Sêr Cymru II
Mid-Term Evaluation

Mae'r ddogfen yma hefyd ar gael yn Gymraeg.

This document is also available in Welsh.

Sêr Cymru II. Mid-Term Evaluation

Authors: Nia Bryer and Heledd Bebb, Ymchwil OB3
Research and Neil Evans, Regeneris

For further information please contact:

Richard Self

Social Research and Information Division, Knowledge and Analytical Services

Welsh Government

Cathays Park

Cardiff

CF10 3NQ

Tel: 0300 025 6132

Email: richard.self1@gov.wales

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Glossary of acronyms

BEIS	The Department for Business, Enterprise and Industrial Strategy. A Department of the UK Government
CCTs	Cross-cutting Themes
ERDF	European Regional Development Fund
ESNR	The Economy, Skills and Natural Resources Group. A Department of the Welsh Government
EU	European Union
EW	East Wales
GDP	Gross Domestic Product
GVA	Gross Value Added
HE-BCIS	Higher Education Business and Community Interaction Survey
HEFCW	Higher Education Funding Council for Wales
HEI	Higher Education Institution
HESA	Higher Education Statistics Agency
ICT	Information, Communications and Technology
IP	Intellectual Property
KPI	Key Performance Indicators
KESS	Knowledge Economy Skills Scholarship
MSCA COFUND	The Marie Skłodowska-Curie Actions COFUND scheme, part of the EU Horizon 2020 programme
NPIF	National Productivity Investment Fund
NRN	National Research Network
PhD	A Doctorate of Philosophy
PCET	Post- Compulsory Education and Training
QR	Quality-Related
R&D	Research and Development
RIW	Research and Innovation Wales
RC	Research Council
REF	Research Excellence Framework
STEMM	Science, Technology, Engineering, Mathematics and Medicine
TERCfW	Tertiary Education and Research Commission for Wales
ToC	Theory of Change
UK	United Kingdom
UKRI	UK Research and Innovation
WEFO	Welsh European Funding Office
WWV	West Wales and the Valleys

1.   Summary of key findings

Design, rationale and need

1.1   A key finding of this mid-term evaluation is that there continues to be a very clear and supportive policy framework in place for the Sêr Cymru II programme. The evaluation found that recent Welsh policy developments and proposals offer an even greater level of direction to the funding of research and innovation in Wales and it is likely that future funding will become available in a much more strategic manner at both the UK and Wales level. The approach adopted by Sêr Cymru II is regarded as good practice and the programme's experience will be useful in helping to inform and shape future approaches to develop STEMM academic research capacity in Wales.

1.2   Stakeholders and funded fellows believed that there continues to be a strong need for Sêr Cymru II intervention and that the initiative continues to serve the aim of addressing the insufficient research capacity in Wales.

1.3   A further key finding of the evaluation is that the programme and its funded research projects are well aligned to those of the SMART Specialisation strategy. It is still difficult to conclude upon the programme's success in meeting the Wellbeing of Future Generations Act goals in light of the fact that the Welsh Government has only started to map the funded project's contributions to these areas. The evaluation found that there remains significant scope for the programme to make a strong contribution to the goals of the Act.

1.4   The mid-term evaluation identified two key external factors which stakeholders thought were important to the success of the programme. The first related to the loss of the Chief Scientific Adviser post-holder for a period of some six months which was considered to have had impacted upon momentum levels. The second related to EU transition and the implications that this would have upon future available funding.

1.5   The Sêr Cymru II programme was found to be acting synergistically with the COFUND project and concerns conveyed by stakeholders at the time of fieldwork about the possibility they could become less aligned in future due to COFUND funding coming to an end sooner, in August 2020, have been

alleviated due to the no cost extension secured by the Welsh Government to the COFUND project.

The baseline position

1.6　The baseline position for the Sêr Cymru II ERDF operations is that:

- Research income amongst Welsh HEIs stood at £190.4m in 2016/17, with the gap necessary to achieve 5 per cent of the UK share having widened (dropping from around 4 per of the UK total over the last four years to 3.2 per cent in 2016/17).

- Research income per researcher in Welsh HEIs stood at £32,800 in 2016/17, £10,300 short of that necessary to reach parity with the UK average. The size of this gap increased from 15 per cent to 24 per cent over the last year.

- STEMM research income across Welsh HEIs stood at £161m in 2016/17 or 3.1 per cent of the UK total. The gap necessary to achieve 5 per cent of the UK share was fairly stable prior to a recent increase (dropping from around 3.6 per cent of the UK total to 3.4 per cent in 2015/16 and 3.1 per cent in 2016/17).

- Welsh HEIs are lagging behind on measures relating to the number of researchers and research income across most STEMM subject groupings, with the gaps being more pronounced in those subjects which account for the larger absolute amounts of funding (such as medicine, dentistry and health). The exception is agriculture, forestry and veterinary science.

- Welsh HEIs continue to perform reasonably well compared to the rest of the UK on other measures of collaboration with the business community.

1.7　As the first Sêr Cymru II researchers were not in place until late 2016, it should be noted that it is still too early to see the impact of its operation in these indicators (e.g. research income).

Programme implementation

1.8　The key findings of the fieldwork in relation to programme implementation are:

- The Evaluation Panel and Programme Beneficiary Board are both considered to be operating effectively, with the Evaluation Panel having become even more effective since the inception evaluation phase.

- HEIs continue to promote Sêr Cymru II via their existing contacts and networks and funded fellows had mainly heard of the programme through their existing networks.

- Funded fellows had found the Sêr Cymru II application process to be largely acceptable and reasonable and the guidance and support offered by host universities was unanimously acknowledged and appreciated by fellows.

- The application peer review process and information supplied to the Evaluation Panel had improved by the fourth round of applications in light of the difficulties experienced during the third round.

- The approval process continues to take a considerable length of time even though this is in keeping with other academic grant funding application timescales. Nonetheless, a small number of successful applicants do not take up their funded opportunity as they secure other funding or work opportunities during this time.

- The majority of fellows thought that the operation was being managed well by the Welsh Government and their respective university.

- Despite having been informed of the requirements in advance of becoming involved, HEIs believe that they are required to allocate unreasonable resources to meet the programme's financial monitoring claim evidence requirements.

- Funded fellows are frustrated by the lengthy and complicated travel application process which they are required to adhere to although it is recognised that the Welsh Government is working with WEFO to streamline the process.

- The support landscape in place for individual early career researchers at their host institutions is appropriate. The practice at one university was regarded as exemplary and there would be scope to replicate this at other

universities should they appoint further research fellows as part of the programme.

- The induction and training packages offered by the programme, and by individual HEIs, was found to be appropriate and well received. The programme welcome events were considered to have been particularly useful for fellows. Some further specific training needs were identified by those who contributed to the evaluation (particularly around commercialisation, establishing spin-out companies and collaborating with industry).

Delivery and performance to date

1.9   A key finding of the mid-term evaluation is that the operation is making good progress towards meeting its aims and objectives and it should be commended for successfully recruiting and appointing 51 funded fellows (against a target of 56) across Wales' universities after four funding calls. At the time of drafting 11 awards had been made from round one, 20 awards from round two, 9 awards from round three and 10 awards from round four. One fellow from round one had left. 33 of the 51 awards have been for Research Fellowships, with three Recapturing Talent, nine Rising Stars and six Chair funding packages. Cardiff and Swansea Universities between them were awarded the vast majority of fellowships. The fellowships cover all four grand challenge areas, although the number relating to ICT and the digital economy (at 11 per cent) is lower than the other three grand challenge areas.

1.10   The evaluation found that funding is being awarded to research projects which are in keeping with the programme's overall aims and objectives although it may be the case that investing in a greater number of academic clusters strategically placed around Chairs could achieve a greater impact in the long term. There may also be merit in clarifying the status attached to the role of Sêr Cymru II funded fellows so as to equip researchers with the greatest possibility of securing further grant funding.

1.11   The Recapturing Talent strand to support researchers to return to work following a career break continues to pose a challenge for the programme, although it is encouraging that there has been an increase, albeit a modest one, in the

number of approved Recapturing Talent fellows awarded since our inception stage evaluation. We are aware that discussions are ongoing with WEFO to reduce the target set for recruiting Recapturing Talent fellows and we support this change.

1.12   A key finding of the mid-term evaluation is that the programme has made reasonable progress against its WEFO funded indicators, accepting that some outputs were not profiled to be achieved until after the mid-term stage of delivery. Performance across East Wales at the present time is behind that of West Wales and the Valleys but this is a reflection of the fact that there are a higher number of awards from the earlier rounds of funding in West Wales than East Wales.

1.13   The evaluation found that it is still early days to be able to come to a firm view on the operation's success in moving towards delivering against Specific Objective 1.1 of the Programme (to increase the success of Welsh research institutions in attracting competitive and private research funding) not least as many funded fellows have only been in post for a short period of time. However, initial feedback and evidence suggests that some of the more established funded fellows are already applying for, and successfully securing, other research funding. It is also important to consider that the Sêr Cymru I programme, funded until March 2019, is also expected to contribute towards the common objective of increasing Wales' STEMM research capacity and help achieve the 5 per cent share of UK research income.

1.14   The impact of the Sêr Cymru II programme will only be experienced in the long, rather than short term period, and that the impact can be expected to continue post programme funding. However, the ongoing changing funding landscape, including the anticipated loss of European structural funding for research and innovation activities coupled with the establishment of UKRI which has bearing upon the remit of Research Councils, may disproportionally impact upon Wales' capacity to secure research income in the future.

1.15   The timescales for Sêr Cymru II outcomes being realised depends upon the timing of fellows taking up their research position. The evaluation concludes that it would be realistic to expect some research related outcomes to be captured within programme monitoring data around twelve to eighteen months into the

role of a funded fellow but that these are likely to take longer to appear within commercial datasets. Other outcomes, notably grant income secured and collaboration with industry, are likely to take longer to be achieved by funded fellows. The evaluation suggests that a realistic timescale for assessing grant income secured via programme monitoring data would be two years from a fellow commencing in post and three years for this data to appear within commercial datasets.

Progress made by funded fellows

1.16   A key finding of this mid-term evaluation is that whilst the survey data found that funded researchers are collaborating with enterprises or third sector organisations, feedback gleaned from interviews with funded researchers revealed that the level of engagement was not particularly meaningful. These interviews also revealed that the opportunities for collaborating are fairly limited due to the experimental and early-stage nature of the research work. The evaluation concludes that the programme does however have an important role to identify and facilitate collaborative opportunities between industry and funded fellows, particularly via the Welsh Government's SMART suite of interventions, and that it should prioritise this work in the future when staffing resources allows for it.

1.17   The evidence gathered during the mid-term stage shows that fellows are collaborating effectively and linking well with related interventions in other universities. Feedback suggests that academic researchers do so by default, utilising their existing international network of contacts, without the need for the Sêr Cymru II programme to actively support them to achieve this.

1.18   The mid-term evaluation sets out in detail the achievements of funded fellows surveyed in terms of levels of grant funding applied for and secured, the number and range of public engagement activities and the number of funded fellows who have already submitted and published papers. In terms of the value of grant funding applied for and secured, data provided by eight surveyed fellows shows that they had been involved with applications for £10.76 million funding and had secured £4.83 million to date. This points to a success rate of at least 45 per cent - given that the outcome of some applications made were not known at the time the final success rate could be higher.

Cross-cutting themes and the Welsh language

1.19   The evaluation found that the programme is making a good contribution to the cross-cutting theme of equal opportunities, particularly in terms of gender and diversity, and that funded projects have significant scope to contribute to sustainable development, given that the primary focus of several research projects is in this area of study. There is less evidence available at this stage to demonstrate how the programme can expect to positively impact the tackling poverty cross-cutting theme.

1.20   This mid-term evaluation reinforced previous findings from the inception phase evaluation that the extent to which the Sêr Cymru II operations can be expected to positively contribute to the Welsh language is limited. Two funded fellows are Welsh speakers and both use the Welsh language in engagement, outreach and teaching work. Since completing the evaluation fieldwork, one funded fellow has successfully published a bilingual research paper. The evaluation concludes that whilst the programme has made every effort to promote Welsh language learning opportunities amongst funded fellows, the take up of such opportunities has been limited to date, not least due to some funded fellows wishing to improve their English language skills in the first instance.

Recommendations

1.21   The mid-term evaluation offers ten recommendations for the remaining delivery period. It recommends that:

1) The programme should focus on increasing its outputs across the East Wales funded programme, given that its rate of achievement in this region is currently behind that of West Wales and the Valleys.

2) Participating HEIs consider what support and action can be taken to ensure that as many as possible of the existing funded fellows can be retained at Wales' HEIs after the Sêr Cymru II programme comes to an end. Aligned to this, the final impact evaluation could examine this issue further and explore options for strengthening the long-term sustainability of funded researchers.

3) The programme considers how it could engage with a broader number of universities in Wales and what flexibility it could adopt to accommodate the

inclusion of non-participating Welsh universities within Sêr Cymru II without compromising upon the objective of funding excellent research projects.

4) The programme explores how it could better fulfil the Welsh Government's regional priorities in the future, as set out in its Economic Action Plan.

5) The Welsh Government considers whether the role of the Evaluation Panel and Programme Beneficiary Board should include the monitoring of outcomes and achievements of the funding investments made.

6) The programme moves towards a sample based claims model as soon as the Welsh Government is satisfied with the full financial evidence claims currently being submitted by HEIs.

7) The programme strengthens its collaboration with the Welsh Government's SMART suite of interventions when staffing resources allows for it, identifying a small number of funded projects which offer the greatest scope for collaborative work and placement opportunities with industry and broker relationships between these academics and industry. The programme should also explore how it can address any barriers faced by funded fellows which currently restrict them from engaging with industry.

8) The Welsh Government actively addresses any future staffing gaps that may arise within the delivery team by securing personnel with previous HE sector experience.

9) A final impact evaluation be conducted over the last six months delivery of the extended Sêr Cymru II project and that a brief counterfactual impact evaluation update be commissioned some 12 to 18 months post project closure to allow for published data to be considered.

10) The Welsh Government puts appropriate data sharing agreements in place to allow for the impact evaluation to consider feedback from successful and unsuccessful applicants as well as collaborating businesses/third sector organisations.

2.   Introduction

2.1   OB3 and Regeneris were appointed by the Welsh Government to undertake an evaluation of the European Regional Development Fund (ERDF) components of the Sêr Cymru II programme.

About Sêr Cymru II

2.2   The Sêr Cymru initiative was initially launched in 2012 by the Welsh Government to address the STEMM capacity deficit in Wales and build a stronger science base in Wales. It aimed to develop research excellence in the grand challenge areas of life sciences and health, advanced engineering and materials and low carbon, energy and environment which form the cornerstone of Wales' Smart Specialisation strategy[1]. A stimulus paper by the Leadership Foundation for Higher Education found that there was a deficit of 600 researchers in Wales involved in STEMM-related disciplines with the largest subject deficits being in clinical medicine, biosciences, physics, electrical and computer engineering, mechanical engineering and maths[2].

2.3   Sêr Cymru II builds upon a predecessor operation, Sêr Cymru (which we subsequently refer to as Sêr Cymru I), which operates via three National Research Networks (NRNs) covering Life Sciences and Health NRN, the Advanced Engineering and Materials NRN and the Low Carbon, Energy and Environment NRN.

2.4   Sêr Cymru II aims to further strengthen Wales' research performance by targeting investment, attracting world-class research talent and, in the case of non-ERDF-funded elements, supporting infrastructure. While building on the work of Sêr Cymru I which focused on recruitment of research Chairs, Sêr Cymru II is different in that it aims to attract research-excellent scientists in the early or middle stages of their career, and those currently on a career break into research posts in Wales.

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[1] Smart Specialisation Strategies are a key part of the European Commission's approach to Cohesion Policy for 2014-2020. They are national or regional innovation strategies that are integrated, place-based economic transformation agendas. Source: European Commission. Smart Specialisation factsheet. March 2014.
[2] The Case for Growing STEMM Research Capacity in Wales. Stimulus Paper. Page 2. Halligan, W and Bright L. Leadership Foundation for Higher Education. London. May 2015

2.5   In November 2015, the Welsh European Funding Office (WEFO) approved two Sêr Cymru II operations under Priority Axis 1, Specific Objective 1.1 of the West Wales and Valleys (WWV) and East Wales (EW) ERDF Operational Programmes[3]. The funding packages approved by WEFO for Sêr Cymru II are set out in Table 2.1.

Table 2.1: Funding Packages Approved for Sêr Cymru II

Funding by region	WWV	EW
ERDF Approved	£14.7m	£8m
Total Project Cost	£20.6m	£18.5m

Source: WEFO Approved Projects List (Updated April 2017)

2.6   The Higher Education Funding Council for Wales (HEFCW) has invested £3.8m in Sêr Cymru II while Health and Care Research Wales have invested £0.4m. The Welsh Government Economy, Skills and Natural Resources Group (ESNR) has committed £3.5m to the programme.

2.7   For each ERDF funded fellowship award, the participating university is expected to make a financial contribution to the overall cost. Table 2.2 outlines the financial contribution rates for universities in WWV and EW.

Table 2.2: Financial intervention rates for Sêr Cymru II

Financial contribution rates by funded region	Sêr Cymru II contribution[4]	University contributions
Sêr Cymru II Fellows, Recapturing Talent and Rising Stars	83 per cent (WWV)	17 per cent (WWV)
	66 per cent (EW)	34 per cent (EW)

Source: ERDF Business Plans

2.8   Table 2.3 provides an overview of the different types of fellowship opportunities available via Sêr Cymru II.

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[3] Welsh Government (2014), 'Priority Axis 1: Research and Innovation. Specific Objective 1.1: Increase competitive and private research funding', *2014-2020 ERDF West Wales and the Valleys Operational Programme and East Wales Operational Programme*.
[4] Consisting of Welsh Government, ERDF, HEFCW and HCRW funding.

Table 2.3: Overview of Sêr Cymru II Fellowship Categories

Fellowship Category	Description
Rising Star	These are prestigious and competitive positions, designed to attract the very best 'rising stars' of academic research. Approximately **10** five-year Rising Star fellowship packages are to be delivered (5 in WWV and 5 in EW), each funded at £200k per annum. The original intention was to deliver 26 packages.
Research	Research fellowships are aimed at stellar candidates; 3-5 years post PhD, from anywhere in the world to come to work in Wales. The fellowships are three years in duration with up to **30** researchers being supported via this route (15 in WWV and 15 in EW).
Recapturing Talent	This strand of Sêr Cymru II aims to provide support for stellar researchers returning to work following a career break. Up to **12** fellows (6 in in WWV and 6 in EW) will be awarded through this strand of the programme.

Fellowship Category	Description
Chair	These awards were initially suggested as part of the operation in order to provide opportunities to attract the best senior academic researchers into Wales. Following initial consultation work with universities as part of the design phase of Sêr Cymru II, this category was excluded from the operation, but was subsequently re-introduced as a result of unexpected demand for a small number of Chair positions through the applications process. At the time of drafting, six Research Chair packages have been supported under the programme, with agreement from WEFO (4 in WWV and 2 in EW).

Source: Sêr Cymru II ERDF Business Plans

2.9   In addition to the ERDF funded element, the Sêr Cymru II programme also contains a Marie Skłodowska-Curie COFUND funded operation, part of the

Horizon 2020 programme, which was initially intended to run from September 2015 to August 2020 but following a no cost project extension will now operate until February 2021. This £17m fellowship scheme awarded by the European Commission to the Welsh Government provides support for up to 90 fellows in a pan Wales operation that runs alongside the ERDF operations. COFUND applicants are expected to be 3-5 years post-PhD. They can be of any nationality but must not have been resident in the UK for more than 12 months in the last three years. The COFUND element is being delivered in parallel with the ERDF operations but is not being evaluated as part of this study.

2.10   Figure 2.1 provides an overview of the various components of the Sêr Cymru programme. Darker boxes indicate the elements which are ERDF funded and therefore the subject of the evaluation.

Figure 2.1: Overview of the Sêr Cymru programme
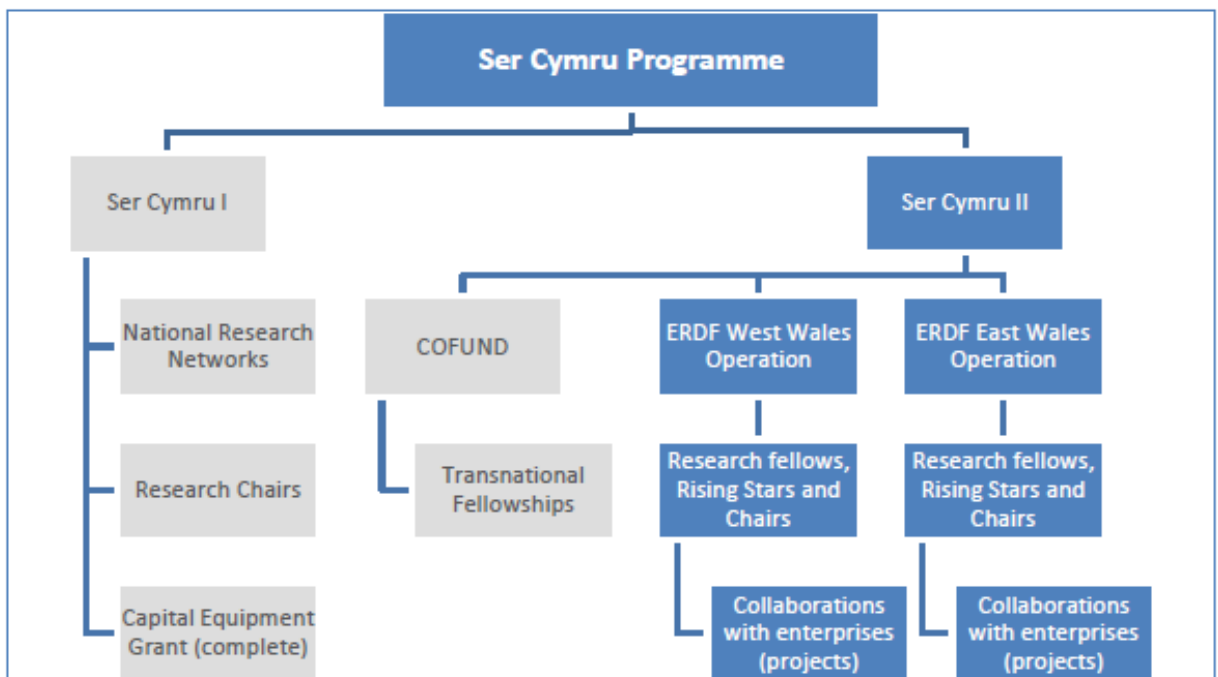
Source: Welsh Government

Evaluation aim and objectives

2.11 The evaluation specification set out that Sêr Cymru II will be evaluated in three stages:

- An inception stage.

- A mid-term stage.

- A final impact stage.

2.12 The work being undertaken by OB3 and Regeneris relates to stages one and two. It is the Welsh Government's intention to commission the summative, final stage impact evaluation in due course.

2.13 The overall aim of the evaluation as set out in the research specification is to:

'Understand with clarity and detail the way that Sêr Cymru II is implemented, its interdependencies and its impacts, particularly, its effectiveness in causing the outcomes and impacts for which the operations were designed, to be realised'.

2.14 The inception evaluation, conducted between January and July 2017, was published in November 2017. It considered the way Sêr Cymru II has been implemented, its interdependencies and impacts and was based on scoping interviews with key stakeholders, detailed analysis of relevant literature, development of a set of theory of change models, preparation of a detailed baseline position and a review of programme monitoring arrangements.

2.15 Six specific objectives were set for this mid-term evaluation stage, namely to:

- Report on the progress made towards achieving the objectives of the operations.

- Provide an indication of progress made to date towards the operations' targets, including progress made against the counterfactual position set out at the inception stage.

- Assess and report on whether there is a continuing need for the operations taking into account their overall aims and wider policy and funding landscape.

- Review the appropriateness of processes, intervention logic, indicators and resources associated with the operations.

- Recommend improvements to the management and implementation of the

operations to improve their efficiency and effectiveness.

- Review and recommend any improvements to the monitoring system.

2.16   In addition, a series of 20 research questions were set for the mid-term evaluation. These were:

- How is the operation progressing against its indicators, aims and objectives?

- How successfully is the operation moving towards delivering against specific objective 1.1 of the Programme i.e. to increase the success of Welsh research institutions in attracting competitive and private research funding?

- How successfully is the operation contributing to the Smart Specialisation strategy, the Cross-Cutting Themes indicators associated with these activities, the promotion of the Welsh Language and the Wellbeing of Future Generations Act goals?

- Has the proportion of researchers and support staff who are Welsh speakers changed and has the extent of Welsh language use by research teams in their work, particularly in publication, teaching and engagement, changed since the inception stage?

- What opportunities are available to beneficiaries of the operations for Welsh language learning? What is the uptake of Welsh Language learning opportunities?

- How effective are the management and operational processes and how can these be improved?

- What risks and barriers have been identified since the start of the operation and how can these be managed?

- To what extent is the operation acting synergistically with the COFUND project and are there ways in which this can be improved?

- What key factors external to the programme are important to its success?

- To what extent are funded researchers collaborating with enterprises and how can this be improved to meet or exceed the WEFO target?

- How effectively are the fellows collaborating and linking into related interventions in other universities and how can this be improved?

- Are the training packages provided appropriate for the operation?
- What level of grant funding have the Research Fellows, Rising Stars and Research Chairs applied for? What are the success rates and the total amounts of funding achieved for each group? What is the range of funding organisation types and purposes they are applying to? What is the impact of this increase in research funding? How can these types of opportunities be maximised in order to build research capacity further?
- How many papers have been submitted and published and are there any early citation figures available?
- What range of and how many public engagement activities have taken place?
- In how many cases has a Pathway to Impact[5] been articulated, and to what extent have the identified impacts been achieved to date?
- How effective is the re-capturing talent strand in supporting researchers to return to work following a career break?
- Is the operation attracting the target number of female applicants and if not, why not and what can be done to improve this?
- Have any researchers left their posts early? Why, and what has been the impact on the operation?
- What is a realistic timescale for the operation's outcomes to be achieved and any subsequent economic impact?

Structure of this report:

2.17 This report is presented in twelve chapters as follows:

- Chapter one: this introduction to the report and to the Sêr Cymru II programme.
- Chapter two: an outline of the evaluation methodology adopted for the mid-term evaluation and the profile of those who contributed to the fieldwork.

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[5] See UK Research and Innovation website guidance for further detail on Pathway to Impact [Accessed 2 October 2018].

- Chapter three: considers recent policy and strategic developments which have taken place in Wales and at the UK level since the inception evaluation was prepared.

- Chapter four: offers an updated baseline position on STEMM academic research in Wales.

- Chapter five: discusses the ongoing rationale, objectives and priorities of the Sêr Cymru II programme.

- Chapter six: considers the programme's delivery and performance to date in light of influencing externalities.

- Chapter seven: considers the implementation model adopted including the programme's management and monitoring arrangements.

- Chapter eight: considers funded fellows' experience of getting involved with Sêr Cymru II including the application and award processes.

- Chapter nine: considers the induction, support and training made available to funded fellows.

- Chapter ten: considers the outcomes achieved by funded fellows, including any interdisciplinary and collaborative opportunities secured.

- Chapter eleven: discusses the programme's cross cutting themes and Welsh-medium research landscape.

- Chapter twelve: offers our conclusions and a set of recommendations.

3. Mid-term evaluation methodology

3.1 The methodology for this mid-term stage evaluation involved the following five stages:

Stage 1: Mid-Term Evaluation Commencement

3.2 The study commencement stage involved meeting with Welsh Government officials in November 2017 to confirm the approach to the evaluation via a detailed Mid-Term Evaluation Plan.

Stage 2: Desk Based Review of Performance and Impact

3.3 The desk-based review involved:

- Updating the policy context to consider recent and upcoming Welsh policies and relevant UK policies.

- Reviewing programme monitoring data, including progress made against financial and output targets and performance to date, to identify successes and any areas of concern.

- Updating the baseline position for the programme as set out in the Inception Evaluation Report, drawing upon additional data available including Higher Education Statistics Agency (HESA) data for 2016/17.

Stage 3: Research Instruments and Sampling

3.4 This involved:

- Updating the semi-structured discussion guide for use with stakeholders. During the mid-term stage the focus of these discussion guides were upon the 20 research questions set out at Chapter 1 as well as four other areas agreed with Welsh Government officials at the commencement stage:
  - The support landscape which is in place for individual early career researchers at their host institutions.
  - The extent of opportunities for interdisciplinary research and how these can be encouraged across the portfolio of approved fellowships and research projects.
  - How third sector organisations can be encouraged to participate in Sêr Cymru II funded research activity.

- o Evidence that the assumptions set out within the policy logic model developed for the inception evaluation are credible and that the anticipated benefits are emerging.

- Preparing a web-based survey questionnaire to distribute to all funded research fellows.

- Preparing a package of semi-structured topic guides for use in conducting qualitative fieldwork with a sample of funded fellows, their academic supervisors and collaborating industry representatives.

- Identifying a sample of 11 funded research fellows for qualitative fieldwork. It was agreed that this sample would be drawn from those survey respondents who agreed to participate further in the evaluation. It was further envisaged that the sample selected would prioritise those who had been in post the longest as well as offering a cross-section in terms of different research fellowship types, research subject areas, region and participating HEIs. However, the final sample of research fellows included within the evaluation was limited by the low response rate to the web-based survey and the research team was required to seek the assistance of three HEIs to boost the sample of funded fellows from within their respective institutions.

Stage 4: Mid-Term Evaluation Fieldwork

3.5 Stage 4 involved:

- Conducting telephone, Skype and face to face interviews with stakeholders. All 32 stakeholders who contributed to the inception evaluation fieldwork were approached for a follow up interview. In all, 14 of these did not contribute due to several factors including having had no further involvement with Sêr Cymru II (five), no response to the invitation email (six) possibly due to the HE sector strikes which were taking place at the time, having moved on from the organisation (two) and due to a colleague of theirs having contributed (one). A total of 25 stakeholders contributed to the mid-term consultations, with 18 of these being re-interviewees and seven new stakeholders. A full list of organisations who contributed to the evaluation is provided in Annex 4. Stakeholder views were sought in relation to:

- The continued need for the operation in the context of the wider policy and funding landscape.
- The appropriateness of processes, intervention logic, indicators and resources associated with the operation.
- The progress made by the operation.
- Any improvements on the management and implementation of the operation to improve efficiency and effectiveness.

- Deploying a fully bilingual census web survey using SNAP software and targeted at funded fellows (across each of the different types) to gather views on:

  - The operation's promotion and application process.
  - The operation's implementation and reporting requirements.
  - Induction, training and support provided.
  - Collaborations with industry and academia.
  - Early outcomes and anticipated impact of their research.

The survey was distributed in April to a total of 33 funded fellows[6] and closed early June 2018 following two further reminder messages. Responses were received from 15 respondents, representing a response rate of 45 per cent.

- Conducting a package of fieldwork with 11 funded fellows and five of their academic supervisors. These interviews focused on similar lines of questioning set out above for the web survey. Seven of the fellows who contributed to the fieldwork were selected on the basis of agreeing to contribute further in their survey responses whilst the remaining four were identified following a request made to three HEIs.

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[6] Whose email contact details were known to be correct and functioning.

Stage 5: Project Management and Reporting

3.6 Stage 5 involved communicating progress with Welsh Government officials throughout the mid-term evaluation stage work programme (via e-mail and telephone). Stage 5 also included the preparation of this Mid-Term Evaluation report.

Methodological considerations

3.7 It was not possible to undertake fieldwork with unsuccessful Sêr Cymru II applicants during the mid-term phase as no data sharing consent had been secured to share applicants contact data with the research team. It was envisaged that these unsuccessful applicants would be surveyed via a brief web-survey and a sample of six would be approached for an in-depth interview. As a result, this evaluation has not been able to offer evidence to inform the counterfactual position as to what would have happened in the absence of programme funding.

3.8 It was anticipated that the package of fieldwork with funded fellows would all involve interviews with an academic supervisor and a representative from industry. However, only five academic supervisors were available to contribute to this evaluation, mostly due to their overseas research commitments at the time of the fieldwork. None of the funded fellows were currently collaborating with any private or third sector organisations to the extent that it would be possible to gather their views about the funded research projects as part of the evaluation.

Profile of contributors

3.9 Of the 15 funded fellow survey respondents:

- Seven were funded Research fellows, two were Recapturing Talent fellows, three were Rising Stars and two were Chairs.

- Seven were based at Cardiff University, four at Swansea University, three at Aberystwyth University and one at Bangor University.

- Four were funded as part of Sêr Cymru II's first round of applications, five via the second round and six via the third round.

- Ten were male and five were female.

- One completed the web survey in Welsh and 14 did so in English.

3.10 Of the 11 funded fellow interviewees:

- Six were funded Research fellows, two were Recapturing Talent fellows, one was a Rising Star and two were Chairs.

- Five were based at Cardiff University, four at Swansea University and two at Aberystwyth University.

- Eight were male and three were female.

4.   Policy context

4.1   This chapter considers recent Welsh and UK policy developments since the inception evaluation report was prepared.

4.2   The inception evaluation report considered some key Welsh Government policies including its Programmes for Government for 2011-2016[7] and 2016-2021[8], its Science for Wales strategy[9] and its Innovation Wales strategy[10]. The inception evaluation also considered the Diamond Review of higher education in Wales and the Welsh Government's response to its recommendations[11] as well as the Hazelkorn Review[12] and the Welsh Governments response to its recommendations via the 'Public Good and a Prosperous Wales' White Paper[13] consultation document. The report further examined the Reid Review[14] of research and innovation in Wales and the Well-being of Future Generations (Wales) Act[15].

4.3   The review found that there was and continued to be a very clear, detailed and supportive devolved policy framework in place for the development and implementation of both Sêr Cymru I and Sêr Cymru II. The review also found that the objectives of Sêr Cymru II were well-aligned with Welsh Government policy although there was scope for the programme to demonstrate how it could better reflect the objectives of the Well-being of Future Generations (Wales) Act.

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[7] Welsh Government (2011), *Programme for Government*, Cardiff
[8] Welsh Government (2016) *Taking Wales Forward*. Welsh Government. Cardiff
[9] Welsh Government (2012), *Science for Wales. A strategic agenda for science and innovation in Wales*, Cardiff.
[10] Welsh Government (2014) *Innovation Wales*, Cardiff.
[11] Welsh Government (2016) Welsh Government response to the recommendations from the Review of Student Support and Higher Education Funding in Wales 'The Diamond Review', Cardiff.
[12] Hazelkorn, E. (2016) Towards 2030. A framework for building a world-class post-compulsory education system for Wales, Cardiff
[13] Welsh Government (2017) Consultation Document. Public Good and a Prosperous Wales – Building a reformed PCET system, Cardiff.
[14] The Reid Review – summary of documents and weblinks
[15] Welsh Government (2015) *Well-being of Future Generations (Wales) Act 2015. The Essentials*. Welsh Government. Cardiff. 2nd Edition, May 2015

4.4 At the UK policy level, the inception evaluation report considered the Roberts Review[16], the Concordat developed by the Research Councils UK[17], the UK Government's White Paper on Higher Education and HE Bill which received Royal assent in April 2017, the Industrial Strategy[18] and details of the National Productivity Investment Fund (NPIF) in the 2016 Autumn Statement[19].

4.5 The inception evaluation report concluded that UK Government policies were, as would be expected, of less direct relevance to Wales given that they focus on policy choices that only apply in England. However, the report suggested that some of the UK Government's recent policy responses (such as the NPIF) could impact upon the programme's performance and its achievement of key outcomes and these were reflected in the theory of change based logic models offered within the report.

Welsh Policy

Prosperity for All – the new Economic Action Plan published December 2017

4.6 The new Economic Action Plan[20] published in December 2017 sets out the Welsh Government's detailed proposals for achieving its economic ambitions stemming from Prosperity for All. Within its objective of equipping 'everyone with the right skills for a changing world' the plan recognises that 'research, innovation and the development of the right skills' forms a cornerstone of the Welsh Government's ambition to create a 'prosperous and fair society'[21]. In the context of Sêr Cymru II and future research funding the plan goes on to state that the Welsh Government will:

'seek to maximise the funds available for research an innovation activity from sources across the UK and beyond. We will work with the Tertiary Education and Research Commission for Wales (TERCfW), the NHS and businesses to increase the number and quality of bids to Welsh, UK, European and International bodies and foundations. We will also take steps to prepare further

[16] Roberts, G. (1998). *Research Careers Initiative Report*. London.
[17] Research Councils UK (2008) *Concordat to Support the Career Development of Researchers* [Accessed April 2017].
[18] HM Government (2017) *Green Paper. Building our Industrial Strategy*, London
[19] Autumn Statement 2016
[20] Welsh Government (December 2017) Prosperity for All: economic action plan [Accessed July 2018]
[21] Ibid p.33

education colleagues, universities and work-based learning providers for the opportunities of new sources of research and innovation funding after the UK leaves the European Union'.[22]

4.7   The plan also sets out the Welsh Government's intentions to move away from its existing policy of supporting economic sectoral growth to one which will prioritise 'a regionally-focused model of economic development'[23]. This change could have a bearing upon the Sêr Cymru II programme in the future as it is likely that a greater impetus will be given to establish a more regionally dispersed team of funded fellows.

The Reid review

4.8   In 2018 Professor Graeme Reid's review of government funded research and innovation in Wales[24] was published. The review reinforced the underlying need for interventions such as Sêr Cymru II as it found that whilst the research and innovation ecosystem in Wales was strong it lacked the 'scale needed to deliver its full potential to the people of Wales'[25]. The report argues that in order to secure its fair share of future competitive-awarded funding such as would be available via the UK Research and Innovation (UKRI), then it is essential that 'Wales has at least parity in the levels of un-hypothecated research[26] and innovation funding compared to the rest of the UK'[27].

4.9   The report offers three strategic recommendations, which if adopted by the Welsh Government, could bring about significant implications for the Sêr Cymru II programme in terms of supporting it to realise its ambitions and outcomes. The three recommendations, for the Welsh Government, are to:

- Increase the visibility and influence of Welsh research by creating a new Welsh Research and Innovation London Office which (alongside the Sêr Cymru initiative) would have a role to attract talent and investment into the Welsh research and innovation community from the UK and internationally.

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[22] Ibid p.34
[23] Ibid p. 4
[24] Welsh Government (2018) 'Review of Government Funded Research and Innovation in Wales'
[25] Ibid p.3
[26] i.e. funding which is not designated for specific areas of research
[27] Ibid p.3

- Strengthen the Welsh research base and enable Welsh researchers to attract a greater share of UK-wide funding by implementing Diamond's recommendation for Quality-Related (QR) funding and creating and additional Future of Wales Fund specifically to incentivise Welsh researchers to win funding from outside Wales.

- Increase the visibility, coherence and impact of research and innovation in Wales by creating a single overarching brand for its innovation activities via the St David's Investment Fund.

4.10   There are several references to the Sêr Cymru initiative (although it does not distinguish between Sêr Cymru I and II) across the Reid Review as a 'very successful' intervention which has the means of building research capacity and there is a strong call to build on its successes in a holistic manner in the future.

Public Good and a Prosperous Wales – the next steps

4.11   Since the preparation of the inception evaluation report, the Welsh Government published further, more detailed proposals[28] for the reform of the post-compulsory education and training system in Wales and for the way in which Welsh Government research and innovation expenditure should be overseen and co-ordinated. The technical consultation document set out detailed plans for the establishment of a Tertiary Education and Research Commission for Wales which would take responsibility for higher and further education, work-based learning, adult learning and research. This new body would be a Welsh Government sponsored body operating at arm's length from the government but within a strategic planning and funding framework established by Welsh Ministers. It will replace the current Higher Education Funding Council for Wales (HEFCW) and become the sole funder and regulator for the sector.

4.12   The consultation document proposes that the new body would adopt responsibility for all Welsh Government research and innovation funding and that this responsibility would fall under the remit of a new committee, Research and Innovation Wales (RIW) so as to strengthen the strategic approach to meeting Wales' major economic, industrial, social, wellbeing and environmental

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[28] Welsh Government (April 2018) 'Public Good and a Prosperous Wales – the next steps Consultation Document

challenges. This proposal, if adopted, would have significant implications for Sêr Cymru as it represents a major change in the way research and innovation would be funded in Wales.

The Weingarten Review

4.13   In April 2018, Professor Weingarten's review of systems for monitoring and improving the effectiveness of post-compulsory education in Wales [29] for the Welsh Government was published. The review, which should be considered within the wider context of post-compulsory education and training reform in Wales, concluded that existing processes for monitoring and evaluating Post-Compulsory Education and Training (PCET) systems in Wales were not dissimilar to those of other counties. However, the review took the view that the 'most critical and serious deficiency' within the current system was that it did not provide Welsh Government with a clear picture of the contribution made by each institution towards key Welsh priorities or allowed it to measure Wales' performance against its desired objectives.

4.14   The review offers two key recommendations, encapsulated within 10 specific actions. The first recommendation is of particular interest to Sêr Cymru II and this evaluation given that it suggests 'that a performance instrument be developed that evaluates the contribution of individual institutions and the system as a whole in six domains reflecting the highest priority Welsh objectives'[30]. Two of these domains would cover the themes of 'enhancing economic impact' and 'improving research and innovation'. The second key recommendation is focused on the role of the new TERCfW. The review suggests that this new body take responsibility for managing the performance monitoring process.

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[29] Professor Weingarten (April 2018) Maximising the contribution of the post-compulsory education and training system to the achievement of Welsh national goals – a review of systems for monitoring and improving the effectiveness of post-compulsory education in Wales
[30] Ibid. p.3

Future Regional Investment

4.15 In January 2017, the Welsh Government published a White Paper 'Securing Wales' Future'[31], which set out the challenges and opportunities associated with Brexit for Wales. Later that year in December, the Welsh Government released a policy paper, Regional Investment in Wales after Brexit[32], which offered detailed proposals for exploring regional investment policy priorities. It makes the case for continued regional investment and calls upon the UK Government to confirm 'continued UK and Welsh involvement in European cooperation programmes, including Horizon 2020'[33]. The proposals offered within the White Paper could have significant bearing upon how regional investment could be made available to initiatives such as Sêr Cymru II in the future. For instance, there will no longer be a need to separate parts of West and East Wales artificially and funding could be made available via new regional plans based upon clearly articulated regional planning and partnership structures.

UK Policy

4.16 There have been fewer UK policy developments which have bearing upon the work of Sêr Cymru II since the inception evaluation report was published.

UK Research and Innovation

4.17 As was proposed within the UK Government's Industrial Strategy White Paper (published in November 2017) the UK Research and Innovation (UKRI) was formed in April 2018 to replace the seven Research Councils, Innovate UK and a new council, Research England, as a single organisation. It is funded through the Science Budget by the Department for Business, Energy and Industrial Strategy (BEIS) and provides funding across the the UK. The White Paper sets out the UK Government's intention to work in partnership with all four nations, including Wales, and makes reference to the approach adopted by the Sêr Cymru programme (interpreted as covering both Sêr Cymru I and II) in 'attracting leading scientific talent matched to its innovation strengths'[34].

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[31] Welsh Government (January 2017) Securing Wales' Future
[32] Welsh Government (December 2017) Regional Investment in Wales after Brexit
[33] Ibid. p.8
[34] UK Government (2017) 'Industrial Strategy – Building a Britain fit for the future' p.26

4.18   UKRI's work is underpinned by the commitment set out in the Industrial Strategy to raise investment within research and development to 2.4 per cent of Gross Domestic Product (GDP) by 2027. Since its establishment it has established a new Future Leaders Fellowship with the objective of developing the next generation of innovation and research leaders from the UK and across the world by providing up to seven years of funding of early-career researchers and innovators. The UKRI has also announced its intention to develop a longer-term Research and Innovation Talent Strategy during 2018.

4.19   Some stakeholders observed that the establishment of UKRI presented both opportunities and threats to STEMM-related academic research in Wales. It was suggested that its introduction could result in the creation of larger funding pots as well as funding streams which would support interdisciplinary research.

Industrial Strategy Challenge Fund

4.20   The UK Government has progressed its agenda to deliver the Industrial Strategy Challenge Fund, which forms a major element of the UK's Industrial Strategy, since the inception evaluation report was drafted. It originally announced the four-year £1 billion investment fund in April 2017 and has since been investing across two waves of funding. The first wave of funding concentrated upon the three challenge areas of healthcare and medicine, clean and flexible energy and robotics and artificial intelligence. The second wave of funding concentrated upon the three challenge areas of driverless cars, manufacturing and future materials and satellites and space technology. The third wave of expressions of interest were received by UKRI during early 2018 and the selected challenge areas are expected to be announced in November 2018.

The future relationship between the UK and EU

4.21   As was reported upon in the inception evaluation, the UK's vote to leave the European Union has important consequences for the UK higher education sector. Since then, the UK Government has progressed its negotiations on the terms of its exit and in July 2018, published its detailed proposals on the future relationship between the United Kingdom and the European Union[35]. The

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[35] HM Government (July 2018) 'The future relationship between the United Kingdom and the European Union'

document proposes that the future relationship includes a science and innovation accord that provides for UK participation in EU research funding programmes such as Horizon Europe[36] and Horizon 2020[37].

4.22 However, the uncertainty created for the Sêr Cymru II programme remains in terms of whether the programme will face greater challenges to attract researchers from EU countries and/or EU research funding to Wales.

Synopsis: Policy Context

4.23 The Welsh policy context continues to remain very supportive of the Sêr Cymru II approach and its underlying objectives. Recent developments offer a greater level of direction to the funding of research and innovation in Wales and suggest moving towards a more strategic way of operating at both a UK and Wales level. The proposed changes offered by the Reid review and the formation of TERCfW in particular within Wales will have major implications for how future academic research will be funded and monitored in Wales.

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[36] See European Commission website for further details about Horizon Europe
[37] See European Commission website for further details about Horizon 2020

5.   Baseline position

5.1   This chapter presents an updated position on the levels of research capacity in Wales' higher education institutions (HEIs) up to the 2016/17 academic year. It builds upon the baseline position set out within the inception evaluation report which offered a detailed overview of Wales' performance up to the 2015/16 academic year. It considers HESA data supplied on request from HEFCW as well as published data. It should be noted however that it is still too early to see the impact of Sêr Cymru II's operation in some of these indicators (e.g. research income) and that the Sêr Cymru I operation is also expected to have bearing upon them.

5.2   *Research capacity* includes the human resources (i.e. research staff) and financial resources (i.e. research income)[38] required to undertake research activities. The outputs of these research activities are then measured in terms of numbers of publications and citations, as well as collaborations with third parties.

5.3   The analysis benchmarks Wales' position and performance against the UK (especially with reference to the 5 per cent share target) as well as internationally, where the data allows.

5.4   The 5 per cent share target is based on Wales as a proportion of UK population as features in publications that examine the research capacity in Wales, as well as the business plans for Sêr Cymru II. For comparison, we have undertaken illustrative analysis of Wales as a share of the national UK economy based on Gross Value Added (GVA). This shows that Wales accounts for 3 per cent of the UK share of total GVA in 2015 (ONS, 2016). Therefore, it may be worth noting that while Wales might perform below the 5 per cent UK share on some of the research capacity indicators examined in this section, its performance when benchmarked against the size of its economy is better.

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[38] We note that research income can be considered as both an input and an output in the context of this evaluation.

Research income

5.5   The latest data on research income is available from HESA for the 2016/17 academic year. This data shows that HEIs in Wales secured £190.4m research income - in all disciplines - out of the total £5,916m secured by all HEIs across the UK. This performance shows a decline on the previous year when research income in Wales amounted to £204.6m.

5.6   Latest 2016/17 research income is equivalent to 3.2 per cent of the UK share, which is two percentage points below the target of 5 per cent based on Wales' population share. This implies that, in order to meet its target of 5 per cent of the UK total, Wales' institutions would need to secure an additional £105.4m of research funding per year. Whilst Sêr Cymru II was expected to make a contribution towards plugging this gap, it is important to note that the programme was never expected to fully address it.

5.7   The £105.4m of additional annual research income required to reach the 5 per cent (at 2016/17 levels) is based on the assumption that the UK total remains unchanged – this implies that in order to increase its share, Wales would need to do so at the expense of other UK regions[39]. However, if Wales were to secure additional research income which is entirely additional to the UK, it would require £111.0m to achieve a 5 per cent UK share[40].

5.8   Figure 5.1 sets out an analysis of how much additional research income would be required, to achieve a 5 per cent share from each of the current income sources. It clearly demonstrates that Wales falls short on all but two income sources in securing its 5 per cent share of national research income:

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[39] This is calculated by establishing what 5 percent of the UK's research income share amounts to and subtracting Wales' equivalent from the 5 per cent UK share to identify the additional income or researchers required.
[40] This approach results in a larger amount required to make up the gap. This is due to the fact that the UK total would rise as well as the Wales total if income secured is additional to the UK. The approach to calculating this is to establish what a 5 per cent share of the UK's research income amounts to, subtracting Wales' equivalent from the 5 percent UK share and scaling up by dividing 0.95 to arrive at the additional income/researchers required for Wales to make up 5 per cent of the UK share.

- The areas in which Wales outperforms its target 5 per cent share are UK central government income sources (5 per cent) and UK other sources[41] (5 per cent).

- In absolute terms, the gap in research funding from research councils and UK-based charities is the largest, with an additional £43m and £27m required respectively from each source to bring Wales up to the 5 per cent national share.

Figure 5.1: Additional research income by source required to meet 5 per cent UK share
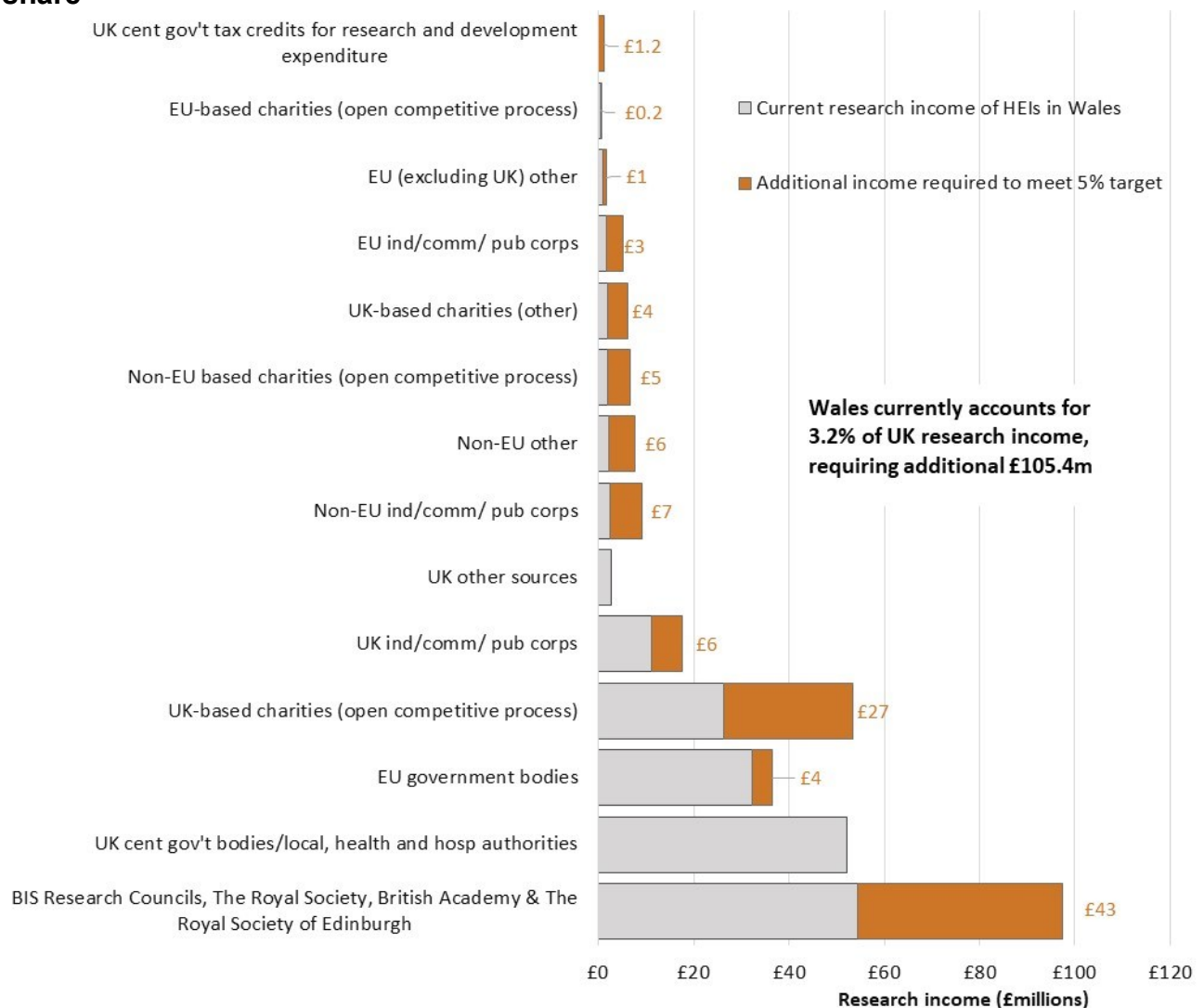
Source: HESA Finances 2016/17

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[41] Other sources are defined as all remaining UK sources of research income. This can include income from HEIs where the HEI is the original contractor.

Table 5.1: Research income by source, 2016/17

Research income source	Research income of HEIs in Wales (£m)	Research income of HEIs in the UK (£m)	Wales as a share of UK research income (per cent)
BIS Research Councils, The Royal Society, British Academy & The Royal Society of Edinburgh	54.4	1,946.5	3%
UK cent gov't bodies/local, health and hospital authorities	52.2	1,005.8	5%
EU government bodies	32.2	729.9	4%
UK-based charities (open competitive process)	26.2	1,065.9	2%
UK ind/comm/ pub corps	11.3	350.3	3%
UK other sources	2.8	53.3	5%
Non-EU ind/comm/ pub corps	2.4	182.8	1%
Non-EU other	2.1	154.5	1%
Non-EU based charities (open competitive process	2.0	131.9	2%
UK-based charities (other)	1.9	123.0	2%
EU ind/comm/ pub corps	1.6	101.8	2%
EU (excluding UK) other	0.9	34.7	2%
EU-based charities (open competitive process)	0.4	10.9	3%
UK cent gov't tax credits for research and development expenditure	0[42]	24.7	0%
Total	**£190.4**	**£5,916.0**	**3.2%**

Source: HESA Finances 2016/17

5.9   Alongside considering Wales' share of the UK total and comparing this to its population share, another way of benchmarking Welsh institutions' performance is by looking at income on a per researcher basis. This shows that in 2016/17, the research income was equivalent to £32,800 per researcher[43] in Wales, almost a quarter lower than the comparative figure of £43,100 across the UK[44]. This shows a worsening performance compared to that in 2015/16 with the gap widening from 15 per cent to 24 per cent.

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[42] Tax credits scheme operate across the UK but none were claimed in Wales during 2016/17

[43] Academics on research contracts, and research and teaching contracts.

[44] The income per researcher is calculated as a ratio of total research income in Wales (£190.4m) to total staff on research, and research and teaching contracts in Wales (5,805). The equivalent calculation is replicated for the UK.

5.10   This means that to make up this gap, an additional £10,300 of research income would be required per researcher in Wales. In total, this would be equivalent to £60m of additional research income provided the number of academics stayed the same (i.e. 5,805 researchers). It should be noted that even if this was achieved, it would still fall short of the amount required to bring Wales up to a 5 per cent national income share. The implication is that Wales' under-performance in generating research income is a result both of the performance of its existing researchers and of a deficit in the actual number of researchers. As an illustration, increasing the number of researchers in Wales to make up the 5 per cent UK share, but keeping income per researcher constant, would only bring Wales up to 4 per cent of national research income share.

Research income trends

5.11   Trends over the last four academic years show that Wales' HEIs experienced growth in research income between 2012/13 and 2014/15, but a fall of 4 per cent in 2015/16 and subsequently 7 per cent in 2016/17. This compares to a much smaller reduction in UK-wide research income of only 1 per cent between 2015/16 and 2016/17. Overall, since 2012/13 research income secured across all UK HEIs has increased more than in Wales, representing a 24 per cent increase compared to 9 per cent increase across HEIs in Wales.

5.12   Correspondingly, over the last four years Wales maintained just under a 4 per cent share of national research income until recently, dropping to 3.2 per cent in 2016/17 (see Figure 5.2). However, it should be noted that these fluctuations year on year for Wales should be expected given the considerable variation in the scale of research grants and hence the potential for this to distort the longer term trend.

Figure 5.2: Research income of HEIs in Wales, 2012/13-2016/17
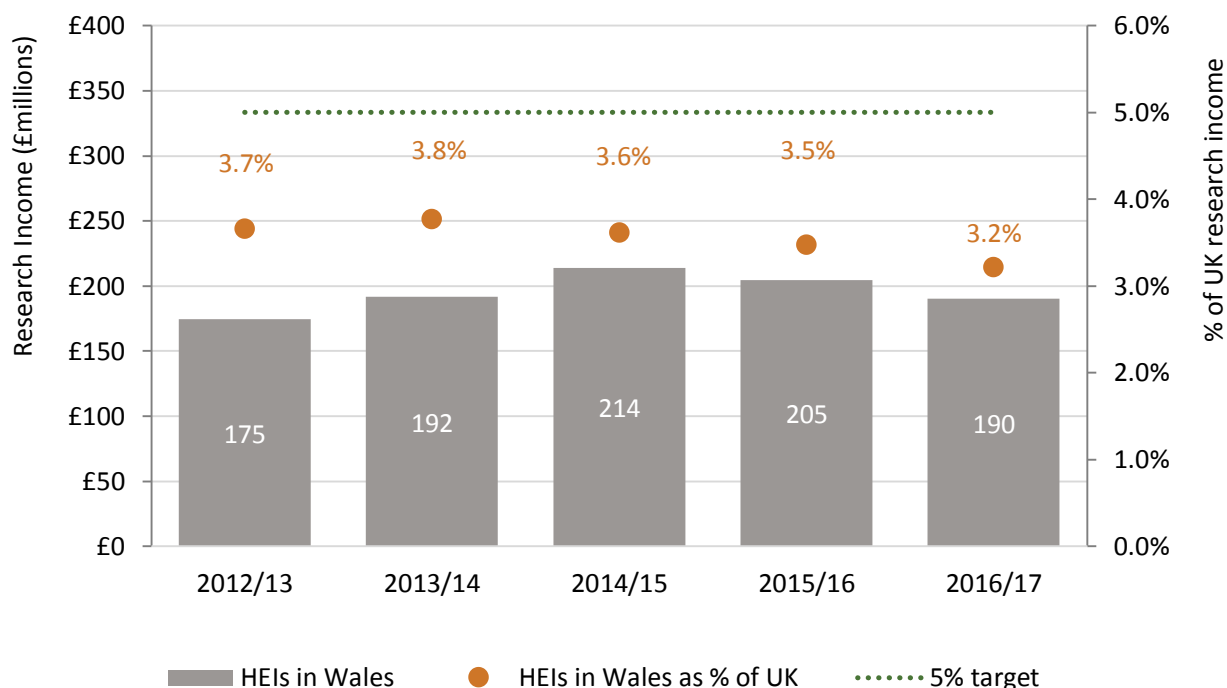
Source: HESA Finances 2012/13-2016/17

5.13   As shown earlier, the largest share of research income secured in Wales is accounted for by research councils (29 per cent). This is similar to the average for all UK HEIs of 33 per cent. Figure 5.3 shows the growth rates in research income among Wales' and UK HEIs. Wales' institutions were capturing an increasingly larger share of income from research councils between 2012/13 and 2015/16, until the drop of nearly a quarter in 2016/17. This compares to a national decrease of one percentage point between 2015/16 and 2016/17. Breakdown by type of research council provides insight into what drove the change in Wales:

- The largest decrease in absolute and relative terms was in income secured from the Medical Research Council (MRC), which saw a 47 per cent reduction on the previous year, equivalent to £8.0m.

- This is followed by a reduction of 30 per cent, or £6.5m in funding secured from the Engineering and Physical Sciences Research Council (EPSRC).

Figure 5.3: Change in Income from Research Councils, 2012/13-2016/17

Income from Research Councils (£millions)

	2013/14	2014/15	2015/16	2016/17
Growth rate UK	8%	8%	9%	-1%
Growth rate Wales	7%	10%	31%	-23%
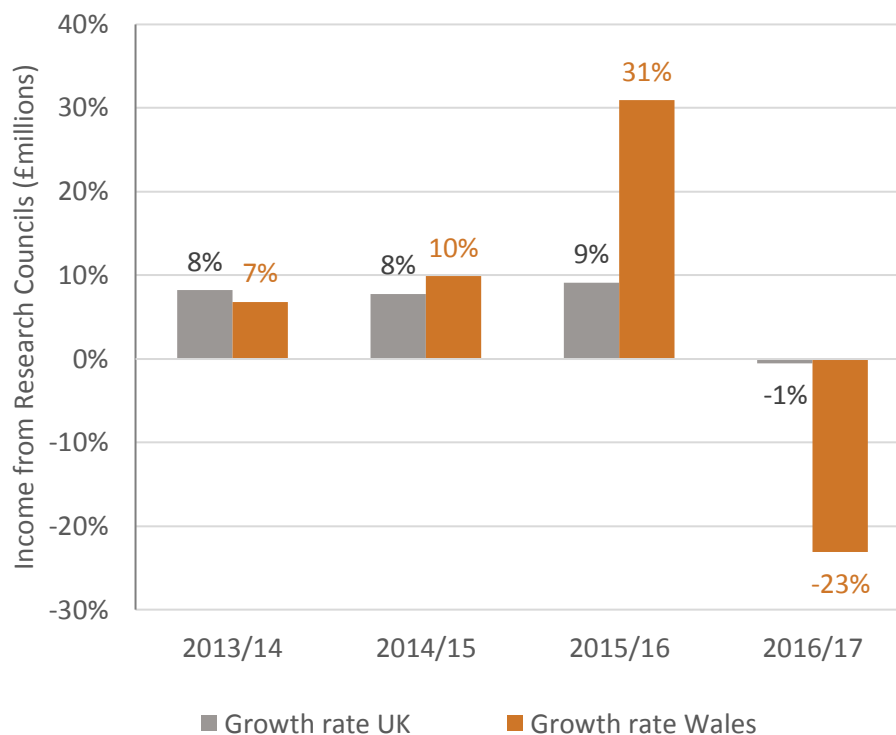
HESA Finances 2012/13-2016/17

5.14 The second largest source of research income in Wales in 2016/17 is UK government sources[45] (27 per cent). Wales has maintained a 6 per cent share of the UK equivalent between 2012/13 and 2015/16, until a recent reduction to 5 per cent of UK share in 2016/17.

5.15 The Wales share of income from EU government bodies has reduced from 6 per cent of the UK level in 2012/13 to 4 per cent in 2016/17. EU funding is the third largest source of research funding for Wales (accounting for 18 per cent of the total), so although it is reducing its national share of this source, this represents a risk for Wales' HEIs.

STEMM Research Income and Trends

5.16 STEMM-related research income is the main focus of Sêr Cymru II. This analysis shows that in 2016/17, 84 per cent of research income in Wales was STEMM related, which was below the UK average of 88 per cent.

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[45] UK Government Sources includes significant amounts of non-competitive EU Structural funds. These capacity building funds are currently listed under UK Government/ Local Authorities category, and not EU or EU Commission funds for the HESA data submission, primarily because such pre-allocated funding is not regarded as competitive and is administered on the basis of below average performance of GDP.

5.17   Wales' STEMM research income in 2016/17 accounted for 3.1 per cent of the UK equivalent, amounting to £161m in absolute terms. This implies that an additional £99m of STEMM-specific research income would be required per year for Wales to meet its target 5 per cent share, assuming the UK total remained unchanged.

5.18   Since 2012/13, Wales has maintained a relatively stable share in STEMM income. However, in absolute terms the gap has been widening, changing from £59m in 2012/13 to £99m in 2016/17.

Figure 5.4: STEMM research income in Wales, 2012/13-2016/17
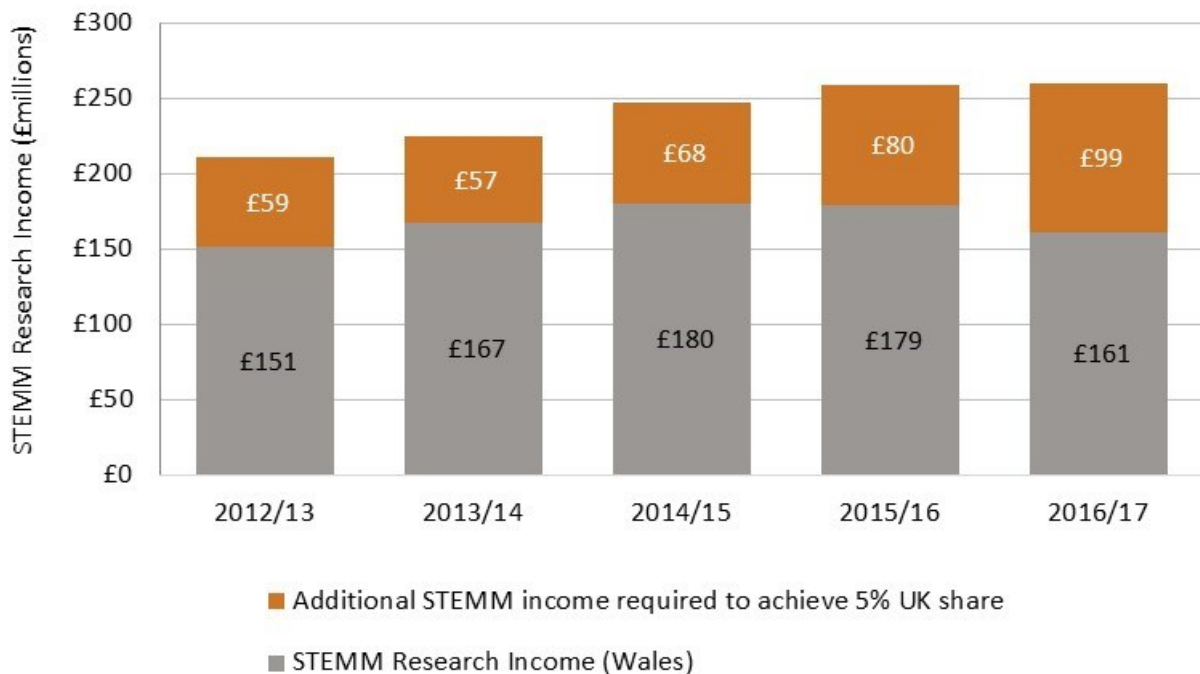
Research income by subject

5.19   Figure 5.5 shows how, out of the four broad STEMM subject groups, the Medicine, Dentistry and Health group makes up the largest share of research income in Wales, accounting for 41 per cent.

Figure 5.5: STEMM research income in Wales by subject, 2016/17

Wales STEMM Research Income
(2016/17)

% of total STEMM research income
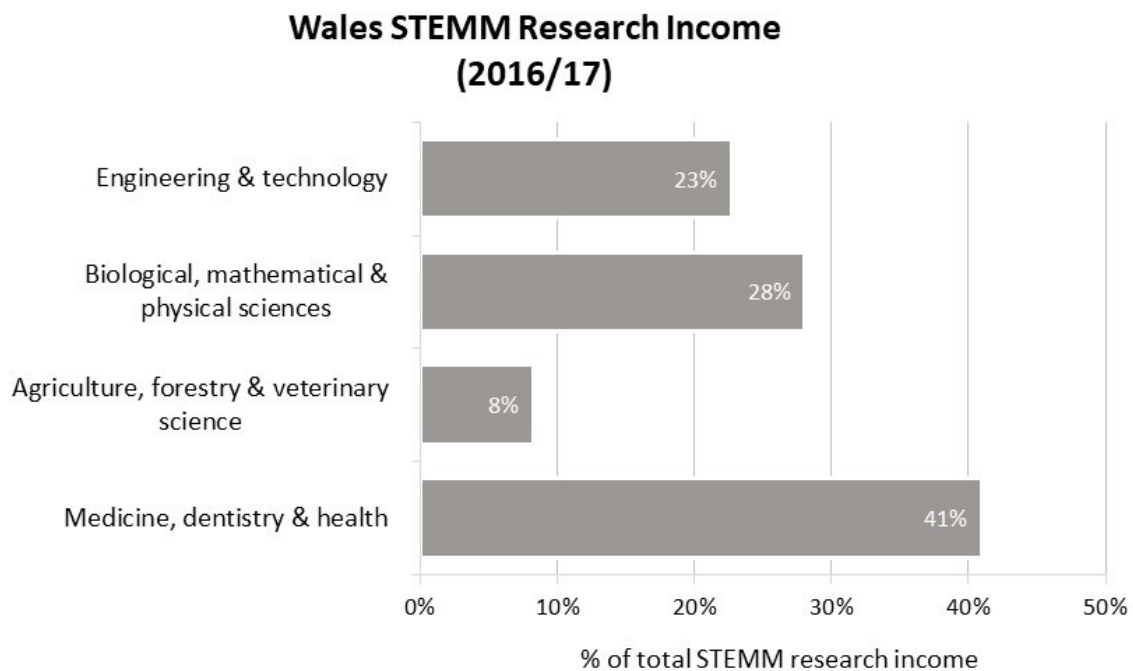
Source:
HESA Finances 2016/17

5.20 Figure 5.6 illustrates how Wales' HEIs have a concentration of agriculture-related research activities. Despite accounting for only 7 per cent of research income in Wales, this is an area where Wales' HEIs exceed the 5 per cent UK share target – i.e. Wales' HEIs account for 11 per cent of Agriculture, Forestry and Veterinary Science research income in the UK.

5.21 The remaining three STEMM subject areas are below the 5 per cent target for UK share, consistently accounting for 3 per cent of the UK between 2012/13 and 2016/17.

Figure 5.6: Wales Research Income by subject as a percentage of UK, 2016/17
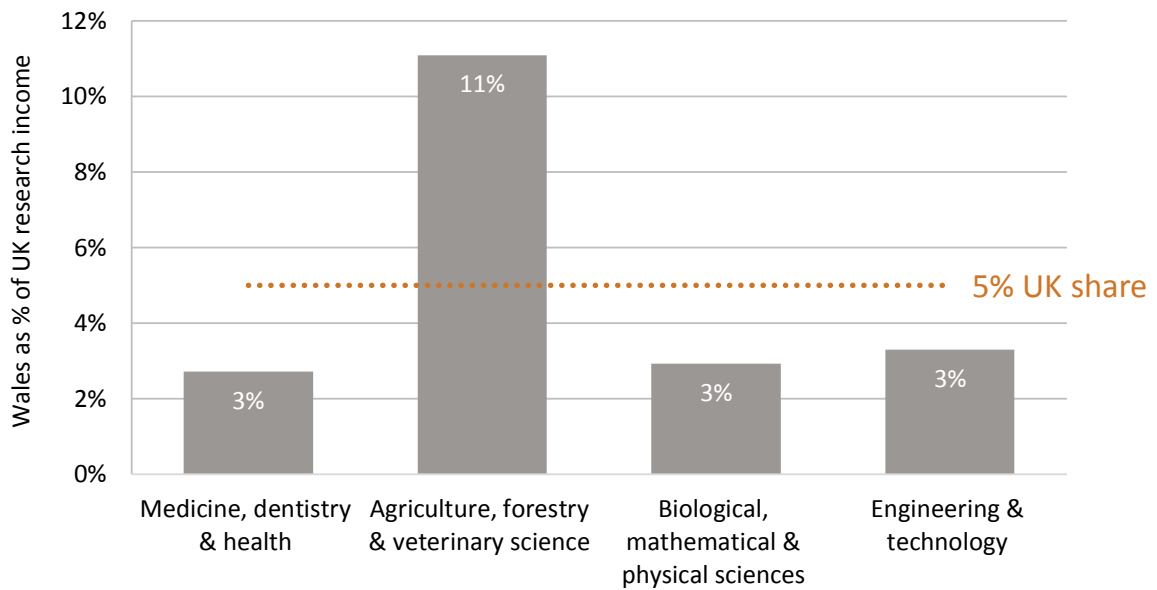
Source: HESA Finances 2016/17

Composition and Trends by institution

5.22   Research income in Wales is concentrated in a handful of HEIs, as shown in Figure 5.7. Of the three HEIs in the East Wales area ERDF area, Cardiff University accounts for 98 per cent of research income in the region, and the University accounts for 53 per cent of research income across the whole of Wales.

5.23   In West Wales and the Valleys ERDF area, research income is more evenly distributed between the six HEIs, with Swansea, Aberystwyth and Bangor Universities accounting for 94 per cent of research income between them.

Figure 5.7: Research income by institution, East Wales and West Wales and the Valleys, 2016/17

HEs in West Wales and the Valleys had a research income of £87m

HEs in East Wales had a research income of £104m
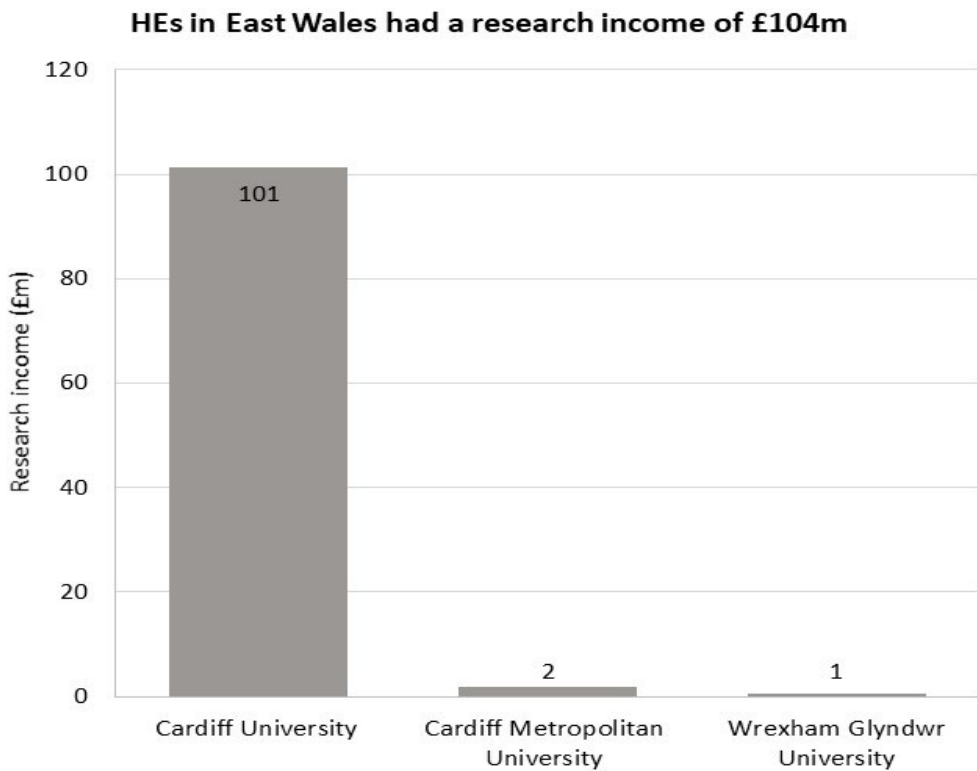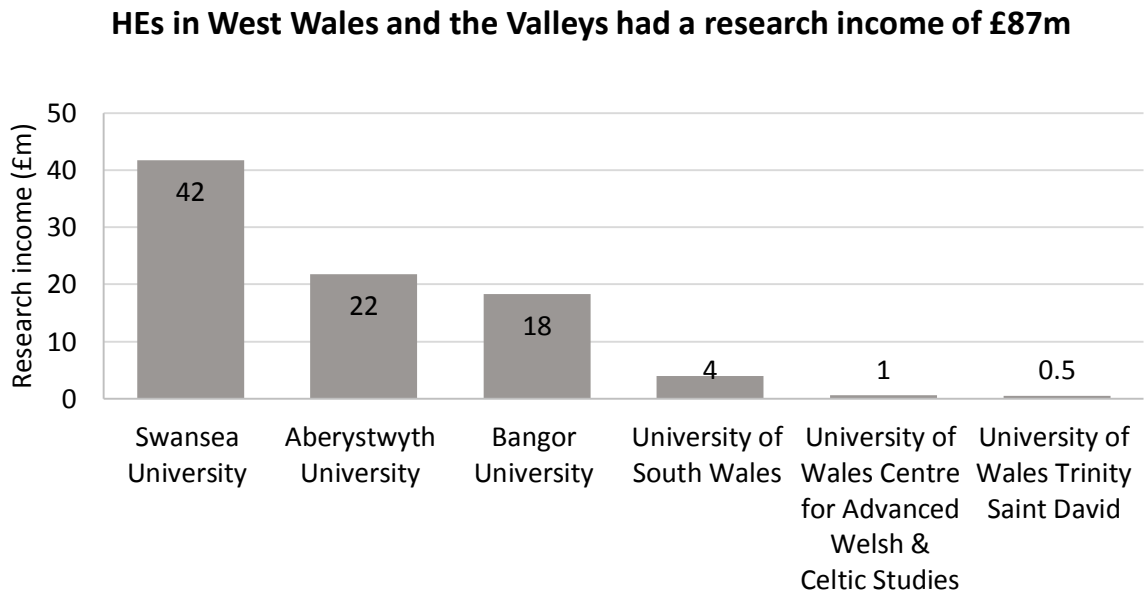
Source: HESA Finances 2016/17

5.24   Trends over the last five years show that the three HEIs in the East Wales area as a whole increased its research income by 14 per cent between 2012/13 and 2016/17, primarily driven by Cardiff University. West Wales and the Valleys only saw an increase of 6 per cent in comparison amongst its six HEIs, although this was mainly driven by Swansea and Aberystwyth.

Table 5.2: Research income by HEI, 2012/13 and 2016/17

	Research income 2016/17 (£m)	Change since 2012/13	
		Absolute (£m)	*Per cent*
Cardiff University	101	13	15%
Cardiff Metropolitan University	2	-1	-28%
Glyndŵr University	1	-	-
Total East Wales	**104**	**13**	**14%**
Swansea University	42	5	12%
Aberystwyth University	22	3	19%
Bangor University	18	-2	-10%
University of South Wales	4	-2	-30%
University of Wales Centre for Advanced Welsh & Celtic Studies	1	-	-
University of Wales Trinity Saint David	>1	0	37%
Total West Wales and the Valleys	**87**	**5**	**6%**

Source: HESA Finances 2012/13 - 2016/17

5.25   The HEIs individually have different mixtures of STEMM and non-STEMM activities, reflected in research income by subject. For instance:

- Cardiff University is the main representative of STEMM in East Wales. In terms of subject areas, it accounts for much of the research income in medicine and related activities (73 per cent of Wales' total) and biological, mathematical and physical sciences.

- In West Wales and the Valleys, STEMM research income is more spread between HEIs. There are some clear subject specialisms at Swansea (engineering and technology, as well as medicine, dentistry and health), Aberystwyth (agriculture-related areas and biological, mathematical and physical sciences), and Bangor (biological, mathematical and physical sciences).

Table 5.3: Research income by HEI and subject area, 2016/17 (£millions)

	Medicine, dentistry & health	Agriculture, forestry & veterinary science	Biological, mathematical & physical sciences	Engineering & technology	Total STEMM	STEMM as % of Wales total
Cardiff University	48.2	0.0	25.1	11.3	84.6	53%
Cardiff Metropolitan University	0.1	0.2	0.3	0.0	0.6	0%
Glyndŵr University	0.1	0.0	0.0	0.2	0.4	0%
Total East Wales	**48.4**	**0.2**	**25.5**	**11.5**	**85.6**	**53%**
Swansea University	11.7	0.0	4.4	21.0	37.1	23%
Aberystwyth University	0.0	10.9	6.8	0.7	18.4	11%
Bangor University	4.8	2.2	7.9	1.1	15.9	10%
University of South Wales	0.9	0.0	0.6	2.1	3.6	2%
University of Wales Trinity Saint David	0.0	0.0	0.0	0.1	0.1	0%
Total West Wales and the Valleys	**17.4**	**13.1**	**19.7**	**24.9**	**75.0**	**47%**
Total Wales	**77.9**	**13.3**	**42.6**	**45.5**	**179.2**	**100%**

Source: HESA Finances 2016/17

Research Staff

5.26   In 2016/17 there were 1,685 staff on research-only contracts, and 4,120 staff on research and teaching contracts, across HEIs in Wales (see Figure 5.8). Together, this accounts for 4 per cent of the UK's research staff (137,150 FTEs). An additional 1,050 FTE researchers would be required (across all disciplines) for Wales to represent a 5 per cent UK share.

Figure 5.8: Research Staff in Wales, 2016/17

Wales research staff currently account for 4% of the UK total

Research and Teaching contracts: 478

Research only contracts: 630

☐ Wales researchers
■ Additional researchers required to make up 5% UK share
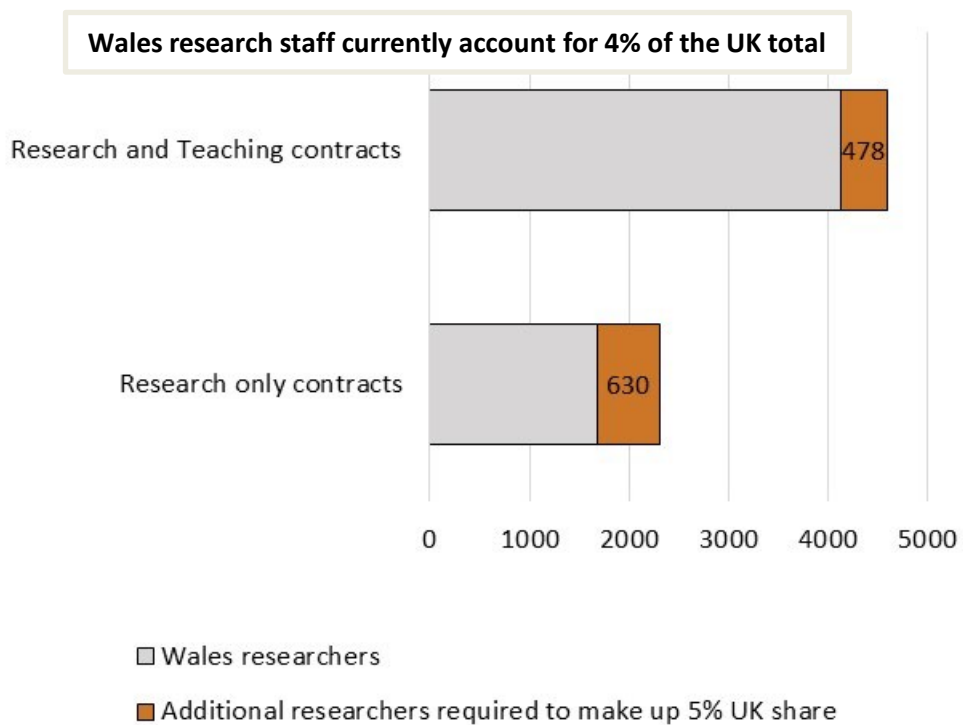
Breakdown of Wales HE staff contract

Research only contracts, 9%

Research and Teaching contracts, 24%

All other contracts, 67%
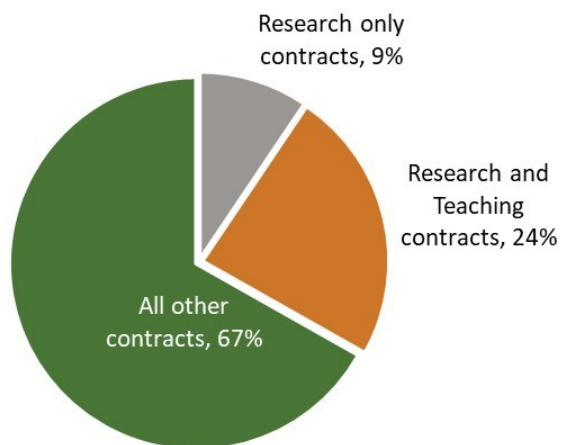
Source: HESA Staff 2016/17

5.27   Of the total research staff (research only, and research and teaching), there are 3,230 STEMM researchers in Wales – also 4 per cent of UK share. Figure 5.9 illustrates how the gap in STEMM disciplines has grown and, in 2016/17 would require 930 additional researchers to reach a share equivalent to 5 per cent of the UK figure (83,150).

Figure 5.9: STEMM Research Staff in Wales, 2012/13 – 2016/17
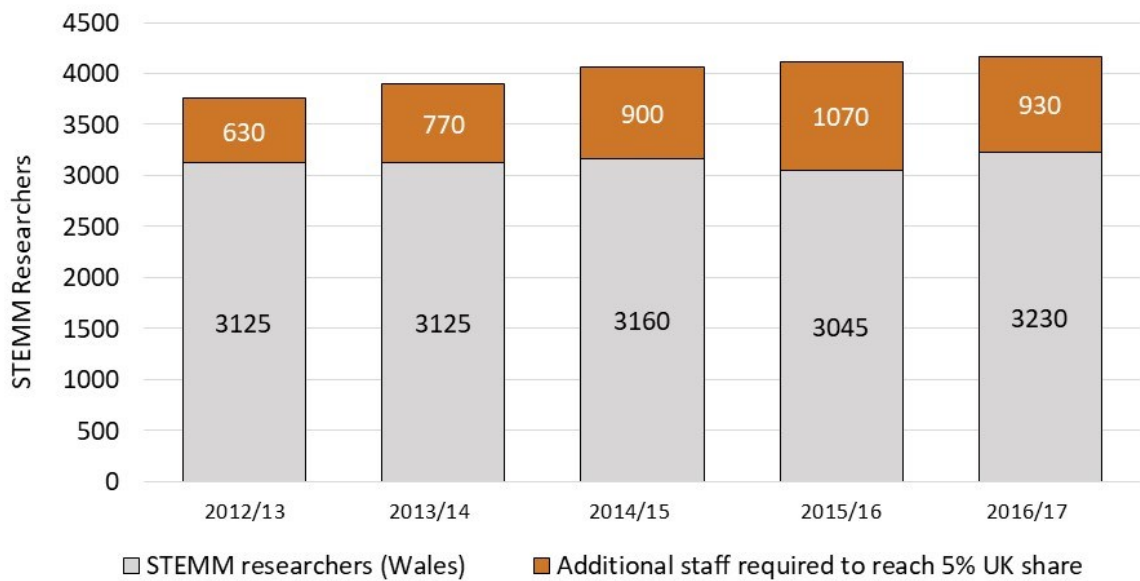
Source: HESA Staff 2012/13-2016/17

5.28   This is a stark increase in the requirement since the Halligan and Bright report[46] estimated 630 FTE researchers would be required based on 2012/13 HESA data. The gap between Wales and the rest of the UK has been widening until very recently: while across the UK the number of STEMM researchers grew by 11 per cent between 2012/13 and 2016/17, in Wales it only grew by 3 per cent.

5.29   In 2016/17, STEMM researchers accounted for 56 per cent of all researchers in Wales compared to 61 per cent across the UK. The largest subject area in staff terms in Wales is medicine, dentistry and health, representing just under a quarter of all staff (24 per cent).

5.30   There is one area where Wales makes up a comparatively larger share of UK researchers, which is agriculture, forestry and veterinary science (6 per cent) In absolute terms this represents around 95 FTE staff. Across all other areas, Wales' share is below the 5 per cent benchmark (see Figure 5.10).

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[46] Halligan, P. and Bright, L. (2015) *The Case for Growing STEMM Research Capacity in Wales*, The Learned Society, Cardiff

Figure 5.10: Research Staff by Subject Area, 2016/17
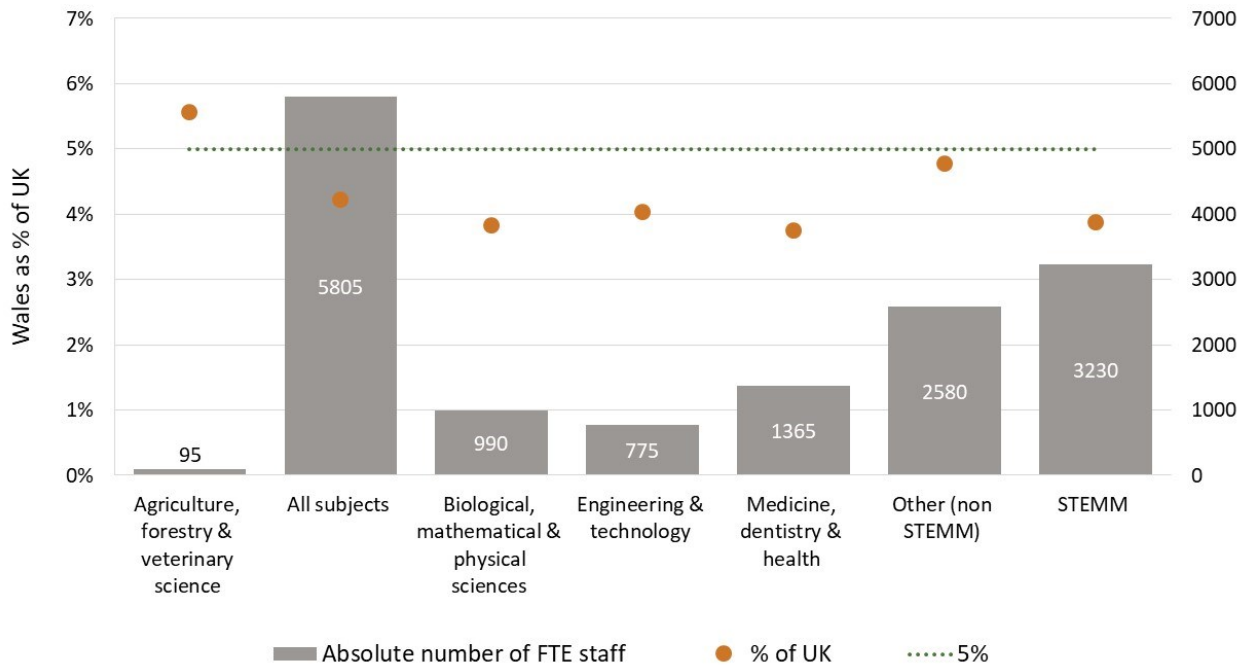
Source: HESA Staff 2016/17

5.31   The gap analysis shows differences between subject areas, which is presented in Figure 5.11. The largest gap in absolute terms is in medicine, dentistry and health, where around 450 more staff would be needed to make up the gap. This is followed by biological, mathematical and physical sciences (300) and engineering and technology (190).

Figure 5.11: Additional research staff by subject required to meet 5 per cent UK share, 2016/17
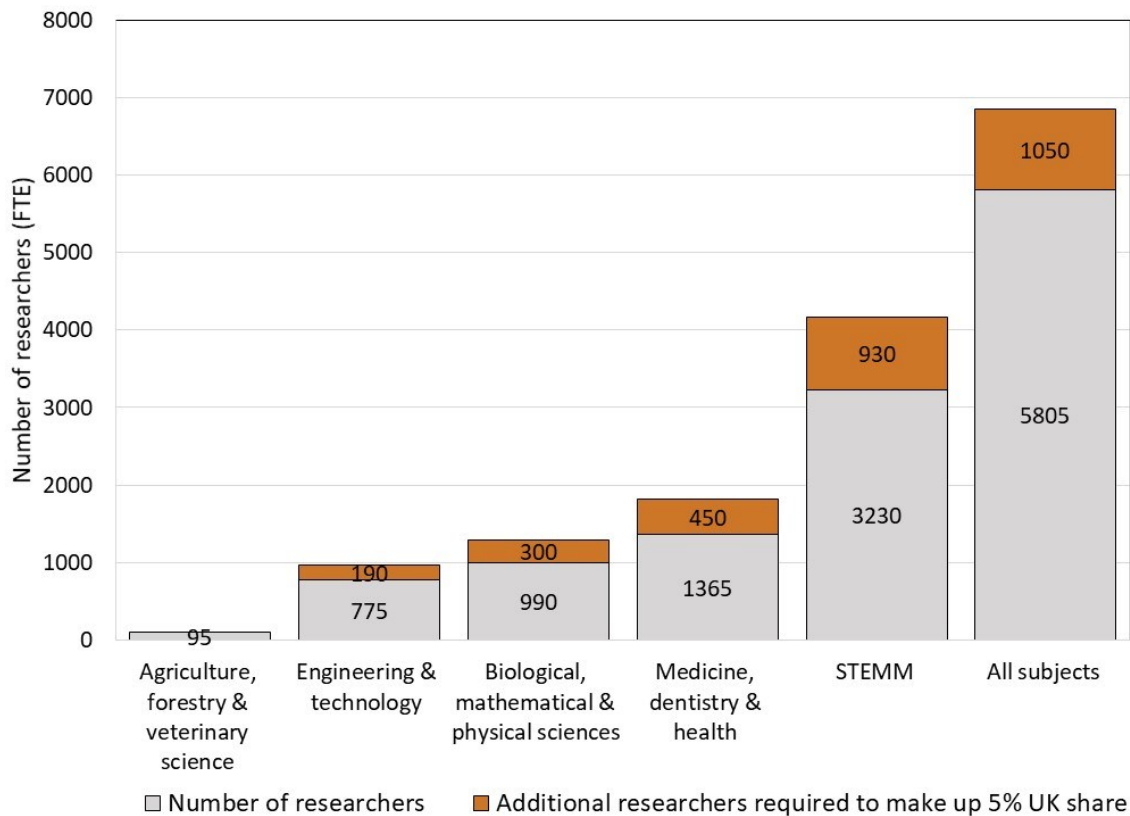
Source: HESA Staff 2016/17

Research output and quality

5.32   It is also useful to consider measures of research output, or the outcomes that result from the research inputs and activities. The sources of published information on research outputs are limited, in a large part due to the source data being held in commercial databases. However, there are a number of publications which can be drawn on, which consider how Wales performs.

Publications and Citations

5.33   The reports by Elsevier (2016; 2013) prepared for HEFCW and BEIS contain useful information on publications and citations relevant to Sêr Cymru II. The 2016 report for HEFCW focuses on the performance of the Welsh research base in particular between 2010 and 2014. The report for BEIS precedes this, examining the UK research base between 2008 and 2012.

5.34   In 2012, UK researchers published 139,700 articles, of which Wales accounted for 4.4 per cent. Wales' share has remained broadly consistent between 2008

and 2012. Citations show a very similar performance in 2012, with Wales accounting for 4.3 per cent of UK's share.

5.35 The report for HEFCW provides more up to date measures, and benchmarks Wales compared to the UK as well as internationally[47]. The findings from this report highlight a strong performance in Wales relative to the UK as well as international comparators:

- The report estimates that Wales ranked 5th out of 17 countries in 2015 based on publications per year per researcher, ahead of the UK (9th) and the EU average (15th).

- Wales performs even better when considering citations per researcher, ranking 4th compared to an overall UK rank of 9.

Research impact

5.36 The REF 2014 assesses the quality of submitted research outputs across UK universities. The results show that more than three quarters of submissions by Wales' HEIs have been assessed as world leading or internationally excellent, which is in line with the UK average.

5.37 Moreover, results found that more than half of Wales' submissions were classed as world-leading in terms of impact on life beyond academia.

5.38 Wales' highest performing subject areas include Psychology and Neuroscience, Allied Health Professions, General Engineering, and Geography/Environmental Studies and Archaeology, followed by other non-STEMM disciplines.

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[47] Comparators include: three other UK countries (Scotland, England and Northern Ireland) and the UK as a whole; European and international countries of similar size and population (Belgium, Denmark, Finland, Ireland, Norway and New Zealand); and other major research nations (USA) as well as international benchmarks (World, EU and OECD countries).

Interactions between HE providers and businesses

5.39   As noted earlier, alongside measures of research capacity, there is also useful data on collaboration achieved by researchers in post. This provides a good indication of the extent to which researchers in Wales' HEIs are engaged in collaborative research and commercialisation activities with the private and public sectors, linking to one of the intended outcomes of Sêr Cymru II.

Collaborative Research

5.40   Data on collaborative research[48] activities and income is provided by the Higher Education business and Community Interaction Survey (HE-BCIS), which at the time of writing is available up to 2015/16.

5.41   The latest data in Figure 5.12 shows that Wales performs well on the measure of income from collaborative research involving public and private funding. It accounts for 6 per cent of the UK total on average, and exceeds this share for some sources of income.

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[48] Collaborative research includes research projects with public funding from at least one public body, and a material contribution from at least one external non-academic collaborator (Source: HESA Definitions).

Figure 5.12: Income from collaborative research involving public and private funding, Wales 2015/16

Wales' Income from Collaborative Research (£m), 2015/16

Wales' Income from Collaborative Research as % of UK, 2015/16

Legend: Wales as % of UK ▪▪▪▪▪▪ 5%
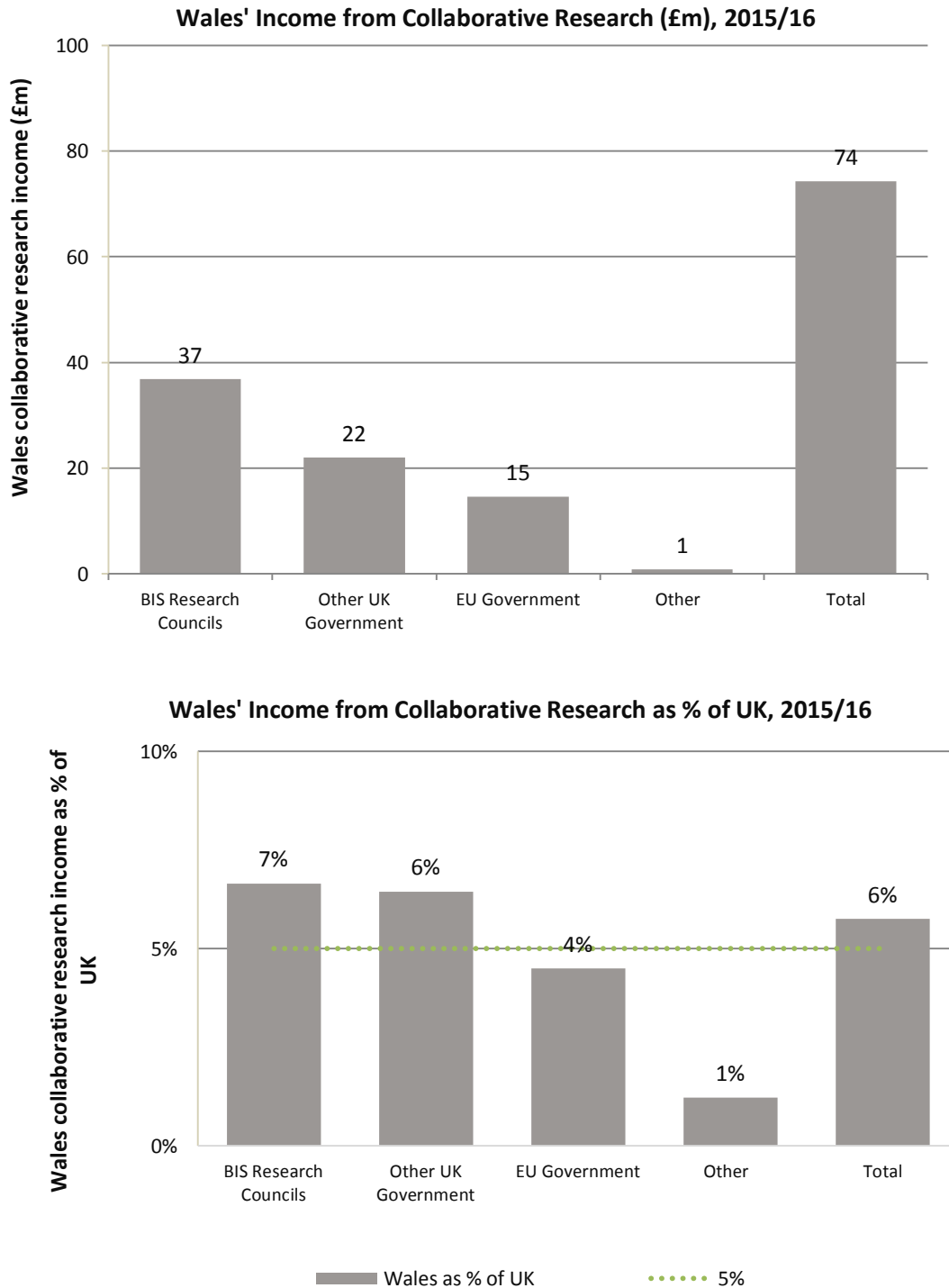
Source: HE-BCIs 2015/16

5.42   This performance exceeding 5 per cent UK share has been consistent over the past five years. Although Wales has been increasing its collaborative research income in absolute terms, the 2015/16 proportion of the UK total is actually the lowest out of the six years (5.7 per cent).

Figure 5.13: Collaborative research income involving public and private funding, Wales
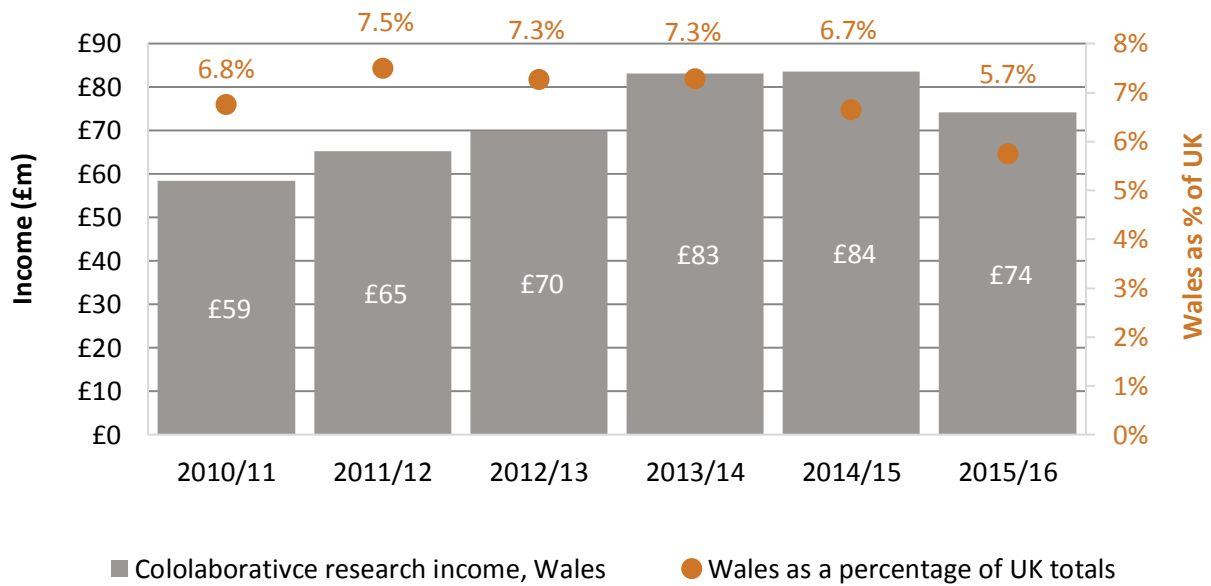
Source: HE-BCIs 2015/16

5.43   Breakdown by Wales' regions and institutions highlights the dominance of Cardiff and Swansea universities, which together account for 84 per cent of Wales's collaborative research income, securing £32m and £30m respectively.

5.44   In turn, East Wales accounts for 28 per cent of Wales' share, having increased by a quarter since 2010/11 driven by Cardiff University. In West Wales and the Valleys, the area accounts for 72 per cent of Wales' collaborative research income having increased this by 13 per cent since 2010/11.

Table 5.4: Collaborative research income by area and HEI in Wales

	Collaborative Research income 2015/16 (£millions)	Change since 2010/11	
		Absolute (£millions)	*Percent*
East Wales			
Cardiff University	32.2	15.9	97%
Cardiff Metropolitan University	2.1	1.0	90%
Glyndŵr University	0.3	0.0	0%
Total East Wales	**34.7**	**17.2**	**99%**
West Wales and the Valleys			
Swansea University	30.0	2.2	8%
Aberystwyth University	3.7	-0.5	-11%
Bangor University	4.8	-1.3	-21%
University of South Wales	1.1	-0.4	-28%
University of Wales Trinity Saint David	0.1	-0.2	-68%
Total West Wales and the Valleys	**39.6**	**0.1**	**0%**

Source: HE-BCIs 2010/11 – 2015/16

5.45   In 2015/16, HEIs in Wales had 533 contracts for research[49] with commercial organisations, which amounted to £11m in research income.

5.46   This constitutes 5 per cent of the total number of SME research contracts across the UK, with the value of these contracts also equivalent to 5 per cent of the UK total.

5.47   Analysis over time suggests a declining performance on SME contracts over the past two years. Wales was around the 5 per cent mark or exceeding it in both measures until 2014/15 on the number of contracts and their value (see Figure 5.14).

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[49] Contract research refers to income identifiable by the HE provider as meeting the specific research needs of external partners, but excluding any research income already counted under the collaborative research activity (Source: HESA Definitions).

Figure 5.14: Contract research with SMEs and non-SMEs, Wales

Contract research with SMEs

Number with SMEs - % of UK ■ Value with SMEs - % of UK ⋯⋯ 5%

Contract research with non-SMEs

Number with other businesses - % of UK
Value with other businesses - % of UK
⋯⋯ 5%
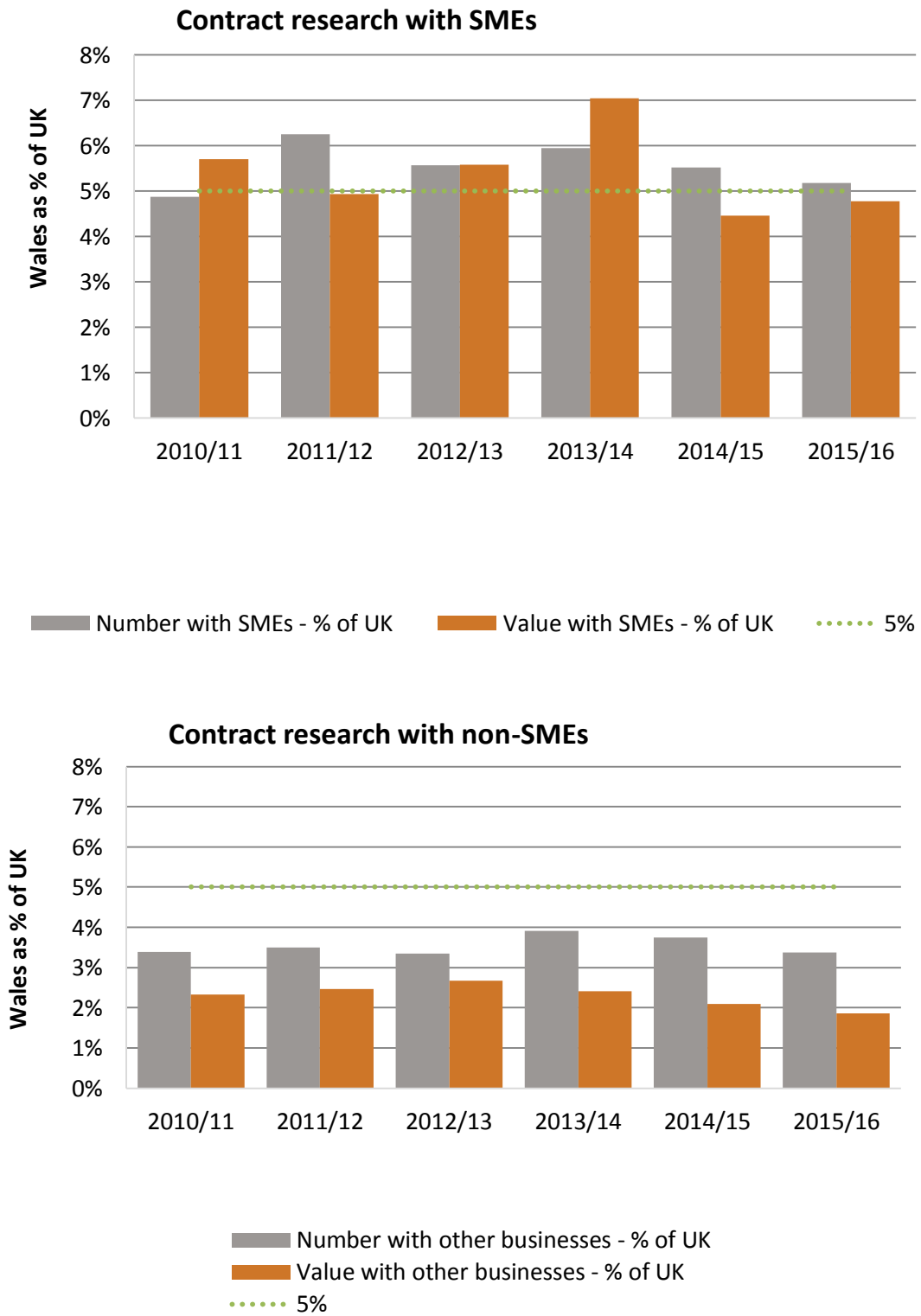
Source: HE-BCIs 2010/11 – 2015/16

5.48   With non-SMEs, however, Wales has consistently held around 3-4 per cent
         national share of contracts and 2 per cent of value.

5.49   The number of consultancy contracts[50] with businesses at HEIs in Wales in 2015/16 constitute only 2 per cent of the UK share, equivalent to 1,963 contracts in Wales out of a UK total of 108,138 contracts. Of these in Wales, 580 were with SMEs (just 1 per cent of UK share of 65,350) and 615 with other businesses (6 per cent of UK share of 9,553). The value of all consultancy contracts amounted to £12m in 2015/16:

- The average value of SME contracts among HEIs in Wales was £3,710 – almost three times the UK average (£1,300). Despite this, Wales only captures around 3 per cent of the UK value.

- However, the average value with non-SME businesses was only £3,600 which is less than half the UK average of £11,800. Wales captures 2 per cent of the UK non-SME consultancy contracts.

Table 5.5: Consultancy contracts with SMEs and non-SME businesses, 2015/16

	Number of contracts		Value of contracts	
	with SMEs	with non-SMEs	with SMEs *(£m)*	with non-SMEs *(£m)*
Cardiff University	250	76	1084	301
Cardiff Metropolitan University	212	21	385	57
Glyndŵr University	3	1	10	22
Total East Wales	465	98	1,479	380
Bangor University	17	8	301	132
Swansea University	29	470	154	911
University of South Wales	36	30	136	750
Aberystwyth University	3	4	19	3
University of Wales Trinity Saint David	30	5	63	21
Total West Wales and the Valleys	115	517	673	1,817
Total Wales	580	615	2,152	2,197

Source: HE-BCIs 2015/16

5.50   So overall, Wales' HEIs are underperforming in both volume and value of consultancy services provided to businesses, with no significant variation over time.

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[50] Consultancy includes contract numbers and income associated with advice and work crucially dependent on a high degree of intellectual input from the HE provider to the client (commercial or non-commercial) without the creation of new knowledge. Consultancy may be carried out either by academic staff or by members of staff who are not on academic contracts, such as senior university managers or administrative/support staff. (Source: HESA Definitions).

5.51   Analysis on an institutional level shows East Wales is leading in SME consultancy contracts, with 465 contracts with a combined value of £1.48m. Cardiff University and Cardiff Metropolitan both have a sizeable share of these contracts, however, Cardiff University has a much higher value associated with these.

5.52   West Wales and the Valleys, on the other hand, leads on consultancy with non-SME businesses. This is driven by Swansea University having 470 contracts in place with a combined value of £0.9m.

Intellectual Property

5.53   HE-BCIS collects a range of intellectual property (IP) indicators to measure 'the value added by the HEI when interacting with a range of external partners'[51]. These indicators provide a helpful indication of how research activities at HEIs translate into products and ideas en-route to commercialisation.

5.54   Below at Figure 5.15 is an overview of performance of HEIs in Wales in disclosures and patents.

- In 2015/16 Wales' HEIs had a total of 242 disclosures (i.e. public sharing of an invention), which is 6 per cent of the UK total. This is a decrease on previous years, as Wales was previously capturing almost 8 per cent in 2012/13.

- Other measures of patents show a relatively weaker performance. The total number of live and active patents at HEIs in Wales (i.e. cumulative patent portfolio) includes 557 individual patents, however, this represents only 3 per cent of the UK total with no significant variation over time.

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[51] HESA Definitions

Figure 5.15: Disclosures and Patents filed by or on behalf of the HEI in Wales, 2015/16
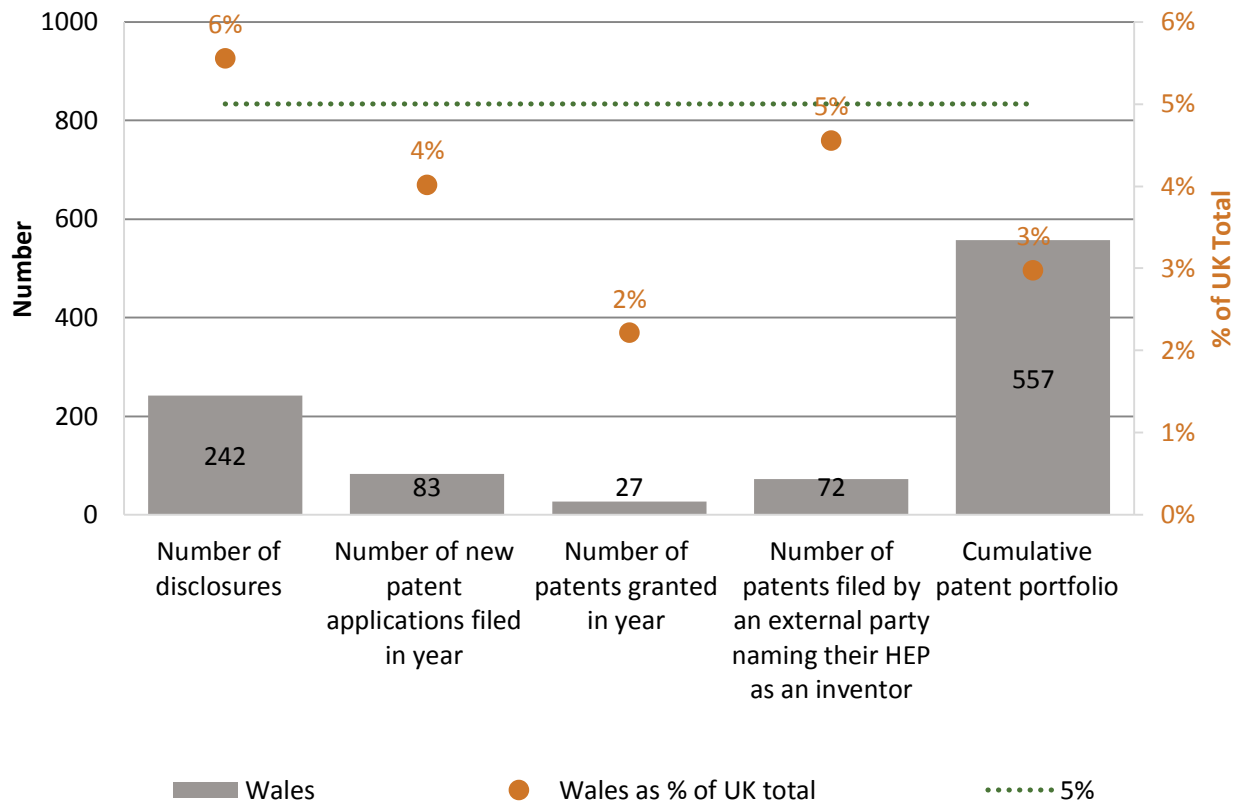
Source: HE-BCIs 2015/16

5.55 Wales' HEIs perform well on the software and non-software licences[52] indicator:

- Software: 85 licences had been granted with SMEs (7 per cent UK share) and 12 with other businesses (1 per cent). A notable point is that more than 24,000 licences with non-commercial organisations had been granted at Bangor University in 2015/16, which on its own makes up almost two thirds of the UK total.

- Non-software: 82 have been granted with SMEs (4 per cent of UK total). A further 227 were granted with commercial organisations, representing a 12 per cent UK share. Around half of licences at Wales' HEIs are generating income (155 licences), which is 9 per cent of the national share.

Figure 5.16: Software and non-software licences granted at Wales' HEIs, 2015/16

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[52] Licences include the number of all active licences granted from licence agreements, assignments, exercised option agreements, licences to spin-outs and income-generating Material Transfer Agreements (MTAs). Software licences govern the use or redistribution of software.

Software licences
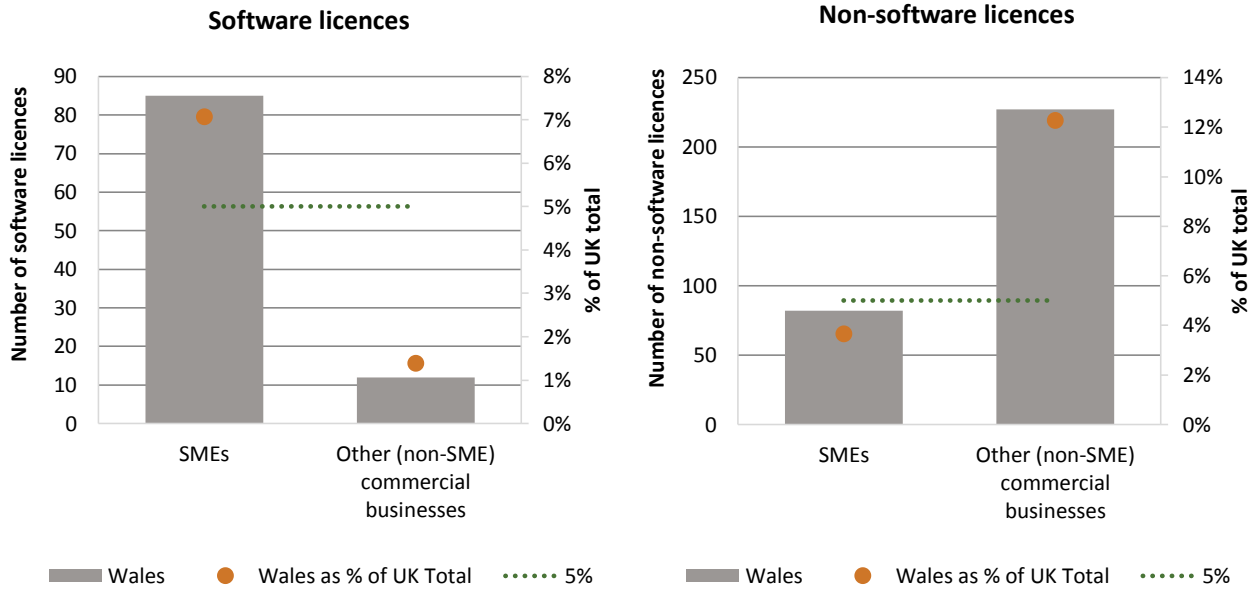
Non-software licences

5.56   Historic performance (Figure 5.17) highlights Wales' strengths in software and non-software licences with non-SME businesses and with SMEs. Wales' share of non-software licences with SMEs has fallen below the 5 per cent benchmark in recent years, whilst it remains above the benchmark for software licences (albeit with significant year-on-year drops since 2012/13). Wales' share of non-software licences going to larger firms is well above the benchmark, at over 12 per cent of the UK total, but well below for software licences.

Figure 5.17: Non-software and software licences granted at Wales' HEIs, 2010/11 - 2015/16

Non-software licences

Software licences
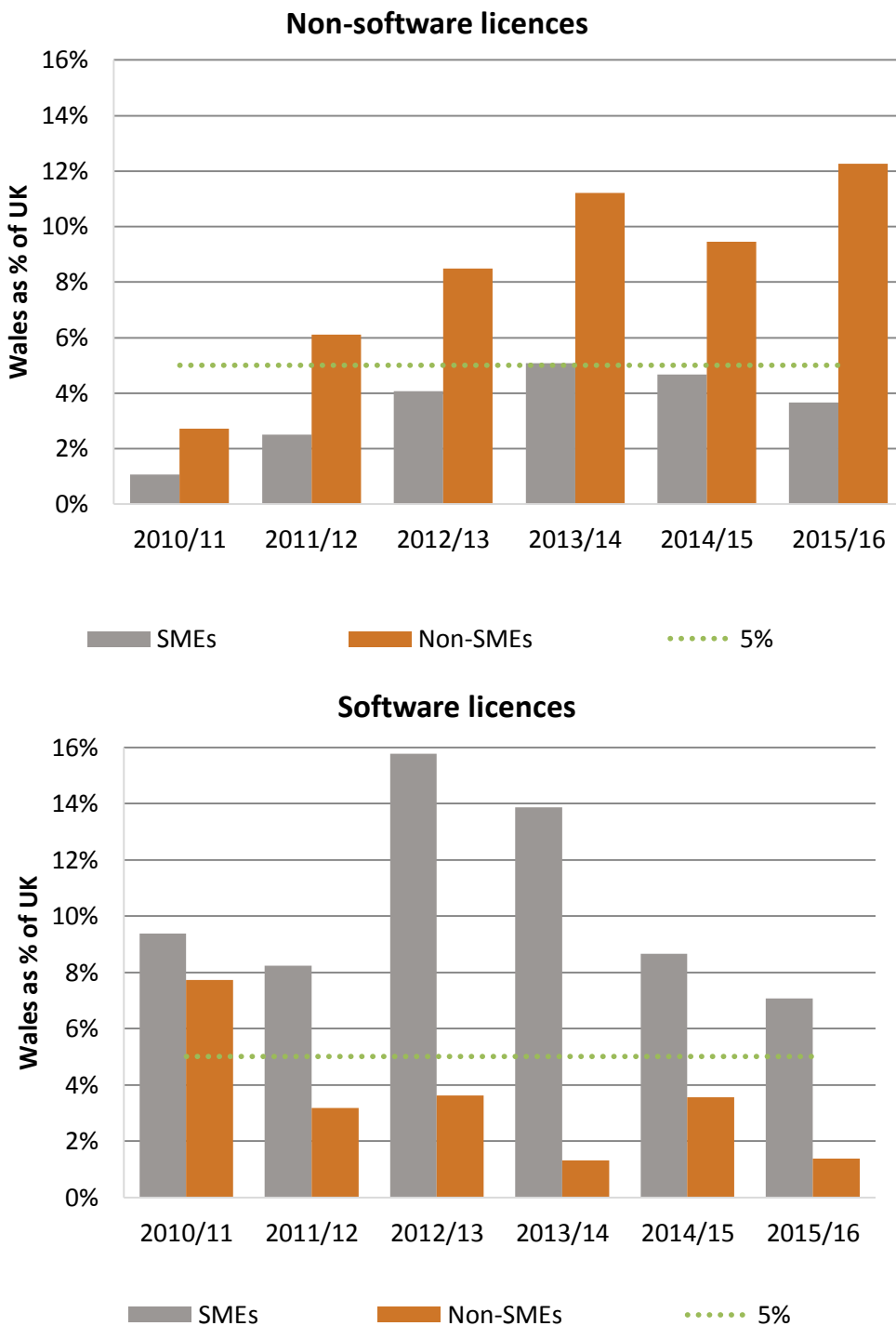
Source: HE-BCIs 2010/11-2015/16

5.57   Intellectual property generated an income of £2.1m for Wales' HEIs in 2015/16. IP income[53] can be further analysed by SMEs and commercial businesses. While this is only equivalent to 2 per cent of the UK total, the average hides some areas of strong performance.

5.58   Trends show SME IP income is volatile, with a peak in 2014/15.

Figure 5.18: IP income with SMEs: software & non-software combined
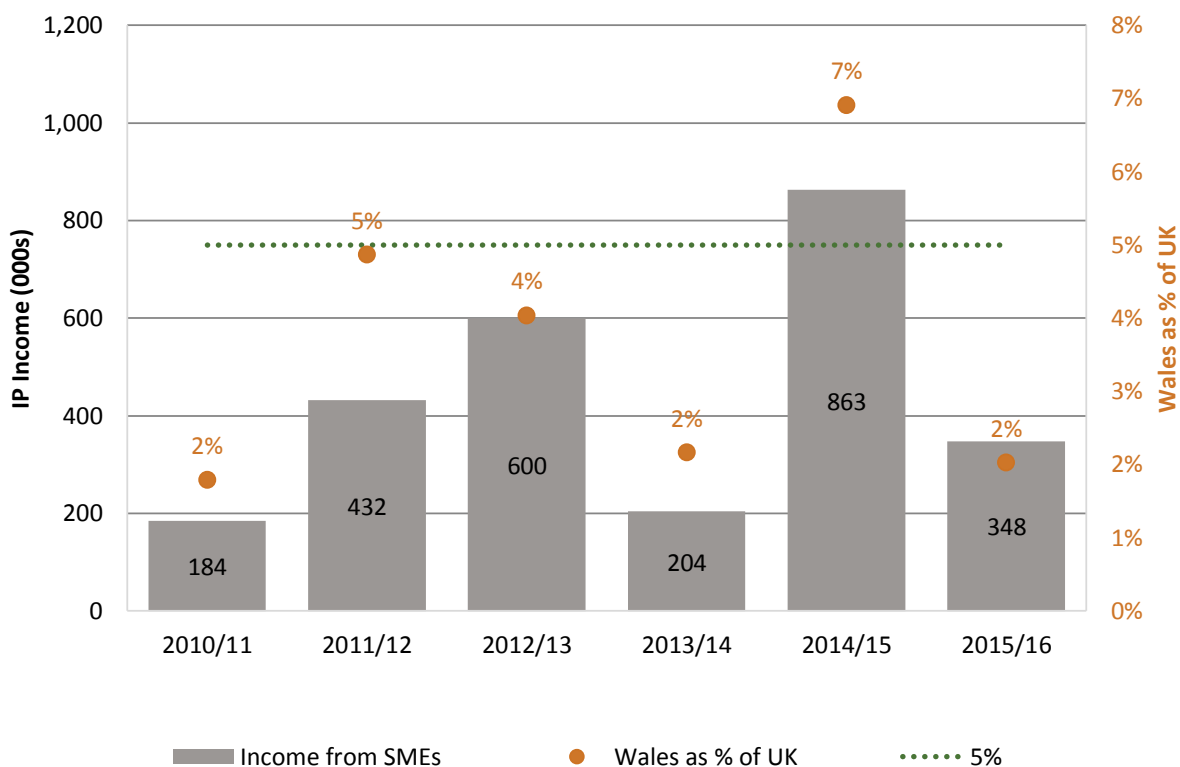
Source: HE-BCIs 2010/11-2015/16

5.59   Income from licences with other commercial businesses amounted to just over £1.6m which is a 2 per cent share of the national equivalent.

5.60   The majority of IP income has been generated by a handful of universities: much of this activity has been driven by Cardiff University (86 per cent of income generated).

5.61   The table below summarises the performance of Wales' HEIs and regions on intellectual property measures.

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[53] IP income includes income from upfront or milestone fees, royalties and patents cost reimbursement (Source: HESA Definitions).

Table 5.6: Summary: IP licences and income, Wales 2015/16

	Number of licences		IP income (£000s)	
	Non-software	Software	Non-software	Software
Cardiff University	272	53	1733	29
Cardiff Metropolitan University	0	0	0	0
Glyndŵr University	0	0	0	0
Total East Wales	**272**	**53**	**1733**	**29**
Bangor University	6	30	0	0
Swansea University	18	1	30	14
University of South Wales	7	3	28	0
Aberystwyth University	6	10	134	4
University of Wales Trinity Saint David	0	0	0	0
Total West Wales and the Valleys	**37**	**44**	**192**	**18**
Total Wales	**309**	**97**	**1925**	**47**

Source: HE-BCIs 2015/16

Spin-off and start-up activity

5.62   Spin-offs are 'companies set up to exploit IP that has originated from within the HEIs'[54]. The activities are the advanced stages of a research journey, as the initial research projects get closer to commercial business activities and hence closer to contributing to economic objectives.

5.63   The table below summarises the performance of Wales HEIs. Shaded cells highlight the indicators where Wales exceeds 5 per cent UK share. Wales shows a reasonable performance in most indicators, with the exception of social enterprises.

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[54] Source: HESA Definitions

Table 5.7: Start-up and spin-off activities at Wales' HEIs, 2015/16

	Established (2015/16)		Still active which have survived at least 3 years		Active firms	
	Number	*% of UK*	*Number*	*% of UK*	*Number*	*% of UK*
Spin-offs with some HEP ownership	12	4%	67	4%	100	4%
Formal spin-offs, not HEP owned	2	6%	29	8%	40	9%
Staff start-ups	4	3%	54	7%	67	7%
Graduate start-ups	308	4%	661	6%	1410	6%
Social enterprises	1	0%	3	1%	7	1%

Source: HE-BCIs 2015/16; Green cells highlight where Wales exceeds 5 per cent UK share

5.64   Analysis by geographical area and institutions highlights the following observations:

- West Wales and the Valleys led on spin-offs with some HEI ownership, where Swansea University accounted for much of this activity. Similarly with staff start-ups, Swansea University had 39 active firms, accounting for more than half of active start-ups in Wales. However, the activity in 2015/16 was modest.

- The area has also outperformed East Wales on formal spin-off activities it generated to date, with two additional spin-offs in the latest year.

- HEIs in West Wales and the Valleys generated 156 graduate start-ups in 2015/16, around half of which are associated with University of Wales Trinity Saint David.

- In East Wales, Cardiff Metropolitan University generated the most graduate start-ups in 2015/16 out of any university in Wales.

Table 5.8: Start-up and spin-off activities at Wales' HEIs, 2015/16

	Spin-offs with some HEP ownership		Formal spin-offs, not HEP owned		Staff start-ups		Graduate start-ups		Social enterprises	
	Number established (2015/16)	Number of active firms	Number established (2015/16)	Number of active firms	Number established (2015/16)	Number of active firms	Number established (2015/16)	Number of active firms	Number established (2015/16)	Number of active firms
Cardiff University	1	31	0	6	2	6	20	190	0	1
Cardiff Metropolitan University	0	2	0	0	0	2	109	293	0	0
Glyndŵr University	0	0	0	5	0	0	23	0	0	0
Total East Wales	1	33	0	11	2	8	152	483	0	1
Bangor University	2	10	0	0	1	9	10	57	0	2
Swansea University	7	47	2	15	1	39	9	70	1	4
University of South Wales	2	7	0	4	0	4	19	177	0	0
Aberystwyth University	0	2	0	9	0	6	30	56	0	0
University of Wales Trinity Saint David	0	1	0	1	0	1	88	567	0	0
Total West Wales and the Valleys	11	67	2	29	2	59	156	927	1	6
Total Wales	12	100	2	40	4	67	308	1410	1	7

Source: HE-BCIs 2015/16

Chapter summary

5.65   Our baseline assessment is summarised in Table 5.9. The table sets out the performance of the Wales' research base against research capacity indicators quantifying the additional requirement to reach the 5 per cent target national share (where appropriate). The table links the data to earlier analysis by Halligan and Bright for comparison.

Table 5.9: Latest baseline position – Research in Wales

Indicator	Baseline position	% Share of UK	Additional annual requirement to achieve 5 % UK share
Research income (2016/17)			
Total research income in Wales	£190.4m	3.2%	£105.4m
Research income per researcher	£32,800	N/A	£10,300*
STEMM research income in Wales	£161m	3.1%	£99m
Research staff (2016/17)			
Research staff, Wales	5,805	4%	1,050
STEMM research staff, Wales	3,230	4%	930
Research income and staff by STEMM subject (2016/17)			
Medicine, dentistry and health – research income	£65.8m	2.7%	£56.1m
Medicine, dentistry and health – research staff	1,365	4%	450
Agriculture, forestry & veterinary science– research income	£13.3m	11.1%	Threshold exceeded
Agriculture, forestry & veterinary science– research staff	95	6%	Threshold exceeded
Biological, mathematical & physical sciences– research income	£45.1m	2.9%	£32.7m

Indicator	Baseline position	% Share of UK	Additional annual requirement to achieve 5 % UK share
Biological, mathematical & physical sciences– research staff	990	4%	300
Engineering & technology– research income	£36.4m	3.3%	£18.8m
Engineering & technology– research staff	775	4%	190[55]
Interactions between HE providers and businesses (2015/16)			
Collaborative research income	£74m	6%	Threshold exceeded
Intellectual property income	£2.1m	2%	3.2%
Spin-offs with some HEP ownership	12	8%	Threshold exceeded
Formal spin-offs, not HEP owned	2	11%	Threshold exceeded
Staff start-ups	4	7%	Threshold exceeded
Graduate start-ups	308	8%	Threshold exceeded

Source: Research staff and income - HESA 2016/17; Interactions between HE providers and businesses – HE-BCIs 2015/16; Research output and quality - Elsevier (2012 data) *Additional income per researcher required denotes the value needed to achieve parity with the UK.

5.66   The key points to note are:

- Research income amongst Welsh HEIs stood at £190.4m in 2016/17, with the gap necessary to achieve 5 per cent of the UK share having widened (dropping from around 4 per of the UK total over the last four years to 3.2 per cent in 2016/17).

- Research income per researcher in Welsh HEIs stood at £32,800 in 2016/17, £10,300 short of that necessary to reach parity with the UK average. The size of this gap increased from 15 per cent to 24 per cent over the last year.

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[55] Note that numbers have been rounded.

- STEMM research income across Welsh HEIs stood at £161m in 2016/17 or 3.1 per cent of the UK total. The gap necessary to achieve 5 per cent of the UK share was fairly stable prior to a recent increase (dropping from around 3.6 per cent of the UK total to 3.4 per cent in 2015/16 and 3.1 per cent in 2016/17).

- Welsh HEIs are lagging behind on measures relating to the number of researchers and research income across most STEMM subject groupings, with the gaps being more pronounced in those subjects which account for the larger absolute amounts of funding (such as medicine, dentistry and health). The exception is agriculture, forestry and veterinary science.

- Welsh HEIs continue to perform reasonably well compared to the rest of the UK on other measures of collaboration with the business community.

5.67   As the first Sêr Cymru II researchers were not in place until late 2016, it should be noted that it is still too early to see the impact of its operation in these indicators (e.g. research income).

6.   Ongoing rationale, objectives and priorities

6.1   This chapter discusses the ongoing rationale for the Sêr Cymru II operations, drawing upon the views of stakeholders interviewed during the mid-term evaluation fieldwork. It should be read in conjunction with the findings set out in the inception evaluation report which considered a desk-based review of Sêr Cymru II documentation in detail and concluded that there was widespread support amongst stakeholders around the need for Sêr Cymru II, that the programme had been appropriately designed to target funding upon early and mid-career research opportunities across STEMM subjects and that the ERDF and COFUND operations had been well aligned.

6.2   The mid-term evaluation fieldwork with stakeholders and funded fellows alike revealed that there continues to be a strong need for Sêr Cymru II intervention. Indeed, most stakeholders did not think that the context within which the programme operated had changed since the inception evaluation phase and several stakeholders stressed that the impacts of the Sêr Cymru II investments (which would in turn have bearing upon the level of need) would only be experienced in the long, rather than short, term.

6.3   Stakeholders took the view that the initiative was continuing to serve the aim of addressing the insufficient research capacity in Wales and that there had been no major changes to its underlying objectives over the last year or so. Stakeholders continued to reinforce the fact that there had been a very clear rationale for the programme and that its overall aims and objectives had remained consistent since its conceptualisation. Stakeholders continued to express their support for Sêr Cymru II being focused upon STEMM subjects and the grand challenge areas identified via the Smart Specialisation Strategy. Furthermore, stakeholders continued to argue that it had been appropriate for Sêr Cymru II to focus on targeting early and mid-career researchers, recognising that it had also been appropriate to include a small number of Chair positions.

6.4   Interviewed stakeholders still believed that the COFUND and ERDF operations were well aligned in principle but some observed that there was a danger that they could become less-aligned in future in light of the fact that the COFUND

programme was due to end sooner, in August 2020, unless the no cost extension currently being negotiated was secured[56]. Other stakeholders observed that despite both programmes being aligned, their implementation differed due to the two funding streams having very different reporting and monitoring requirements.

6.5   With the benefit of hindsight, there was a stronger suggestion during the mid-term fieldwork that the Sêr Cymru II programme could have operated in a more strategic manner in the way it awarded funding. A small number of stakeholders suggested that a greater number of academic researcher clusters, as opposed to individual funded fellows, could have been funded via the programme as it was thought that this approach, whereby small teams of funded fellows had been appointed within the same department, was working effectively. It was suggested that had a greater number of cluster-based opportunities been pursued by universities, the Sêr Cymru II programme could achieve greater added-value than operating as a standard grant-funding programme for post-doctoral researchers.

6.6   Perhaps a new theme raised by a number of stakeholders during the mid-term fieldwork related to the role that other Wales HEIs not currently in receipt of Sêr Cymru II funding could play within the programme. This argument was largely influenced by the fact that funding is currently concentrated within two universities. It was suggested that future provision should look at supporting the development of academic STEMM research capacity within a broader number of Welsh universities. Indeed, there was some appetite for developing 'a sub-scheme targeted at those newer universities who at present are restricted from engaging with the programme'. It was suggested that Sêr Cymru II, given that it is now fairly well-established, could afford to adopt some degree of flexibility in order to accommodate the involvement of non-participating Welsh universities.

6.7   Some stakeholders also suggested that it would be timely to consider whether the aims and objectives of the Sêr Cymru II programme should be maintained in the future as they stood, or whether there was a need to review these and adapt to future needs. For instance, some observed that it would be appropriate for

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[56] However, we understand that the Welsh Government has since secured this no cost extension to the COFUND programme

future provision to focus on ensuring that existing funded fellows are supported into permanent contracts across Wales HEIs, rather than maintaining recruitment efforts to attract other new researchers to Wales. Indeed, this was a cause of concern for some stakeholders who argued that Sêr Cymru II and respective host institutions should exercise a duty of care towards the large cohort of sterling researchers who have been recruited into Wales. Others suggested that it might be appropriate to review programme objectives in light of the fact that four Chairs had been recruited to Sêr Cymru II, particularly given that their appointment offered additional opportunities for the programme to contribute towards strategic Welsh Government policy developments in their fields of expertise.

7. The Sêr Cymru II implementation model

7.1 This chapter sets out the findings from the mid-term fieldwork in relation to the programme's implementation model and considers the application process, the programme's management and reporting requirements as well as lines of communication. It draws on the views of 32 interviewed stakeholders, 15 surveyed funded fellows and qualitative interviews with 11 funded fellows and five of their academic supervisors.

Management, governance and delivery arrangements

7.2 A detailed overview of the implementation model for Sêr Cymru II is set out in the inception evaluation report. The organisational and governance arrangements are summarised in Figure 7.1. The initiative continues to be managed by the Welsh Government who oversee the competitive bidding process for awarding funding to fellows. At the time of drafting, four bidding rounds had taken place with offers being made to the fourth cohort of successful applicants. An Independent Evaluation Panel considers all funding applications and makes recommendations to the Programme Beneficiary Board to approve. Individual proposals for funding continue to be reviewed by international external peer reviewers.

Figure 7.1: Sêr Cymru II Governance Structure[57]
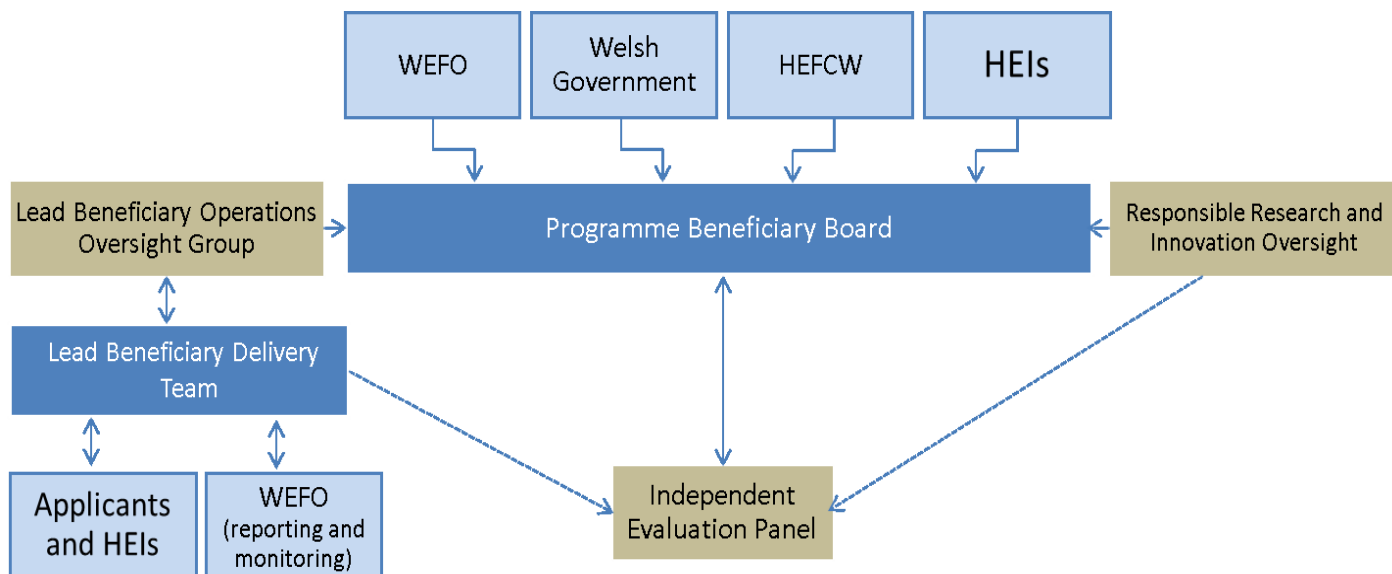
Source: Sêr Cymru II ERDF Business Plans

7.3   Members of the Evaluation Panel as well as Welsh Government officials thought that the Evaluation Panel had become even more effective since the inception evaluation phase, largely due to members gaining greater familiarity with each other and 'bedding down into their role'. One such stakeholder added that the panel 'was fulfilling its role very well'. It was noted that members' enthusiasm and level of commitment had been maintained since the programme's inception and this was considered a key strength of the approach.

7.4   Interviewed Evaluation Panel members noted that they would welcome feedback from the Welsh Government about the progress made by approved projects. Two such members suggested that the Panel could develop a programme outcome monitoring role (possibly in conjunction with the Programme Beneficiary Board) so as to introduce a greater level of rigour to the monitoring of programme (and project level) outcomes. This, it was argued, would help the Evaluation Panel with future application assessment work as members would secure a better grasp of what worked and didn't work following the approval stage.

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[57] The Welsh Government is the main beneficiary.

7.5   Members of the Programme Beneficiary Board as well as Welsh Government officials also believed that the Programme Beneficiary Board continued to work effectively and that a key strength of the Board was the continued involvement and commitment from all Wales' HEIs. As was the case with Evaluation Panel members, there was a desire amongst member of the Programme Beneficiary Board to see a greater shift in emphasis towards programme and project level outcomes and achievements over the coming year or so.

Hearing about Sêr Cymru II

7.6   The inception evaluation found that Sêr Cymru II opportunities were mainly promoted via advertising to existing research academics who in turn made contact with potential candidates across the world to raise awareness. The findings from the mid-term evaluation fieldwork suggested that HEIs had maintained similar approaches to promote funded opportunities over the last year and it was noteworthy that several stakeholders thought that the Sêr Cymru 'brand' had become better recognised and established over time, which was thought to have helped with the programme's promotional activities. Some suggested that the brand could be promoted further however, particularly in terms of ensuring that programme successes were celebrated and communicated in the future: 'there isn't much information about Sêr Cymru out there at the moment. There isn't anything to celebrate the scheme.'

7.7   Several stakeholders believed that overall, Sêr Cymru II had been able to attract a healthy level of interest from prospective applicants and at least two stakeholders involved in the assessment of applications reported that the standard of submitted applications had improved over time.

7.8   At the time of applying for Sêr Cymru II funding, six of the 15 surveyed funded fellows held an academic position at a Wales university (two of these held either a teaching or a research assistant role), a further four held an academic position at a UK university and another four held an academic position at a university outside of the UK. One respondent was working in industry at the time.

7.9   The most common method of coming to hear about the Sêr Cymru II funded opportunity amongst surveyed fellows was via another academic colleague or individual (cited by six respondents) followed by direct communication from the host university (five respondents), reflecting the efforts deployed by individual

HEIs to promote funding opportunities. Four had come to hear about Sêr Cymru II from their academic supervisor and only one cited having seen the opportunity via a website. This is perhaps not unsurprising given the need for applicants to secure the support of their prospective host institution prior to making an application for funding via the programme.

7.10   Of the 15 surveyed fellows, three had taken up their funded position in either December 2016 or January 2017. Six had commenced during the summer of 2017 and the remaining six had commenced between October 2017 and January 2018.

7.11   Interviewed fellows mainly heard of Sêr Cymru II through their existing academic networks. Examples were provided of fellows who had already collaborated with academics at Wales-based universities and who had developed strong working relationships with individual professors. Three of the fellows interviewed were contacted by Wales-based professors (one of whom was a Sêr Cymru II Chair) who explained the Sêr Cymru II programme and encouraged them to apply for posts. The Wales-based academics then worked with the individuals as they prepared their applications. This was the only way they had come across the Sêr Cymru II programme: 'I would not have heard of Sêr Cymru II otherwise'.

7.12   One fellow had heard of Sêr Cymru II via a specialist electronic newsletter in their field of expertise which promoted opportunities of work, conference and publications. Again, this fellow had existing links with a well-regarded team of academics based at a Welsh university, and contacted the Chair of the research team directly who encouraged his application.

7.13   Three other interviewed fellows were already based in the department of a Welsh university where they would ultimately be placed as part of the programme. In these instances, two had heard about the programme during discussions with senior academics in their respective departments. The other applicant had received an internal advert about Sêr Cymru II funding opportunities from the University's Research Office and had raised it with their line manager, who supported the idea. Prior to submitting an application, this individual had to go through an internal submission process first within the University, and was ultimately chosen as one of only two applications from a possible nine to be submitted to Welsh Government.

7.14   An interviewed Recapturing Talent Fellow described how they were contacted by an existing contact at the University. After a seven year career break, this fellow had not found the process of finding out about Sêr Cymru II a straightforward one, and felt that the process was dependent on those already in academia playing a very proactive role in contacting those who were currently on career breaks or had moved into private sector employment: 'I was lucky, I knew someone'. However, the individual questioned how the Sêr Cymru II programme would have engaged with 'recapturing talents' without such a proactive contact.

7.15   One interviewed Chair described how he was being pursued by renowned London based Universities and a Wales based university. The London based 'offer' would have had 'more kudos and a grand sounding title' but he was concerned that they lacked vision, and ambition. In contrast, the Chair, who was originally from Wales, and had an existing working relationship with a University here, had been particularly impressed with the host University's Vice -Chancellor who had made it clear that there was a gap at [the University] to be filled, and that there was ambitious support from the top. The Chair was attracted by the fact that there was a strong infrastructure already in place and a critical mass of research into their areas of expertise, with a world class centre and institute already part of the University infrastructure. He also felt that the Vice-Chancellor and the university were ready to invest and that they understood that such investment would need to be long-term in order to produce results. The Chair felt that the university had the vision to set up a centre that could compete on an international stage. As a result it was agreed that an application was made to the Sêr Cymru II programme.

Applicant's experience of the application process

7.16   In terms of applicants' experience of the application process the majority of surveyed fellows had found it acceptable and reasonable, adding that the process had been 'very straightforward', 'user friendly' and 'transparent'. Figure 7.1 shows that all but one of the surveyed fellows were satisfied with the suitability of the expert reviewers selected to review their funding applications and the rigour of the application review process. The majority had been satisfied with the ease of completing the full application form to the Welsh Government,

although three of the surveyed respondents were very unsatisfied with the application form. Surveyed fellows were slightly more critical of the time spent waiting for a decision on the outcome of their application and waiting for Welsh Government approval letters to be awarded.

Figure 7.2: Surveyed respondents views' of the application process
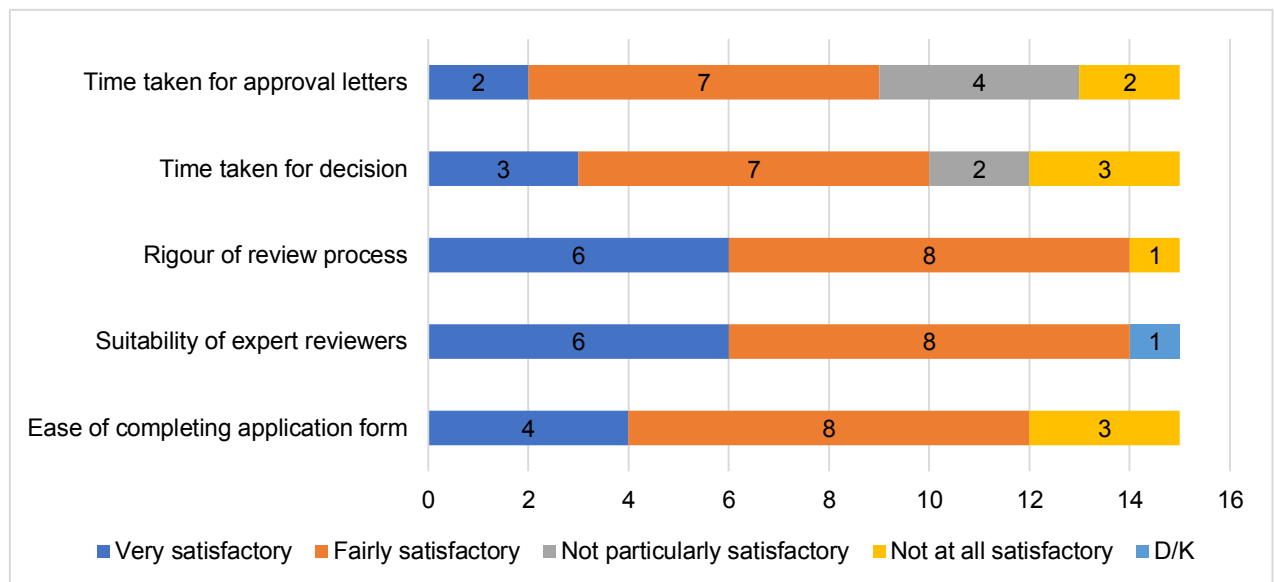
Source: OB3 Survey of funded fellows (n=15)

7.17 The main issues raised by the minority of surveyed respondents who had been dissatisfied with the application process related to the lack of clarity issued by the Welsh Government around eligibility and the fact that the form and accompanying guidelines were only made available at the 'very last minute'. One of these respondents also observed that it had not been particularly reassuring to work with documents which 'had 'draft' watermarks' on them and argued that 'clear guidelines and criteria [should be] in place months before application deadlines' be set.

7.18 The majority of interviewed fellows were happy with the application process for Sêr Cymru II. They understood that an application process was required for the awarding of such funding and generally felt that the process was 'sound and robust'. One fellow described how the overall experience of completing the application form and dealing with the host university had been a pleasant experience. One fellow felt that the level of information requested as part of the application process was appropriate whilst another mentioned that it compared to other similar applications they had made in the past. One fellow even

suggested that the application process could be harder: 'I applied for various opportunities…and I think Sêr Cymru should be more difficult when thinking about other processes – it wasn't as in-depth and in-detail. I'm not sure if it was taken as seriously'.

7.19   Two of the fellows mentioned the opportunity to respond to reviewer's comments as something that they particularly valued, especially as one had received quite negative comments from one reviewer, and felt that his application had not been fully understood. The opportunity to set the record straight and provide further comment was much appreciated.

7.20   Guidance and support from the host university was unanimously acknowledged and appreciated by fellows. The interaction with host universities was deemed positive and useful, although the extent of support offered largely depended upon the approach adopted by individual departments. The Rising Star fellow in particular had been grateful for the guidance and support through the process and concluded that they would not have been able to prepare a proposal without such additional support from the host university.

7.21   Some areas of the application form were raised as being particularly challenging nonetheless including:

- *Describing how the research could be applied to public engagement and outreach activities* – this was described by two interviewed fellows as a section that was unusual, and slightly challenging to complete.

- *Linking the application to the relevant policy and strategy priorities in Wales* – one interviewed fellow described how this section 'is playing a game in some respects, but the University knew what buttons to press for the section on the Welsh economy and what strategies to quote'.

- *Difficulty in tracking the status of the application* – due to the fact that there were no clear timescales set for the process.

- *A lack of background information about Sêr Cymru II* – one fellow mentioned that there was no information about the programme online and no understanding of the level of fellowship provided. As such, making the career decision was somewhat of a step into the unknown: 'I accepted the position in blind faith'. Some interviewed fellows suggested that it

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would be helpful for the programme to have its own dedicated website which shared information, showcased the work of high-calibre funded fellows and celebrated the achievements of the operation. Another interviewed fellow thought that an online application process should be adopted by the programme.

7.22 Several HEI stakeholders were still critical of the time taken to issue approval letters after funding applications had been approved and were able to cite a few examples of applicants who had withdrawn from the process during this time, often due to having secured another funding or work opportunity. At least three of the interviewed fellows commented upon the difficulties which they had faced as a result of the considerable length of time taken for the Welsh Government to issue a formal approval letter to the HEI at which they would be based. These examples were all from the earlier stages of the Sêr Cymru II application process. A fellow with more recent experience of the programme felt that the time spent waiting for a decision was quite short in comparison to other applications that he had submitted at the same time: 'I think it was about three or four months' but the competitive nature of the market suggests that early notification of successful applications remains crucial. A couple of fellows had also experienced delays between notification of a successful outcome and being in post and stressed the importance of moving swiftly to make these arrangements. In one example, their previous host institution had continued to pay a salary for a couple of months longer than planned to cover the delay 'or otherwise I would not have had an income. It was a very stressful time for me financially'.

7.23 Most stakeholders believed that the Sêr Cymru II application process worked well overall, although some criticism was expressed about the management of the third round of applications. A few stakeholders observed that the Welsh Government had increased its efforts to contact a greater number of application peer reviewers during the fourth round of applications in light of the low and inconsistent numbers secured during the third round. Indeed, data provided by the Welsh Government shows that in excess of 700 external reviewers were contacted to review the 38 applications received during the fourth round (for both ERDF and COFUND) and a 20 per cent response rate was secured. This

compared to some 350 for round two and 480 for round three applications. The previous low number of reviewers was attributed in part to the lack of Welsh Government staff capacity who were able to approach possible reviewers.

7.24 Stakeholders believed that it was appropriate that Sêr Cymru II provided an opportunity for applicants to respond to the comments offered by external reviewers as this often resulted in the development of stronger projects. A few stakeholders commented positively upon the Evaluation Panel's approach to defer their decision making in order to provide this opportunity for applicants to respond to comments and indeed, a couple of stakeholders suggested that applicants should be offered the opportunity to be interviewed by members of the Evaluation Panel.

Management and administration

7.25 The majority of surveyed fellows (11 of the 15 respondents) thought that the Sêr Cymru II operation was being managed either very or fairly well by both the Welsh Government and their university. Stakeholders recognised that the Welsh Government had invested significant time and effort into the programme's strategic level planning but thought that some elements, such as programme paperwork, could have been in place earlier.

7.26 Several fellows found the process of requesting funds an onerous one that differed to the approach of other grant funders such as Research Councils 'where you get allocated a budget from the start'. One common issue raised by several surveyed and interviewed respondents related to the lengthy and complicated application and claim process in relation to requesting permission to travel as part of their research. Concerns were raised about the need to apply for approval three months prior to an overseas visit in order to satisfy WEFO funding requirements, as planning ahead this far in advance was not always realistic. Fellows suggested that the process of 'writing four or five pages on why I want to attend a conference' was too time-consuming and not in line with previous experience of fellowship funding. Furthermore, others made the point that delays in securing approval for travel from the Welsh Government led to delays in being able to book flights and hotels at reasonable rates, which often resulted in increased costs. One fellow mentioned that they tended to pay for parking and basic subsistence out of their own pocket now, without requesting

reimbursement, simply because the amount of paperwork associated with the process took too much of their time.

7.27   One survey respondent observed:

'The amount of information required to travel is insane. It takes ages for them to approve the travel (even to London) which increases a lot the final prices of flights and accommodation. They [Welsh Government] don't understand the importance of having flexibility to use travel funds to make the most of opportunities such as being part of a consortium to write a grant to increase the impact of our work'.

7.28   HEI stakeholders reinforced the difficulties associated with this, adding that COFUND funded fellows did not face any such restrictions such as requiring three months' notice for securing international travel approval, as the European Commission's guidelines differed to those implemented by the Welsh Government as a condition of WEFO funding requirements.

7.29   Another issue, raised by one survey respondent and at least one stakeholder related to the status of funded fellows awarded by universities and funding bodies and it was suggested that this varied from one institution to another. The survey respondent argued that the operation could have communicated more effectively with other funding bodies to ensure that the role of a funded fellow was better understood to be at the 'senior early career fellow' as opposed to a more junior post-doctoral level. This perception was thought to hinder fellows' ability to secure grant funding, for instance 'this means that I am very limited in terms of the research grants that I can apply for, which is in turn limiting my career progression'. Although surveyed respondents called upon the Welsh Government to clarify whether Sêr Cymru fellows were indeed 'standard postdocs' or 'fellows in the sense of UK Royal Societies' it is understood that the Welsh Government has confirmed that funded researchers fall into the first rather than the second category.

7.30   Interviewed fellows generally stated that they did not have much direct involvement with Welsh Government in terms of the management of the programme, and that the host university would act as a 'go between' in most cases. Of those who felt they could comment, one described the programme as being 'well managed' by Welsh Government, whilst another felt that there was

some lack of knowledge and uncertainty within the Welsh Government management team and an element of 'learning as they are going along'. Another fellow, whilst acknowledging that their interaction with the Welsh Government team was limited, mentioned that they were able to contact one or two members of staff for advice and support if necessary, and that they had always been very helpful.

7.31   An interviewed Chair felt that the discussions with Welsh Government tended to be around rather 'bureaucratic and menial' issues and felt that there was a lost opportunity to utilise the expertise and experience of some of the more senior funded academics to fulfil Welsh Government's vision for research excellence in Wales. For example, the Chair stated how he had no involvement at all in a biotechnology strategy currently being developed by Welsh Government, and that those driving the strategy at Welsh Government did not have any direct experience of the sector: 'The Sêr Cymru network isn't very strategic and we aren't being used effectively. Welsh Government wants to develop research and innovation but don't have the experience, yet here we are, and we are completely under-utilised at a national level'.

7.32   Fellows praised the management at each of their respective host universities, highlighting the positive and strong support provided, in a relaxed and trusting manner. The two Recapturing Talent fellows interviewed particularly valued the informal, day-to-day support they received from their line manager and wider university staff.

7.33   Fellows described how the research office and finance teams in their host universities were obviously well-versed in dealing with WEFO funding and reporting requirements and that they were very efficient in dealing with administrative issues and 'extremely useful' in supporting fellows with any issues as they arose.

7.34   A number of HEI based stakeholders voiced their frustrations at the monitoring arrangements put in place by the Welsh Government despite them being notified upfront by the Welsh Government that they would be required to supply evidence for all individual items of expenditure claimed via the programme before moving towards an expenditure sampling approach once the Welsh Government was satisfied that all claims met the necessary EU funding

requirements. This '100 per cent evidence approach' was proving hugely onerous for HEIs and was a source of tension between Welsh Government delivery staff and individual HEIs, particularly given that some HEIs were not thought to have adequate resources in place to administer the programme. In the case of HEIs who had taken on several funded fellows it was observed that significant resources was spent on meeting programme audit requirements and a strong call was made for the approach to be commensurate with the risks involved. At the time of undertaking the fieldwork, representatives from HEIs called upon the Welsh Government to adopt an expenditure sampling approach and by the time of drafting it is understood that the Welsh Government was moving towards this approach.

7.35   Aligned to this point, HEI stakeholders also drew attention to the fact that existing financial claims submitted to the Welsh Government had not been settled and that these were still outstanding at the time of our fieldwork. At least two HEIs mentioned that they had not received payment for a period of 15 months and the programme was becoming a huge financial burden for their respective institutions. Several reasons were offered for these delays – in some cases it was thought that the adoption of the new WEFO online system to process claims had led to delays, in others it was noted that there had been errors in the claims submitted by universities whilst in others, insufficient documentation had been shared with the Welsh Government.

Reporting Requirements

7.36   Sêr Cymru II fellows are required to submit quarterly claims to the Welsh Government and at the time of undertaking the fieldwork the monitoring forms which funded fellows are required to complete were being reviewed[58] and plans were underway to move towards utilising the WEFO online reporting mechanism[59].

7.37   Around three-quarters of the surveyed fellows (11 of the 15 respondents) thought that the reporting requirements asked of them by the Welsh Government were appropriate and acceptable. Some ten of those surveyed had

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[58] The most recent version of the Sêr Cymru II scheme guidance (Version 3) was issued by the Welsh Government in November 2017.
[59] By the time of drafting the report it is understood that the WEFO online reporting tool was being utilised.

received some or significant support in order to meet the operation's reporting requirements. Some stakeholders thought it was inappropriate for the three different types of researchers to have to adopt the same monitoring form as the nature of their work and level of responsibility differed.

7.38   Views around the reporting requirements varied amongst interviewed fellows. More experienced and senior fellows felt that the reporting requirements and Key Performance Indicators (KPIs) were 'very simple and straightforward' and were considered similar to the requirements of other funding schemes. A couple of fellows had struggled initially with the requirements, particularly as the format of the reporting forms were regularly adapted initially, but had now familiarised themselves with the reporting requirements and were clearer about how to approach the process. Three fellows, including the Rising Stars had struggled with the reporting requirements: 'This goes beyond anything that I have experienced' and felt that the process had been a learning curve.

7.39   One very experienced and senior fellow suggested that a little flexibility in the KPIs initially outlined in the research application would be sensible, simply due to research projects having a tendency to evolve and change as the work progresses. Welsh Government officials confirmed that whilst it is possible to make reasonable changes to funded fellow KPIs, any WEFO funded KPIs cannot be changed.

7.40   Most of the interviewed funded fellows felt that too much detail was required in the quarterly reports submitted to Welsh Government. One fellow felt that there was a 'tendency to micro manage', whilst another described the quarterly financial auditing process as 'heavy handed'. In defence, it was argued that the reporting requirements placed upon funded fellows had been driven by the need to meet EU funding requirements, together with the need to ensure that appropriate use of public money was being made.

7.41   Four fellows suggested that the frequency of reporting should become less regular, to allow better reflection of the progress of what are long term research projects rather than the current quarterly reporting structure: 'I don't have any big conclusions every three months. At the moment I explain to [WG] that I continue to do what I did before!' Three of these fellows suggested that reporting every six months would be a more sensible approach, whilst another suggested

a more detailed annual report with an opportunity to update any information quarterly only if there was something substantial to report. However, introducing any change to the current quarterly reporting format would have implications for programme reporting and financial claims submitted to WEFO.

Communication

7.42   In the absence of a funded fellow on-line networking group at the outset, a few researchers established their own online forum for funded fellows using Slack[60]. Since then the Welsh Government has set up a Yammer group[61]. Stakeholders suggested that having two online groups was proving problematic for researchers as there was a danger information needed to be duplicated on both the official and unofficial sites.

7.43   Some issues were also raised about the approach used by the Welsh Government to communicate directly with funded fellows, and that European Officers within the respective institutions were not being informed of some developments e.g. events taking place.

Sêr Cymru II Delivery Team

7.44   The Sêr Cymru II delivery team within the Welsh Government has consisted of up to nine officials who divide their time between the ERDF and COFUND elements of the programme. The programme as a whole (including COFUND and ERDF operations) is overseen by the Head of Research Programme Development who reports to the Head of Operations in the Chief Scientific Adviser for Wales' division.

7.45   Interviewed stakeholders continued to comment positively upon the work of the Head of Research Programme Development but still voiced their concerns about the over-dependency of the programme upon this one individual. This issue was perhaps becoming more pressing recently in light of the fact that the postholder had taken on greater responsibility for securing future programme funding and could allocate less time to the direct management of the Sêr Cymru II operation. Several stakeholders argued that the programme required the input of a dedicated manager who understood the HE sector.

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[60] A cloud-based communication portal
[61] A social networking online site

7.46   The delivery team has experienced some turnover across its staffing capacity of late and the lack of capacity across the team at times has presented some challenges for the management of Sêr Cymru II. Several stakeholders also suggested that, other than the Head of Research Programme Development who has a HE background, there was a lack of understanding and expertise of the HE sector across the Welsh Government delivery team.

7.47   It was also a cause of concern for members of the Evaluation Panel who were concerned about the quality of information submitted to them during the third round of applications. This was thought to have been addressed by the fourth application round as the information submitted to the Evaluation Panel during this funding round had improved substantially compared to the third. As a result, it was thought that the panel had been able to fulfil its duties much more efficiently.

Chapter summary

7.48   The key findings of the fieldwork in relation to programme implementation were:

- The Evaluation Panel and Programme Beneficiary Board were both considered to be operating effectively, with the Evaluation Panel having become even more effective since the inception evaluation phase.

- HEIs continued to promote Sêr Cymru II via their existing contacts and networks and funded fellows had mainly heard of the programme through their existing networks.

- Funded fellows had found the Sêr Cymru II application process to be largely acceptable and reasonable and the guidance and support offered by host universities was unanimously acknowledged and appreciated by fellows.

- The application peer review process and information supplied to the Evaluation Panel had improved by the fourth round of applications in light of the difficulties experienced during the third round.

- The approval process continues to take a considerable length of time even though this is in keeping with other academic grant funding application timescales. Nonetheless, a small number of successful applicants do not

take up their funded opportunity as they secure other funding or work opportunities during this time.

- The majority of fellows thought that the operation was being managed well by the Welsh Government and their respective university.

- Although HEIs have been informed of documentation requirements, they believe that they are required to allocate unreasonable resources to meet the programme's financial monitoring claim requirements.

- Funded fellows are frustrated by the lengthy and complicated travel application process which they are required to adhere to although it is recognised that the Welsh Government is working with WEFO to streamline the process.

8. Delivery and performance to date

8.1 This chapter considers the achievements of the Sêr Cymru II programme to date, including its performance against its funded targets and some of the key externalities which have influenced its performance.

Fellows and research projects funded to date

8.2 At the time of drafting, there had been four funding calls across the Sêr Cymru II programme. A total of 183 applications were received over these four rounds across the EDRF and COFUND programme. The number of applications received per round varied with 64 made during round one, 43 during round two and 38 during rounds three and four respectively.

8.3 The WEFO quarterly claim covering the period up to the end of December 2017 reports that offer letters had been issued to successful prospective fellows for Rounds 1, 2 and 3. Applications for round 4 were considered during that quarter and by the time of drafting one offer had been made for a Rising Star applicant at Cardiff University.

8.4 Based upon an analysis of Welsh Government datasets received in April 2018, a total of 51 fellowships were awarded across the first four round of calls of the Sêr Cymru II ERDF programme[62]:

- In terms of live awards, 11 awards were offered from round one, 20 awards from round two, 9 awards from round three and 10 awards from round four. One round one fellow had left.

- Cardiff and Swansea Universities between them have been awarded the vast majority (43 in total with 24 allocated to Cardiff University and 19 to Swansea University).

- South Wales University has one live award from round one and Aberystwyth University has five live awards which include two Chair packages. Bangor University has two live awards which includes a package of support for Research Chairs.

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[62] Including one fellowship which was awarded during round 1 but later withdrew due to personal circumstances.

- 33 of the 51 awards have been for Research Fellowships, with three Recapturing Talent, nine Rising Stars and six Chair funding packages.

8.5 In addition to these 51 awarded fellowships a further 10 applications were withdrawn during rounds two, three and four. Four of these applicants withdrew their application after the Panel and Programme Beneficiary Board had agreed to support the project, but before an award letter had been issued to the individual. A mix of reasons were provided for withdrawing including personal reasons (two), being offered a job elsewhere as well as securing another grant funding source such as a Medical Research Council (MRC) funded fellowship and an Engineering and Physical Sciences Research Council (EPSRC) award, which applicants had submitted in tandem with their Sêr Cymru II application.

8.6 Table 8.1 provides an overview of the fellowships awarded to date against the output targets for each category, as set out in revised business plans agreed with WEFO.

Table 8.1: Overview of awarded fellowships (rounds 1 to 4 excluding any withdrawn) against revised targets

Fellowship Type	WWV Target	WWV Achieved	EW Target	EW Achieved
Research	15	16	15[63]	17
Rising Star	5	4	5	5
Recapturing Talent	6	3	6	-
Chairs	2	4	2	2
Total	26	27	26	24

Source: Welsh Government (outputs as at 23 August 2018)

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[63] Includes one funded fellow who left in August 2017.

8.7 This shows that after four rounds, the target number of Research Fellows in West Wales and the Valleys and East Wales has been exceeded.

8.8 Recent positive progress has been made in relation to the awarding of Rising Star and Recapturing Talent fellowships, largely driven by the number of awards issued during the third and fourth rounds to these types of fellowships.

8.9 Despite this, stakeholders continued to express their concerns about the lack of interest in the Recapturing Talent category which reinforced their opinion that there was insufficient demand amongst possible researchers to achieve this overall target of 12. Stakeholders suggested that this WEFO funded target needed to be reviewed and reduced to reflect actual up-take levels. Some stakeholders were also of the opinion that it would be appropriate to review the criteria for awarding this funding as the low level of interest suggested that it was not currently meeting the needs of the target cohort. Despite the programme having adopted similar criteria to other funding sources (e.g. the Daphne Jackson Trust for scientists and engineers returning to research following a career break[64]) and relaxing its criteria over time, it was generally thought that the criteria had been too stringent and that it might have been appropriate to offer secondment opportunities to those working within industry as part of this package.

8.10 Stakeholders continued to argue that it has been appropriate to support a limited number of funded Chairs within the Sêr Cymru II programme and welcomed the fact that these appointments had been strategically located across Wales[65]. The inclusion of Chairs was considered to represent a shift in the focus of delivery but stakeholders generally took the view that their inclusion offered a greater opportunity for Sêr Cymru II to create stronger specialist clusters of academic researchers within their respective institutions, which would in turn have a greater impact on developing self-sustaining networks.

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[64] Further information about the Daphne Jackson Trust
[65] It was reported that three Chairs had taken up their positions at Cardiff, Swansea and Aberystwyth University whilst a fourth was about to take up position at Bangor University.

Performance against funded targets

8.11   Most stakeholders based at HEIs as well as other organisations appeared to be satisfied with the progress being made by Sêr Cymru II but had little concrete evidence to substantiate their views as it was felt that the programme was not yet disseminating information on its achievements against funded indicators.

8.12   Programme achievements against the current ten indicators for Sêr Cymru II are set out in Table 8.2. It is worth noting that some outputs were not profiled to be achieved by the mid-term stage given that they are mostly dependent upon the research conducted by new researchers. As such, we don't think it appropriate to offer a view on some output indicators e.g. societal or economic benefits or researchers securing permanent roles, as these will only be realised during the second half of the Sêr Cymru II delivery.

8.13   Overall, the programme has been able to make better progress against all of its output targets across West Wales and the Valleys than in East Wales. This is to be expected however as a higher number of awards were made from the earlier rounds of funding in West Wales and the Valleys than East Wales. It is worth noting that the achievement rate in claims submitted to Welsh Government against the result indicator (funding secured to carry out applied research) is much better in East Wales than in West Wales and the Valleys.

8.14   The table shows that as at August 2018 the programme has supported 54 new researchers, against an overall target of 74 for both West Wales and the Valleys and East Wales. The programme's performance across West Wales and the Valleys (with 35 of the 38 new researchers supported) is better than that of East Wales, where only just over half of the target of new researchers has been achieved. Again, this reflects the rate at which awards have built up over the two programme areas. The programme has made good progress against its target for research publications produced by researchers, having already achieved over half of its target across both West Wales and the Valleys and East Wales combined.

8.15   At this mid-term stage we would possibly have expected a greater number of new researchers to have become STEMM ambassadors, given that only 5 of the 51 directly funded fellows (and against an overall programme target of 52) have been reported activity. Again, the programme's success in achieving this output differs between West Wales and the Valleys and East Wales.

Table 8.2: Achievements against Sêr Cymru II Indicators and Targets

Indicator	Indicator Type	WWV		EW		Total	
		Overall Target	Achieved	Overall Target	Achieved	Overall Target	Achieved
Amount of funding secured to carry out applied research (over seven years)	Result	£13m.	£0.4m	£12.5 m	£2.1m	£25.5 m	£2.5m
Number of new researchers in supported entities across the life of the programme[66]	Output	38	35	36	19	74	54
Number of enterprises (commercial and non-governmental organisations) co-operating with research institutions[67]	Output	27	12	25	0	52	12
Number of research publications produced by researchers	Output	27	23	25	6	52	29
Number of other jobs and PhD studentships created by/linked to the new posts	Output	27	4	25	2	52	6
Number of commercialisable outcomes	Output	5	0	5	0	10	0
Number of societal or economic benefits	Output	5	0	5	0	10	0
Number of Research Fellows taking up permanent role in the host institution[68]	Output	13	3	13	0	26	3
Number of STEMM ambassador activities	Output	27	11	25	2	52	13
Number of Research Fellows undertaking activities outside of standard postdoctoral role[69]	Output	10	2	10	0	20	2

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[66] The number achieved is based upon new researchers in post, rather than awards made.
[67] As at August 2018, it is understood that WEFO is in the process of agreeing with the European Commission that this indicator be changed to 'Number of partners cooperating in a research project'
[68] This indicator was changed from 'number of Research Fellows 'going into academic or commercial research jobs at or before the end of their 'Sêr Cymru II' fellowship'
[69] E.g. organising a conference in their areas of research; submitting a research proposal as Principle Investigator

8.16   Stakeholders from HEIs as well as other organisations continued to take the view that the research topics funded provided good coverage of the three original grand challenge areas. Figure 8.1 shows how all ERDF and COFUND funded fellowships have been awarded across the four grand challenge areas. Just over half of all fellowships relate to a single grand challenge area while the remaining half relate to two or more grand challenge areas. When considering the four grand challenge areas covered by fellowships (be that on a single or combined basis):

- 49 per cent relate to low carbon, energy and the environment.

- 44 per cent of the fellowships cover life sciences and health.

- 34 per cent relate to advanced engineering and materials.

- 11 per cent relate to ICT and the digital economy.

Figure 8.1: Grand challenge areas covered by ERDF and COFUND fellowships
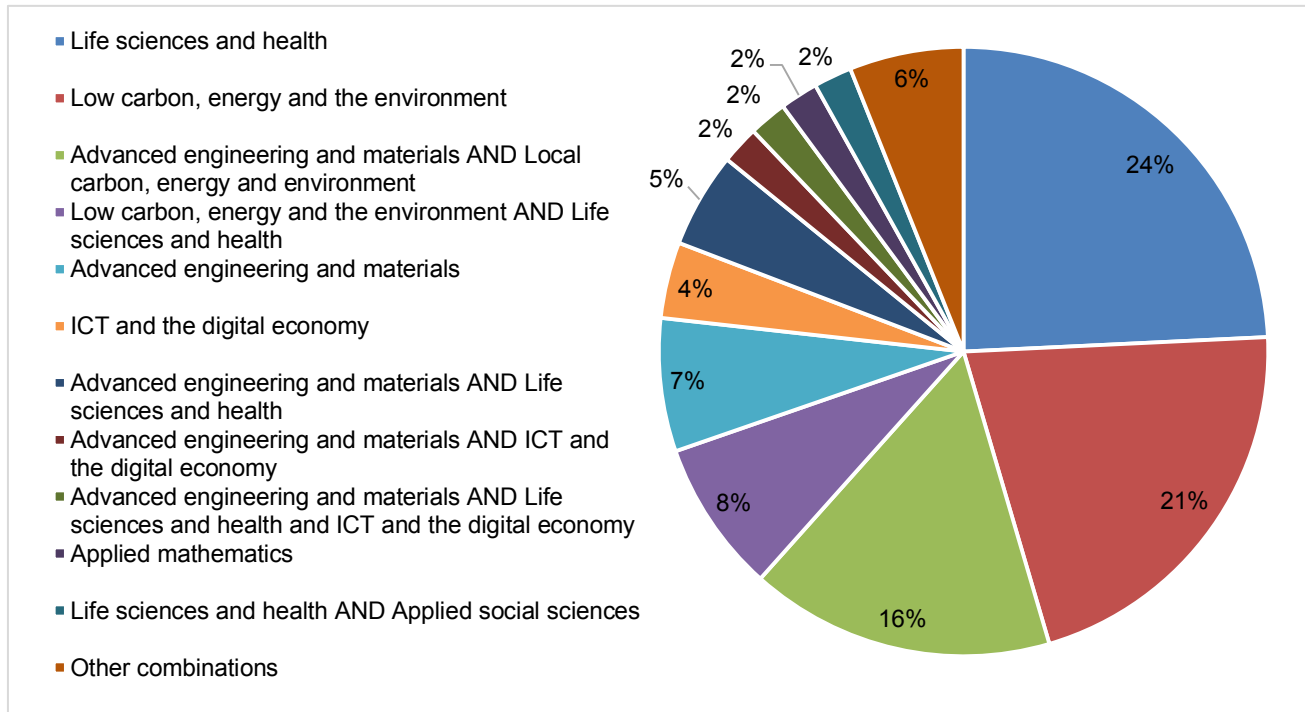
Source: Welsh Government, April 2018 Base=128 fellows

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[70] These outputs are generally higher than those reported to WEFO as at the end of July 2018 – some outputs were not reported to WEFO as the data has not been included in the returns provided by fellows.

8.17   Stakeholders would have welcomed a better geographical spread of funded projects and as discussed in Chapter 6, some would welcome the inclusion of non-participating HEIs. Others were mindful that restrictions such as the availability of match funding on the part of other HEIs, such as Bangor University, had restricted the number of applications which this institution was able to make to the programme.

8.18   The majority of stakeholders were unsighted about how Sêr Cymru II funded projects were contributing to the goals of the Wellbeing of Future Generations (Wales) Act and those who were in a position to comment suggested that applicants had not been asked to identify and demonstrate how their research projects would contribute to these goals. It is understood, however, that the Welsh Government intends to ask future applicants (for both the COFUND and ERDF funded programmes) to demonstrate how their projects will contribute towards the goals set out in the Act. Furthermore, one stakeholder suggested that it would be beneficial for the programme to map existing funded research projects against the broad goals of the Act[71] and demonstrate in detail how some projects were contributing effectively to one or more of these areas.

Influence of key external factors

8.19   Some stakeholders expressed their concern that Sêr Cymru II may have suffered from the lack of a dedicated champion and leader as a result of the previous Chief Scientific Advisor stepping down from her post during 2017 and the length of time taken for a new post-holder to commence in the role in March 2018. Some stakeholders held a perception that the programme had suffered from 'a lack of direction' and 'a hiatus in momentum' during that time. However, others argued that there was no concrete evidence to show that any Sêr Cymru II provision had been delayed or affected by the lack of a dedicated Chief Scientific Advisor to champion the programme for this six-month period. Stakeholders were unanimous in their view that the appointment of Professor Peter Halligan as Chief Scientific Advisor was crucial in ensuring that the Sêr Cymru II programme continued to have a voice and champion at a UK level,

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[71]The seven well-being goals are a prosperous Wales, a resilient Wales, a healthier Wales, a more equal Wales, a Wales of cohesive communities, a Wales of vibrant culture and thriving Welsh language and a globally responsible Wales.

particularly given the ongoing uncertainties in terms of future funding as a result of Brexit.

8.20   The other key externality raised by stakeholders in the main related to the UK's decision to leave the EU. Several stakeholders observed that this had created unpredictability and uncertainty for the HE sector generally although the fieldwork did not reveal that it had impacted the programme directly as yet e.g. whilst some stakeholders suggested that Brexit might have influenced prospective applicant's decisions to apply to a university in Wales there continued to be a steady level of interest in funding opportunities. Stakeholders thought that Brexit was likely to impact the programme in the future, for instance, there was some suggestion that Brexit could negatively impact upon Wales' ability to secure international research income in the future.

Chapter summary

8.21   After four funding calls across the Sêr Cymru II programme a total of 51 fellowships had been awarded by the Welsh Government against a target of 56 in all and the programme is to be commended for this success. There are currently 11 awards from round one, 20 awards from round two, 9 awards from round three and 10 awards from round four. One fellow from round one had left. 33 of the 51 awards have been for Research Fellowships, with three Recapturing Talent, nine Rising Stars and six Chair funding packages. Cardiff and Swansea Universities between them were awarded the vast majority of fellowships. The fellowships cover all four grand challenge areas, although the number relating to ICT and the digital economy (at 11 per cent) is lower than the other three grand challenge areas.

8.22   The programme has made reasonable progress to date against its other WEFO funded indicators, accepting that some outputs are not expected to be realised until after the mid-term stage of delivery. Performance across East Wales generally appears to lag behind that of West Wales and the Valleys but this is expected given the lower number of awards made in the earlier rounds of funding in East Wales.

9.   Funded fellows' induction, training and support

9.1   This chapter considers the programme's induction, training and support provision provided to funded fellows. It draws upon the views of surveyed fellows, interviewed fellows and their academic supervisors as well as stakeholder opinions.

Induction

9.2   The timescales for getting successful applicants into their posts has in many cases, taken considerably longer than anticipated. This has been in part due to the delays in Welsh Government issuing formal approval letters to HEIs but also due to the issues which applicants have had to face in terms of securing work visas to allow them to work in the UK. In one case for instance a HE stakeholder observed that 'it's taken us 18 months to get the fellow in'.

9.3   The Welsh Government, in conjunction with its partner HEIs, has delivered welcome events for each round of appointed funded fellows with the first of these having taken place in November 2017 and the second in June 2018.

9.4   Some three quarters of surveyed fellows (11 of 15 respondents) had attended a Sêr Cymru II welcome event. Four had not done so and one of these suggested that they had not been offered this opportunity. Most of those who had attended had found the event either very useful (four) or fairly useful (five) whilst the remaining two had not found them useful. Respondents suggested that too much information had been shared on reporting processes at these events with not enough time provided for questions.

9.5   Most surveyed fellows thought that the induction provided by the Sêr Cymru II programme (including that made available by their own university) had provided them with some knowledge about Wales, the Higher Education sector in Wales and Welsh Government policies and strategies - although it was noteworthy that so few thought the induction had achieved this to any great extent. For instance, 12 surveyed respondents thought that the induction had provided them with some knowledge about Wales whilst only one surveyed respondent thought that it had done so to a large extent.

9.6   Two survey respondents noted that they would welcome further information to have been included within their induction programme and these were:

- A summary of key Welsh Government strategies and

- Information on other university and business activities across Wales.

9.7 Seven of the interviewed funded fellows recalled attending at least one induction or welcome event from Welsh Government, and all felt that they had learnt a little about the policy and strategy context within Wales. Two fellows described the high level information received about the Wellbeing for Future Generations Act. One fellow also remembered reading up on some policies and programmes, such as SMART Cymru following the introduction at the event. Fellows felt that gaining this strategic context allowed them to better understand the importance of Sêr Cymru II and how it fitted with the wider policy approach in Wales. Some fellows also recalled being introduced to the higher education structure and its priorities in Wales, and being provided with some background information about Wales as a country more generally. These aspects of the induction were described as 'good', 'well worth it' and easy to attend.

9.8 Fellows also remembered an induction process to deal with more practical issues organised by Welsh Government outlining Sêr Cymru II processes, structures and guidance. It was generally felt that this had been more 'scattered' in its approach and had been a lot of information to take in at the outset. One fellow felt that processes and guidelines associated with being a Sêr Cymru fellow had not been clearly conveyed during this induction. Another fellow suggested that this type of information might be better presented after a period of settling into the role: 'it's easy to forget when there's so much information, but the process gave me the confidence to go back and ask if there was anything'.

9.9 Fellows were appreciative of the 'prestigious' welcome event, particularly as some felt that there had been a lack of information about the programme online when they applied for their fellowships. They were pleased to see the programme receiving recognition and were made to feel important: 'they brought out the red carpet and the cameras'. Whilst one fellow felt that the pace of the event was a little slow, and another felt that there was quite a lot of waiting around during the welcome event, most felt that the welcome event 'was more and beyond what I would expect'.

9.10   Only three of the interviewed funded fellows had undertaken any formal induction process within their respective institutions. They described them as 'standard university induction' sessions providing information on health and safety, finance and HR process. One fellow recalled a four hour training session as part of the induction in relation to the Welsh language which he deemed as useful as he had not lived in Wales before.

9.11   The Recapturing Talent fellow had not been in a research led post for several years and felt that their perception of the research environment was out-dated. As such, the content of the host university level induction had proved more useful to them than that of the Welsh Government.

9.12   Two fellows hadn't needed any institution level inductions as they already worked there and had previously undertaken the process. More senior appointments, such as Chairs or more experienced fellows stated that they did not require any formal process and had simply been introduced to relevant individuals at the University.

Training

9.13   Some two-thirds of surveyed respondents (nine) had received Welsh Government training whilst fewer (five) had received training delivered by their own university.

9.14   The type of Welsh Government training accessed by surveyed fellows were reported as networking events, knowledge of HE and soft skills, leadership, industrial and public engagement, communication and career development. The type of university training provision accessed by surveyed fellows included courses on research management, outreach, data protection, supervision of PhD students, teaching and grants.

9.15   All but one of the surveyed respondents who had accessed Welsh Government training considered it had been either very or fairly useful to them whilst all surveyed respondents through that the training provided by their own university had been very or fairly useful.

9.16   There was no consensus about the areas of training which surveyed respondents would welcome as part of the Sêr Cymru II operation. Rather it was suggested by one respondent that they would welcome being able to access

funding in order to 'attend training tailored to my needs and related to my research topic' as the training needs of fellows were considered 'too diverse' to be met via by the programme alone.

9.17   Turning to consider the views of interviewed fellows, the more experienced fellows and appointed Chairs did not identify any specific training needs, but four fellows had accessed at least some form of training.

9.18   In terms of Welsh Government training, several interviewed fellows praised how they had been encouraged from the outset to ask for specific training that might be deemed useful, and appreciated the opportunity to feed into the process. In terms of training arranged to date, three of the interviewed fellows recalled attending a two day training course on how to present and how to engage with industry. Both described the session as appropriate and of high quality. The psychological component of the session, enabling the fellows to better understand themselves, and how to overcome internal obstacles had been very informative, whilst tips and techniques on how to present and communicate with impact was also deemed useful. A more recent training event on how to make research relevant to the public, from Techniquest, was also highly praised. One fellow described how the training sessions offered an excellent opportunity to meet up and network with other Sêr Cymru II fellows and that this in itself was useful.

9.19   Examples of host training sessions attended by interviewed funded fellows were mainly technical, science-based training relevant to their research studies. One fellow had attended a financial training course which demonstrated how to buy equipment using the host university's procurement processes, which was deemed necessary for his role.

9.20   In terms of additional training needs for the future, one fellow queried whether the training provided to date were closely enough aligned with the Sêr Cymru II programme outcomes. On this note, fellows suggested training requirements on the commercialisation aspect of their research, with one suggesting 'a whole day on commercialisation', especially if some successful case studies could also be presented.

9.21   Training and support in relation to establishing start-up companies was also identified by another funded fellow. Similarly, another fellow wished to know how

to go about building collaborative opportunities with private sector businesses or 'industry leaders' and mentioned that they would be happy if Welsh Government would take a lead on this. Specifically, funded fellows would appreciate information on who is available in the market for collaboration, and conversely, how to make businesses more aware of the collaborative opportunities available to them with Sêr Cymru II fellows. One fellow also specifically requested training and support with grant and bid writing.

9.22   Stakeholders were less sighted about the training which fellows had attended, but did raise concerns about the short notice given to fellows and suggested that it would be helpful if a planned programme of events be disseminated prior to the start of any academic year. This, it was argued in light of some low attendance numbers, would help secure better attendance at Welsh Government events in the future.

Pastoral Support

9.23   It was perhaps not surprising that only one of the surveyed respondents considered that they had received pastoral support from the Welsh Government as part of the Sêr Cymru II operation given that HEIs were responsible for pastoral provision, rather than the Welsh Government.

9.24   A higher number, six of the 15 respondents, had received pastoral support from their own university and where they had done so, surveyed respondents had found it either very or fairly helpful. Amongst the pastoral support provided by their own university, surveyed respondents observed that they had support from a line manager, personal tutor or supervisor as well as relocation support. In a few cases surveyed respondents reported that they had undertaken part in their university's programme of induction for new staff.

9.25   The vast majority of the funded fellows interviewed had not received any pastoral support as they felt that they did not need any due to their experience. Three fellows outlined how they had assigned mentors or line managers that were approachable if they required any support. Funded fellows did not identify any additional pastoral support required.

9.26   Stakeholders observed that one university had taken a leading role in the development of a pastoral package of support for its funded fellows and

regarded this approach as good practice which could be adopted by other institutions.

10.   Outcomes achieved by funded fellows

10.1   This chapter considers the work undertaken by funded fellows in terms of their collaborations with industry and academia. It also considers the outcomes achieved by funded fellows in terms of engagement and outreach, grant funding applied for and secured to date as well as anticipated impact of their research project. The chapter largely draws upon the views of surveyed and interviewed funded fellows and their respective supervisors, as well as the views of stakeholders where appropriate.

Collaborations with industry

10.2   As part of their applications to Sêr Cymru II, project applicants are required to demonstrate how their research project will engage with industry. The survey of funded fellows points to a very strong level of collaboration with private sector businesses (13 of 15 respondents) and the examples provided ranged from SMEs to multi-national operations, often operating within specialist sectors. The nature of these collaborations varied and included information exchange, project testing, use of technology and collaboration on a joint funding bid.

10.3   Surveyed respondents identified many benefits of collaborating with private sector organisations for their funded research project including:

- Access to low cost, bespoke equipment and consumables not available within the university.

- Access to additional funding which would cover the costs associated with employing an additional researcher for the project.

- Ensuring that the research was meeting the needs of a potential future customer.

10.4   Fewer funded fellows (eight respondents) had collaborated with third sector enterprises since coming into post. The nature of these enterprises varied from small charities to larger establishments, located within and outside of Wales. Likewise, the nature of these collaborations varied and included formal support to the original funding application, joint funding of research project and data collection role.

10.5   Surveyed respondents identified fewer benefits of collaborating with third sector enterprises for their funded research project. In the main it was argued that their involvement had increased their chances of securing Sêr Cymru II funding and only one respondent believed that their involvement had provided access to consumables not available within the university.

10.6   Surveyed respondents were asked about the support they would welcome from Sêr Cymru II to increase or further any collaboration with private sector businesses and/or third sector enterprises. Amongst the ideas suggested were:

- Support to identify appropriate businesses in Wales with whom fellows could collaborate.

- Opportunities to experience placements in industry.

- Being able to free up their time (e.g. via an intern) to allow funded fellows additional capacity to engage with these organisations.

10.7   Despite the positive messages gleaned from the survey responses however none of the interviewed fellows were in a position to share information about industry partners whom they were actively collaborating with in order for them to be approached as part of the evaluation. It was suggested on many occasions that the nature of these collaborations were 'light-touch' and that industry would only stand to benefit from the outcomes of the research project at a later stage.

10.8   Interviews with funded fellows did share a little more light on some early industry collaboration currently underway. Several fellows noted that they had maintained existing links developed with industry during their funded fellow role. Examples were given of existing links with companies in Italy, England and Sweden that continued to be relevant to their Sêr Cymru II funded research. In some cases, these collaborations included 'in kind' support (such as expertise and access to data at pharmaceutical companies), often 'to the tune of £3-4m'. As such in-kind contributions are considered by WEFO to be ineligible, one senior fellow felt that the support was not therefore considered as valuable as a cash contribution.

10.9   Four other fellows were relatively new in post and mentioned that it was too soon to collaborate with private sector businesses. They did not have a clear plan in place to engage with industry although all were very aware of the need to

develop contacts and nurture relationships with businesses given that it is a key outcome for the programme. Interestingly, one interviewee felt that the focus within the application process on industry collaboration had brought this area of work to the fore sooner than would otherwise have been the case: 'This programme wants you to link your proposal to industry, which I haven't thought about before. It gave me a chance to think and look at it, which is a positive'.

10.10 Industry collaboration was also emphasised as important by one of the Chairs interviewed: 'you need that mix of research and developing links with companies and investors – for the whole team – that experience within academia and outside. It is difficult to develop the individual just within a university environment, particularly early career academics. Ideally you want staff who can work 50 per cent of their time at the university and 50 per cent with the businesses. This is what they do so well in places like Boston'.

10.11 Three of the funded fellows suggested that it would be helpful if more guidance could be provided by Welsh Government on how to identify and target relevant companies based in Wales. Due to the fact that Wales was a new country of residence for many of the fellows, they felt that they lacked the knowledge of the business landscape in Wales. For others, engaging and collaborating with industry was an unfamiliar process in itself, and they felt that they lacked the knowledge and experience of how to approach and work with private sector businesses. In this respect, networking events and relevant training would be useful.

10.12 One fellow felt that there was an over-emphasis on collaboration with companies based in Wales, and that this could be challenging for some sectors with a lack of e.g. pharmaceutical companies based in Wales.

10.13 In general, most interviewed fellows felt that it was too soon to know whether commercial opportunities would arise from any industry collaboration, and that processes around securing patents and protecting intellectual property would not happen during the immediate timeframe. One or two fellows were warily optimistic about opportunities to set up spin-out companies in due course: 'I'd say it's fifty-fifty at the moment'. Another fellow also warned that not all aspects of the research would necessarily bring about immediate commercial

opportunities, but that the research could inform future projects, and thus should still be valued.

10.14 Interviews with stakeholders reinforced the lack of collaboration between funded fellows and industry at the time of fieldwork. Some stakeholders suggested that fellows held different interpretations of what constituted collaborative work with industry and suggested that some fellows considered this to be a discussion about ideas whereas others viewed it as a formal collaboration. Other stakeholders noted that it was always a challenge for academic researchers to get industry collaboration off the ground despite applications having to demonstrate a high level of formal support from industry to their research concept.

10.15 The mid-term evaluation fieldwork revealed that there is very little meaningful collaboration between the Welsh Government's SMART Suite of Programmes such as SMART Innovation, SMART Expertise and SMART Cymru and the Sêr Cymru II funded projects[72], although there has been effort to promote these initiatives as well as the Knowledge Transfer Partnerships (KTP) to pro vice chancellors at Wales' universities recently. The lack of collaboration was attributed largely to the lack of staffing resources and time given to explore these opportunities on the part of both the SMART and Sêr Cymru II programme teams as well as the lack of time on the part of funded fellows to explore speculative collaboration opportunities and it still being 'early days' in this respect. Stakeholders suggested that an appropriate structure needed to be put in place to facilitate these discussions and to map potential linkages in order to build upon some initial good practice which had been facilitated between one researcher and the SMART Expertise initiative.

Collaborations with academia

10.16 All surveyed fellows had explored collaborative opportunities with academics from other universities outside of Wales whilst seven had done so with academics from other universities in Wales.

10.17 The nature of these collaborations included co-working on research projects, joint grant funding applications and co-authoring research publications. The

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[72] More information about the Welsh Government's [SMART Suite of Programme](#)

benefits to the Sêr Cymru II funded project of working with 'global leaders' in their field were considered to be significant and included gaining access to different research techniques, development of personal skills, access to other peoples' ideas and access to a wider dissemination network and greater academic impact. Several respondents observed that collaboration with academia came with the territory of academic work and that 'discussions with experts elsewhere aid my experimental design'.

10.18   The majority (12 of the 15 surveyed respondents) of funded fellows had explored interdisciplinary research opportunities. In some cases it was observed that the research project itself was by its very nature, interdisciplinary whilst others noted that they had contributed to a joint interdisciplinary grant funding application, such as to Horizon 2020.

10.19   Interviews with funded fellows supported the findings of the survey, with several examples of academic collaboration on grant applications and on submitted research papers. Most of the examples were of collaborations with existing links to previous Universities where fellows had worked, with examples of these links being strengthened further under Sêr Cymru II. The fieldwork encountered one example of new academic collaborations that 'weren't part of my original plan' from a fellow who had collaborated with a government institute in Germany, the University of Marseilles, the REGA Institute for Medical Research at the University of Levern in Belgium and two Universities in the USA. In each case, the 'world class' individuals worked with were examples of inter-disciplinary collaborations, and as such, had enabled the fellow to publish biological data in relation to their research, which had subsequently helped with publication outcomes.

10.20   Four other interviewed fellows who were in earlier stages of academic collaboration all described it as 'interdisciplinary', with one describing 'everything I do is interdisciplinary', whilst another felt that in order to test the findings of their research, the medical trials that followed would require working across several different subject fields.

Engagement and Outreach

10.21   Ten of the surveyed fellows had undertaken public engagements activities and these had included media contributions, events at the National Eisteddfod and presentations to various stakeholder organisations.

10.22   Only four had delivered any STEMM outreach activities. The most common activities were identified as the delivery of STEMM sessions to school aged pupils, encouraging more girls and women to pursue STEMM careers and attendance at STEMM events outside of their university. Several funded fellows identified a number of restrictions which hindered their ability to engage in outreach activities. These included the lack of time, being fairly new to the role and not having the opportunity to organise such activities yet as well as the perceived additional administrative burden that was associated with reporting such outputs to the Welsh Government. Indeed, it was suggested by at least two surveyed fellows that outreach activities was not their main priority and that it was 'the first output to drop' as a result.

10.23   Interviewed fellows referred to a range of engagement and outreach activities undertaken thus far. Three fellows had been involved with activities in relation to the Seren network, and another had been involved with the Welsh Government's STEM Ambassador programme. Two fellows had also supported activities under the Reaching Wider initiative at their host institutions, aimed at increasing HE participation from previously under-represented groups and communities in Wales. Other outreach activities highlighted included:

- Taking part in the Pint of Science festival, which brings scientists to local pubs to discuss their latest research and findings.

- An information sharing collaboration between the host university and Parkinson's UK to highlight research currently underway.

- Swansea Science Festival.

- Career Pathway Exhibitions and school conferences.

- A university English-language teaching programme.

10.24 Three fellows also mentioned that they were teaching and lecturing within their departments and undertaking some additional duties such as drafting and marking exam papers.

10.25 Eleven of the surveyed fellows had presented at conferences – with some of these having done so at three conferences since coming into post. A small number of these conferences were held in Wales, others across the UK and the majority outside of the UK. Four of the interviewed fellows referred to conferences where they had presented their research or attended conferences that were specific, relevant and renowned in their fields of expertise. The conferences mentioned by both surveyed and interviewed fellows included:

- the Miami Winter Symposium on Stem Cell Research.

- the International Conference on Antiviral Research in Atlanta (at which the fellow had received a personal award).

- the 25th Nano Congress for Future Advancement in Dublin.

- Personalised Medicine: from Discovery Science to the Patient.

- International Microwave Symposium 2017.

- GW4 Biosensors Meetings.

- BioNanoPhotonics 2017.

- Sêr Cymru II Festival of Research 2017.

- Semiconductor and Integrated Opto-Electronics Conference in Cardiff University.

- Materials Research Society spring meeting in Phoenix US.

- Royal Microscopic Society workshop on Photonic and Optoelectronic Materials in Exeter.

- UAV Harmonious (Valencia, Spain).

- ESA Climate Change Initiative Collocation Meeting (Oxford University).

- Ecopotential Workshop on land cover classification (Italy).

10.26   Interviewed fellows also referred to upcoming conferences that were currently being arranged. Four other fellows mentioned their intention to attend and present relevant academic conferences in due course but had no plans in place at the moment. Two of these fellows had been in post for less than a year. Two fellows also mentioned the importance of raising awareness of their projects via social media, such as Twitter, The Conversation website and via relevant meetings with research centres or research groups relating to their field of expertise.

10.27   Ten of the surveyed fellows had submitted research papers to be published and nine of the surveyed fellows had already had research papers published.

10.28   Interviewed fellows all fully intended to publish research papers and noted its importance in demonstrating research progress: 'it's the only thing people look at'. Again the number of research papers published to date varied amongst those interviewed (with a clear correlation to the number of years they had been in post). One interviewed fellow had already published three papers, these would be submitted to REF in due course. Another two fellows had published a paper each to date, and a further three were currently working on research papers. One fellow, currently in his first year was confident of being in a position to submit and publish research papers during the second year as a funded fellow, whilst another fellow felt that it would take at least five years to get a paper related to the Sêr Cymru II research published.

10.29   Interestingly one fellow felt that the main focus of the dissemination should be about getting companies engaged with the research and that most of their time should be focused on developing the commercial opportunities. Nevertheless, producing research publications was still a target for them.

Grant funding

10.30   Eleven of the surveyed fellows had been involved with applications for other grant funding (some of these had made several funding applications). Ten surveyed fellows had successfully secured grant funding. The sources of funding applied for included the European Research Centre, the Engineering and Physical Sciences Research Council, the Medical Research Council, the MRC Development Pathway Funding Scheme, European Space Agency, Geoscience Australia, Swansea University, the Knowledge Economy Skills

Scholarship (KESS) II, Parkinson's UK, Dunhill Medical Trust, Agor IP, Fisheries Society of the British Isles, L'Oreal Women in Science Fellowship, Microbiology Society Outreach Grant, eFutures and the Chance Symposium Travel Grant.

10.31   In terms of the value of grant funding applied for and secured, a financial figure provided by eight surveyed fellows shows that they had been involved with applications for £10.76 million funding and had secured £4.83 million to date. Some noted that they were waiting to hear the outcome of some funding applications at the time of survey.

10.32   In terms of the purpose of making grant funding applications, several surveyed fellows noted that their intentions in making applications was to be able to fund research positions within their teams, including PhD students.

10.33   Stakeholders observed that funded fellows were starting to demonstrate that they were securing additional grant funding within their roles. Some suggested that fellows were looking to maximise upon the European funding sources such as Horizon 2020 whilst these were still available to them.

10.34   Interviewed fellows referred to several examples of grant applications that had been made which had enabled them to expand their research interests. Examples included:

- A research fellow at Cardiff university had been successful in obtaining a £100k Springboard grant from the Academy of Medical Sciences which had employed a post-doctoral researcher for two years. This was the first time this grant had ever been awarded to Cardiff University. The application had since been disseminated internally as an example of best practice.

- The same Research Fellow had also successfully applied for two £50k grants awarded by the Wellcome Trust and internal institutional funds available via the Industrial Strategy Challenge Fund to pay for two research fellows for one year each.

- Another fellow had received small scale grant funding from Innovate UK and the Engineering Physical Science Research Council.

- £20,000 of funding from the Royal Society had been obtained by a Fellow to buy specialised instruments.

- A fellow had been successful in obtaining a KESSII PhD grant that complemented their research.

10.35 Another three fellows were currently awaiting to hear about the outcome of their grant applications. These included:

- A Parkinson's UK/Dunhill Medical Trust grant valued at approximately £800,000 to build the capacity of the team through recruitment of PhD and postdoctoral research students.

- An Engineering and Physical Sciences Research Council grant proposal prepared in partnership with Imperial College London in Nanostructured Topological Photonics valued at £1 million, with £800,000 to be allocated to the host University.

- An application for a Medical Research Council grant by a Sêr Cymru II Chair to fund a new research project, worth approximately £2.4 million.

10.36 Another fellow had applied for approximately £1.5 million of grant funding since coming into post, but had not been successful to date.

Anticipated impact of research

10.37 Surveyed and interviewed fellows alike were asked about the likely impact their research project would have.

10.38 Interviewed fellows acknowledged that they had been required to consider the anticipated impact of their project during the application stage as it was a condition of funding that they included a considered Pathways to Impact[73] statement as part of their case. Most interviewees were already familiar with the concept of Pathways to Impact, as it was considered an essential component of any academic funding research proposals submitted. However, the extent to which interviewees had prior experience of this process varied and some interviewees, particularly Recapturing Talent fellows, had found this challenging as a result. Interviewed fellows thought that the Sêr Cymru II application process had encouraged them to consider the anticipated impact of their research project at an earlier point than they may have done so otherwise. In one such case an interviewed fellow observed that: '[Sêr Cymru II] wants to link your

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[73] Further detail about Pathways to Impact

proposal to industry, which I hadn't thought about before. It gave me a chance to look at it, which is a positive'.

10.39   At the time of undertaking the fieldwork most interviewed fellows thought that it was too early to come to a view about the extent to which their Pathways to Impact was being achieved. Whilst consideration for their research impact had been built into their approaches it would be unlikely for these plans to materialise until a later stage. Indeed, one fellow also warned that the impact of some research projects could be confined to academia and may not bring about any economic or societal impacts.

10.40   Surveyed fellows expected to disseminate the findings of their research project in a number of ways with the most anticipated methods being academic publications including high impact journals and conference presentations. A few surveyed respondents also highlighted the importance of disseminating via the media and outreach events.

10.41   Only four of the surveyed fellows thought that their research project would be applicable to public policy and these tended to focus on health related policies in the main. A slightly greater number of funded fellows thought that their project would lead to commercial opportunities and these tended to include opportunities relating to spin-out companies and opportunities which could be exploited with industrial partners.

10.42   Finally, at least ten surveyed fellows believed that that their research project would bring about social or economic benefits. These included environmental benefits, health benefits – including mental health benefits - (largely as a result of improved treatment to health conditions and disorders), improved quality of life, greater knowledge and understanding as well as the direct benefits of jobs creation within Wales.

10.43   Several examples of the potential impact of the research were provided during the interviews with funded fellows. Examples of potential impact included:

- *Environmental benefit* – research by a fellow which looked at integrating solar panels in buildings could 'change the way we use energy', with the materials developed also reducing the cost of producing energy.

- *Public policy impact* – one fellow's research could lead to significant developments which would impact on the use of plastic and the evidence base provided by the research could lead to tangible outcomes which could change policy.

- *Health benefit* – if the research by one interviewed fellow was successful, following testing on patients with severe Parkinson's disease it could lead to the slowing of the impact of the disease on the patient as it would 'decrease the rate of death of dopamine neurons' thus resulting in positive outcomes for sufferers and their family members.

- *Greater knowledge and understanding* – one fellow felt that the main outcome from their research would be a 'change in the tools people will use in biomedicine which will make it …more informative and quicker'. Their research could 'accelerate the pace of medical and biomedical research'.

10.44 The main anticipated impact identified by interviewed fellows was economic in nature, with several hopeful that start-up companies would be set-up or that commercial benefits via patenting or IP would be realised in due course. For one of the interviewed Chairs, it was argued that the real economic benefit would only be felt when the research project received substantial investment, was transferred out of academia, or sold to investors – but such impacts would be long-term (at least five years from inception). The Chair had previous experience of such achievements, and highlighted the importance of working with, and obtaining intervention from government if this was to be realised in Wales.

10.45 A few fellows also alluded to some direct outcomes as a result of their fellowship awards. Over time, their contribution to the 2020 REF return could enhance the reputation and attractiveness of their host institutions. Similarly, their roles as 'ambassadors' for Wales via Sêr Cymru II would raise awareness of the opportunities within their host institutions, which again, over time, could inspire young people and future early career academics to choose Wales as a research study destination. One of the interviewed fellows also suggested that the programme has generated a change in perception amongst academics based outside of Wales, given that Wales was not previously considered a potential destination for many global academics. By now however Sêr Cymru II had

'increased the exposure of Wales immensely on a global stage' and made it a more attractive destination for up and coming academics.

Future Plans

10.46   Interviewed fellows were asked about their future plans and likelihood of staying in Wales. Although it was early days for several of those interviewed, the response was generally positive, with all those interviewed hoping for or positive about an opportunity to stay in Wales: 'I'd like to settle here'. Others had children attending schools or had taken out mortgages, and were very keen to stay on, although there had been no formal discussions as yet about future employment opportunities at host institutions in most cases.

10.47   One fellow had already accepted a permanent position at their host institution and could remain at the institution following their Sêr Cymru II funded fellowship: 'I'm really excited. It feels like I've just had my first permanent job. Now I can think about settling down. I've never sat still'. The fellow was hopeful that this would provide an opportunity to 'move up the ranks', establish spin-out companies and work with other companies.

10.48   However, there was a degree of uncertainty around the ability of host institutions to continue to fund posts post ERDF funding. One fellow described this as 'the elephant in the room' and it was an issue that worried a number of fellows. Another fellow felt that 'as much as the Welsh Government is willing to attract good people, there is no long-term commitment from the university'. One fellow gave an example of a new Head with different priorities making their future less certain as 'the commitment isn't there within the school' and felt that it was a shame that the Sêr Cymru II programme couldn't provide more security post funding.

10.49   Some fellow supervisors and line managers felt that Welsh Government could look to use their influence and work with Universities to ensure they understood the value of the fellows recruited to Wales. However, with the current pressures facing universities, there was concern that there would be 'a temptation to free up the budget', particularly in the absence of a clear path going forward: 'There seems to be a lack of strategic vision for these types of fellowships – it needs more direction'.

10.50 Going forward, one of the Chairs interviewed felt that the programme needed to 'really focus on developing a critical mass of experts and academics in two or three priority areas'. It was felt that STEMM was too wide a focus at the moment, and that specific sub-sectors, where Wales could be world-leading needed to be identified, with fellows funded in close alignment with Chairs: 'it's better to restrict the options for funding available via Sêr Cymru, and just concentrate on a few key priorities'.

10.51 The uncertainty of Brexit was also raised as an issue, with some fellows finding it difficult to comment on the ability of host universities to sustain the research after ERDF funding when there was a general lack of clarity about research investment post Brexit in the UK. A couple of fellows also felt that Wales (and the UK more generally) would be a less attractive place to choose to work on research.

10.52 Finally, some interviewed senior academics felt that Sêr Cymru in future had a role to attract people back to Wales, and that getting such individuals back to Wales meant they were more likely to stay the course and be more invested in developing opportunities with potential to support and grow the economy.

11. Cross cutting themes and the Welsh language

11.1 This chapter considers the extent to which the Sêr Cymru II operations and its funded research projects are likely to support the cross-cutting themes (CCTs) and the Welsh language.

Cross-cutting themes

11.2 As an ERDF-funded operation, Sêr Cymru II is expected to contribute to the three cross-cutting themes of equal opportunities and gender mainstreaming, sustainable development and tackling poverty and social exclusion. The operations are expected to report to WEFO on actions against a number of cross-cutting indicators, namely:

- Equal opportunities: positive action measures taken for women, female participation in STEMM and actively supporting speakers of the Welsh language.

- Sustainable Development: local supply chain development and resource efficiency measures.

- Tackling poverty: volunteering schemes.

- Developing and engaging CCT champions.

11.3 At the time of undertaking the mid-term fieldwork, the Welsh Government was in the process of appointing a CCT Champion to lead on this work and it was expected that this appointment would help the programme drive forward its ambitions and achieve its funded indicators.

Equal Opportunities and Gender Mainstreaming

11.4 In terms of equal opportunities and gender mainstreaming, stakeholders continued to take the view that this was an area which Sêr Cymru II had a positive contribution to make. Several HEI stakeholders reflected upon the positive gender split of funded fellows at their own institutions and thought that the programme was performing well against its ambition of achieving a 50:50 male female ratio, with a minimum of 40 per cent women fellows.

11.5 Several stakeholders argued that the Recapturing Talent fellowships in particular offered a direct opportunity to encourage women to return to research

careers although the lack of take up of this category of fellowship suggests that either there is either a lack of demand for such opportunities, that the fellowships offered do not appeal to the target groups or that they have not been promoted widely enough beyond existing HEI contacts and networks.

11.6   Stakeholders also thought that Sêr Cymru II was making a positive contribution to broadening the ethnic diversity of academic researchers in Wales in light of the fact that the programme was attracting and recruiting fellows from across the globe and appointing individuals from different cultures, backgrounds and ethnicity to work within the HE sector in Wales.

Sustainable development

11.7   The Sêr Cymru II programme has actively supported fellows to conduct research across the grand challenge area of low carbon, energy and the environment. In doing so, the ERDF operations also intend to help improve the sustainability of the research community in the WWV and EW regions.

11.8   All but two of the surveyed respondents thought that their Sêr Cymru II funded project would make either a significant (five) or some (eight) contribution to the cross-cutting theme of sustainable development. Indeed, several of these surveyed respondents (as well as a few interviewed fellows) were eager to stress that the primary focus of their research was on 'sustainable development'. For instance, respondents reported that they were developing new technologies which could be applied to sustainable energy generation, were researching power consumption reductions and researching areas of health which could affect the level of demand upon NHS provision.

Tackling poverty

11.9   Sêr Cymru II is expected to contribute to the tackling poverty agenda via its work to 'develop research excellence and the industrial capacity base in Wales' in STEMM areas. This is expected 'over the longer term' to generate a 'range of highly skilled, skilled and semi-skilled jobs, thus providing a range of new employment opportunities not otherwise available'[74].

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[74] WEFO Business Plans. p.14.

11.10   In all, seven surveyed respondents thought that their project would make a contribution to the cross-cutting theme of tackling poverty and social exclusion and at least two interviewed fellows observed that they were undertaking engagement activities as part of the HEI's Reaching Higher strategies which would help contribute towards this cross-cutting theme. Where they believed they could have an impact, surveyed respondents suggested that their research project would create new jobs, generate financial investment into Wales, lead to health improvements including mental health improvements.

Welsh Language

11.11   Stakeholders noted that Sêr Cymru II had been able to appoint a very small number of Welsh speaking fellows, and it was suggested that they could act as Welsh language 'champions' for the programme.

11.12   Of the 15 surveyed fellows, two were fluent Welsh speakers. Since joining Sêr Cymru II, two of these had been actively involved in the delivery of Welsh-medium engagement activity including the delivery of provision at the science pavilion ('Y Gwyddonle') in the National Eisteddfod for Wales and Welsh-medium TV and radio news. Several other stakeholders observed that they were aware of a few fellows who had undertaken outreach activities at events such as the National Eisteddfod, including non-Welsh-speaking fellows.

11.13   The remaining 13 surveyed fellows could either only speak a few words in Welsh (five) or were unable to speak it at all. Nine of the 13 surveyed fellows who considered themselves to be non-Welsh speakers had been encouraged by either the Welsh Government or their university to learn or improve their Welsh since embarking on their Sêr Cymru II funded role. However, the fieldwork did not encounter any evidence to suggest that fellows were taking up these opportunities. Feedback offered by one such fellow suggested that their priority, given that English was their second language, was to improve their English rather than Welsh language skills.

11.14   Feedback from representatives at one HEI shows that fellows would have received an introduction to the Welsh language as part of their induction at the university and would have been provided information about Welsh language learning opportunities, given that local Welsh for Adults provision was also

delivered by the university. However, to date there had been no uptake of this provision amongst fellows at that institution.

The Welsh-medium research landscape

11.15 There is very little evidence that the Sêr Cymru II initiative has had any significant bearing upon the level of STEMM Welsh-medium research capacity and provision in Wales to date although it is important to note that one funded researcher has published a bilingual research publication during 2018. There continued to be a widespread view amongst interviewed stakeholders that Sêr Cymru II could only expect to make a fairly limited contribution to the Welsh-medium research landscape. There are many practical opportunities which the programme could pursue however, accepting that these are fairly small-scale in nature, including:

- Continue to offer the opportunities for funded researchers to learn Welsh and to develop a greater level of understanding about Welsh culture and industry.

- Continue to develop the role of Welsh speaking fellows (two are already known) and the opportunities to undertake Welsh-medium engagement and dissemination.

12. Conclusions and recommendations

12.1 This chapter presents our conclusions at the mid-term stage and offers a set of recommendations for the remaining delivery of the Sêr Cymru II programme. First, the chapter considers the extent to which recommendations offered within the inception stage evaluation have been addressed.

Addressing inception stage evaluation recommendations

12.2 We offer our observations on some of the actions taken to address recommendations offered for the remaining Sêr Cymru II delivery period within the inception evaluation report:

- We recommended that the Sêr Cymru II Business Plans better reflect how the intervention could make a contribution to the Wellbeing of Future Generations Wales Act with a particular focus on capturing monitoring data as evidence of how this is achieved against a number of appropriate indicators. We understand that the Welsh Government is undertaking an exercise to map out which of the Wellbeing and Future Generations Act goals each funded research project can be expected to contribute towards. We understand that the Welsh Government also intends to identify and develop case studies which will demonstrate how particular funded projects contribute to the goals of the Wellbeing and Future Generations Act as well as the objectives set out within the Economic Action Plan.

- We recommended that the Welsh Government address the risk of Sêr Cymru II being over-dependent upon one individual who currently fulfils the role of Head of Research Programme Development as a secondee. Whilst the Welsh Government has recruited additional staff into the Sêr Cymru delivery team, we are of the opinion that the programme is still at risk of being dependent upon this individual given that the delivery team lacks any substantial prior HE sector experience.

- We recommended that clearer, more consistent and faster technical guidance, specifically around the implementation of ERDF funding and ensuring compliance with requirements, be issued to universities in receipt of funding. The latest programme guidance was issued in November 2017

and it appears that this, coupled with ongoing learning gained from delivery experience, appears to have addressed the concerns of universities.

- We recommended that funded fellows report upon training or professional development activities, cross-cutting theme activities and outcomes and teaching time utilised as part of the reporting template. We further recommended that the Welsh Government includes more closed or option-based responses within the report template to facilitate analysis of outputs and impacts. At the time of undertaking the mid-term fieldwork we were informed that these monitoring forms were being reviewed by the Welsh Government with a view to including these in the reporting templates.

- We recommended that alternative and innovative marketing and communication approaches be piloted in order to reach a broader cohort of individuals who may be interested in the Recapturing Talent fellowship opportunities. Our mid-term fieldwork did not reveal that HEIs had adopted any significant new approaches to the way in which they promoted Recapturing Talent fellowship opportunities, although it is encouraging to see that two additional offers were made by the programme since the inception stage evaluation, bringing the total to three.

- We recommended that the target set for Recapturing Talent fellowships be reviewed and if deemed appropriate, reduced to a more realistic and achievable number. We understand that the Welsh Government are currently discussing this change with WEFO. We take the view that a reduction in the target would still be pragmatic.

- We recommended that the Welsh Government support fellows with outreach related training and facilitating links and networks with organisations who promote science with young people, and encourage fellows to learn Welsh and disseminate their findings through the medium of Welsh. We understand that initial efforts have been taken to address the outreach training needs of funded fellows whilst the demand for Welsh language support has not materialised as yet.

- We recommended that greater effort be made to engage businesses. Whilst some fellows have successfully engaged with businesses since the

inception evaluation, overall the levels of engagement across the programme remain fairly low. There continues to be a need to equip fellows with the appropriate skills to approach and work with industry as well as a need to identify and directly broker relationships on their part with businesses. However, we accept that addressing this need will be challenging given the limited resources available within the Welsh Government team so we recommend that specific actions be prioritised within this current programme of delivery and that other ideas are considered within future interventions.

12.3   The inception evaluation report also noted that 'there had not been a formal review of Sêr Cymru I and there was a perception amongst stakeholders that there was very limited transfer of knowledge and learning gained from the delivery of Sêr Cymru I'[75]. Subsequent to the publication of the inception evaluation of Sêr Cymru II, the Welsh Government commissioned an evaluation of Sêr Cymru I. At the time of the drafting of this report the Sêr Cymru I evaluation report was in press. It has therefore not been possible to incorporate the findings of the Ser Cymru I evaluation into this report.

Design, rationale and need

12.4   There continues to be a very clear and supportive policy framework in place for Sêr Cymru II. The evaluation found that recent Welsh policy developments and proposals offer an even greater level of direction to the funding of research and innovation in Wales and it is likely that future funding will become available in a much more strategic manner at both the UK and Wales level. The approach adopted by Sêr Cymru II is regarded as good practice within some of these recent proposals (e.g. the recommendations of the Reid review) and it is likely that the programme's experience will be useful in helping to inform and shape future approaches to develop STEMM academic research capacity in Wales. We conclude that Sêr Cymru II could explore how it could better fulfil the Welsh Government's regional priorities in the future, as set out in its Economic Action Plan, by encouraging a greater number of quality applications from a wider number of HEIs. We understand that the next phase of Sêr Cymru is likely to

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[75] Inception Evaluation of the Sêr Cymru II programme p.8

have a greater focus on industrial and applied research, thereby being of greater relevance to those HEIs who have not previously applied to the programme.

12.5   We further conclude that the programme and its funded research projects are well aligned to those of the SMART Specialisation strategy given the focus upon STEMM subjects and the grand challenge areas identified within the strategy. It is still difficult to conclude upon the programme's success in meeting the Wellbeing of Future Generations Act goals in light of the fact that the Welsh Government has only started to map the funded project's contributions to these areas. The feedback from all contributors to this evaluation suggests that there is significant scope for the programme to make a strong contribution to the goals of the Act and we are confident that these are likely to materialise over time.

12.6   The mid-term evaluation identified two key external factors which stakeholders thought were important to its success. The first related to the loss of the Chief Scientific Adviser post-holder for a period of some six months which was considered to have had impacted upon momentum levels. The second related to EU transition and the implications that this would have upon future available funding.

12.7   We conclude that the Sêr Cymru II programme is acting synergistically with the COFUND project and that the concerns conveyed by stakeholders at the time of fieldwork about the possibility they could become less aligned in future due to COFUND funding coming to an end sooner, in August 2020, have been alleviated due to the no cost extension secured by the Welsh Government to the COFUND project. There are significant differences in the administrative and monitoring arrangements put in place for funded fellows via these two programmes as a result of them being funded via two different sources.

Progress made towards objectives and targets

12.8   We conclude that the operation is making good progress towards meeting its aims and objectives and it should be commended for successfully recruiting and appointing 51 funded fellows (against a target of 56) across Wales' universities. We are of the opinion that funding is being awarded to research projects which are in keeping with the programme's overall aims and objectives although it may be the case that investing in a greater number of academic clusters that would be strategically placed around Chairs could achieve a greater impact in the long

term. There may also be merit in clarifying the status attached to the role of Sêr Cymru II funded fellows so as to equip researchers with the greatest possibility of securing further grant funding.

12.9 The Recapturing Talent strand to support researchers to return to work following a career break continues to pose a challenge for the programme, although it is encouraging that there has been an increase, albeit a modest one, in the number of approved Recapturing Talent fellows awarded since our inception stage evaluation. We are aware that discussions are ongoing with WEFO to reduce the target set for recruiting Recapturing Talent fellows and we support this change.

12.10 We conclude that the programme has made reasonable progress against its WEFO funded indicators, accepting that some outputs were not profiled to be achieved until after the mid-term stage of delivery. Overall, the programme has been able to make better progress against all of its output targets across West Wales and the Valleys than in East Wales due to the higher number of awards made during earlier rounds of funding in West Wales and the Valleys than East Wales.

12.11 It is still early days to be able to come to a firm view on the operation's success in moving towards delivering against Specific Objective 1.1 of the Programme (to increase the success of Welsh research institutions in attracting competitive and private research funding) not least as many funded fellows have only been in post for a short period of time. However, initial feedback and evidence suggests that some of the more established funded fellows are already applying for, and successfully securing, other research funding. It is also important to consider that the Sêr Cymru I programme, funded until March 2019, is also expected to contribute towards the common objective of increasing Wales' STEMM research capacity and help achieve the 5 per cent share of UK research income.

12.12 It is important to note that the impact of the Sêr Cymru II programme will only be experienced in the long, rather than short term period, and that the impact can be expected to continue post programme funding. However, the ongoing changing funding landscape, including the anticipated loss of European structural funding for research and innovation activities coupled with the

establishment of UKRI which has bearing upon the remit of Research Councils, may disproportionally impact upon Wales' capacity to secure research income in the future.

12.13   The timescales for Sêr Cymru II outcomes being realised depends upon the timing of fellows taking up their research position. In our view it is realistic to expect some of the research related outcomes such as published research and dissemination activities delivered by funded fellows to be captured within programme monitoring data around twelve to eighteen months into their role. These outcomes are likely to take longer (possibly around a further year) to appear within commercial databases such as HEFCW datasets and Scopus, due to the reporting lag. Other outcomes, notably grant income secured and collaboration with industry, are likely to take longer to be achieved by funded fellows, not least in the case of grant funding due to the time taken by potential funders to make decisions and award funding. We would therefore suggest that a realistic timescale for assessing grant income secured via programme monitoring data would be two years from a fellow commencing in post and three years for this data to appear within commercial datasets.

12.14   The long-term timescales for achieving some of these outcomes will have bearing upon the ideal timing for undertaking a final impact evaluation i.e. delaying a counterfactual impact evaluation until a minimum of 12 months post project completion would allow a greater proportion of outcomes and impacts to be captured. However, we also appreciate that there is a need to satisfy future policy funding decision making and so we would recommend that the final impact evaluation be conducted over the last six months delivery of the extended Sêr Cymru II project but that a brief counterfactual impact evaluation update be commissioned some 12 to 18 months post project closure to allow for published data to be considered. We would suggest that the final counterfactual impact evaluation considers published research datasets such as Scopus. It would also be appropriate that the evaluation be informed by fieldwork with successful and unsuccessful research applicants as well as businesses or third sector organisations who have collaborated with funded researchers. In order to achieve this the Welsh Government would need to put appropriate data sharing agreements in place and ensure that any sample of projects selected for in-

depth review includes those who have collaborated with businesses or third sector organisations.

The baseline position

12.15   The baseline position for the Sêr Cymru II ERDF operations is that:

- Research income amongst Welsh HEIs stood at £190.4m in 2016/17, with the gap necessary to achieve 5 per cent of the UK share having widened (dropping from around 4 per of the UK total over the last four years to 3.2 per cent in 2016/17).

- Research income per researcher in Welsh HEIs stood at £32,800 in 2016/17, £10,300 short of that necessary to reach parity with the UK average. The size of this gap increased from 15 per cent to 24 per cent over the last year.

- STEMM research income across Welsh HEIs stood at £161m in 2016/17 or 3.1 per cent of the UK total. The gap necessary to achieve 5 per cent of the UK share was fairly stable prior to a recent increase (dropping from around 3.6 per cent of the UK total to 3.4 per cent in 2015/16 and 3.1 per cent in 2016/17).

- Welsh HEIs are lagging behind on measures relating to the number of researchers and research income across most STEMM subject groupings, with the gaps being more pronounced in those subjects which account for the larger absolute amounts of funding (such as medicine, dentistry and health). The exception is agriculture, forestry and veterinary science.

- Welsh HEIs continue to perform reasonably well compared to the rest of the UK on other measures of collaboration with the business community.

12.16   As the first Sêr Cymru II researchers were not in place until late 2016, it should be noted that it is still too early to see the impact of its operation in these indicators (e.g. research income).

Implementation and management

12.17   In terms of the effectiveness of management and operational processes the key findings of the mid-term evaluation are that:

- The Evaluation Panel and Programme Beneficiary Board continue to work effectively.

- The application peer review process and information supplied to the Evaluation Panel had improved from the third to the fourth round of applications.

- The approval process continues to take a considerable length of time even though this is in keeping with other academic grant funding application timescales. Nonetheless, a small number of successful applicants do not take up their funded opportunity as they secure other funding or work opportunities during this time.

- Although HEIs have been informed of the documentation requirements they believe that they are required to allocate unreasonable resources to meet the programme's financial monitoring requirements.

- Funded fellows are frustrated by the lengthy and complicated travel application process which they are required to adhere to although it is recognised that the Welsh Government is working with WEFO to streamline the process.

- There is still an over-dependency upon the Head of Research Programme Development and a lack of HE sector experience within the remaining Welsh Government delivery team.

12.18   In terms of the support landscape which is in place for individual early career researchers at their host institutions the feedback gathered during the mid-term stage suggest that this is mostly appropriate. The practice at one university was regarded as exemplary and there would be scope to replicate this at other universities should they appoint further research fellows as part of the programme.

12.19   Feedback from funded fellows suggest that the induction and training packages offered by the programme, and by individual HEIs, are appropriate and well received. The programme welcome events were considered to have been particularly useful for fellows. Some further specific training needs were identified by those who contributed to the evaluation (particularly around commercialisation, establishing spin-out companies and collaborating with industry) and it was encouraging to observe that fellows felt comfortable requesting specific training as needs arose.

Progress made by funded fellows

12.20 Whilst the survey data found that funded researchers are collaborating with enterprises or third sector organisations, feedback gleaned from interviews with funded researchers revealed a different picture and it was reported that the level of engagement was not particularly meaningful. These interviews also revealed that the opportunities for collaborating are fairly limited due to the experimental and early-stage nature of the research work. We conclude that the programme does however have an important role to identify and facilitate collaborative opportunities between industry and funded fellows, particularly via the Welsh Government's SMART suite of interventions, and that it should prioritise this work in the future when staffing resources allows for it. We think that it would be appropriate for the programme to identify a small number of funded projects which offer the greatest scope for collaborative work with industry and broker relationships between academics and industry. We also think that the programme could address existing barriers faced by funded fellows (e.g. lack of time, burdensome nature of demonstrating engagement etc) which currently restrict them from engaging with industry.

12.21 The evidence gathered during the mid-term stage shows that fellows are collaborating effectively and linking well with related interventions in other universities. Feedback suggests that academic researchers do so by default, utilising their existing international network of contacts, without the need for the Sêr Cymru II programme to actively support them to achieve this.

12.22 Chapter 10 of the report sets out in detail the achievements of funded fellows surveyed as part of this evaluation in terms of levels of grant funding applied for and secured, the number and range of public engagement activities and the number of funded fellows who have already submitted and published papers. In terms of the value of grant funding applied for and secured, data provided by eight surveyed fellows shows that they had been involved with applications for £10.76 million funding and had secured £4.83 million to date. This points to a success rate of at least 45 per cent - given that the outcome of some applications made were not known at the time the success rate could be higher.

Cross-cutting themes and the Welsh language

12.23 The evaluation found that the programme is making a good contribution to the cross-cutting theme of equal opportunities, particularly in terms of gender and diversity, and that funded projects have significant scope to contribute to sustainable development, given that the primary focus of several research projects are in this area of study. There is less evidence available at this stage to demonstrate how the programme can expect to positively impact the tackling poverty cross-cutting theme.

12.24 This mid-term evaluation reinforced previous findings from the inception phase evaluation that the extent to which the Sêr Cymru II operations can be expected to positively contribute to the Welsh language is limited. Two funded fellows are Welsh speakers and both use the Welsh language in engagement, outreach and teaching work. Since completing the evaluation fieldwork, one funded fellow has successfully published a bilingual research paper. We conclude that whilst the programme has made every effort to promote Welsh language learning opportunities amongst funded fellows, the take up of such opportunities has been limited to date, not least due to some funded fellows wishing to improve their English language skills in the first instance.

Recommendations

12.25 We offer 10 recommendations for the remaining delivery period. We recommend that:

1) The programme should focus on increasing its outputs across the East Wales funded programme, given that its rate of achievement in this region is currently behind that of West Wales and the Valleys.

2) Participating HEIs consider what support and action can be taken to ensure that as many as possible of the existing funded fellows can be retained at Wales' HEIs after the Sêr Cymru II programme comes to an end. Aligned to this, the final impact evaluation could examine this issue further and explore options for strengthening the long-term sustainability of funded researchers.

3) The programme considers how it could engage with a broader number of universities in Wales and what flexibility it could adopt to accommodate the

inclusion of non-participating Welsh universities within Sêr Cymru II without compromising upon the objective of funding excellent research projects.

4) The programme explores how it could better fulfil the Welsh Government's regional priorities in the future, as set out in its Economic Action Plan.

5) The Welsh Government considers whether the role of the Evaluation Panel and Programme Beneficiary Board should include the monitoring of outcomes and achievements of the funding investments made.

6) The programme moves towards a sample based claims model as soon as the Welsh Government is satisfied with the full financial evidence claims currently being submitted by HEIs.

7) The programme strengthens its collaboration with the Welsh Government's SMART suite of interventions when staffing resources allows for it, identifying a small number of funded projects which offer the greatest scope for collaborative work and placement opportunities with industry and broker relationships between these academics and industry. The programme should also explore how it can address any barriers faced by funded fellows which currently restrict them from engaging with industry.

8) The Welsh Government actively addresses any future staffing gaps that may arise within the delivery team by securing personnel with previous HE sector experience.

9) A final impact evaluation be conducted over the last six months delivery of the extended Sêr Cymru II project and that a brief counterfactual impact evaluation update be commissioned some 12 to 18 months post project closure to allow for published data to be considered.

10) The Welsh Government puts appropriate data sharing agreements in place to allow for the impact evaluation to consider feedback from successful and unsuccessful applicants as well as collaborating businesses/third sector organisations.

Annex 1: Summary of Round 1 Approved ERDF Fellowships

Host university (Operational Programme)	Fellowship Title	Category	Principal Grand Challenge Area
Cardiff (EW)	InGaAs nanopillar SPADs for single photon sensing at near infrared wavelength	Research Fellow	Advanced engineering and materials
Cardiff (EW)	Monolithically grown InAs nanowire APD on silicon-on-insulator substrate for high speed and low cost coherent optical communication system	Research Fellow	Advanced engineering and materials
Cardiff (EW)	Synthetic Bioluminescence: Next-Generation Technology for Dual-Colour Deep-Tissue High-Resolution Bioluminescence Imaging	Research Fellow	Life sciences and health
Cardiff (EW)	Biomolecular mechanisms underlying cellular responses to non-thermal electromagnetic fields: getting to the 'heart' of the matter	Research Fellow	Life sciences and health
Cardiff (EW)	Vector-borne emerging diseases: computer-aided design, synthesis and biological evaluation of novel antiviral compounds against Chikungunya and Zika viruses.	Research Fellow	Life sciences and health
Swansea (WWV)	Exploiting triplet excited states in organic semiconductors for organic electronic and spintronic devices	Research Fellow	Advanced engineering and materials
Swansea (WWV)	Green low surface energy materials	Research Fellow	Advanced engineering and materials

Swansea (WWV)	Ultra conductive copper-carbon nanotube wire: enhancing electrical performance, achieving processing reproducibility, and ensuring stability	Recapturing Talent	Advanced engineering and materials
Swansea (WWV)	Towards enabling the quantification of the manufacturing process on the efficiency of aerodynamic components	Research Fellow	Advanced engineering and materials
Swansea (WWV)	The armchair quantum wire: energy distribution for the 21st century	Research Fellow	Low carbon, energy and the environment
Swansea (WWV)	Stability of Solution Processed Solar Cells	Research Fellow	Low carbon, energy and the environment
Swansea (WWV)	Ser SAM	Chair	Low carbon, energy and the environment
South Wales (WWV)	Consensus analysis and synthesis for networked multi-agent systems with randomly occurring incomplete information	Research Fellow	ICT and digital economy
South Wales (WWV)	Novel operational control and mitigation strategies for nitrous oxide (N2O) emissions from wastewater treatment plants-Control N2O	Research Fellow	Low carbon, energy and the environment

Source: Welsh Government Monitoring Data

Annex 2: Summary of Round 2 Approved ERDF Fellowships

Host institution (Operational Programme)	Fellowship Title	Category	Principal Grand Challenge Area
Cardiff (EW)	In Vivo Functional Imaging of Top-down Cortical Dynamics in Health and Disease	Research Fellow	Life sciences and health
Cardiff (EW)	Global Sustainability and Food Security: assembling sustainable and just cities	Research Fellow	Life sciences and health
Cardiff (EW)	Biotic versus abiotic drivers of nutrient generation in subglacial environments	Research Fellow	Life sciences and health
Cardiff (EW)	The holy-grail of diabetes management: bloodless, painless, and accurate microwave continuous blood glucose monitor	Research Fellow	Life sciences and health
Cardiff (EW)	Accelerating Chemical Transformations Using Renewable Energy	Research Fellow	Low carbon, energy and the environment
Cardiff (EW)	Development, evaluation and validation of a microfluidic device for pathogen detection and quantification using Loop-mediated Amplification (LAMP) and Bioluminescent Assay in Real Time (BART)	Research Fellow	Life sciences and health
Aberystwyth (WWV)	SolHeat - The key to heating the Sun's atmosphere: ubiquitous small-scale plasma flows	Research Fellow	Low carbon, energy and the environment
Swansea (WWV)	Nanostructured materials with target modifiers for electro-catalytic	Research	Low carbon, energy and the

	reduction of carbon dioxide (TMERC)	Fellow	environment
Swansea (WWV)	Advanced computational methods for optimal feedback control with applications in engineering and life sciences	Research Fellow	All
Swansea (WWV)	Discovering the crustal structure beneath the Greenland Ice Sheet and its control of ice mass loss and sea level rise	Research Fellow	Low carbon, energy and the environment
Swansea (WWV)	Synergy of Nanocatalysts and Nanowires for a New Sensing Platform	Research Fellow	Low carbon, energy and the environment
Swansea (WWV)	Engineering the new generation of biomimetic artificial muscles	Research Fellow	Life sciences and health
Swansea (WWV)	A practical toolkit for metallurgists to study plastic deformation	Research Fellow	Low carbon, energy and the environment
Swansea (WWV)	Printable Graphene Metal Organic Frameworks (GMOF) Composite Sensor platform	Research Fellow	Life sciences and health
Swansea (WWV)	Developing Light and Electron Driven Nanoscale Catalysts for Water Treatment and Renewable Green Fuel Generation (LED-NaCat)	Rising Star	Low carbon, energy and the environment
Swansea (WWV)	Cholesterol metabolites in dopamine neuron development and Parkinson's disease diagnosis and therapy.	Rising Star	Life sciences and health
Swansea (WWV)	Next-generation semiconductors for photodetectors and optoelectronics	Rising Star	Low carbon, energy and the environment

Source: Welsh Government Monitoring Data

Annex 3: Summary of Round 3 Approved ERDF Fellowships

Host institution (Operational Programme)	Fellowship Title	Category	Principal Grand Challenge Area
Aberystwyth (WW)	Boosting Bee Immunity in Wales - Safeguarding pollinator services by development of a winter feed for UK bees enriched with an immune stimulant (BeeWales)	Re-capturing Talent	Low Carbon Energy and the Environment
Aberystwyth (WW)	Big Data Stringology Algorithms for 2nd and 3rd Generation Sequencing (SeqInfo)	Re-capturing Talent	Life Sciences and Health
Aberystwyth (WW)	Earth Observation for Living Wales	Research Chair	Low Carbon Energy and the Environment
Aberystwyth (WW)	A Centre of Excellence for Bovine Tuberculosis (CBTB) for Wales	Research Chair	Life Sciences and Health
Bangor (WW)	Artificial Light Impacts on the Encroachment of Invasive Species (ALIENS)	Research Fellow	Low Carbon Energy and the Environment
Bangor (WW)	Energy Institute at Bangor University	Research Chair	Low Carbon Energy and the Environment
Cardiff (EW)	Sêr Cymru II Chair in Systems Medicine	Research Chair	Life Sciences and Health

Cardiff (EW)	Cardiff Translational Drug Discovery Centre (CTDDC)	Research Chair	Life Sciences and Health
Cardiff (EW)	Mapping subicular mnemonic circuitry	Rising Star	Life Sciences and Health
Cardiff (EW)	Photonic Topological Insulator Semiconductor Laser and One-Way Photonics	Rising Star	Advanced Engineering and Materials
Swansea (WW)	Ecological and management effects of behaviourally mediated fisheries impacts	Research Fellow	Life Sciences and Health
Swansea (WW)	Overcoming challenges to freshwater conservation in a fragmented world	Rising Star	Life Sciences and Health

Source: Welsh Government Monitoring Data

Annex 4: Summary of Round 4 Approved ERDF Fellowships

Host institution (Operational Programme)	Fellowship Title	Category	Principal Grand Challenge Area
Cardiff (EW)	Deconvoluting the Dementia Phenotype using Functional Genomics and Computational Approaches	Rising Star	Life Sciences and Health
Cardiff (EW)	Integrated compound semiconductor lab-on-chip optical biosensor enabling infectious disease diagnostics at the point-of-care	Rising Star	Life Sciences and Health
Cardiff (EW)	Imaging immunity in the genetic risk for Alzheimer's disease	Research Fellow	Life Sciences and Health
Cardiff (EW)	Structural and functional investigations into the outcomes of genetic studies	Research Fellow	Life Sciences and Health
Cardiff (EW)	Small-molecule immune checkpoint inhibitors: an innovative approach to treat cancer.	Research Fellow	Life Sciences and Health
Cardiff (EW)	Knowing to grow: Increasing the resilience of plant centred food production skills	Research Fellow	Low Carbon Energy and the Environment
Cardiff (EW)	The development of in vitro models of respiratory biofilm assembly to develop novel antimicrobial therapies	Precision Medicine Fellowship	Life Sciences and Health
Cardiff (EW)	Immune fingerprinting of bacterial infections in cirrhosis	Precision	Life Sciences and Health

		Medicine Fellowship	
Cardiff (EW)	Role of NFIC in acute myeloid leukaemia: pathological and prognostic significance	Precision Medicine Fellowship	Life Sciences and Health
Cardiff (EW)	New Players in Organ Size Determination and Homeostasis	Rising Star	Life Sciences and Health

Source: Welsh Government Monitoring Data

Annex 5: List of organisations consulted

Aberystwyth University
Cardiff University
HEFCW
Life Science Research Network Wales
Medical Research Council
Sêr Cymru National Research Network for Low Carbon, Energy and Environment
Swansea University
The Learned Society of Wales
TWI Ltd.
University of South Wales
University of Wales Trinity St David
WEFO
Welsh Government