organised with the Enterprise Europe Network Wales), and cybersecurity (jointly organised with Innovation Point and the Cybersecurity Cluster in Wales).

In addition to raising general awareness at flagship events such as Digital 2016 and Colnnovate, the Horizon 2020 Unit worked in collaboration with stakeholders to identify cross-organisational European opportunities. This led to a number of successful targeted events and/or master-classes such as on ICT and Industry 4.0 (see page 26).

## FOR EXAMPLE

Bridgend based Econotherm Ltd has used its renowned expertise in heat pipe technology and networks in Wales, the UK and Europe to attract invitations to collaborate in three Horizon 2020 projects, attracting almost €1m. The Horizon 2020 Unit will work with Econotherm to develop a case study and communicate their experiences in order to help other Welsh organisations learn from their success.

Working closely with colleagues in the Welsh Government Brussels office, the Unit has also ensured that Welsh activity is showcased in Europe, for example at the "Innovation Driving Health and Economic Outcomes" event held in Brussels in December 2016.

A range of methods have been used to promote Horizon 2020 this year (see figure 14).



Figure 13 – World class researchers networking at the Sêr Cymru II: Celebrating and growing research in Wales event. Sêr Cymru II is an excellent example of synergy between EU funds with both ERDF and Horizon 2020 supporting an increase in researcher capacity in Wales.

## Forward look

The third Horizon 2020 Annual Event will take place on the 30 March 2017 and will focus on how maximising EU research and innovation funding opportunities will help Welsh organisations thrive now and well into the future. It will provide an opportunity for stakeholders to discuss the mid-term evaluation of Horizon 2020 and Wales' White Paper 'Securing Wales' Future: Transition from the European Union to a new relationship with Europe'. During the afternoon, specialist workshops will be dedicated to the hugely topical subject of smart energy systems (jointly organised with Cardiff University) and the range of support available to Welsh businesses looking to develop and maximise new technologies and innovations for commercial success (the 'stairway to excellence').

Looking further ahead, the Horizon 2020 Unit is working with partners to scope and develop a number of regional and thematic events in 2017, with workshops for businesses and master-classes likely to feature.

Case studies will continue to be developed and promoted and the Horizon 2020 Unit will work closely with the Welsh Contact Point Network (see page 24) to increase exposure of the communication resources already available.

We will also continue to promote the expertise of Wales in Brussels and beyond through events and other communication channels, for example, a planned event on digital innovation in Brussels.

## Promoting the opportunities in Horizon 2020

May 2016 marked the launch of the Horizon 2020 e-News. This regular 'opt-in' e-bulletin is a useful communication tool to highlight key information for the Horizon 2020 community in Wales, and covers Welsh successes, guidance and best practice, relevant events and links to other European and National funding. It was particularly beneficial following the EU referendum result where clear messages on Horizon 2020 being open for business and the UK Treasury providing a lifetime expenditure guarantee could be reinforced.

We have also been active in promoting Horizon 2020 in Wales through press

releases and social media communication channels including twitter (@WEFOWales and @WEFOCYmru).

Our Horizon 2020 tweets attracted some 73,000 views in 2016. Horizon 2020 pages on the EU funding section of the Welsh Government website continue to promote successful case studies and guidance for applicants. Digital footage of Horizon 2020 case studies are also available on the Welsh Government's YouTube channel and continue to be shared at numerous events and workshops for the Horizon 2020 community.



Figure 14 – An illustration of the range of communications activity undertaken in 2016.



# Key objective: Maximise the impact of existing and emerging support

There is a significant amount of skills, experience and expertise available at Welsh, UK and EU levels. It is equally recognised that this support structure will continue to evolve and emerging sources of support

must complement existing activities. It is a key aim of the Horizon 2020 Unit to engage and focus these resources for the benefit of Welsh organisations and ensure a consistent service (see Figure 15).



## Key

■ Welsh Contact Point Network

■ Horizon 2020 community

■ Research and innovation ecosystem

Figure 15 – Relationship between key Horizon 2020 actors from a Welsh perspective



## Progress to date

The Horizon 2020 Unit continued to work closely with stakeholders throughout 2016 including Welsh Government departments, the National Research Networks, Welsh higher education, Innovate UK and the Enterprise Europe Network to help co-ordinate and target support for Welsh organisations and to share knowledge and best practice. Close engagement with thematic/sectorial groups such as the Life Sciences Hub, the Welsh Higher Education Brussels thematic groups and Innovation Point also continued, as demonstrated by the examples in this report.

The Horizon 2020 Unit has also been an active member of the UK Government's Horizon 2020 Network; this was particularly useful following the EU referendum result to ensure that Welsh organisations' views were understood by UK stakeholders and that the latest information could be given to the Horizon 2020 community in Wales.

The Welsh Contact Point Network (see Figure 15) is central to the activity under this key objective. Through its continued communication the network has further strengthened its approach in sharing and acting upon intelligence it receives; ensuring that there is 'no wrong door' for Welsh organisations seeking support on Horizon 2020. This has included working with Welsh organisations that have achieved a 'Seal of Excellence'<sup>19</sup> to explore further avenues of support and alternative funding, for example in areas such as life sciences.

### FOR EXAMPLE

Neem Biotech, an SME based near Abertillery, Blaenau Gwent, has been involved in EU Framework programmes for a number of years, working with Welsh universities such as Aberystwyth and Swansea as well as over 30 overseas

partners including the Georg-August-Universität Göttingen (Germany), the Spanish National Research Council (CSIC) and the Royal Institute of Technology in Stockholm. They have now been awarded €0.12m from Horizon 2020 for the FUNGUSCHAIN collaborative project, which involves the valorisation of mushroom agrowastes to obtain high value products. The company is also looking for further success with support from SCoRE Cymru.

The Welsh Government's EU office in Brussels has organised events on ICT, marine energy and health innovation and facilitated high level meetings between the Welsh Government, and representatives from the Commission's Research Directorate and other research stakeholders. Also, working with our partners in Welsh Higher Education Brussels, the Welsh Government maintains and facilitates participation in networks – for example the Vanguard Initiative on Advanced Manufacturing, the European Regional and Local Health Authorities network, the European Innovation Partnership on Active and Healthy Ageing, the European Regions Research and Innovation Network (ERRIN), European Regions for Innovation in Agriculture, Food and Forestry as well as with the emerging smart specialisations platforms on energy and agri-food. Furthermore, the Government and its partners in Wales House, Brussels have strong relationships with a wide range of regions including Catalonia, Flanders, Wallonia, Quebec, the Basque Country, Skane (Sweden), Tampere, Saxony Anhalt, Baden-Württemberg and Lombardy.

The activity undertaken within this key objective has therefore helped address many of the messages in the EU Funding Ambassadors final report published in March 2016<sup>20</sup>

<sup>19</sup> The European Commission's Seal of Excellence <https://ec.europa.eu/research/regions/index.cfm?pg=soe>

<sup>20</sup> EU Funding Ambassadors final report published March 2016  
<http://gov.wales/docs/wefo/publications/160317-ambassadors-report.pdf>

## Forward look

There will be more emphasis on the exchange of information within the Welsh Contact Point Network and with the wider research and innovation ecosystem. This will be driven by a significant increase in data as many ERDF research and innovation schemes accelerate delivery during 2017.

There will be strong expectations that pipeline information on potential collaborations or bids for funding are shared at an early stage wherever appropriate and that this will facilitate targeted support from all relevant partners. The location of the Horizon 2020 Unit in WEFO will

help facilitate this but there will also be a requirement on partners in the Welsh Contact Point Network and the wider research and innovation ecosystem to play their part.

Targeted engagement with Brussels networks will continue, while opportunities to develop research and innovation links beyond Europe will also be considered; active links with Texas, California, Massachusetts and Quebec are already in place. SCoRE Cymru has already supported collaboration meetings in nations including China, Korea, Canada, the USA and Africa.

## Collaborating on the future of industry

Regular discussions within the Welsh Contact Point Network and the wider research and innovation ecosystem helps identify trends and future opportunities. Building on discussions with an industry partner (previously supported by EU funds under Objective 1) and the Welsh Higher Education Brussels advanced manufacturing group, the Horizon 2020 Unit identified an emerging interest in 'Industry 4.0' in the Horizon 2020 community in Wales.

Industry 4.0 involves the digitalisation of the manufacturing industry; products finding their way independently through the production process (intelligent factories, machines and products communicate with each other, cooperatively driving production).

It was agreed that the interest merited a targeted event with both an awareness raising session and a more detailed technical session. Working with its networks the Unit was able to source support from a range of speakers for the event including UK National Contact Points, higher education and the private sector.

Event highlights included the launch of a relevant Horizon 2020 project (DIGICOR<sup>21</sup>), information on upcoming Industry 4.0 Horizon 2020 calls, and an update on a new I4MS Digital Innovation Regional Hubs initiative in Wales<sup>22</sup>.

The afternoon workshop, hosted by a member of our expert and evaluator group, targeted existing and future Horizon 2020 applicants. The 'master-class' session detailed insights on writing a successful bid, focusing on the Industry 4.0 theme, as well as addressing the main issues that have proven to be a bottleneck to achieving higher success rates.

In addition to the formal sessions, the event provided an ideal opportunity for networking and for stakeholders to discuss the opportunities and risks that Industry 4.0 presented for Wales. It also allowed the Horizon 2020 Unit to raise awareness of the guidance material created by the expert and evaluator group (see page 28).

The event, held in November, was very well received by attendees and the Horizon 2020 Unit plans to host more of these targeted sessions throughout 2017, in collaboration with our growing partnerships across Wales.

21 DIGICOR will develop an online marketplace and technology to enable more advanced customisation of products and services by integrating innovations from smaller businesses into larger-scale production processes (<http://digicor-project.eu/>)

22 <http://www.dmiw.co.uk/> Digital Manufacturing Innovation Hub Wales (DMIW) – website

# Key objective: Support and develop our experts and evaluators

There are a number of Horizon 2020 experts/evaluators in Wales with valuable knowledge and experience. By supporting a 'community of practice' involving these experts/evaluators we can help ensure Wales maximises its influence on the delivery of Horizon 2020 and use their knowledge to support the

Horizon 2020 community in Wales. It is also important that we work with stakeholders to help them understand the benefits of supporting their experts/evaluators, as this has the potential to increase their numbers and therefore the benefits.

## Progress to date

The community of practice have met four times in 2016. Discussions have included:

### **Performance of Welsh organisations in Horizon 2020**

The group raised awareness of specific opportunities and identified ways of supporting an increase in the success of Welsh organisations.

### **Sharing knowledge and best practice**

The group discussed upcoming themes in Horizon 2020 as well as experiences of being an evaluator/offering advice to new evaluators in the group.

### **Communication – of the group and of Horizon 2020 in Wales**

The group are all actively involved in Horizon 2020 and were therefore able to use their knowledge to help develop a series of informative documents (featured below). The group itself is promoted through social media, the e-News and relevant meetings and events.



### **Implications of the EU referendum result**

The timely creation of the group allowed it to act as a forum and support network following the EU referendum in June 2016. The group shared experiences and information, providing clarity and support. The group reported that they were not experiencing any bias in the evaluation of proposals following the referendum result; this important information was shared with the Horizon 2020 community in Wales via e-News and relevant meetings/events.

Members of the community of practice have also been extremely helpful in developing and delivering 'master-class' sessions for potential Horizon 2020 applicants; this included sharing insights and general experiences of proposal development/evaluation at targeted thematic events throughout the year (see page 23).

The number of registered experts/evaluators from Wales continues to increase compared to FP7: 12 in 2012 (FP7); 47 in 2014; and over 60 in 2016.

Figure 16 – Wrexham-based Ecodek Ltd, a leading manufacturer of eco-friendly composite materials, has secured more than €1.5million of EU funds as part of three Horizon 2020 projects aiming to develop new products and markets from recycled building materials and waste from water treatment plants. The company recognises that participation in Horizon 2020 will enhance its network of alliances with strategic partners, including universities, cutting edge manufacturers and technical centres. The Horizon 2020 Unit hopes to draw on the expertise and experience of companies like Ecodek in the future to support other Welsh organisations to be successful.



## Forward look

The community of practice will continue to meet regularly during 2017.

Topics for discussion will include EU Transition, increasing the success of Welsh organisations in the Societal Challenges and the production of further guidance. It is also hoped that, with the support of the experts/

evaluators, further 'master-class' sessions on developing a successful proposal will be delivered in key topic areas across Wales.

The Horizon 2020 Unit will continue to encourage stakeholders to put forward individuals for the community of practice.

## Practical advice from Horizon 2020 experts and evaluators

In a clear example of partnership, the 'community of practice' worked closely with the Horizon 2020 Unit on the production of the following guidance documents which have been promoted at events and via social media, and are available on the WEFO website<sup>23</sup>.

### **The community of practice of Welsh experts and evaluators**

This document clarifies the purpose of the group, who should be involved as well as the benefits that can arise from the activities of the group.

### **Hints and tips for Welsh Horizon 2020 applicants**

The group compared experiences and collected ideas to create a succinct and clear 'top five tips' for potential Horizon 2020 applicants.

### **Benefits of being a Horizon 2020 expert/evaluator**

This document clarifies the role of an expert/evaluator, highlights the benefits of being one, as well as some practical tips on how to maximise chances of being selected to evaluate proposals.

<sup>23</sup> PDF links to the community of practice produced documents can be found at the Horizon 2020 in Wales page on the EU funding pages of the Welsh Government website: <http://gov.wales/funding/eu-funds/horizon2020/?lang=en>



# Annex A – ERDF research and innovation portfolio

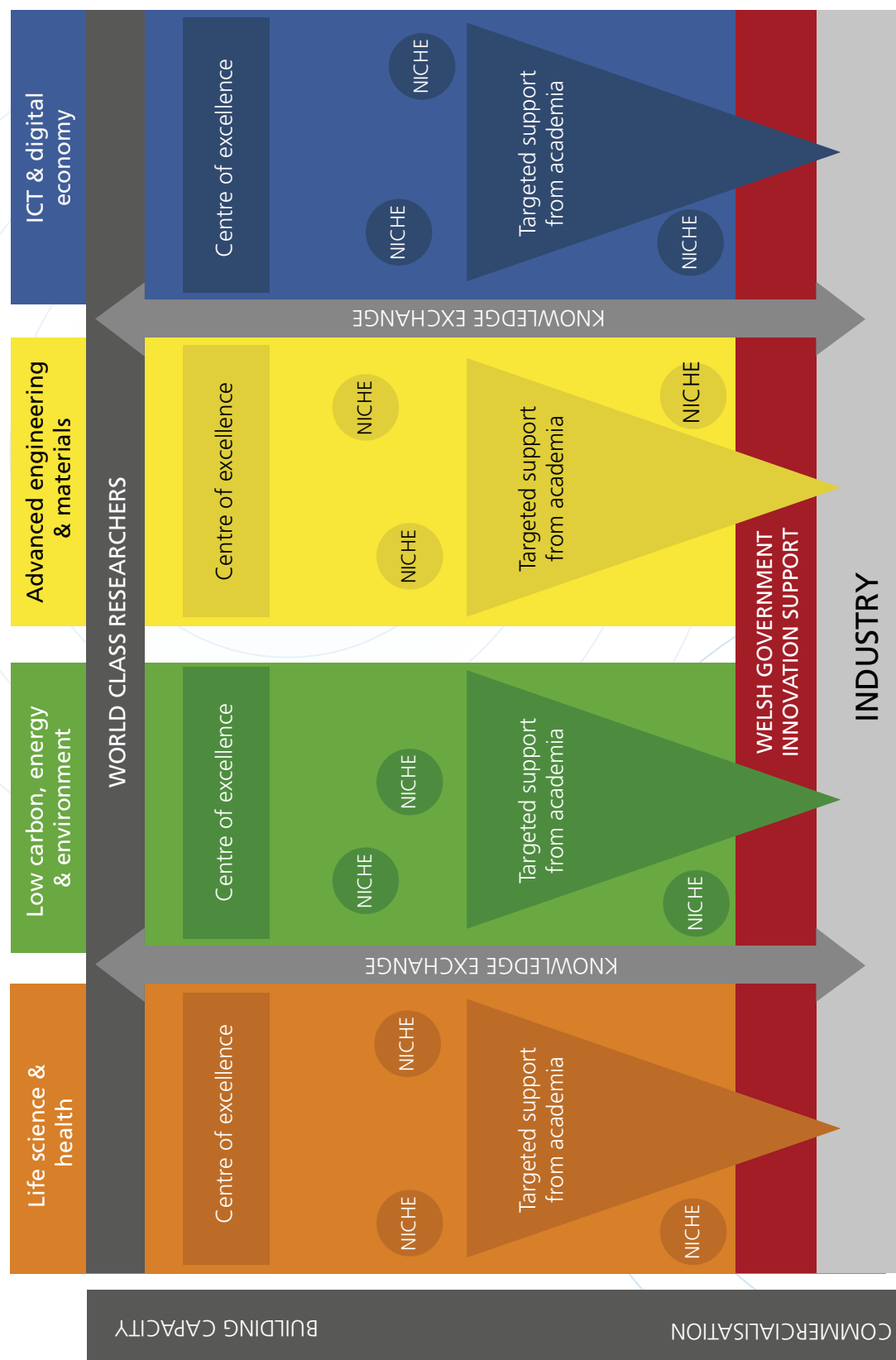


Figure 17 – Illustration of the structure of the ERDF research and innovation portfolio

# Annex A – ERDF research and innovation portfolio

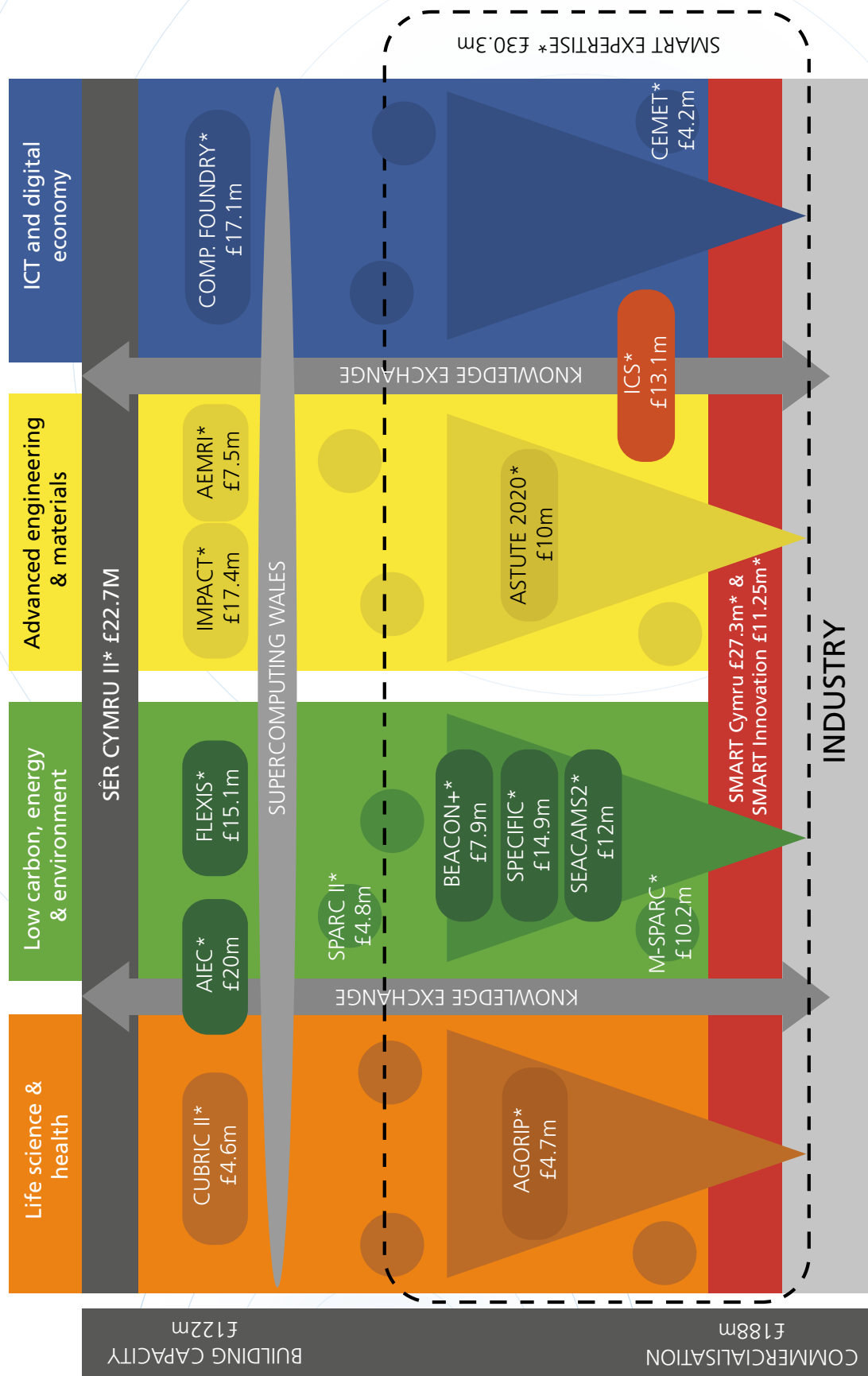


Figure 18 – Approved operations and proposed investments in an advanced stage of development (as at 31 December '16)