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Academic Expertise for Business: Final Programme Evaluation

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Academic Expertise for Business: Final Programme Evaluation

CM International and The Innovation Partnership

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Views expressed in this report are those of the researcher and not necessarily those of the Welsh Government

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Glossary of acronyms

A4B	Academic Expertise for Business
AC	Accelerate Clusters
BETS	Business, Enterprise, Technology and Science - the former Welsh Government Department, currently known as Economy, Science and Transport
BIP	Business Innovation Programme
CETIC	Centres of Excellence for Technology and Industrial Collaboration (CETIC) Programme
CMI	CM International
ED	Experimental Development
ERDF	European Regional Development Fund
ERP	Economic Renewal Plan
ESDF	Early Stage Development Fund
EST	The Welsh Government department for Economy, Science and Transport
EU	European Union
FE	Further Education
FEI	Further Education Institution
FTE	Full Time Equivalent
GVA	Gross Value Added
HE	Higher Education
HEI	Higher Education Institution
I&E	Innovation and Engagement
ICT	Information and Communication Technologies
ILO	Industrial Liaison Officer
IP	Intellectual Property
IPM	Internet Project Monitor
IR	Industrial Research
ISD	Institute for Sustainable Design
KECD	Knowledge Exploitation Capacity Development
KEF	Knowledge Exploitation Fund
KHW	Know How Wales
KTP	Key Performance Indicator
KTCIR	Knowledge Transfer and Collaborative Industrial Research
KTP	Knowledge Transfer Partnership
LADP	Large Application Development Project

R&D	Research and Development
RD&I	Research, Development and Innovation
REF	Research Excellence Framework
SAV	Strategic Added Value
SME	Small and medium sized enterprise
TCF	Technical and Commercial Feasibility
TIP	The Innovation Partnership
TRL	Technology Readiness Level
WEFO	Welsh European Programme Office
WG	Welsh Government

Executive Summary

Introduction

1. CM International (CMI) and The Innovation Partnership (TIP) were appointed by the Welsh Government to undertake the final evaluation of the A4B programme. This report provides details of the evaluation findings, and considers project activity in the period December 2008 to December 2014.

The evaluation has been carried out prior to the project's closure (in line with the required evaluation timetable) and does not consider any monitoring or spend data after the end of December 2014. As a consequence the reported outputs, spend and impacts should be considered as provisional.

2. The objective of the final evaluation is to assess the achievements of the programme, its management and delivery, impacts, value for money; and provide recommendations for future delivery.
3. The methodology employed includes analysis of project monitoring records, interviews with HE and FE institutions, surveys of staff /academics and businesses. A workshop with the A4B management and delivery team was also undertaken, alongside case studies of nine projects.

Project overview

4. The A4B programme was delivered on a pan-Wales basis, with the aim of strengthening and maximising the capabilities of higher (and where appropriate, further) education institutions to support businesses through knowledge transfer, and the commercialisation of research and encouraging the development of innovative technologies. The programme comprised two separate European projects - Knowledge Exploitation Capacity Development (KECD¹) and the Knowledge Transfer and Collaborative Industrial Research (KTCIR²), and was intended to:
 - i. Improve on current capabilities and build on new innovative methods of operation piloted previously
 - ii. Provide a simplified, single, strategic and integrated approach to knowledge transfer funding support and academia

¹ Project 80015

² Project 80016

- iii. Provide a coherent development platform to enhance the provision of both financial and technical support to academia as the programme moves forward
 - iv. Continue to build on the collaborative approach to funding Knowledge Transfer by HEFCW and the WG Department for Economy, Science and Transport (ES&T)
 - v. Support the cross-cutting themes of the ERDF Operational programme by developing new knowledge and technologies and systems which will impact on environmental sustainability, and working with the HE and FE institutions to support equality and diversity strategy development
5. It responds to identified needs to strengthen R&D, innovation, and knowledge transfer, in Wales. The programme's integrated support was targeted at particular 'strand' activities in the first half of its delivery, including IP commercialisation projects (e.g. feasibility projects), Knowledge Exchange Networks, Knowledge Transfer Centre (KTC), Collaborative Industrial Research Projects (CIRPS). In the second half of the programme the explicit strands were removed, and the programme moved towards a more open and flexible model of delivery, in which an open call was made for projects meeting the overall objectives of A4B.
 6. The programme was intended to address the cross-cutting themes of environmental sustainability and equality and diversity, through the production of 'hearts and minds' documentation, training for the delivery team and periodic review of the approach adopted.
 7. The agreed project budget for the full period was £32.6 million (KECD - £11.6 million and KTCIR - £20.9 million). This budget was re-profiled in 2014, and represented a decommitment of some £18 million in the original budget. This followed a lower than anticipated programme demand.
 8. The programme was managed by a central team within the Welsh Government's Innovation Department. This included support for the development of projects (development managers), appraisal of projects (appraisal and assessment panel), and validation and monitoring (monitoring of financial data, outputs and the project's progress).

Final outputs to December 2014

9. The programme funded a total of 255 projects to December 2014. This included 161 KECD and 94 KTCIR. A further 100 projects were funded outside the Convergence area. All of Wales' HEI and nine FEIs received funding from the programme, with HEIs accounting for the largest proportion of projects (86%). The KTCIR was the largest project by expenditure value with activities such as KTC and CIRP accounting for £15 million and £10.2 million of the budget respectively. Grants ranged from £5 thousand to £2 million.
10. Total project expenditure to December 2014 was £30.5 million (KECD £10.3 million, KTCIR 20.1 million).
11. Against its main performance indicators to the end of December 2014 the programme achieved mixed performance, with strongest outputs found in its innovation-related outputs: collaborative R&D activities, products, processes and services registered and launched, and investment induced. Both projects, however, are below many of their agreed targets. This is particularly evident in the KECD project, where core economic impact outputs, such as jobs created, are substantially below target. Perhaps the most successful performance against target is in relation to investment induced as a result of A4B. This has achieved more than £20 million in funding, and points to A4B supporting further R&D activity, and reducing the risk for subsequent investors and funders. Output indicators for the cross-cutting themes are all below the target, with no evidence that the business plan activities were implemented.

Beneficiary experiences and achievements

12. The results of the fieldwork suggest that the project beneficiaries were generally satisfied with the programme, viewing it as an important source of funding for knowledge transfer and exploitation, building on the legacy of previous supports in Wales. Such activity is becoming more important to HE stakeholders, with the Research Excellence Framework (REF), and highlights the ongoing importance of this type of funding.
13. The surveys revealed a strong level of prior collaborative R&D activity on the part of both academic and businesses. In this respect many A4B projects helped to build on pre-existing staff capacity. Achievements identified include development of new products, processes and services, jobs, sales and new collaborations. They also reveal benefits for both academic and industry partners. Academics and other staff,

for example, point to improved skills, linkages to, and understanding of industry needs.

14. Many of the new products, processes and services developed with the aid of A4B remain under development, with partners anticipating that the collaborative R&D process will help to produce future commercialisation in the coming years.

Impacts achieved

15. The results of the evaluation research indicate the role of A4B in producing both actual and potential economic, innovation and environmental impacts. This includes supporting projects that address a range of key challenges in areas such as health and renewable energy. The full scale of the programme's impacts are, as noted above, partly dependent on the ability of the institutions to sustain the collaborative R&D and commercialisation capacity (including the business partnerships, centres and so on), and for the results of the project activity supported by external funding to be successfully commercialised. These areas represent long-term processes, and highlight the likelihood that many outcomes will occur after the formal end of the programme. At the end of the programme, however, the following economic impacts can be identified:
 - £30.5 million net additional GVA
 - 586 net additional FTE jobs
16. A4B has also supported environmental sustainability through its support for new products, processes and services in key areas such as reduction of greenhouse gas emissions and renewable energy.

Value for money

Economy

17. Project expenditure, at the end of programme point (December 2014), was to £30.5 million. The approved funding for the programme - £32.6 million – had some £18 million of funding decommitted to account for the lower than expected demand. Active steps have been taken throughout the life of the programme to ensure economy in its delivery.

Efficiency

18. The programme's delivery efficiency was strongly influenced by external policy and economic context changes. This required it to evolve its delivery approach over the programme period, and respond to the needs of instructions and emerging lessons.

This flexibility has enabled the Welsh Government's management team to learn lessons (e.g. the best approach to managing calls) and improve delivery efficiency over the course of the A4B programme.

19. Key challenges faced by the programme, and noted by programme staff and participants, concern the administration and monitoring elements of the programme. These aspects of the programme are generally recognised as being shaped by both the size of the programme, its complexity and the requirements for European funding.
20. The A4B delivery process has continued to evolve and adapt to changing circumstances. The evaluation research and, in particular the discussions with both A4B staff and partners of the programme, identified areas where the overall efficiency of the delivery process should be considered. These included balancing the need for flexibility in calls for proposals and the efficient allocation of A4B development manager resources, the composition of assessment panel, the format of project contacts and structures of review meetings, smoothing out the claims handling process, and taking steps to agree indicator and eligibility definitions early on in future programmes.

Effectiveness

21. Against the original objectives of the programme the results of the evaluation suggest that the programme has contributed, with evidence found in relation to:
 - Capabilities in support of the knowledge transfer and commercialisation process.
 - Investing in collaborative R&D.
 - Embedding innovation awareness and attitudes.
 - Developing new products, processes and services.
 - Producing wider multifaceted impacts (economic, social and environmental).
 - Building and strengthening collaborative linkages.
 - Producing HE and FE benefits.
 - Producing environmental sustainability through the introduction of new products, processes and services.
22. A key feature of these benefits, however, is that much of the activity supported by the programme requires further funding and development work to achieve full commercialisation. This is consistent with the long term nature of the R&D process, and highlights the potential for future benefits to emerge, after the end of the programme.

23. Achievements against the cross cutting themes is an area of programme weaknesses, with limited activity in support of the business plans for these themes. Recent efforts have, however, been undertaken to address this output's weakness, with discussions taking place with specialist providers of cross-cutting themes support.

Strategic added value and sustainability

24. The evaluation suggests that the A4B programme has made important contributions to Strategic Added Value (SAV) in Wales, helping to catalyse knowledge transfer and exploitation activity in Wales, helping to support the activities and wider agenda of key organisations such as HEFCW and Finance Wales (in addition to giving expression to the Welsh Government's own strategies for Science and Innovation). Its activities also highlight strong synergy with both Welsh Government support such as Innovation Vouchers, as well as the wider support available at the UK and European levels (e.g. Innovate UK collaborative R&D funds, Research Council knowledge transfer funds and EU Research and Technological Development Framework funds).
25. The sustainability of the A4B programme is currently subject to an application for ERDF funding (Priority 1) for the 2014-2020 programme. The view of the stakeholders interviewed / surveyed as part of this evaluation, however, suggest there is a clear and ongoing demand for A4B-type funding in Wales' HE and FE institutions, and businesses. In this respect the support provided by the programme was felt to be central to provide knowledge transfer and exploitation activity in Wales. Sustainability of the projects funded by the programme is less certain, and will also depend on the success of projects in attracting future funding.
26. Many stakeholders recognise that the Welsh Government intend to target future support on a smaller number of centres and projects. This is in line with the targeting approach identified in Innovation Wales (smart specialisation).

Key lessons and recommendations from the evaluation

27. The findings highlight a number of lessons and recommendations relating to future support for knowledge transfer and knowledge exploitation in Wales:

Recommendation 1: Welsh Government should continue to fund knowledge exploitation and knowledge transfer activity with a strong focus on collaborative R&D.

28. The research findings indicate that without A4B-type funding, much knowledge exploitation and knowledge transfer activity would not take place. This is due to the lack of other forms of funding, and the inherent 'risky' nature of the R&D process. The evidence suggests that collaborative R&D projects and knowledge transfer centre activity are areas which have the potential to produce greatest impacts. Here the potential for innovative models of funding such as the Fraunhofer-type model (1/3rd industry, 1/3rd government and 1/3 competitive funding) may provide a mechanism to target future funding on key areas of expertise, existing capabilities, and societal challenges should also be considered.

Recommendation 2: Welsh Government should balance the needs of larger and smaller HE/FE institutions in Wales when designing future funding programmes for knowledge transfer and exploitation.

29. Here, the findings indicate differing capacity and delivery needs of smaller and larger institutions, and HE and FE institutions in Wales. Institutions, on balance, value the less restrictive approach to project funding, in which project applications can be developed to meet both the overall objectives of the programme, and can be shaped to maximise outcomes. It will be important that a balance is sought, however, between an open and restrictive approach, and ensuring that more defined funding formats (e.g. strands or sub-projects) are used to address challenges faced in engaging smaller institutions (FE and HE). This should consider the potential for FE institutions to support SMEs with current technologies. Likewise, consideration should also be given to supporting large firms, SMEs and start-up businesses to develop future technologies.

Recommendation 3: Welsh Government should continue to develop strong working relationships with Wales' HE and FE institutions, underpinned by robust communication mechanisms.

30. Here, communications between Welsh Government and the institutions have, on occasions, been challenging with reports of multiple contacts and contact points in both HE and Welsh Government, leading to 'mixed messages'. These instances are, in part, linked to the centralised structure of the programme, and the multiple level of Welsh Government contacts required to deliver a project. In future Welsh Government should examine the potential for a designated case officer role (either

a development or validation team member) to allow for project managers and academic partners to be clearly directed on key issues and queries. It should also consider the introduction of periodic institution-level A4B project case review meetings involving the commercial/industrial liaison officers, plus project managers appointed by the institutions and the relevant A4B development / A4B case officers for the institution.

Recommendation 4: Stronger synergies between the support programmes of the Welsh Government's Innovation team should be established.

31. While the A4B programme has arguably produced a strong level of strategic added value, with its integrated approach and alignment with other strategic priorities (Innovation, Science and so on) and support (e.g. HEFCW), there is significant potential for it to encourage delivery synergies between its core innovation programmes for business R&D and knowledge transfer. This should ensure that there is potential for providing 'follow-on' funding routes and maximising the potential for commercialisation outputs to be achieved from business innovation and collaborative innovation projects.

Recommendation 5: Project appraisal should introduce a greater degree of independence.

32. The appraisal of projects through an assessment panel helps to bring together a range of expertise and perspectives to advise on funding decisions. While HEFCW represented the main 'independent' panel member in the life of the programme, it would be beneficial to add to this independent membership, particularly where there is likely to be significant financial support or investment packages to be approved.

Recommendation 6: Future projects should ensure a greater focus on smoothing out the flow of new project applications.

33. Here the appraisal process employed by A4B faced substantial challenges to manage and respond to the flow of projects. Efforts have been made throughout A4B to improve the efficiency of this process (e.g. greater 'early warning' from development managers). It will be important that any future programmes examine ways to further improve this process through clearer communication with project applicants on when projects are due for discussion by the panel, or the use of an electronic appraisal process for smaller projects.
34. Minimising the peaks (or bottlenecks) in applications should also help to stretch resources in the development team. In this respect consideration should also be

given to setting specific numbers of development manager hours or days for individual projects.

Recommendation 7: Communication should be underpinned by modern monitoring technologies and systems.

35. The IPM system employed to collect monitoring data lacks the functionality associated with more modern systems, including limited flexibility and difficulties in flexible data extraction. Both HE and FE institutions view the IPM system as being 'out of date'. Addressing this will help to improve the overall delivery efficiency of future programmes (and contribute to recommendation 3).

Recommendation 8: Future programme monitoring should be structured to ensure efficient claims processing and collection of data.

36. Monitoring is a particular challenge for a large, integrated, programme such as A4B. In the course of the programme the A4B team experienced substantial challenges in managing the claims process effectively, with substantial peaks and troughs associated with fixed claims dates. In this respect consideration should be given to setting claims dates in relation to actual project start dates.
37. Improving the monitoring interface with key project partners is a further area where efficiency could be improved, and will help to better understand project activity and achievement. This is likely to benefit from establishing a direct monitoring interface with project partnerships in future. Other efficiency areas include the early clarification of indicators and eligibility. This will help to ensure clarity with project partners, and the avoidance of redundant data collection.

Recommendation 9: Future innovation programmes should address the cross-cutting themes primarily through their support for innovative projects in the area of environmental sustainability and equality and diversity products, processes and services.

38. The findings from the evaluation indicate that the programme has faced difficulties in addressing the cross cutting themes objectives and targets for raising awareness via the institutions and signposting businesses to support. They do, however, illustrate how the primary activity of the programme – development of new products, processes and services – has contributed to key areas such as renewable energy and reduction of emissions, and social processes. In this respect the focus of some projects on addressing societal grand challenges indicates a way in which future programmes can be structured to support the cross-cutting themes.

1. Introduction

- 1.1 This report provides findings from CM International (CMI) and The Innovation Partnership (TIP)'s final evaluation of the Welsh Government Academic Expertise for Business (A4B) programme.
- 1.2 A4B provided a pan-Wales support for knowledge transfer, exchange and exploitation, managed by the Welsh Government. It operated between 2008 and 2014, and provided an integrated approach to support, drawing lessons and building on earlier Welsh Government-funded activities such as the Knowledge Exploitation Fund (KEF), the Centres of Excellence for Technology and Industrial Collaboration (CETIC) Programme, Know How Wales (KHW) and Accelerate Clusters (AC).
- 1.3 The A4B programme was part-funded by the European Regional Development Fund (ERDF) through two separate programmes:
- Knowledge Exploitation Capacity Development (KECD) – ref 80015
 - Knowledge Transfer and Collaborative Industrial research (KTCIR) – ref 80016
- 1.4 The final evaluation of the A4B programme builds on an earlier mid-term evaluation undertaken by CMI, and focuses on the outputs, outcomes and impacts achieved, as well as the lessons for future delivery.

Objectives of the evaluation

- 1.5 The detailed objectives of the final evaluation are set out in the evaluation specification. They include drawing conclusions on the following:
- i. How and to what extent did project activity reflect the commitments set out in the business plan?
 - ii. What are the perceived outcomes of the project from the perspective of beneficiaries? How and to what extent is this making a difference compared to if the improvements had not been implemented?
 - iii. Based on evidence, what would be the outcome, and potential long term impacts, of withdrawal of project funding for beneficiaries of the project?
 - iv. Which aspects of project delivery have led to positive outcomes, or could be viewed as 'good practice'?
 - v. What barriers and constraints has the project faced? What are the 'lessons learnt' from dealing with such barriers and constraints?

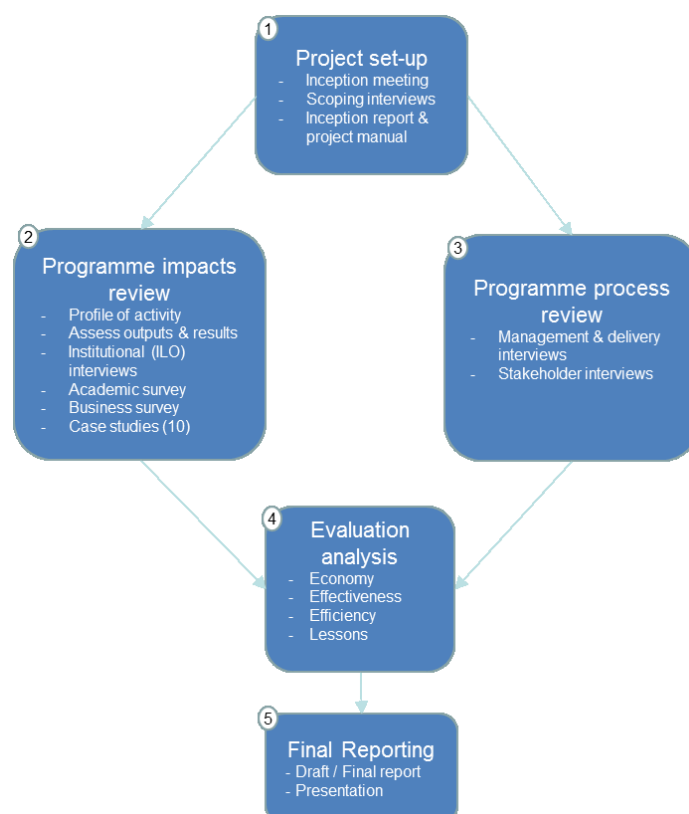
- 1.6 The evaluation specification also set the requirement to understand the programme's fit with Welsh Government priorities and policies, and outline any changes/recommendations for future activity; including lessons learnt (regarding project delivery and monitoring).

Research methodology

- 1.7 The final evaluation is based around five work stages and builds on monitoring data collected by the Welsh Government A4B team, alongside interviews with A4B delivery staff, interviews with universities and colleges, and a survey of academic and business beneficiaries. Case studies of a selection of A4B project activities were also developed. A summary of the approach adopted can be found in Figure 1.1 below detailing the focus and scale of the fieldwork undertaken for the evaluation.

This report sets out the final evaluation findings, based on project activity in the period December 2008 to December 2014. As the evaluation has been carried out prior to the project closure (in line with the required timetable) it does not consider any data that may become available after the end of December 2014. As a consequence the reported outputs, spend and impacts should therefore be considered as provisional.

Figure 1.1 Final evaluation work stages



- 1.8 Further details of the approach adopted can be found in Annex I, including details of the approach and impact methodology adopted.
- 1.9 The final evaluation research was undertaken in the period December 2014 to May 2015.

Structure of the report

- 1.10 The report begins with an overview of the A4B programme logic model and its underpinning assumptions (Chapter 2), followed by a profile of funding and expenditure at the end of programme stage (Chapter 3).
- 1.11 The main focus of the report, however, is found in Chapters 4, 5 and 6, where outputs and impact of the A4B programme and its value for money are considered. This is followed by an assessment of the project's Strategic Added Value (Chapter 7).
- 1.12 The report concludes by examining the key end of programme evaluation findings, including key lessons and recommendations for the future Welsh Government support for knowledge transfer and exploitation (Chapter 8).

2. Overview of the programme

- 2.1 The A4B programme was launched in 2008/09 and operated on a pan-Wales basis. The following section sets out the key features of the programme model, with the primary focus on its activities in the Convergence area of Wales.

Aims and objectives

- 2.2 A4B aimed to strengthen and maximise the capabilities of higher (and where appropriate, further) education institutions to support businesses through knowledge transfer, and the commercialisation of research and encouraging the development of innovative technologies.
- 2.3 The A4B Programme was funded by Welsh Government and EU Structural Funds, and was intended to stimulate new business ideas; to provide help to launch new products and processes onto the market; to catalyse the leverage of additional R&D funding into research products; to support R&D collaborations and to help businesses in Wales to benefit from collaborating with universities.
- 2.4 The A4B programme model was intended to³:
- Improve on current capabilities and build on new innovative methods of operation piloted previously
 - Provide a simplified, single, strategic and integrated approach to knowledge transfer funding support and academia
 - Provide a coherent development platform to enhance the provision of both financial and technical support to academia as the programme moves forward
 - Continue to build on the collaborative approach to funding Knowledge Transfer by HEFCW and the WG Department for Economy, Science and Transport (ES&T)
- 2.5 As noted in the introduction, the programme comprised two separate European projects, designed to support activity in Wales:
- *Knowledge Exploitation Capacity Development (KECD)* supported higher and further education institutions to improve their capability for knowledge exploitation in partnership with companies. This was intended to foster R&D, innovation and technology and its commercial exploitation. It drew on best practice from the earlier CETIC and KEF projects by building capacity in the Institutions through networking with the aim of increasing the number of

³ See Invitation to Tender: Academic Expertise for Business: Final Evaluation, Contract Number: C147/2014/2015.

enterprises engaging with the institutions and carrying out effective commercialisation through spinout or licensing agreements. It also provided technical advice and support to enhance institutions ability in commercialisation, partnership development and dissemination of information.

- *Knowledge Transfer and Collaborative Industrial Research (KTCIR)* was intended to enhance and accelerate the transfer of knowledge and the development of innovation from higher and, where appropriate, further education institutions to businesses and to ensure the quality of knowledge transfer and innovation services to business.

- 2.6 These projects highlight the importance of the A4B programme in supporting both the HE and FE sectors to both develop and strengthen capability for knowledge transfer and exploitation, and to support the sectors to implement such activities through collaboration with businesses. This highlights the potential for the programme to develop lasting capacity within the sector, beyond the funding period for A4B. It also holds the potential for businesses to gain R&D legacy benefits, whereby projects lead to further knowledge transfer or innovation activity.
- 2.7 The A4B programme was further intended to contribute towards the cross-cutting themes of equality and diversity, and environmental sustainability practices.

Rationale

- 2.8 The rationale for the A4B programme is set out in the two project's business plans (KECD and KTCIR). These plans highlight the A4B programme's potential to contribute towards the innovation and growth of the Welsh economy. Both Business plans were developed from a strong evidence base associated with earlier knowledge transfer and exploitation activities in Wales, and associated evaluations. Here, the final evaluations of both KEF⁴ and the CETIC⁵ programmes, for example, concluded that the rationale for knowledge transfer and commercialisation in higher and further education remained valid as a driver of higher value added in the Welsh economy.

Need

- 2.9 The rationale for the A4B programme was, as noted above, supported by its focus on innovation and knowledge transfer / exploitation. These have been identified as important contributors to growth, as expressed by the recent Innovation Wales

⁴ PACEC (2007) Evaluation of the Knowledge Exploitation Fund.

⁵ The Innovation Partnership Ltd (2008) An Evaluation of the Centres of Excellence for Technology and Industrial Collaboration (CETIC) Programme 2004-2007.

policy⁶ statements. This document highlights the importance of the knowledge base as a source of expertise and facilities that can be better harnessed to promote innovation and jobs. The A4B programme's objectives, with a focus on enterprise assistance, HE/FE capacity building and knowledge transfer are consistent with this agenda.

- 2.10 Knowledge transfer and innovation more broadly have long been identified as essential to the UK's future economic prosperity with businesses acting as its key driver; but the complex nature of knowledge has presented practical difficulties in terms of achieving business innovation. The UK Department for Business, Innovation and Skills has identified three forms of failure where the market does not incentivise businesses sufficiently to undertake the optimum level of innovation activity:
- Information failures – knowledge and expertise is not easily accessible
 - Coordination failures – lack of collaboration and exploitation of similarities between business and academic research
 - Spillover failures – difficulty of seeking return on investment purely for the innovator
- 2.11 While knowledge transfer between businesses and higher education has been identified as important in generating new products, processes and services, evidence points to the challenges that many businesses face in accessing academic expertise. In this respect the A4B programme sought to address market failures identified across the UK in terms of access to knowledge and the R&D capacity of businesses.
- 2.12 These factors suggest that without assistance, companies will tend to under invest in R&D and innovation projects. No firm data is available on the precise nature of these failures specifically in Wales. It has long been recognised, however, that there is a need to make companies and researchers aware of one another's expertise and opportunities, and strengthen such links to make knowledge more accessible.
- 2.13 The innovation performance of Wales is clearly significantly affected by, and consequent upon, the overall economic structure and performance of the country and poses important challenges for policy makers. The structure of the Welsh economy is not characterised by an abundance of high growth sectors, and job opportunities. Furthermore levels of expenditure on business R&D in Wales (0.6%

⁶ Welsh Government (2013) 'Innovation Wales'. Available at:
<http://gov.wales/docs/det/publications/140313innovationstrategyen.pdf>

of regional Gross Value Added⁷), for example, fall some way behind the UK regional average (1.3%). While available evidence suggests that interactions between academia have increased in recent decades through concerted action and support, the opportunity for Wales' knowledge base to make a stronger contribution to its economic prosperity is well recognised.

- 2.14 For businesses to fully benefit from knowledge transfer and innovation, findings from research literature suggests that time is required to build up trust and mutual understanding⁸. Research also suggests that the potential of companies to absorb new knowledge and build R&D capacity is dependent on them having pre-existing knowledge in a similar or related area. In this respect the concept of 'absorptive capacity' maintains that 'related knowledge confers an ability to recognise the value of new information, assimilate it, and apply it'⁹. Put simply this suggests that, unless they already possess appropriate contextual information, businesses will have difficulty absorbing the knowledge needed to build R&D and innovation capacity.
- 2.15 The rationale for investing in the A4B programme to promote knowledge transfer, innovation and capacity development in Wales has, therefore, a strong basis. In this respect the A4B programme has the potential to contribute towards further investment in academia-industry collaboration, R&D, and new innovative products and processes.

Strategic priority

- 2.16 The rationale for the A4B programme is related to its contribution towards strategic priorities in Wales. To this end, A4B was designed to contribute to the current Programme for Government (2011), and its aim of 'strengthening the conditions that will enable business to create jobs and sustainable economic growth', as well as policy statements on innovation and the role of higher education in supporting economic development. These strategic linkages are clearly identified in the A4B programme's business plans, which point towards its role in supporting knowledge transfer capacity and research and innovation in the Welsh economy.

⁷ Office for National Statistics (2014) 'Regional Economic Indicators, March. Available from: <http://www.ons.gov.uk/ons/rel/regional-trends/regional-economic-indicators/july-2014/rep-regional-economic-indicators.html#tab-Innovation>

⁸ Sabel, C.F. (1992) 'Studied trust: building new forms of co-operation in a volatile economy', in Pyke, F. and Sengenberger, W. (Eds.) *Industrial Districts and Local Economic Regeneration*, Geneva: International Institute for Labour Studies, pp. 215-250.

⁹ Cohen, W. M. and Levinthal, D. A. (1990) 'Absorptive capacity: a new perspective on learning and innovation', *Administrative Science Quarterly*, Vol. 35(1), pp. 128-152.

- 2.17 The innovation and economic development agenda in Wales is most clearly expressed in Innovation Wales (2013)¹⁰. This document highlights the role of universities and colleges in economic development in Wales, arguing that:
- ‘Higher and Further Education institutions will be required to confirm and reinforce the role of knowledge transfer and commercialisation in their core strategies, providing a long term commitment to these activities as a condition of Welsh Government support’.
- 2.18 Innovation Wales identifies a range of opportunities as the basis for future action, including ‘low carbon energy and environment’. Here, Innovation Wales indicates priorities in key areas such as smart living, energy resource-efficiency and large scale electricity generation, procuring social housing to the highest low-carbon, and adaptation to climate change and development of new products such as smart meters.
- 2.19 The role of the higher education sector in contributing towards innovation and economic development is also noted in the Policy Statement on Higher Education. This argues that:
- ‘Future growth in new jobs is most likely to come from the high-skilled occupations with high proportions of graduates. Interaction between universities and business is important for stimulating innovation and economic growth, and university research and innovation helps to create high-value industrial clusters. A successful long-term approach will require sustained investment in the key areas of greatest opportunity for Wales’.
- 2.20 This maintains that universities can play a central role in the knowledge economy, and concurs with the recent Wilson review that they can contribute towards important outcomes such as commercialisation, knowledge exchange, provision of graduates with appropriate skills, attraction of new investment and public engagement¹¹. The Policy Statement on Higher Education further argues that Wales performs well on a number of metrics (collaborative research income), but needs to ‘*adopt a more collaborative proactive and strategic approach to maximise income from research and consultancy contracts, patents and intellectual property*’. This challenge is consistent with the objectives identified above for A4B.

¹⁰ Welsh Government (2013) ‘Innovation Wales’. Available from: <http://wales.gov.uk/docs/det/publications/130714innwalesen.pdf>

¹¹ Wilson, T. (2012) ‘A Review of Business–University Collaboration Professor’, a report by Sir Tim Wilson. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32383/12-610-wilson-review-business-university-collaboration.pdf

Project activities and cross-cutting themes delivery

2.21 The A4B programme provides a range of integrated support measures supporting:

- Universities and colleges across Wales to develop their capacity to support businesses (typically SMEs) in knowledge transfer and exploitation projects.
- Knowledge transfer and exploitation projects between universities and colleges and businesses

2.22 The A4B programme, in both its supported activities and the delivery process, evolved considerably throughout the delivery period. This, in part, resulted from consultation and user feedback and Welsh Government policy development with respect to emerging sector priorities (e.g. the Economic Renewal Plan), and research and innovation (e.g. Science for Wales, Innovation Wales).

2.23 In the first half of the A4B (to 2011/12) programme project activities were grouped according to a number of strands. These were designed to provide integrity and synergy across project activities in the following areas:

IP Commercialisation

2.24 IP Commercialisation was aimed at the development of ideas into commercial licensing or spin out arrangements, allowing institutions to maximise the number of ideas being explored and to improve the commercial viability of these ideas going forward. It provided funding for IP Commercialisation funded Feasibility, Early Stage Development and Large Application Development projects. These activities were informed by an IP Commercialisation Task and Finish Group

Knowledge Exchange Networks

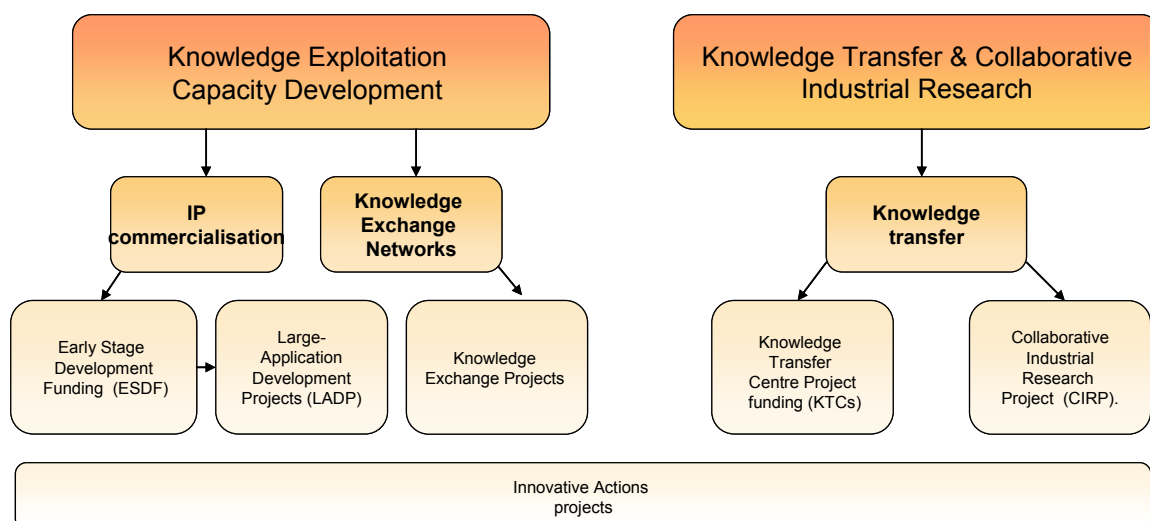
2.25 This strand was concerned with projects which identify and develop effective innovative academic and business knowledge exchanges, delivering results and impacts which are necessary to effect economic change. Knowledge Exchange funds the Knowledge Exchange Projects (KEPs).

Knowledge Transfer

2.26 This strand was concerned with building knowledge transfer capacity from educational institutions and ensuring quality of knowledge transfer and innovation services to business. It provided funding for Knowledge Transfer Centre (KTC) and the Collaborative Industrial Research Projects (CIRP). A number of shorter KTPs were also funded during the early part of the programme, and were removed following the publication of the ERP (as a result of the sector prioritisation).

- 2.27 In addition to these strands the A4B Programme also funded projects that show commercial potential and opportunity in areas that may arise, but not covered by other parts of the Programme. These were known as '**Innovative Actions**'.
- 2.28 The relationship between the two business plans, strands and resulting Projects at the mid-term is set out in the Figure 2.1 below.

Figure 2.1: Programme Funding, Strand and Project Structure at the mid-term stage



Source: CMI Mid-term Evaluation of A4B (2011)

- 2.29 The A4B Programme delivery process was adapted during the life of the project. Initially the delivery process was built around annual and rolling calls for project proposals. This was subsequently amended following the initial period of operation to a defined competitive call structure. This development was introduced towards the end of the first half of the programme with a focus on ensuring greater submission of good quality projects. Calls were subsequently issued on a regular basis by the development team, in response to needs identified and discussion with stakeholders. This approach was intended to provide clear guidance on the Welsh Government's expectations and alignment with important policy objectives.
- 2.30 Delivery in the second half of the programme, however, reverted back to open rolling calls. This followed a change in the overall management responsibility, where the explicit strands were removed, and strand managers reallocated to a role of supporting project development in defined geographical areas of Wales. In parallel to this shift in approach, the project moved towards a more open and flexible model of delivery, in which an open call was made for projects meeting the overall objectives of A4B.

- 2.31 In practice, this meant that there were fewer restrictions on project size and scope, while at the same time, allowing larger, more ambitious projects to be developed. This did not preclude institutions from developing projects aligned to the previous strands (e.g. CIRP, KEP, Innovative Actions), but enabled them to do so in a more flexible manner.
- 2.32 The ability to include capital funding in project proposals was also introduced at the mid-point of the programme, and a strong focus given addressing the priorities of the Science for Wales strategic actions in relation to the National Research Networks, Sêr Cymru and the Grand Challenge priorities.

Cross-cutting themes

- 2.33 The programme's approach to cross-cutting themes was identified in the business plans, and was devised in consultation with the WEFO Cross Cutting Team. This approach was intended to promote the two cross cutting themes to both partner and recipient organisations, and used a number of mechanisms:
- 2.34 A promotional document with the aim to win 'hearts and minds' and signpost to best practices. This was intended to be given to all participants including partner and recipient organisations, consultants and the project delivery team. In this way it is hoped the project was intended to raise awareness of the potential benefits of integrating cross cutting themes into an organisation.
- 2.35 Training of the delivery team, including induction training on their obligations to promote and where appropriate integrate the cross cutting themes in the operation and development of the project.
- 2.36 Evaluation of the approach at the end of year three, to inform future delivery plans.

Approved funding and targets

- 2.37 As noted in the introduction, the A4B programme was part-funded through the EU Convergence programme, with match funding provided by Welsh Government. Additional grant in aid funding was provided by the Welsh Government to enable the programme to be delivered outside of the Convergence area.
- 2.38 The total funding package over the period April 2008 to December 2014 was initially some £50.3 million (KECD – £22.3 million and KTCIR – 28 million) for the two European funded projects, plus additional grant in aid funding of £20 million (£70.3 million).

2.39 This original budget was revised at the mid-term, with £18 million funding decommitted from both European projects to reflect the different mix of projects funded by the programme, and the lower than anticipated activity levels (KECD - £11 million, and KTCIR - £7 million). The revised budget is set out in the table below. This includes the funding allocated to the both European projects, as well as the additional Welsh grant in aid funding (described as the 'overall programme total').

Table 2.1: A4B project and programme funding

Description	KECD project	KTCIR project	Totals
ERDf	£5,407,937	£9,613,873	£15,021,810
Welsh Government Match funding	£6,237,363	£11,336,035	£17,573,398
European project totals	£11,645,300	£20,949,908	£32,595,208
Welsh Government Grant in aid funding	£12,988,602		
Overall programme total	£45,583,810		

2.40 Monitoring of the A4B programme has been undertaken using a suite of output and result indicators. This includes both final targets, and profiled forecasts covering the full period of the programme.

2.41 The final core European targets for the A4B programme are set out in Table 2.2 below.

Table 2.2: A4B project revised core output targets¹²

Description	KECD targets	KTCIR targets	Totals
Enterprise assisted	704 (800)	1,148 (1200)	1,852 (2000)
Collaborative R&D	85 (60)	530 (60)	615 (120)
Gross jobs (FTE) created	36.5 (50)	183.5 (240)	220 (290)
Investment induced	£2,038,999 (£0)	£21,863,151 (£9,000,000)	£23,902,150 (£9,000,000)
Products processes or services registered	123 (90)	132 (15)	255 (105)
New or improved products processes or services launched	89 (20)	339 (60)	428 (80)
Enterprises adopting or improving Environmental Action Plans	0 (20)	0 (20)	0 (40)
Enterprises adopting or improving Equality Strategies and Monitoring Systems	0 (20)	0 (20)	0 (40)

¹² This table sets out the 'reprofiled' targets, as agreed with WEFO in 2012, with original targets in brackets.

- 2.42 These project targets were revised and agreed with WEFO in 2012. This responded to a number of areas where variance was identified in outputs (positive and negative) based on an assessment of performance to date as well as taking into account the suitability of the target levels set in the original business plan.
- 2.43 The targets illustrate the balance between the two European projects and are consistent with the primary focus of KECD, on building capacity for knowledge transfer and exploitation, in contrast to the KTCIR's focus, of supporting collaboration and knowledge transfer activity.
- 2.44 In addition to the core European targets, the A4B programme was also monitored through a number of secondary performance indicators. These are summarised in Table 2.3 below.

Table 2.3: A4B project secondary indicators

Description	KECD project indicator	KTCIR project indicator	Totals
Academic Engagement (hours)	47	53.5	100.5
Funding Secured, Project / Institution	£6,920,246	£10,733,394	£17,653,640
Funding Secured, Company	£300,000	£44,000	£344,000
Spinout Company	7	6	13
Licence Agreement	0	0	0
Gross Jobs Safeguarded	16.5	139	155.5

- 2.45 These targets have provided a wider range of indicators through which to monitor the programme and supplement the European indicators. They include indicators in areas such as funding leverage, new enterprise creation, IP results and jobs safeguarded (particularly important in the recent economic downturn). Together, the core and secondary indicators provide the potential to monitor both the delivery of the A4B programme, and the achievement of subsequent results by the institution and company beneficiaries.

Project management

- 2.46 The A4B programme management structure was designed to ensure that the applications were supported, and subsequently subjected to appraisal team verification, eligibility checks, and monitoring. The following staffing groups were established as part of this structure.

Programme development

- 2.47 Throughout the life of the A4B programme institutions were able to receive support from the A4B Development Team. This team provided an interface with the prospective academic applicant and assisted with the development of the bid. They also undertook mentoring for approved projects, completing three monthly reviews and attending steering group meetings.

Programme appraisal

- 2.48 Successful applications were then subject to review and assessment by an Appraisal Team, and subsequently submitted to the A4B Assessment Panel for approval. Appraisal was based on criteria such as commercial opportunity, overall strategic delivery, project viability, economic impact and overall value for money offered. Successful projects moved to the delivery process, with support provided on an ongoing basis by the Development Team.

Validation and monitoring

- 2.49 The Validation and Monitoring Team, in parallel, monitored the financial and performance aspects of projects.

Summary

- 2.50 The programme logic model demonstrates a clear flow from an identified need, a set of delivery activities and intended outputs, through to the achievement of outcomes and impacts in both the Convergence area, with strong synergies between the two underlying European projects. The model is summarised in the logic model diagram as shown in Figures 2.2 and 2.3 below¹³:

¹³ Based on the final reprofiled funding and targets, agreed with WEFO.

Figure 2.2: A4B programme project logic model (KECD)

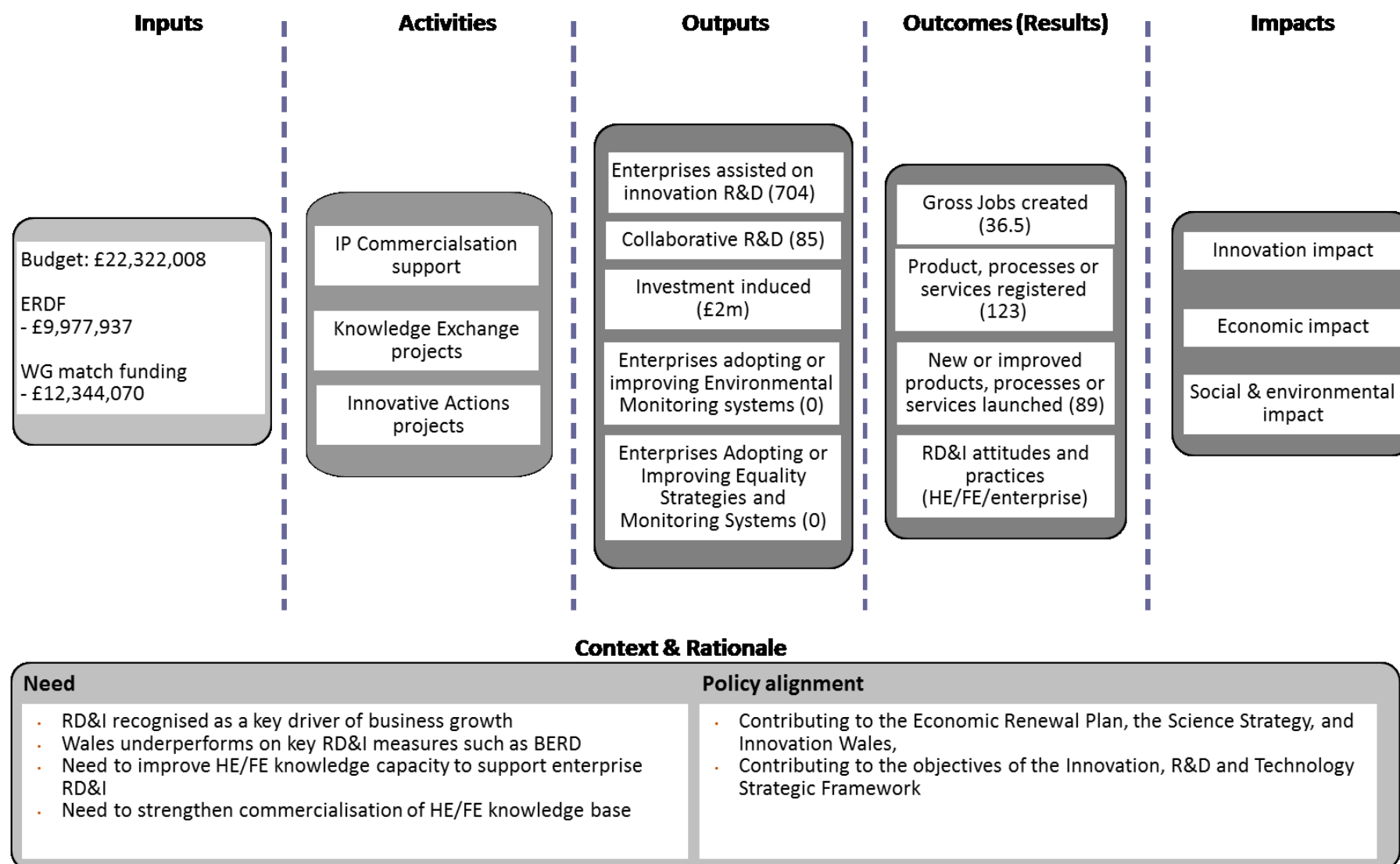
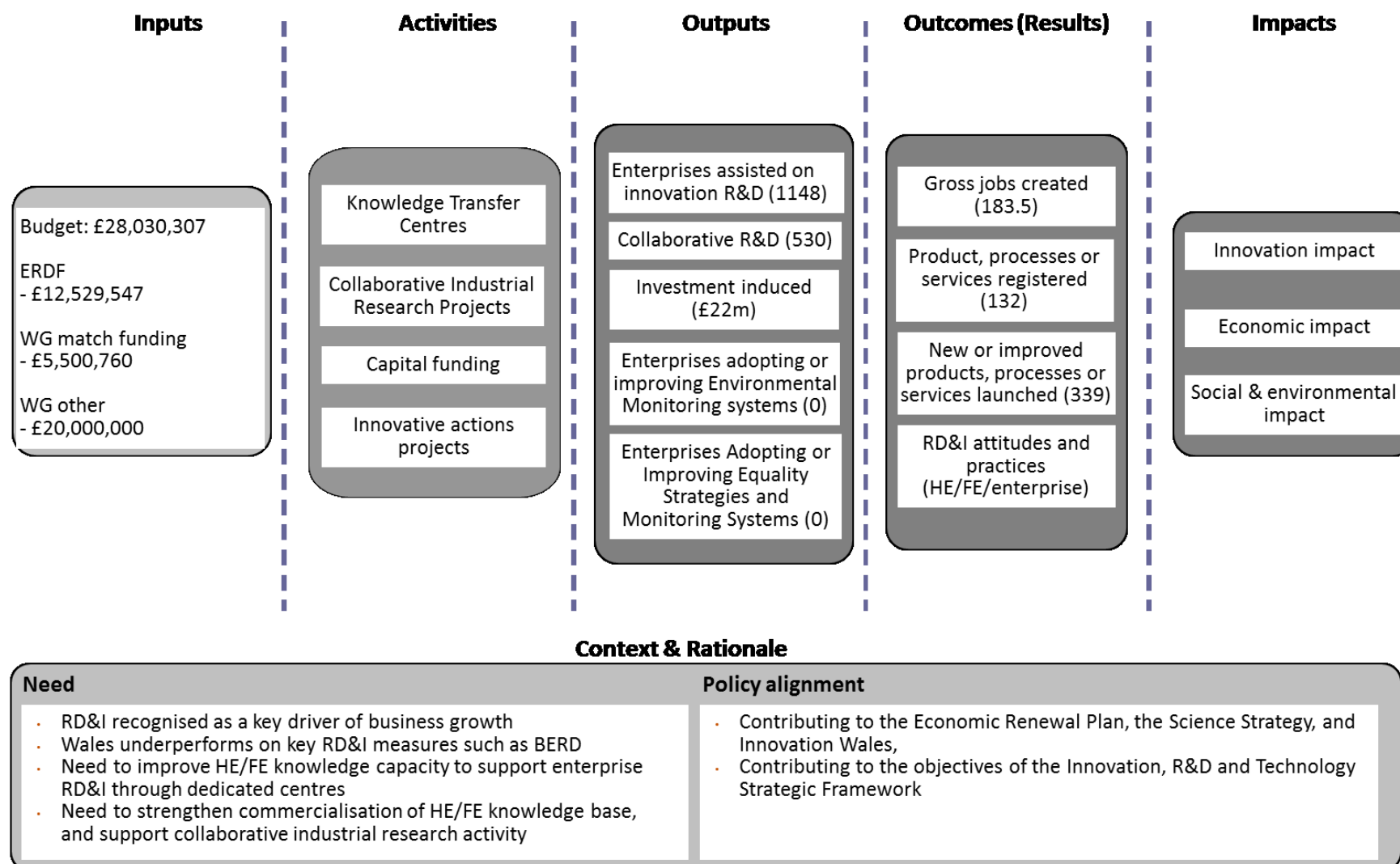


Figure 2.3: A4B programme project logic model (KTCIR)



3. Project activity and achievements against targets

3.1 This section of the report provides an assessment of the activity and outputs performance of A4B programme. It makes reference to the projected targets (to the end of December 2014) and considers impacts achieved at the end of the possible and in future, where possible.

Overview of project activity

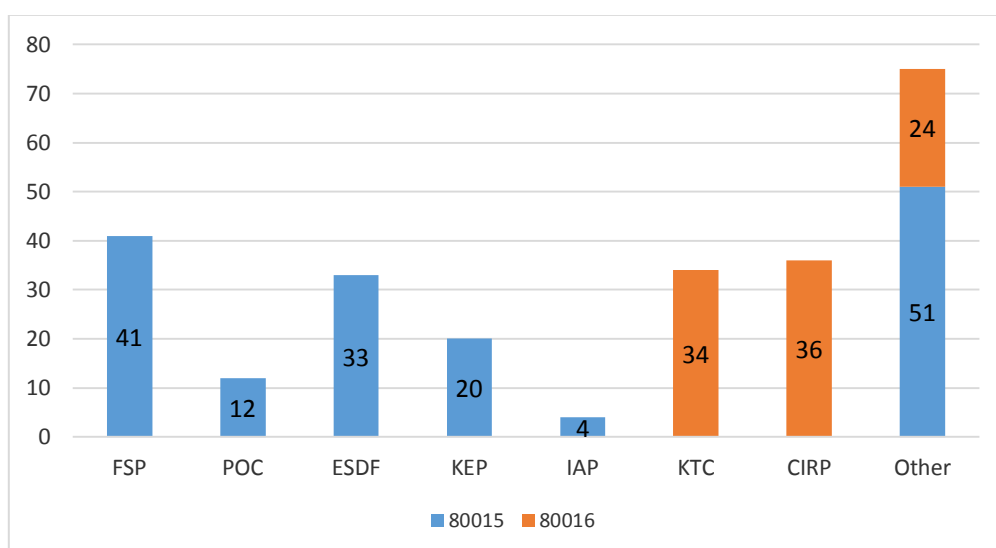
3.2 The A4B programme approved grant funding for 255 projects¹⁴ (KECD – 161 and KTCIR – 94) which had a total value of circa £40.6 million including A4B funding of circa £25.1 million.

3.3 Various types of projects were distributed across a range of institutions, including eight HEIs and nine FEIs, with a maximum project value of just under £2 million and minimum project value of £5k. Projects are further summarised below with a focus on the 255 projects that received some level of EU funding.

Project Type

3.4 Figure 3.1 illustrates the different type of projects undertaken in the A4B programme, and suggests that feasibility study projects accounted for the largest number (41 of 255 or 16%). This was followed by CIRP and KTC projects (16% and 14% respectively), and Early Stage Development Funding (ESDF) projects (13%). However, the largest proportion of projects fall within the category 'other'. This reflects the shift away from 'strand' projects, and the opening up of the programme to applications which address the overall objectives of KECD and KTCIR.

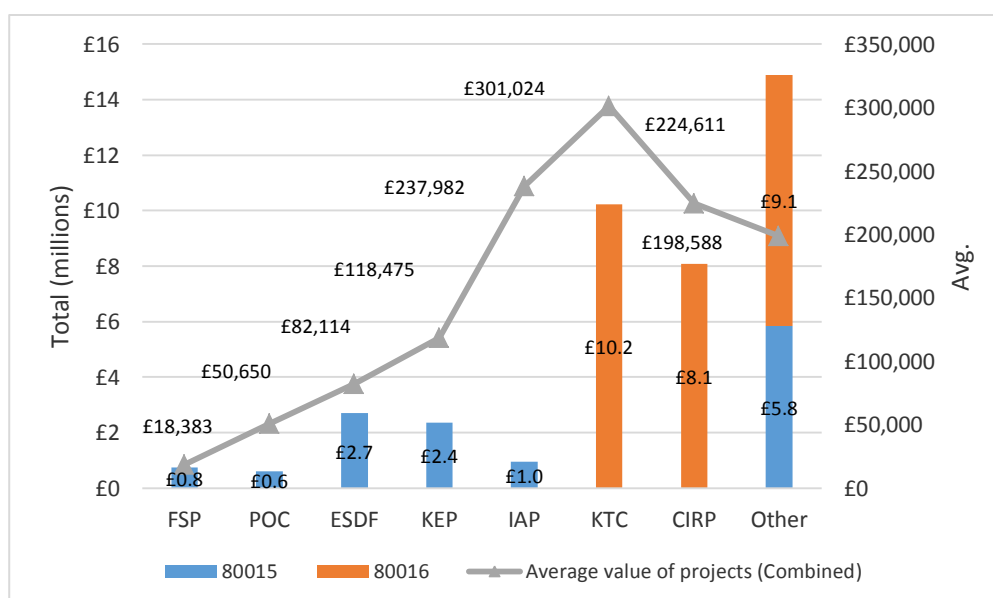
Figure 3.1: Number of Projects Approved by Type



¹⁴ An additional 110 projects were supported outside of the Convergence area (i.e. non-EU funded) at a value of just less than £15 million.

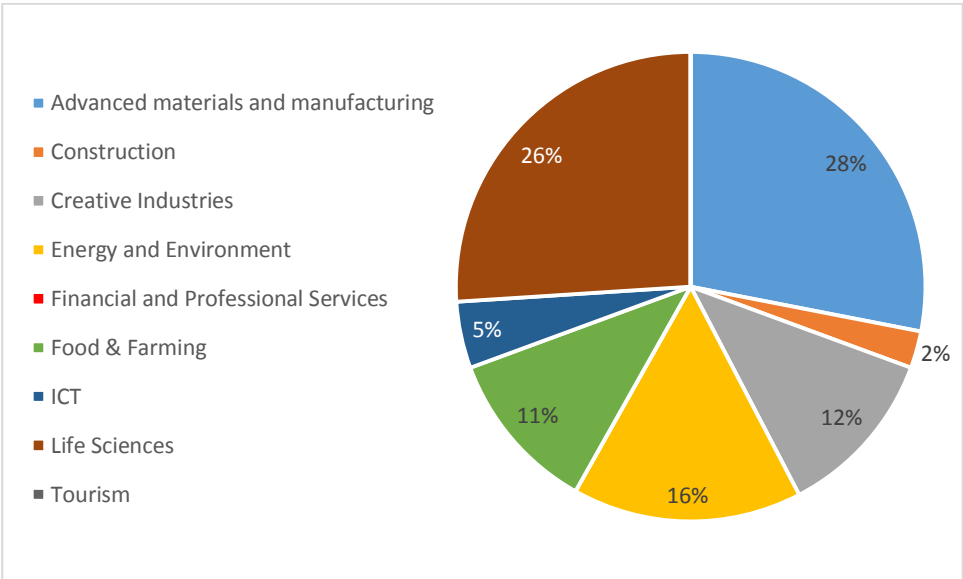
- 3.5 When projects are categorised according to value the data also shows that 'Other' projects were the largest group of projects, followed by KTC and CIRPs (Figure 3.2) with all strands under KECD accounting for smaller amounts of funding generally. The 'Other' category includes those projects undertaken during the second half of the programme, with the majority having a collaborative (CIRP and KTC) focus (82%).
- 3.6 The significance of this investment reflects the complexity of activity undertaken in these projects (for example, multiple partners, infrastructure, employment etc.). All other projects were comparatively smaller in value, reflecting the smaller scale of activity undertaken.

Figure 3.2: Grants Received by Project Type



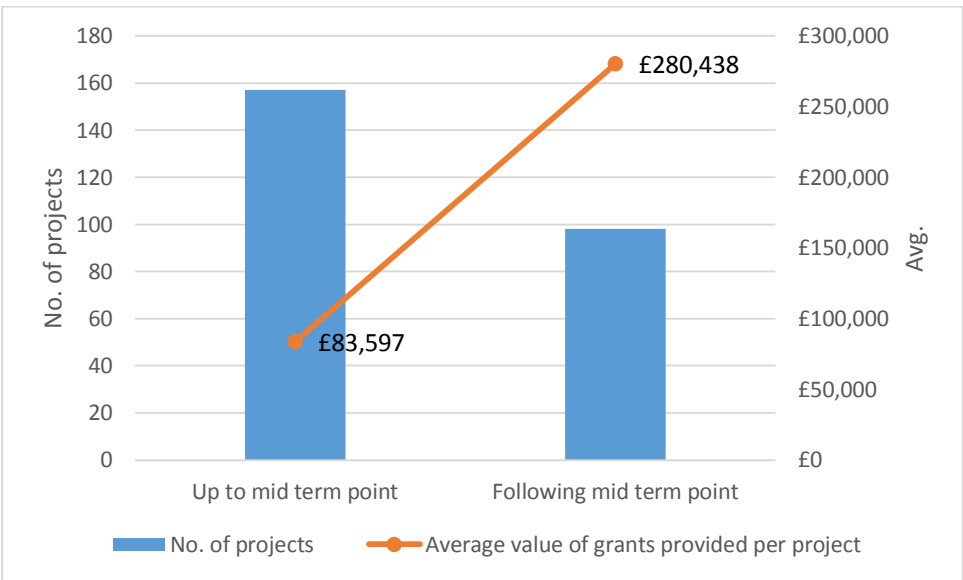
- 3.7 Projects were supported in the main Welsh Government priority sectors. Figure 3.3 indicates that advanced material and manufacturing, and life sciences business sectors accounted for more than half of all projects supported (28% for the former and 26% for the latter).
- 3.8 Other important sectors included energy and environment (16% of projects), the creative industries (12%), and food and farming (11%). The remaining Welsh Government business sectors featured in less than 10% of projects.

Figure 3.3: Projects' primary sector



- 3.9 As discussed in earlier sections the delivery approach of the A4B programme moved away from a more open approach after the mid-term stage. This transition is reflected in Figure 3.4, which shows that, after the mid-term point of the programme, fewer, but larger, projects were supported.
- 3.10 In the pre mid-term period, for example, A4B funded 157 projects that had an average value of £84k per project (£13.1 million in total), compared to 98 projects funded post mid-term that had an average value of £280k (£27.5 million in total).

Figure 3.4: Project size and number up to and following the mid-term point



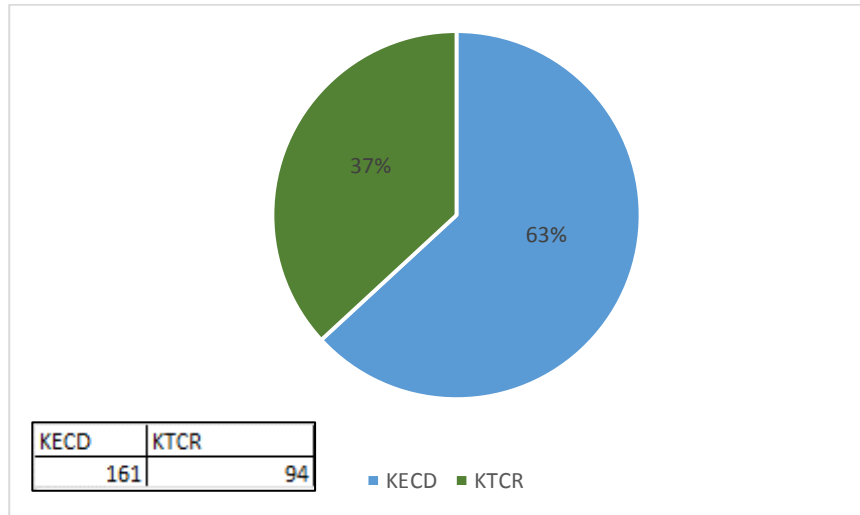
Project Funding

- 3.11 As indicated in Figure 3.5, the KECD project funded the largest number of A4B projects (161 of 255 projects or 63%). However, the Knowledge Transfer and Collaborative Industrial research (KTCIR) projects were far greater in terms of value

with circa £27m overall which is around two thirds of the total value of A4B projects. The remaining third (circa £13m) were KECD projects.

- 3.12 On average, KTCIR projects were more than £200k higher at £291k per project compared to £84k for KECD.

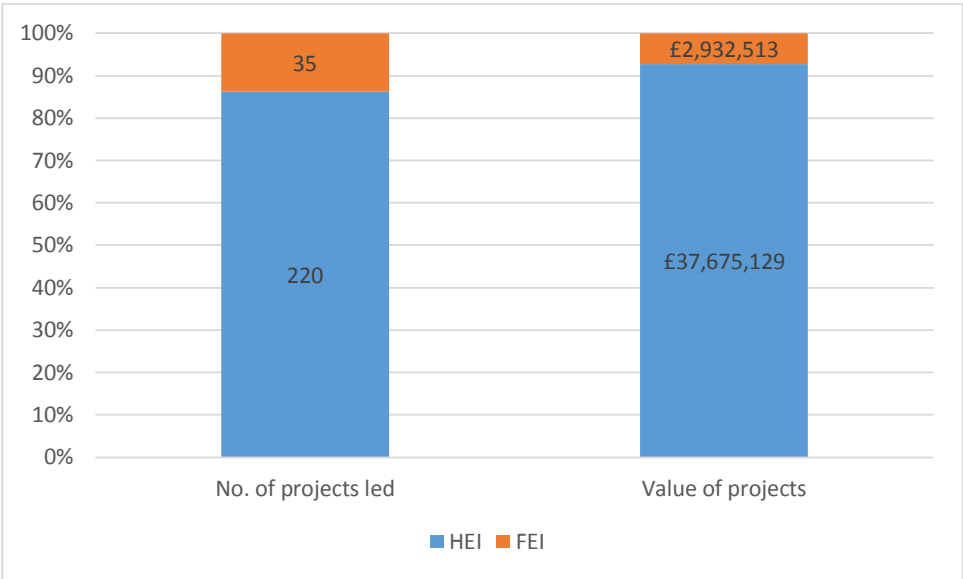
Figure 3.5: Proportion and number of projects funded through KECD and KTCIR



Institutional participation

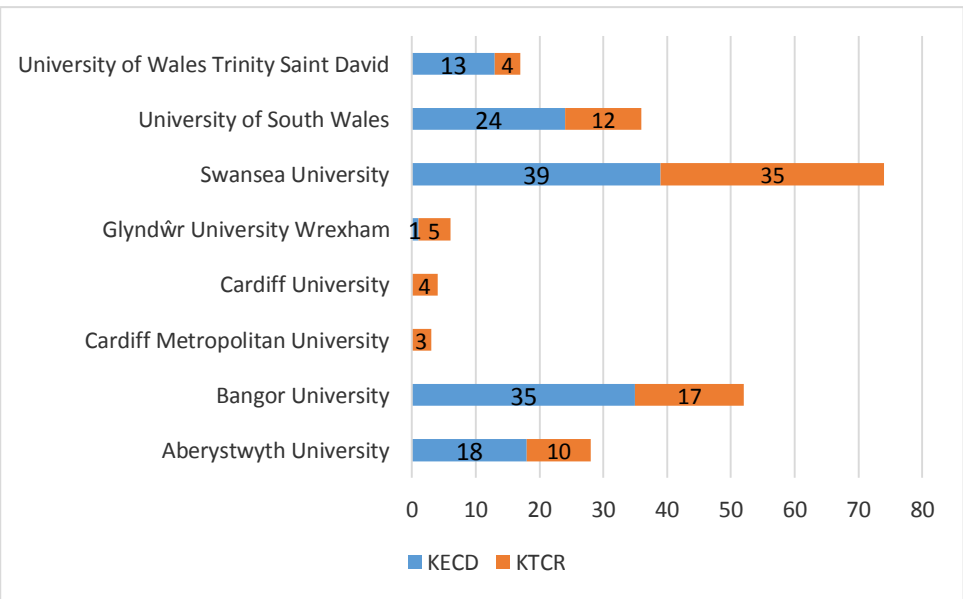
- 3.13 When viewed by institution Figure 3.6 illustrates that the vast majority were undertaken by HEIs (86%, 220 of 255). HEIs also accounted for the vast majority of total project value with 93% of the £40.6m A4B projects at an average of £171k per project, compared to FEIs (7% of project value at an average of only £84k per project).
- 3.14 Although not formally part of this evaluation, analysis of the non-EU funded projects involved HEIs to an even greater extent with 104 of the 110 non EU funded projects including HEIs (95%) and more than 99% of total project value.
- 3.15 This dominance by HEIs, in part, is a result of FEI limitations in capacity to respond to calls since further education institutions do not have significant levels of staff employed in knowledge transfer / exploitation. In addition, some elements of the programme are not targeted at FE activities, such as IP and Commercialisation.
- 3.16 A4B did seek to address the imbalance in funding between HE and FE, with further education-specific calls made for ESDF projects resulting in strong participation from FEI-led 42% of all ESDF projects). However, the overall imbalance did not alter significantly after the mid-term point.

Figure 3.6: Approved Funding by HE and FE Institutions



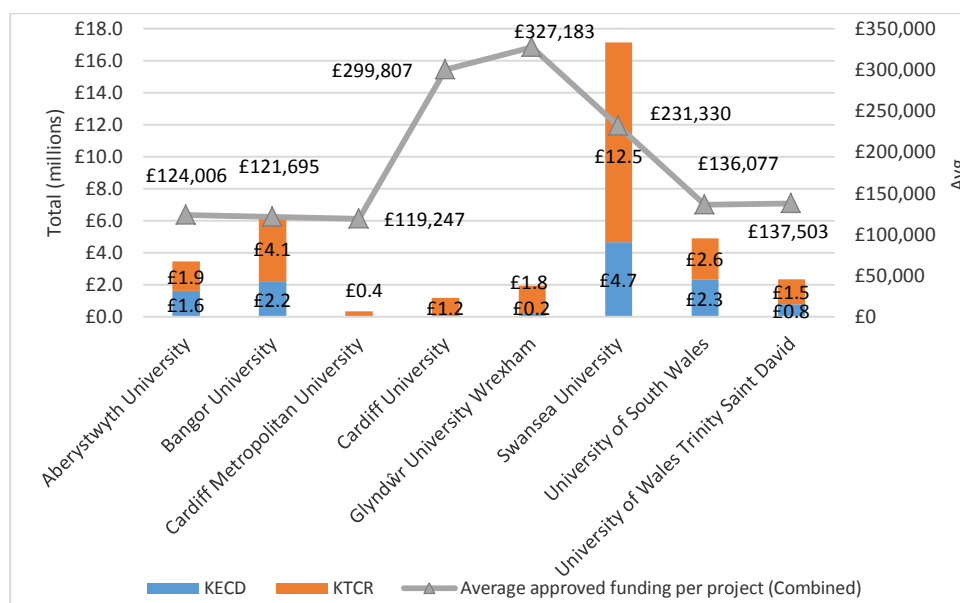
- 3.17 All of Wales’ HE Institutions, with the exception of the Open University, and nine (9) FE Institutions participated in A4B projects.
- 3.18 As shown in Figure 3.7 below, Swansea University accounted for the largest proportion of projects (34%). This is followed by Bangor University, the University of South Wales and Aberystwyth University who led (24%), (16%), and (13%) projects respectively. Together these four Universities account for 86% of the projects led by HEIs or 75% of projects led overall.
- 3.19 Each of the remaining four HE Institutions led less than 10% of HEI led projects. If non-EU funded projects were included Cardiff University would have been the second largest HEI with respect to A4B project numbers (50).

Figure 3.7: Number of Projects led by Higher Education Institution



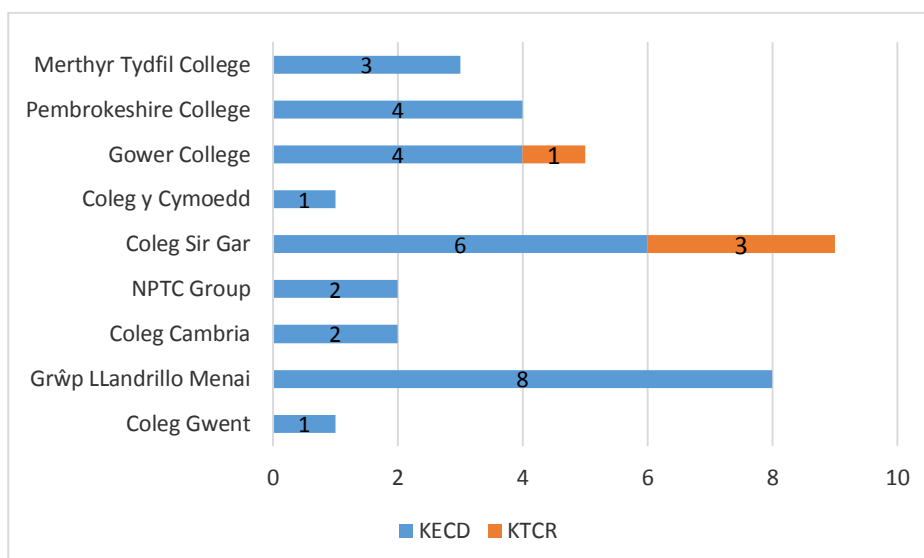
- 3.20 As illustrated in Figure 3.8 below, Swansea University projects were also greater in value overall with £17.1m of the £37.7m total HEI project value and were £231k per project on average (see Figure 12 below).
- 3.21 This is far greater than the other Universities, with Bangor University accounting for the second highest amount of project value at £6.3m (£122k on average) followed by the University of South Wales and Aberystwyth University with £4.9m and £3.5m of total project value, or £136k and £124k on average per project.

Figure 3.8: Approved Funding by Higher Education Institution



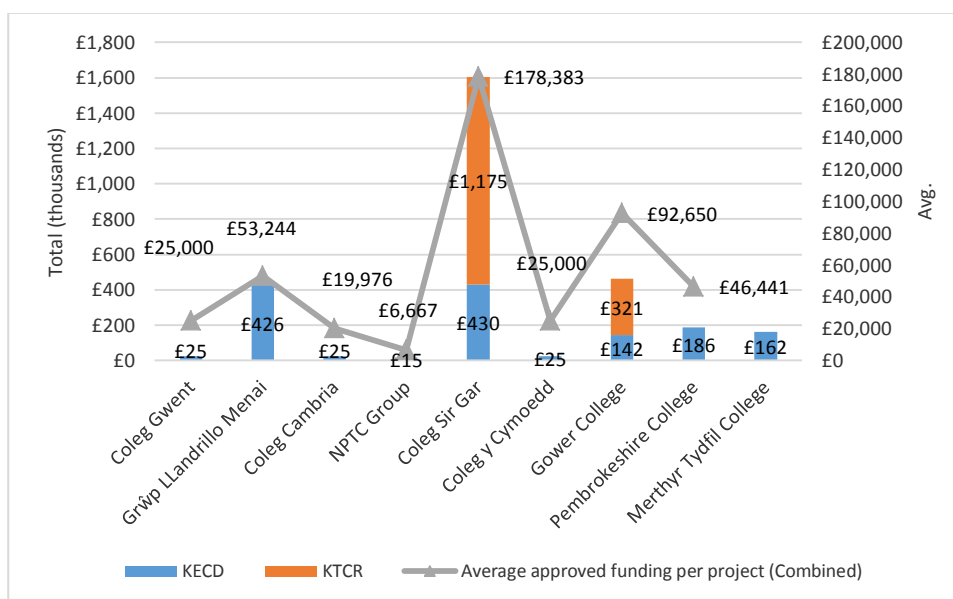
- 3.22 While a majority of Welsh FEIs did participate in A4B projects, Figure 3.9 reiterates the comparatively low level of participation by the sector as a whole. Here, Coleg Sir Gâr led more projects than any other FEI (26%), closely followed by Grŵp LLandrillo Menai (23%), and Gower College and Pembrokeshire College (14% and 11%). Together these four institutions accounted for almost three quarters of FEI projects funded by the programme (74%).

Figure 3.9: Number of Projects led by Further Education Institution



3.23 Based on the value of FEI projects Coleg Sir Gâr received the greatest sum, with a total value of £1.6m overall (55% of all FEI projects). All other FEI's received less than £0.5m over the course of the programme.

Figure 3.10: Approved Funding by Further Education Institution



Profile of funding and expenditure

3.24 Total project expenditure (up to quarter 27 of 2815) by the A4B programme was £30,507,927. This figure was split between the two European projects as follows:

- KECD - £10,350,164 (final forecast: £11,645,300)
- KTCIR - £20,157,763 (final forecast: £20,949,908)

¹⁵ Quarter 27 is based on an estimate of programme expenditure up to this December 2014, and does not reflect the final claim paid by WEFO.

3.25 Table 3.1 below provides further details on the main areas of expenditure, including the cumulative programme expenditure, against the delivery profile expenditure, project final target (what is expected at the final target) and the proportion of the final target achieved to date.

Table 3.1: Programme expenditure (December 31st 2014)

Expenditure Type	Cumulative Expenditure To Date (Q27) (£)	Total Forecast Project Cost (£)	Forecasting Budget remaining (£)	% of Budget used
Grants	25,054,008	26,864,410	1,810,402	93.2
Accommodation	21,844	22,044	200	99.0
Administration	6,026	6,376	350	94.5
Human resources	11,061	11,561	500	95.7
ICT	660,775	660,775	0	100
Legal & professional	187,014	240,620	53,606	77.7
Marketing & promotion	53,977	55,877	1,900	96.6
Staff	4,355,812	4,568,583	212,771	95.3
Travel & transport	157,408	164,961	7,553	95.4
Total	30,507,927	32,595,208	2,087,281	93.6

3.26 The table illustrates that the main expenditure area for the programme was A4B grants (£25 million to date), followed by staff (£4.4 million). Other areas of expenditure reflected the ICT, Legal and professional, travel and transport activities associated with the programme. In terms of the overall expenditure to date, some 94% of the (reprofiled) budget had been spent, with the main areas of underspend being in relation to legal and professional fees (78% of total budget) and A4B grants.

3.27 Table 3.2 demonstrates the key income indicators. This illustrates the ERDF contribution and Match funding from the Welsh Government.

3.28 The table sets out cumulative income to date (what income has been received to date), the project final target (the final income forecast) and the percentage of final forecast achieved to date. This includes estimated income up to claim 27 (to the end of December, 2014).

3.29 The total cumulative income for the A4B programme to the end of December 2014 was £30.5m. This comprised £13.8m of ERDF funding, and match funding of

£16.7m by the Welsh Government. The programme's total cumulative income is 6% below the forecast final figure of £32.6m.

Table 3.2: Cumulative income (December 31st 2014)

Organisation	Cumulative Income To Date	Total Forecast Project Income	Total Forecast Project Income remaining	% of Total Forecast Project Income remaining
Total Welsh Government Match Funding	£16,725,911	£17,573,398	£847,487	5%
ERDF Funds through WEFO	£13,782,016	£15,021,810	£1,239,794	8%
Total Programme Funding	£30,507,927	£32,595,208	£2,087,281	6%

Gross outputs achieved against targets

- 3.30 Monitoring of the A4B programme's performance was based around a broad series of project indicators. The following tables demonstrate the primary output indicators and results collected for the programme to end of December 2014, including performance against revised targets for the two European projects.¹⁶
- 3.31 Table 3.3 sets out performance according to the primary output indicators included for the KECD business plan. This table indicates that the project has performed particularly strongly against its investment induced target, with more than £2.1 million achieved compared to a target of circa £1.2 million. This represents some 185%, or nearly double the target achieved.
- 3.32 Achievement for the number of collaborative R&D projects, products processes or services registered, and enterprises assisted were also relatively strong for the KECD project with 95%, 92%, and 86% of the targets achieved respectively. Against this strong performance, less than half the target for gross jobs created was achieved with only 17.8 FTE jobs created compared to a target of 36.5 (49%). While a number of targets have not been met by the project, the balance of the outputs is consistent with its focus on building capacity (e.g. collaborative R&D, registration of new products and new investment) and the long term nature of the commercialisation process. This can be seen in the comparatively lower performance of outputs/outcomes which measure economic benefits from the project (jobs and products launched).

¹⁶ The output figures used in the report are, as noted in section 1.2, provisional and should therefore be treated with caution.

3.33 The KECD project has achieved 86% of its final target for enterprises assisted. Given the 'pipeline' nature of the A4B programme this underperformance has potentially impacted on the ability of the project to achieve the other remaining indicators.

Table 3.3: KECD primary output indicators (December 31st 2014)

Description	Revised target	Actual	% of target achieved
Collaborative R&D (number)	85	81	95%
Enterprises adopting and implementing Environmental Action Plans (number)	0	0	n/a
Enterprises adopting or improving equality strategies and monitoring systems (number)	0	0	n/a
Enterprises assisted (number)	704	607	86%
Gross jobs created (FTE)	36.50	17.80	49%
Investment induced (GBP)	£1,161,240	£2,143,712	185%
New or improved products processes or services launched (number)	89	19	21%
Products processes or services registered (number)	123	113	92%

3.34 In addition to the primary output targets, the A4B team also monitored a set of secondary targets¹⁷ for the KECD project shown in Table 3.4.

3.35 This indicates that the project has been extremely successful in supporting both business and institutions to secure further funding. These indicators give further support to the capacity building focus of KECD. In this respect the project holds the potential to substantially improve its economic performance indicators in the future, as this capacity helps to provide lasting activity and benefits.

Table 3.4: KECD secondary output indicators (December 31st 2014)

Description	Revised target	Actual	% of target achieved
Funding Secured, Project / Institution	£6,920,246	£7,792,206	113%
Funding Secured, Company	£300,000	£2,974,242	991%
Spinout Company	7	12	171%
Licence Agreement	0	2	n/a
Gross Jobs Safeguarded	16.5	3.3	20%

¹⁷ These output indicators are defined by the project, with data collected from the institutions in the same way as WEFO outputs (i.e. through the IPM system). Full definitions of the outputs can be found in Welsh Government (2011) 'Procedural guidance', October.

- 3.36 Table 3.5 below sets out performance according to the primary output indicators included for the KTCIR. This table indicates that the KTCIR project performed relatively well with two output targets exceeded and another four only slightly below the target.
- 3.37 The KTCIR project was particularly successful in terms of the number of collaborative R&D projects and new and improved products launched. This contrasts with the performance against targets of gross jobs created (83%), and products, processes, or services registered (77%), and investment induced (77%).
- 3.38 The balance of the outputs achieved by the KTCIR project reflects the stronger focus on the delivery of knowledge transfer and innovation activity, and indicates (as expected) more advanced commercialisation and economic benefits relative to the KECD project (e.g. jobs and products, process or services launched). Enterprises assisted are also below the target for the combined programme. As in the case of the KECD project, KTCIR has also supported fewer than anticipated. Its underperformance, however, is comparatively small.

Table 3.5: KTCIR primary output indicators (December 31st 2014)

Description	Revised target	Actual	% of target achieved
Collaborative R&D (number)	530	783	148%
Enterprises adopting and implementing Environmental Action Plans (number)	0	0	n/a
Enterprises adopting or improving equality strategies and monitoring systems (number)	0	0	n/a
Enterprises assisted (number)	1148	1122	98%
Gross jobs created (FTE)	183.50	152.78	83%
Investment induced (GBP)	£9,511,710	£7,330,781	77%
New or improved products processes or services launched (number)	339	422	124%
Products processes or services registered (number)	132	102	77%

- 3.39 Performance against the secondary indicators (Table 3.6) provides further evidence that the KTCIR project has performed comparatively strongly with respect to funding secured (institution and company). Spinout company generation and licensing agreements also performed strongly. The jobs safeguarded figures are comparatively strong, and indicate an important phenomena associated with the

recent economic downturn – that of employers retaining existing staff (safeguarding) in place of new recruitment.

Table 3.6: KTCIR secondary output indicators

Description	Revised target	Actual	% of target achieved
Funding Secured, Project / Institution	£10,733,394	£21,356,711	199%
Funding Secured, Company	£440,000	£5,636,383	1281%
Spinout Company	6	15	250%
Licence Agreement	0	2	n/a
Gross jobs created Safeguarded	139	126.1	91%

3.40 While the A4B programme database does not provide sufficient information that would allow these outputs to be profiled according to the different strands of activity (e.g. CIRP, KTC), the results of this analysis of primary and secondary indicators points towards CIRP and KTC providing stronger results, during the life of the programme, than those focused on capacity building (KECD).

Summary

- 3.41 The results of this section suggest that the A4B programme supported some 255 projects (across the two European projects). This activity was principally concentrated in the higher education sector, and included support for a range of different projects supporting the development of capacity for knowledge transfer and IP exploitation, as well as collaborative R&D activity. These projects contributed towards the Welsh Government's sector priorities.
- 3.42 The programme was delivered to a budget of £30.5m (December 2014). This figure is substantially below the original budget and follows the financial de-commitment, resulting in an £18 million reduction in overall budget (for the European projects).
- 3.43 Against the output targets for the programme as a whole, A4B's strongest performance has been achieved in relation to R&D and innovation-related outputs (for example, collaborative R&D projects, investment induced, new and improved products, processes or services registered, spin-outs generated, and funding secured), with comparatively lower levels of performance reported against more commercial and economic outputs (gross FTE jobs, new and improved products, processes and services launched). This balance of outputs, to a large extent, reflects the long-term nature of the innovation and commercialisation process, and the core focus of the programme on building capacity for the future.

- 3.44 Other key factors are likely to be the lower than anticipated number of enterprises assisted, and the role of the economic downturn, both of which are likely to be associated weaknesses in demand at certain points in the programme period. When analysed by European project, the KTCIR project has generally produced stronger levels of outputs (e.g. KTC and CIRPS) relative to the KECD project.
- 3.45 A key area of strength of the A4B programme has been its performance in terms of additional investment contributed secured for both projects and subsequent projects.

4. Beneficiary experiences and achievements

4.1 The A4B programme contains a range of partners and potential beneficiaries. Based on the programme logic model (see section 2), surveys and fieldwork were carried out on three principal groups. This included:

- HE and FE institutions - benefits and impacts seen at the institutional level.
- Academics and project staff – benefits to the individual academics and research teams.
- Company – benefits to the company concerned.

4.2 The results of this research are described in the sections below.

HE and FE institutional findings

4.3 Perspectives on the experience of the A4B programme were taken from a range of central functions, including senior management, industrial liaison, and finance officers in both the HE and FE sector. These staff were identified by the A4B central points of contact and typically provided a strategic perspective on the programme.

4.4 The interviews revealed a strong belief that A4B provided important funding for knowledge transfer and exploitation, which was not available from other sources. In this respect A4B was perceived to build on the long and deep legacy of support in Wales and helping to build capacity over time for commercial activity. In this respect, previous supports such as those provided by the Knowledge Exploitation Fund and the CETIC programme have provided support for collaborative R&D, which has evolved into the A4B programme.

4.5 In supporting knowledge transfer and exchange, A4B funding was perceived to be complementary, for HE institutions, with the former HEFCW innovation and engagement funding supporting the development of innovation strategies in the higher education sector in Wales. This provided formula-based and collaborative project funding, and was available for most of the period under which A4B operated. As one HE institution put it:

‘We used I&E {HEFCW Innovation and Engagement fund} money to fund the (knowledge transfer) office...it gave us the ability to put management resources beyond A4B – where it was difficult to build in management time’

- 4.6 The role of A4B was perceived to have been useful in helping to build knowledge transfer infrastructure and capacity, with institutions valuing the ability to develop ideas and undertake research in support of commercialisation. This helped institutions to make links to industry and build collaborative projects which have the potential to go on to further activities. In this respect the role of A4B-type activity, focused on applied commercial links is an area that is becoming more important within the university sector, in particular, with the Research Excellence Framework (REF) and the emphasis placed on demonstrating impact from research. One institution described this link to REF in the following terms:
- ‘There have not been any A4B projects used as case studies in our recent REF submission. It is pretty clear, though, that applied R&D project such as A4B are going to become even more important in future’
- 4.7 In the HE sector, the central A4B appointed contacts are generally part of the industrial liaison office or finance office. Such offices are typically the first point of contact and can play a number of roles, ranging from simple disseminator of calls for projects to more complex liaison and project support. For the most part institutions felt this approach to communications worked well. Several institutions did point out, however, that there had been cases where direct contact between A4B staff and academics had led to mixed messages.
- 4.8 Within the universities the role of the Industrial Liaison officers (ILOs) is perceived to play a mediating role between A4B and academic staff helping to manage expectations, understand whether the idea is best funded through A4B or other programmes (KTP, charities, research councils) and provide general guidance. In this way the ILO can help to manage demand for the programme and facilitate the development of suitable project proposals.
- 4.9 Institutions recognise that the support available through the programme evolved considerably throughout the delivery period. As noted in Chapter 2, for a large part of the period under consideration, a competitive call-based system was employed. These calls were typically perceived to provide a clear statement of the call objectives, eligibility criteria, funding and so on, and were typically grouped together in so-called ‘strands’.
- 4.10 In the latter part of the programme these strands were removed, as part of a transition towards an open call structure, in which proposals were requested without significant restrictions. For the most part the move towards more flexibility in the last

phase of the programme was valued by other participants. Here, flexibility was seen as allowing for a greater focus on the outcome, rather than squeezing projects into a particular format, as well as mixing of content and outcomes that would not be possible within the stands. As one HE institution manager indicated:

‘The open call had the advantage that we could develop a bid that wasn’t aligned to a particular strand and [as a result] we could mix and match content and outcomes...so I would say the flexibility was excellent.’

4.11 Similarly, another indicated that:

‘Flexibility is good...it allows us to focus on outputs rather than trying to squeeze projects to fit in with calls’ (a smaller HE institution)

4.12 For some smaller institutions, however, the strands were perceived to be easier to manage and ‘sell’ internally:

‘Strands were much better...we knew exactly what was expected and what made a good project’ (an institutional manager at a smaller HE institution)

4.13 While A4B principally supports academic-industry projects, the programme also included support, managed by the industrial liaison officers to undertake small feasibility projects. These elements of support were informed by early consultations between A4B and the sector as part of a task and finish group. Perhaps unsurprisingly they were particularly valued by the ILOs as a way to assess whether a project had sufficient potential for further development work.

4.14 The institutions recognise that the capacity to absorb A4B funding is highly variable. In this respect the larger, research intensive institutions have been able to better support the development of projects, and undertake projects. A number of institutions believe, however, that they could have made more applications – particularly those with strong industry links, but with companies based outside the Convergence area – where funding was comparatively restricted.

4.15 A further group that perceived barriers to use of the programme included a number of the FE institutions interviewed. In the case of FE sector the primary issue cited by interviewees was the limited level of research activity, the primary focus on teaching and training support to business, and associated staff capacity to engage in knowledge transfer work. This makes it difficult to release staff for non-teaching work, and explains why subcontractors have often been used to deliver many FE ESDF projects. The challenges faced by the FE sector have been recognised, and

lead to a number of initiatives which have targeted the sector more directly – for example, the introduction of strategic projects for FE institutions to review their commercial offer and develop strategic actions. FE institution interviewees were extremely positive about the Welsh Government’s efforts in this respect:

‘The A4B money has given us the opportunity to map out what we were doing, benchmarking ourselves against other colleges.... to step outside and reflect on a different way forward’

It has had a massive impact...helping us to develop new ideas with the staff within the institution, and getting them used to this type of activity’

4.16 Another FE interviewee, while positive about A4B generally, did indicate that:

‘The (A4B) forms can be a bit off-putting due to the language...they don’t really speak well to what we do here [at the FE college]...’

4.17 The administration of the programme was a further area where many interviewees provided perspectives on A4B. The feedback here generally agreed that the ‘paperwork’ required for A4B was relatively heavy (in comparison with other programmes). Most recognised that this was related to the European funding requirements associated with the A4B programme. In many cases the administrative burden was seen as ‘part of the territory’ for such projects. Similarly, others pointed to the complexity of the programme and the associated communication challenges surrounding topics such as project assessment, eligibility and financial aspects. Here, it was generally understood that the project team faced challenges associated with the large scale centralised, and flexible nature of the programme. As one HE institution put it:

‘Welsh Government’s management of A4B improved over the period, with good advice from our [development] advisor, and post award manager. Overall, the programme was managed well within the constraints they faced...they faced a lot of challenges administratively, given the scale [of A4B]’

4.18 Similarly, another HE institution pointed out that:

‘People forget that it was European funded...with the usual constraints and gripes’

4.19 Other institutional managers argued that the Welsh Government and WEFO could have done more to ease the administrative burden and enable full engagement:

‘(administration of) A4B represented a substantial cost to the university and it would have helped if we could have included this cost within projects’

‘EU funding is bureaucratic but A4B made it even more excessive...there was a need for far better governance of the scheme, with more independent peer review in the appraisal process.’

4.20 The concerns about the administrative burden were also often linked to the systems established to upload project information to A4B. Here the IPM system had been used throughout the life of the programme. There was general agreement, however, that the IPM system had reached the end of its useful life in its current format, and required upgrading.

Academic and business survey findings

4.21 This section of the report examines the results of telephone surveys conducted with both academic and business beneficiaries. An invite to participate in the business survey was sent to businesses located in the Convergence area in Wales (using the A4B programme database) who had participated in A4B project activities, with a total of 61 responding (out of 906 records¹⁸).

4.22 The academic survey was sent to a number of academics with the assistance of the A4B ‘key points of contact’ and produced a total of 36 completed responses (out of 52 records).

4.23 The two surveys examined the following areas:

- The support delivered by academics and received by businesses.
- Experience of engagement prior to and following interaction with the project.
- Achievements of the A4B projects.
- Satisfaction with the projects and areas for development.

4.24 The following sections present the results of these surveys.

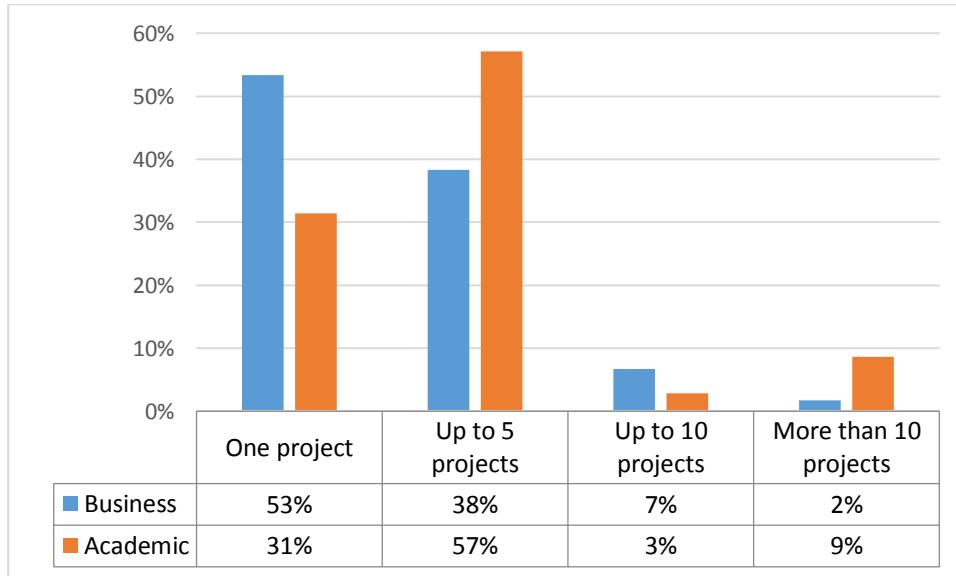
A4B support delivered and received

4.25 The results indicate that the majority of academics surveyed (24 of 35 or 69%) have been involved in more than one A4B project (see Figure 4.1). Indeed, three

¹⁸ The relatively low response to this survey reflected the lead role of the academics, which meant that business were, in effect, secondary participants with no direct funding from Welsh Government.

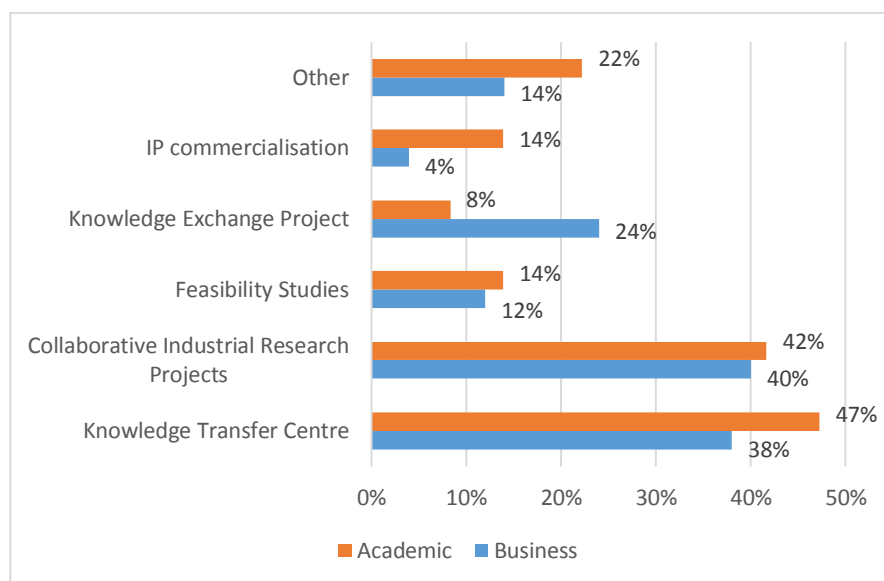
academics (9%) have been involved in more than 10 A4B projects, while another 20 were involved in up to five (57%).

Figure 4.1: Number of A4B projects (Academic and Business surveys)



- 4.26 In contrast, while most businesses surveyed (32 of 60) were only involved in one project (see Figure 4.1 above), some 23 businesses reported participating in up to five projects, four participated in up to ten and one participated in more than ten.
- 4.27 These findings highlight the iterative nature of the R&D processes with one project often producing results requiring subsequent exploration through collaboration and bids to A4B. It may also imply that successfully applying to and undertaking an A4B project helps improve chances of subsequent application success (see Figure 4.8 for further details of collaborative activity undertaken by academics and businesses).
- 4.28 In terms of the type of projects the surveyed beneficiaries have been involved in, Figure 4.2 indicates that KTC and CIRP projects were the two types both businesses and academics were most frequently involved with (38% and 40% of businesses cited these two projects, respectively as did 47% and 42% of academics).

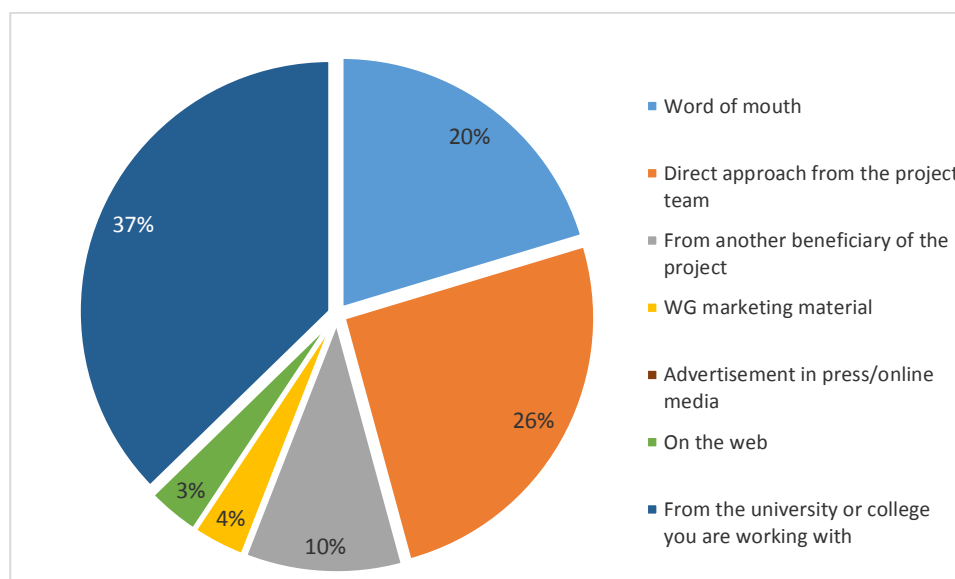
Figure 4.2: Types of project (Academic and Business surveys)



Before A4B

- 4.29 Academics typically became aware of the A4B programme through their individual points of contact at each HE and FE institution. These individuals were responsible for disseminating A4B information within their institutions (see Chapter 2 above).
- 4.30 Businesses, on the other hand, became aware of the programme through a range of different sources as illustrated by figure 17 below. This chart suggests the surveyed businesses first heard of A4B through various sources with an approach from a university or college the businesses were already working with cited most frequently with 37% reporting this (22 of 59). The other main sources of accessing the programme were a direct approach from the A4B project team, cited by 26% (15 of 59), and word of mouth, cited by 20% (12 of 59). Together, these three account for the manner in which 83% of businesses first heard about the A4B programme.

Figure 4.3: How did you first hear about the A4B programme? (Business survey)



4.31 Beneficiaries were asked to rate their reasons for participating in A4B (see Tables 4.1 and 4.2) on a scale. The results suggest that the most important reason for businesses was to improve products and processes (average score of 3.8 and 3.6 out of five respectively). This is consistent with the main focus of A4B programme. The opportunity to access government funding, to improve businesses' skills base, and to identify new customers / market were also scored relatively highly at 3.4, 3.3, and 3.0 respectively.

4.32 According to one company:

'The most important thing was the opportunity of working with the calibre of partners we were presented with. The range of knowledge and experience they were able to share with us has been very positive and productive.'

Table 4.1: Reasons for taking part in A4B (Business Survey)

Reasons	Average Score (1-Not at all important, 5-Very important)
To improve products	3.8
To improve processes	3.6
To access government funding	3.4
To improve our skills base	3.3
To identify new customers / markets	3.0
To identify ways of reducing costs	2.7
To introduce new management techniques	2.4
To recruit a graduate	2.4

4.33 Many of the businesses surveyed were spin-outs from universities or had a long-standing relationship with universities and colleges. One company, for example, reported they had worked with Swansea University over a number of years, that that the main driver to participate in A4B was to maintain the collaborative relationship. Similarly, other businesses reported A4B was an opportunity to access expertise and equipment. Another still indicated that A4B was a way to:

‘keep in the loop’ of Welsh Government support programmes so as to not miss out in future opportunities’.

4.34 As for the academics, the highest score reported was to help fulfil the institutions’ commitment to knowledge transfer. This was scored as being ‘very important’ in 70% of academics’ decisions with an average score of 4.5. Academics also participated in A4B as they were aiming to better understand industry, which scored an average of 4.2 in the scale of importance.

4.35 Comparatively few academics reported that providing evidence in support of the institution’s RAE /REF submission was important (average score of 2.8).

Table 4.2: Reasons for taking part in A4B (Academic Survey)

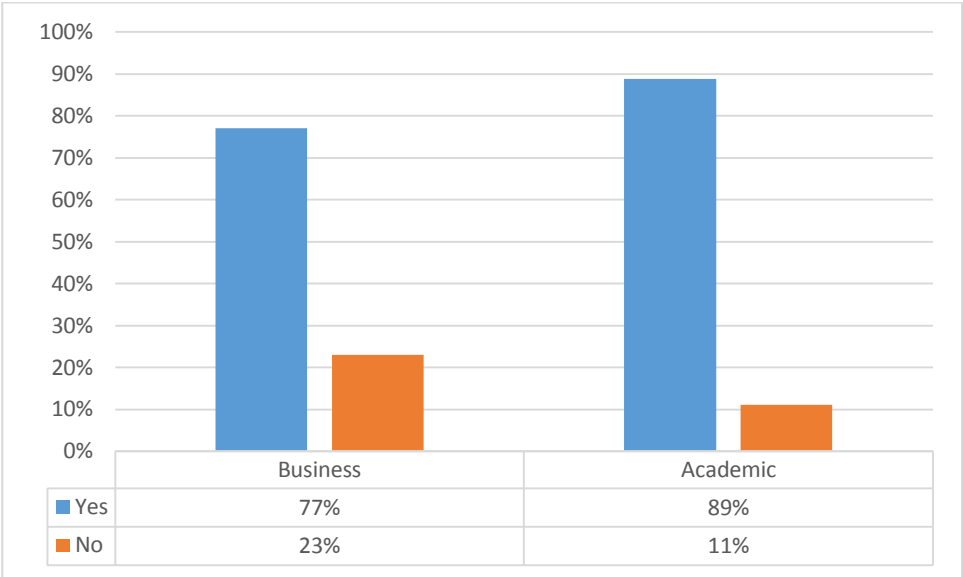
Reasons	Average Score (1-Not at all important, 5-Very important)
To help fulfil the institution’s commitment to knowledge transfer	4.5
To better understand industry	4.2
To create opportunities for future consultancy work and / or grants	3.8
To contribute towards research and teaching generally	3.6
To generate exploitable IPR	3.5
To create research publications	3.1
To provide evidence in support of the institution’s RAE /REF submission	2.8

4.36 As with the business respondents, many of the academics cited the key driver to participate in A4B was to have ‘greater industrial engagement’ and to ‘build on long standing links to industry’. Another factor cited frequently by academics was the opportunity of obtaining capital to develop facilities and procure equipment, as well as funding for R&D purposes. According to one respondent:

‘This gave us the ability to build capacity... we need these types of programmes to elevate our research and provide support to regionally-based businesses.’

4.37 For the vast majority of businesses and academics, their A4B projects followed on from previous collaborative research links between the two as indicated in Figure 4.4.

Figure 4.4: Previous collaborative research links? (Academic and Business surveys)



4.38 This shows that 47 of 61 businesses and 32 of 36 academics (32 of 36) surveyed confirmed they had previous collaborative links.

4.39 Some of the business survey respondents reported their companies were spin-outs from universities and therefore ‘closely attached’ to the university. Other business respondents reported they had personal links to universities/colleges or the academics themselves as they had previously held positions at the institutions.

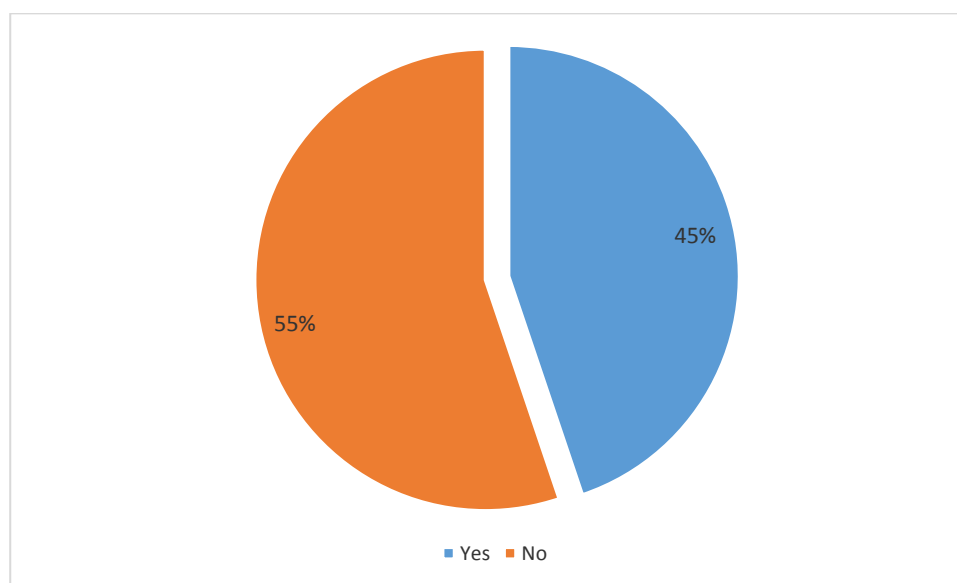
4.40 The academics reported they had collaborated with a wide range of companies of various sizes and sectors, ranging from SMEs to multinationals such as TATA Steel, and sectors such as engineering, manufacturing, construction, materials and healthcare. These academics reported they had learned many lessons from their previous collaborations with industry which had put them *‘in good stead’* for the A4B programme.

4.41 One academic reported that previous collaborations gave an insight into *‘what the companies would like to get out of the collaborative projects’* and another reported they had a better understanding of the *‘expense, time and rationale’* required for these activities. Two academics reported they had learned that large companies are *‘very slow to get moving’* which had been a *‘bigger barrier than anticipated’*. In contrast, another academic reported the main lesson drawn from collaborations with

industry was that industry want a *'quicker response than academics are able... to provide'*.

- 4.42 According to the survey results, 13 of 29 academics had exploited research for commercial benefit before their initial engagement with A4B. Some of these respondents reported the commercial activities were undertaken through spin-out companies, while others reported they had a history of developing new technologies and solutions which are exploited for commercial benefit through other routes such as licensing.

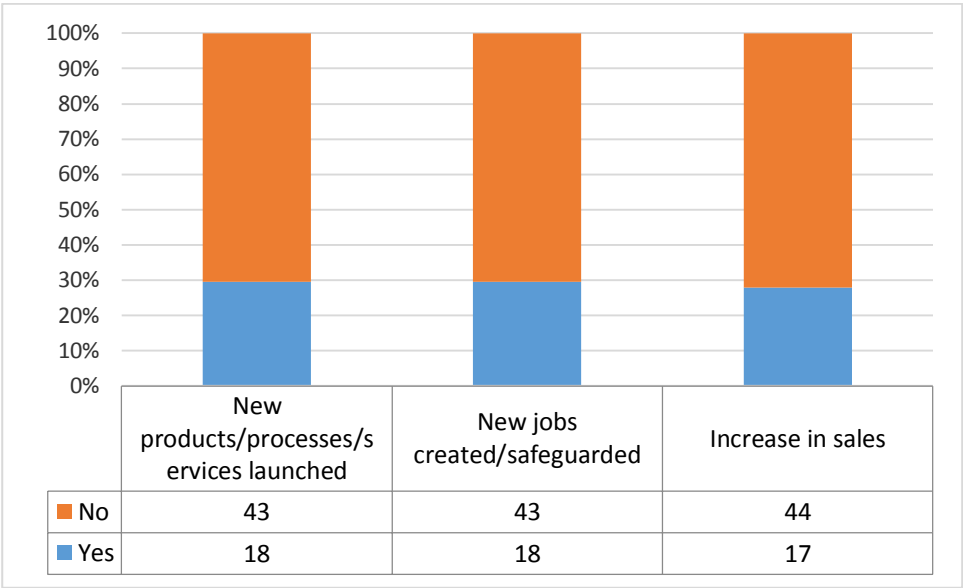
Figure 4.5: Research exploited for commercial benefit before A4B? (Academic survey)



Achievements of the A4B projects

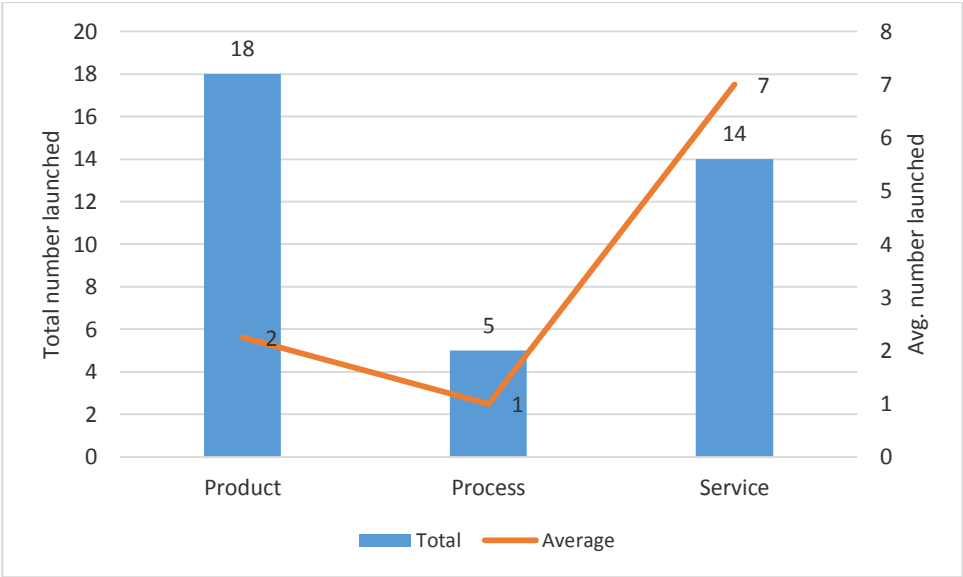
- 4.43 In terms of the achievements from participation in the A4B programme, businesses and academics were asked what outputs have generated from projects.
- 4.44 The results suggests the outputs achieved by businesses to date have been relatively modest.
- 4.45 Figure 4.6, for example, indicates that 18 of 43 business respondents reported new products, processes or services have been launched as a result of A4B support, 18 of 43 reported new jobs have been created or safeguarded as a result of the support, and only 17 of 44 reported an increase in sales.

Figure 4.6: Company results (Business survey)



4.46 Of the eight respondents who reported new products had been launched, and the five reporting new processes, and two reporting new services - a total of 18 products, 14 services, and five processes have been launched to date (see figure 21 below).

Figure 4.7: New products/processes/services launched (Business survey)



4.47 In addition to new products, processes or services, businesses also reported other benefits.

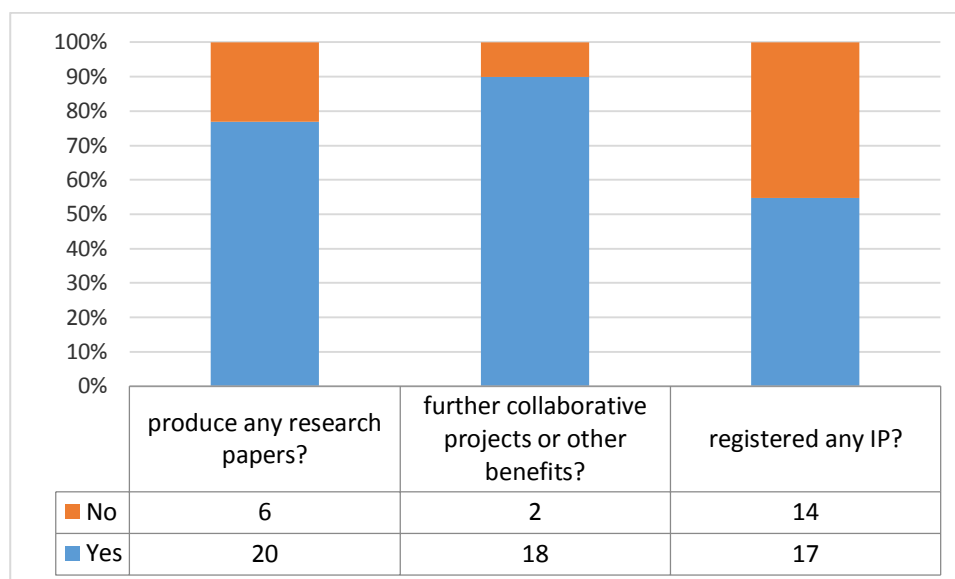
4.48 The most frequently cited 'other' benefit was the role of A4B in providing relationship and network building opportunities. In this respect some businesses reported that they received unexpected benefits, with one receiving:

‘considerably more knowledge and support from the A4B team than was anticipated’

- 4.49 Two businesses also reported that A4B had identified new areas in which their products and services could be applied, or new technology areas and products that could be developed. Finally, other businesses reported that participation in A4B projects had increased their credibility and improved their marketing techniques, with one reporting they were able to gain subsequent investment.
- 4.50 The academics’ experience of A4B projects also suggest a range of results. This generally included a positive impact on HE and FE institutions’ knowledge transfer strategy and activities. In this respect A4B was cited by respondents as being a core support available to assist with applied R&D activity, and one with limited options outside of A4B.
- 4.51 According to a number of other respondents, having greater exposure to industry has led to the academics developing ‘an in-depth understanding of their needs and requirements of business’. One college reported that A4B has ‘created a strong desire to continue with such activities’ as they have been able to meet business needs while another college reported the programme has led to creating an institutional knowledge transfer strategy which, in turn, has led to supporting more than 200 businesses. Reiterating this point, another academic reported:
- ‘We now have a better understanding of what works and what doesn't work, and how to go about getting the attention of the industrial community.’
- 4.52 As Figure 4.8 illustrates, 18 of 20 of academics surveyed¹⁹ reported that their A4B projects has led to further collaborative projects or other benefits, while 20 of 26 reported research papers were produced as a result of the project, and 17 of 31 reported they had registered IP. In terms of the IP registrations, three respondents reported it was being licensed to another company, and two each reported it was being exploited by the company partner and a spin-off venture.
- 4.53 These results suggest that a comparatively significant range and volume of academic results have been achieved through the A4B programme.

¹⁹ A relatively high number of respondents (14) skipped this question. This may have been the result of respondents not perceiving the question to be relevant to their projects/resulting benefits.

Figure 4.8: Have your A4B projects led to... (Academic survey)



4.54 Academic beneficiaries were also asked to rate the importance of A4B in contributing towards the institutions' activities and commitments as shown in Table 4.3 below. Again using the scale of 1 to 5 where 1 is not at all important and 5 very important, academics rated the programme as being important to very important in a number of issues.

4.55 According to the academics surveyed, the main contribution made by A4B towards HE and FE institutions' activities and commitments was to fulfil the institutions' commitment to knowledge transfer, scoring 4.4 on average. This is closely followed by academics reporting that A4B created follow-on consultancy work or grants, led to a better understanding of industry (scoring 4.2 each), and contributing towards research and teaching generally (score of 4). A4B's contribution towards generating exploitable IPR and creating research publications were deemed as being comparatively less important.

Table 4.3: Importance of A4B programme in... (Academic survey)

Activities and commitments	Average Score (1-Not at all important, 5-Very important)
Fulfilling the institutions' commitment to knowledge transfer	4.4
Creating follow-on consultancy work or grants	4.2
Better understanding of industry	4.2
Contributing towards research and teaching generally	4.0
Generating exploitable IPR	3.5
Creating research publications	3.3
Providing evidence in support of institutions' RAE / REF submission	2.9

- 4.56 The academics also reported a range of ‘other’ benefits as a result of the A4B support with four reporting some unexpected networking opportunities. Two academics developed international connections, with one reporting connections made with a Farmer's Union in Turkey, the US army/navy, and the BioControl Centre in Saudi Arabia, while another reported they had developed links with ‘major companies abroad’. Another academic reported UK-wide links with the Manufacturing Technology Centre (MTC) in Warwick, F1 and motorsport companies while another reported a high level of engagement with early career researchers in Wales.
- 4.57 Three respondents also reported the level of demand they had experienced for the services was unexpected, with one reporting:
- ‘The level of demand has been much greater than anticipated, this has led to additional areas of technical work, a better understanding of different sectors in Wales.’
- 4.58 Another two academics reported the A4B interventions led to a different approach of collaborating with industry with more of a focus on ‘idea generation’ than simply graduate placement opportunities. One academic reported the A4B projects has focussed the institution and its scientists more towards transferring knowledge and how to do this with SMEs especially.

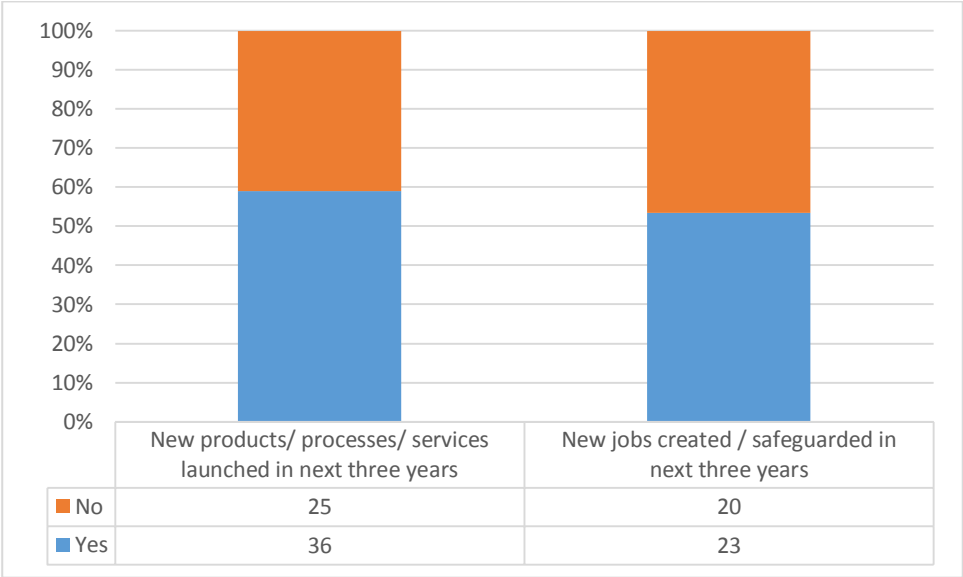
Future

- 4.59 The ‘Future’ section of the survey looked at the results and intentions/expectations of the academic and business participants following A4B support.
- 4.60 The two surveys suggest positive future impacts for both businesses and the academic institutions with the respondents intending to further engage and collaborate in R&D activities and the expectation of further results in the years ahead.
- 4.61 The results show businesses expect to achieve greater results after the funding period has ended than what has been achieved to date. As for the academics, this section further suggests A4B has had a meaningful impact on HE and FE institutions and will generate further outputs and collaborations in future.
- 4.62 Figure 4.9 illustrates that the majority of business respondents expect their A4B projects to generate results in terms of job creation and launch of new products/

processes/ services in the next three years. This contrasts with the results achieved to date where the majority of businesses reported these outputs had not been achieved (see section above).

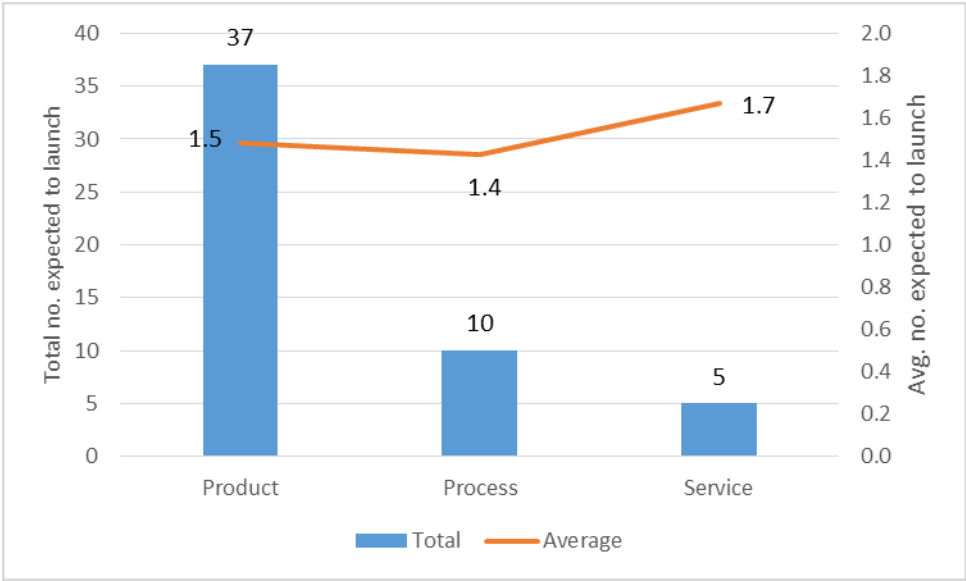
4.63 Although only - number needed of businesses reported new products, processes or services had been launched to date as a result of A4B support, number reported they expected to launch one or more of these in the next three years as a result of their A4B projects. This means the proportion of businesses expecting new products/ processes/ services in the next three years is almost double that achieved to date. Similarly, number of businesses expect new jobs to be created or safeguarded in the next three years when the ‘Don’t know’ responses are excluded, compared to only number reporting new jobs had been created or safeguarded to date.

Figure 4.9: Results in the next three years (Business survey)



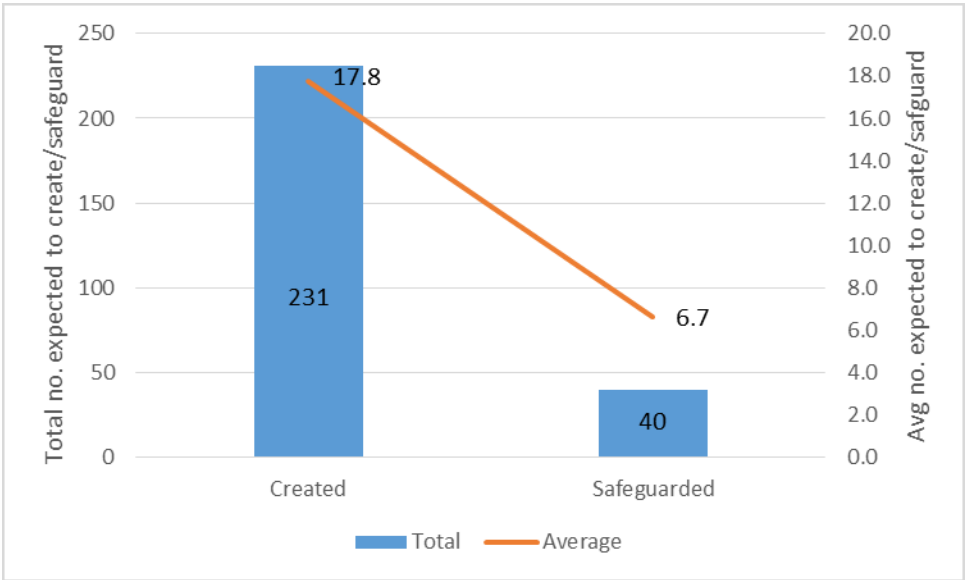
4.64 Of the 25 respondents expecting new products launched in the next three years, seven expecting new processes, and three expecting new services, a total of 37 products, 10 processes, and five services are expected to be launched (see Figure 4.10 below). This translates to 1.5 products, 1.4 processes, and 1.7 services launched on average per company expecting to generate this output.

Figure 4.10: New products/processes/services launched in next three years (Business survey)



4.65 As for the potential job creation in the next three years, 13 respondents reported they expected a total of 231 jobs to be created as a result of A4B (based on their projections and best estimates). Further to this, six respondents expected 40 jobs safeguarded in total. This translates to an average of 13 jobs created and six safeguarded per business expecting these outputs.

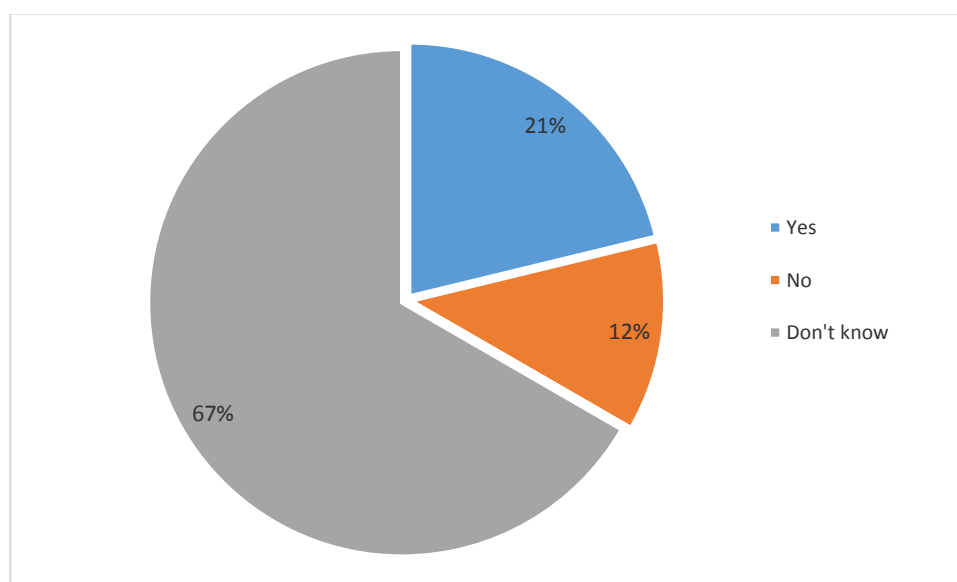
Figure 4.11: Number of new jobs created/safeguarded in next three years (Business survey)



4.66 Two thirds of the academic respondents (22 of 33) reported they didn't know whether there would be an increase in the number of jobs created/safeguarded within the institution as a result of A4B funding after the funding period has ended, as illustrated by Figure 4.12.

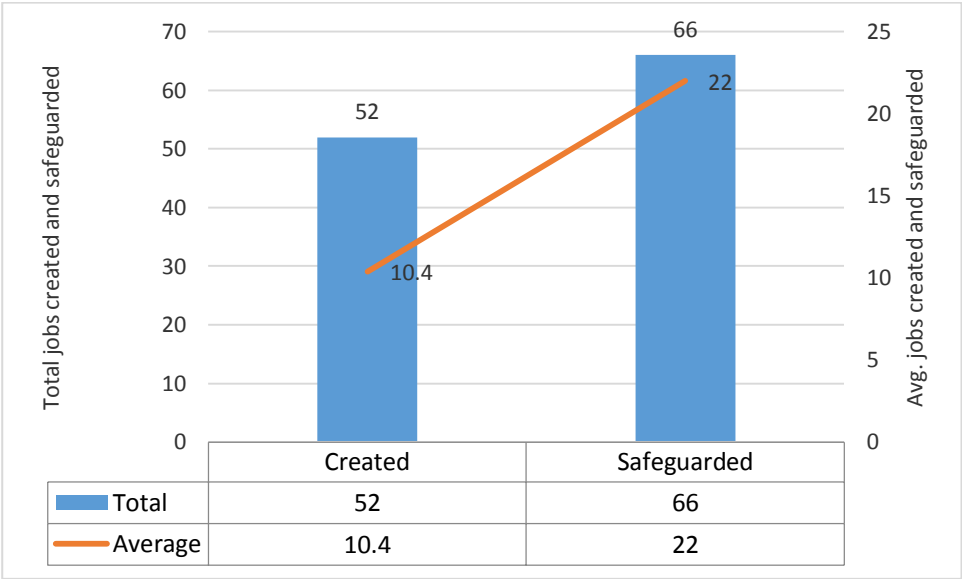
4.67 The remaining third of responses includes 7 of 33 reporting they do expect jobs created/safeguarded after the funding period has ended, while 4 of 33 reported that they didn't expect this. This means that if 'Don't know' is excluded, 7 of 11 respondents reported that they did expect further jobs created/safeguarded as a result of the programme in the years ahead.

Figure 4.12: New jobs created/safeguarded after funding has ended (Academic survey)



4.68 As Figure 4.13 illustrates, five HE / FE respondents reported the expected creation of 52 jobs in total after the funding period has ended as a result of A4B, while three respondents reported an expectation of safeguarding 66 jobs in total. On average, academic respondents who provided estimates expected to create 10.4 jobs after the funding period has ended, and 22 jobs safeguarded.

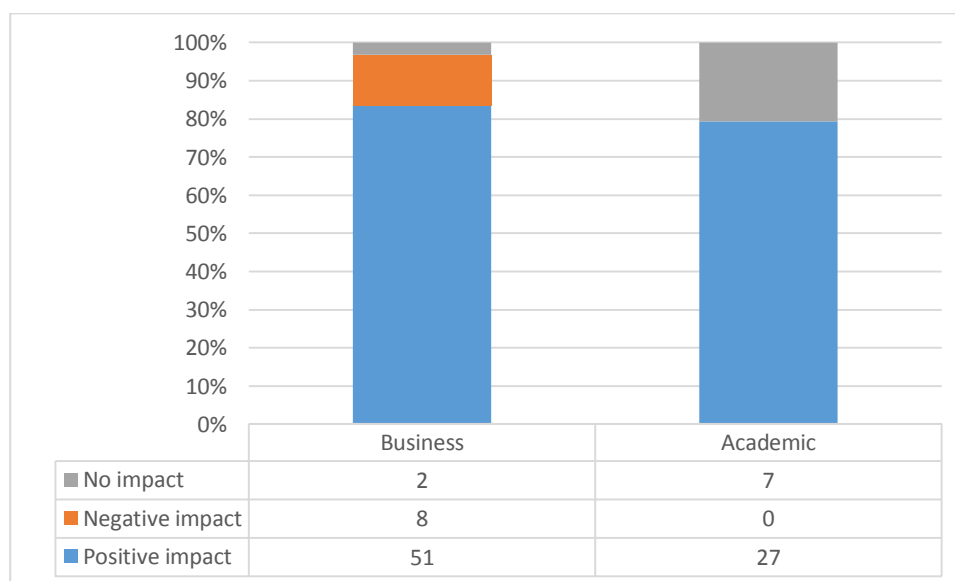
Figure 4.13: New jobs created/safeguarded after funding has ended (Academic survey)



- 4.69 These figures are from a comparatively small sample, however, and are skewed by one respondent who reported an expectation of creating 40 jobs and safeguarding 60 more. Excluding the results of this respondent provides an average of three for both the expected HE / FE jobs created and jobs safeguarded.
- 4.70 In terms of intention for further collaboration, every respondent in the academic survey (31) reported that they intend to continue collaborating with their company partners, while 54 of 60 businesses reported that, likewise, they intend to continue collaborating with their university or college partners.
- 4.71 Many of these respondents reported they would pursue further collaboration as follow up work on their A4B projects was required to produce the project outputs. One company, for example, reported they had successfully developed a prototype as a result of A4B support, but could not fund launching the product and sought further support to do so.
- 4.72 Some businesses reported they were collaborating with academic institutions to develop bids for other research programmes, while many other businesses reported that collaboration with universities has always been, and will always be essential to their R&D activity. One company, for example, explained that SMEs '*cannot always make advances*' in R&D without HE support because of their lack of capacity. According to the respondent, although the universities do not involve themselves in the production process, their contribution to research, which provides the basis for product development, is '*crucial*'.

- 4.73 Many of the academics reported the relationships developed with industry through A4B were 'long-term' and 'sustainable' with one reporting they had 'built a strong consortium of member companies' to their KTC. Other academics reported the services provided through A4B would continue following it and their relationship with the companies will continue as a result.
- 4.74 The positive impact A4B has had on future links between businesses and universities or colleges is confirmed in Figure 4.14 where 51 of 61 businesses and 27 of 34 academics reported a positive impact as a result of the programme.

Figure 4.14: Attitudes to future links between businesses and HEI/FEI (Academic and Business survey)



- 4.75 Only 8 of 61 businesses reported a negative impact while no academic reported A4B had negatively affected their attitude to future links with businesses. Finally, the remaining 7 of 34 academics and 2 of 61 of businesses reported there had been no impact.
- 4.76 Elaborating on this, many of the businesses reported the positive collaborations with universities or colleges was '*not always the case*' but A4B had made them '*more likely*' to seek further collaboration. Again, emphasising how A4B had a positive impact on businesses in comparison to other industrial-academic collaboration programmes, one business reported A4B seemed to be more '*industry-focussed*' with a strong focus on '*satisfying business needs*'. It was '*more aligned with the commercial approach*'. Another reported the academics they collaborated with were '*good people*' while another developed a '*good relationship*' with a university.

4.77 Many academics and businesses reported the A4B support had '*consolidated*' and '*reaffirmed*' their attitude towards collaboration as many had a '*long-term*' working relationship. One academic reported:

'The research unit and researchers already had a positive attitude, but the project has helped to build up a strong culture of working with industry / sustainability.'

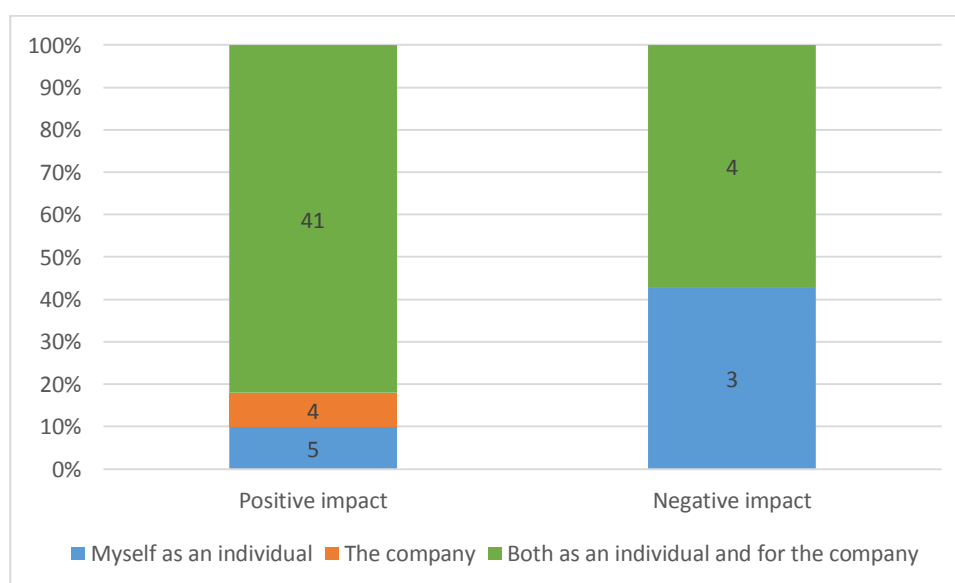
4.78 Another academic reported '*a level of trust*' had been built with both partners able to experience the benefit of collaboration:

'whereas before industrial partners may have been reluctant to work with academic partners, we are now perceived as a valuable resource'.

4.79 Finally, some businesses reported the projects had '*opened our eyes*' to the potential of collaboration with academia while one college reported the A4B programme had brought '*a certain kudos*'.

4.80 As Figure 4.15 illustrates, more than 41 businesses reporting a positive impact on their attitude towards future collaborative links, reported this had been experienced by both the individual respondent and the company. Of those reporting a negative impact, almost include no. here reported this had affected them as an individual only as opposed to affecting the attitude of their business towards future links.

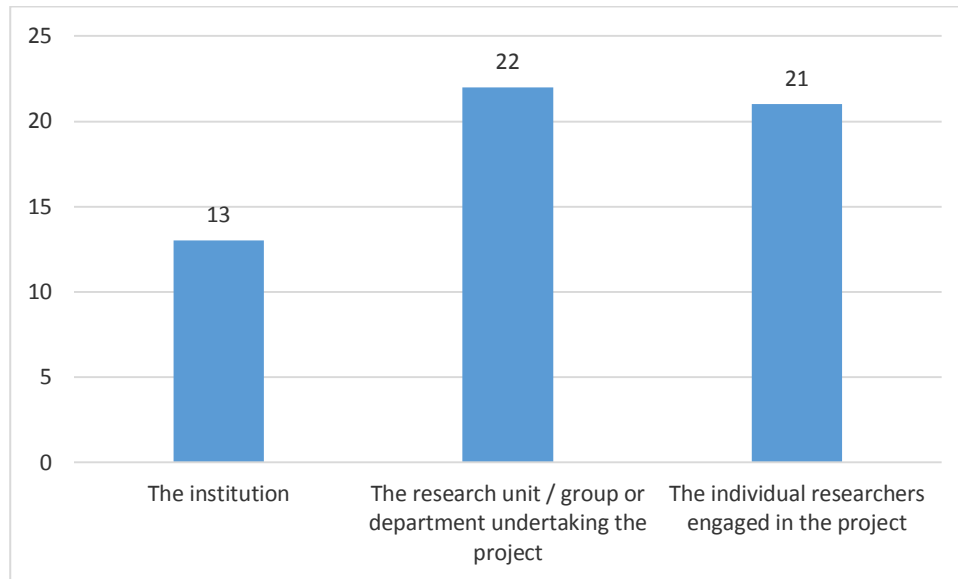
Figure 4.15: Has this change in attitudes been experienced by... (Business survey)



4.81 Of the 27 academic respondents who reported A4B had a positive impact on attitudes towards future links with businesses, Figure 4.16 illustrates this had mostly been experienced by the research units/ departments and the individual researchers themselves as opposed to the institutions as a whole. Twenty-two

reported this impact had been experienced by the research unit/department, 21 reported it had been experienced by the individual researchers, and just under half 13 reported it had been experienced by the institution.

Figure 4.16: Has this change in attitudes been experienced by.. (Academic survey)



Satisfaction with the projects and areas for development

- 4.82 Overall, both the academic and business beneficiaries were satisfied with the A4B programmes as illustrated by Tables 4.4 and 4.5. Here, beneficiaries were asked to rate their satisfaction with different elements of the support on a scale of 1-5 where 1 was very dissatisfied and 5 very satisfied.
- 4.83 Businesses were most satisfied with the quality of support provided and quality of research and support from the University or College, with both of these receiving an average score of 4.2. Businesses were also satisfied with suitability of the support for their company, rating this at 4 on average.

Table 4.4: Overall satisfaction with A4B (Company Survey)

Activities and commitments	Average Score (1-Very dissatisfied, 5-Very satisfied)
Quality of research and support from the University or College	4.2
Quality of support from the A4B team	4.2
Suitability of support for your company	4.0
Outcomes of the project	3.8

- 4.84 Many businesses explained they were less satisfied with the outcomes of their A4B project as it was too early to determine what the outcomes would be. Five business respondents reported they had only developed a prototype or hadn't launched their product and it was therefore hard to measure the outcomes as it was '*work in progress*'. This explains why more respondents reported they were neither satisfied nor dissatisfied with the outcomes than with any other category, with number reporting this in comparison to number reporting the same for quality of support.
- 4.85 Another four businesses reported the outcomes of their projects were '*disappointing*' as they had '*not achieved a breakthrough*'. However, three of these emphasised this was not a reflection of the University or academics as it would have been '*just as likely*' with private companies. One company reported the project had been useful as they were able to rule out some ideas following the '*negative feedback*' they received through A4B research. Another concluded it is the nature of R&D that some projects will find scope for opportunity and others will determine the projects are not feasible.
- 4.86 Although many respondents reported their projects were ongoing or determined they were not feasible and scored the outcomes category slightly lower as a result, a number of other businesses did report good outcomes from their A4B project. Four of these businesses emphasised how crucial A4B had been in producing these outcomes by reporting the project would not have gone ahead without support from the programme as the '*risk was too high*' for them to undertake the activities alone. Another respondent reported the business wouldn't have known where else to seek support had it not been for A4B, while another reported the following: '*These projects really add value and a level of research that we cannot afford to undertake ourselves*'.
- 4.87 Many businesses praised the support provided by academics and their institutions with one reporting the support was '*second to none*' and that '*I can't praise it*

enough'. The respondent further explained their positive experience with the project was mainly because of the *'personality and leadership'* of the individual and the team of academics providing the support. However, this was not the experience of all business beneficiaries with two expressing dissatisfaction with the academics. One reported the programme itself was good but the academics were not as they were *'just out to make some quick money from government funding'*.

- 4.88 As for the academics' satisfaction with A4B, respondents reported they were most satisfied with the outcomes of the intervention with a score of 4.5 on average including n of academics reporting they were 'very satisfied' with it. Academics also reported they were satisfied with their engagement with the Welsh Government team and the support received, scoring this at 4 on average and with n reporting they were either satisfied nor very satisfied. Finally, academics reported they were least satisfied with the application process, scoring this on average at 3.5 with n reporting they were neither satisfied nor dissatisfied with this process.

Table 4.5: Overall satisfaction with A4B (Academic Survey)

Satisfaction with...	Average Score (1-Very dissatisfied, 5-Very satisfied)
Outcomes of the intervention	4.5
Engagement/support with WG project team	4.0
Application process	3.5
Outcomes of the project	3.8

- 4.89 One academic appreciated the 'hands-off' approach of Welsh Government, reporting it was useful as it *'allowed us to get on with things'*. Another reported Welsh Government were flexible in their approach towards the KPIs, recognising *'it is the spirit of the project, not just the KPIs'* and recognising the challenges in achieving the KPIs.
- 4.90 In terms of areas for development, when asked how could particular aspects of A4B be improved, the main issue cited by the academics was the bureaucratic burden associated with the application and monitoring processes. Two academics, however, reported that they appreciate the application and monitoring is necessary and *'when European funding is involved it will always be long winded'*. It was reported as being a *'necessary evil'* and one that is recognised, particularly *'when a large amount of funding is requested'*.

- 4.91 In total, 14 academics reported a desire for ‘less paperwork’, with three academics suggesting A4B should adopt a similar approach to Innovate UK’s process, described as more ‘*streamlined*’, ‘*simpler*’ and ‘*much easier to understand with clearer deadlines*’. Other application process approaches praised by academics as potential models for A4B include the Research Council and DEFRA.
- 4.92 A number of academics criticised the quality of the A4B review process with one reporting the pool of experts making up the review panel was not experienced enough to make accurate judgments. Another reported the review panel failed to consider the success of previous proposals as part of the process and, again, suggested Innovate UK’s two-stage process²⁰ as a ‘*good way of doing things*’ and ‘*does not waste too much of academics’ time*’.
- 4.93 Four academics reported there were too many restrictions in the programme and greater flexibility would be an improvement, with one reporting the requirement for Welsh partners (in the first part of the programme) was a barrier where there was insufficient capacity. Two more reported there should be greater flexibility in the areas and business sectors in which R&D can be undertaken with one suggesting a greater focus on interdisciplinary research support.
- 4.94 Poor communication was an issue for three academics, with one reporting this had caused cash flow problems for the institution, and another reporting support was minimal in the area of monitoring and evaluation and that it took too long to get a response from the A4B team. Two respondents reported insufficient support was provided in the application process and in the exploitation stage, as well as a failure to support the implementation of a follow-on strategy and a ‘*grow liaison to the next level*’ support. Two other respondents reported IP issues, with one reporting the requirement for the university to take all the IP should be examined and purchasing rules should be made more flexible as they are ‘*overly restrictive in relation to quotes*’. Another suggested A4B should adopt the IP model of ASTUTE and reduce the IP audit paperwork.
- 4.95 Finally, other suggestions made to improve A4B support include providing more information on where academics can leverage A4B, and creating a central website with quality checked documentation. One academic reported a need to provide

²⁰ Innovate UK’s Early Stage Translation, Industrial Research, and Experimental development awards follow a 2 stage application process with an expression of interest submission as a first stage. Successful applicants from this stage are then invited to submit a full stage application (see, for example: <https://connect.innovateuk.org/documents/1524978/1866952/Industrial%20Biotechnology%20Catalyst%20-%20Late-Stage%20-%20Technical%20Feasibility%20Studies%20-%20Round%204%20-%20competition%20guidance>)

more focus on FEIs, another suggested that funding should be concentrated on fewer centres to maximise impact, while another suggested dedicated capital calls for one off R&D needs.

- 4.96 When asked what improvements the academics would like to see made to the Welsh Government's support for knowledge transfer and IP exploitation more generally, the most frequent response was to have a continuation of the A4B programme. A couple of academics reported future programmes should continue to recognise research and infrastructure capacity while another reported future programmes should 'continue to foster strong industry links'.
- 4.97 In terms of a future iteration of the A4B programme, five academics reported they would be in favour of a programme based on the Fraunhofer/Catapult model with one reporting their lab could be developed as a catapult and another reporting a focus on building capacity is the '*correct*' model for academic-industry projects. One academic reported that greater involvement from industry would be a positive approach but another believed it would be difficult to have a model requiring financial contribution from industry of one third.
- 4.98 Other suggestions made to improve Welsh Government's support for knowledge transfer and IP exploitation include communicating IP demands to universities, focussing on Technology Readiness Level (TRL) 6-8 to maximise economic impact, and to focus on larger projects which have the greatest potential for impact as opposed to a '*transaction based model*' based on SMEs. Another academic suggested the WG could provide '*hand holding and guidance*' support for research bids e.g. Horizon 2020.
- 4.99 Businesses were also asked to suggest improvements that could be made to Welsh Government's support for knowledge transfer and IP exploitation with many citing similar potential improvements to the academics.
- 4.100 Ten of the businesses reported they would like to see the lifecycle of a future programme extended and suggested A4B or a similar type of programme should be continued as further support was required for their project.
- 4.101 According to one business, Welsh Government do not appreciate the time it can take to develop products, and the Government has a tendency to expect instant results. A continuation of the programme and extending its lifecycle would ensure that many more projects are able to produce results. Three businesses also reported greater support should be provided in the commercialisation stage and

getting products to market. Two businesses reported they would like future projects to be of a larger scale as the A4B interventions were too small to deliver upon their ambitions.

- 4.102 As with the academic respondents, many businesses also criticised bureaucratic issues with a number of businesses reporting the application process was difficult and should be simplified. Some businesses also complained of the review panel with one respondent questioning the *'expertise and experience'* of the panel and reported Innovate UK's process was far better.
- 4.103 A number of businesses also reported communication as an area that could be improved in future Welsh Government support programmes, as it was hard to *'track down'* the WG A4B team on occasions. Two businesses reported future programmes should be more flexible, with one reporting more interdisciplinary knowledge transfer would be an improvement and another reporting less restrictions should be put in place on the makeup of project partners. According to this respondent, the threshold requirement for private company involvement was set too high in their project and businesses were *'brought on board'* simply to *'fill the quota'*.
- 4.104 One of the most frequent suggestions for improvement cited was to change the dynamic of a future programme to be more industry focussed. According to one respondent, A4B was *'too far removed from the commercial world'* and the respondents suggested a mechanism to bridge the gap between the development stages and commercialisation in order to *'get things going'*. Many of the respondents reported the projects should be industry-led and managed *'more commercially'*. Two suggested academics could receive training to improve their project management capability and understanding of *'how to manage commercial projects'* including communication with industrial partners. In managing the projects, one respondent suggested the Government should provide *'account managers'* as opposed to *'project administrators'*. The distinction is that account managers would have the freedom to manage projects in a common sense approach as opposed to being bound by restrictions. In terms of the manner in which the projects are funded, two respondents reported businesses should receive funding directly from the A4B team.
- 4.105 Some business respondents reported more support should be provided to the smaller businesses and the A4B programme made it difficult for small businesses and start-ups to participate because of the cost involved. Finally, other comments made include one respondent suggesting Welsh Government should have a more

cohesive ‘joined up’ strategy in their support provision as opposed to having different WG programmes compete against each other, while a spin-out company reported the business didn’t need knowledge transfer support on the science but support was required in the marketing and commercial aspects.

Case study findings

- 4.106 Detailed evaluation case studies were undertaken with nine A4B projects. These included, where possible enterprise and/or academic perspectives.
- 4.107 The aim of the case study interviews was to gain a detailed understanding of the support provided and results achieved by a sample of projects, and to identify business and academic/university benefits, as well as wider impacts where identifiable (economic, environmental, social, innovation and so on) at the end of the programme.
- 4.108 The following section provides an integrated overview of the case study results, drawing on interviews. These case studies were selected to reflect the diversity of project activity supported by A4B, and include evidence from both HE and FE experiences, different size and sectors:

1. *Development of responsive control system for artificial lung, CIRP.* A Swansea University Project HE 09 COL 1029
2. *Added Value from OATS CIRP.* An Aberystwyth University project HE 11 161001 and HE 11 COL 1007
3. *Up-grading of Welsh timber to fulfil future market potentials.* A Bangor University project HE 026 COL 1023
4. *Accomplish - Algal Carbon Capture and Biomass Production Linked Supply Chain CIRP.* A Swansea University project HE 09 COL 1037
5. *Advanced Anaerobic Processes and Biogas Systems (AAPBS) KTC.* A University of South Wales project HE 14 15 1009
6. *Patient Specific Medical Product Development KTC.* A Cardiff Metropolitan University project HE 01 KTC 1005
7. *Moving Images Wales (MIW) KTC.* A UWTSD project HE 04 16 1001 and HE 04 KTC 1003
8. *SUPER- Sustainable Product Engineering.* A Swansea University project Swan HE 09 16 1005
9. *VocalEyes pilot.* A Pembrokeshire College project (part of a Strategic Plan). FE 16 15 1001; FE 16 15 1002

4.109 The full results of the case studies can be found in the annex. A summary of key findings from the case studies is set out below:

- The case studies illustrate a number of areas of successful commercialisation, with examples of partners introducing new products, processes and services. These examples include the introduction of new medical equipment in the NHS (Patient Specific Medical Product Development project), improvement in processes (the Advanced Anaerobic Processes and Biogas Systems project), and introduction of new services (for example, the Pembrokeshire Strategic Plan project).
- The innovation impacts noted in the case studies illustrate the role of the A4B programme in producing not only innovation benefits, but also social/health benefits, and potential environmental sustainability benefits. These are areas of impact that have relevance to important strategic and societal challenges, and the cross-cutting themes objectives, as well as indicating the potential for the A4B programme to contribute towards a wider range of Welsh Government and wider objectives.
- Companies of all sizes are included in the case studies, helping to support collaborative R&D and knowledge exchange and IP exploitation activity. This includes examples of support for individual and groups of partners. In the latter case this illustrates the role of the programme in helping to promote networking and exchange, as well as potential for supply chain benefits. Such support also has the potential to strengthen supply chain interactions and innovation linkages between companies in (and outside) of Wales.
- While there are examples of positive impacts achieved by the project, the case studies confirm the iterative and long-term nature of the innovation process. In this respect a common theme in the case studies is the role of the A4B programme in supporting the development of new opportunities, but with further work required to achieve full commercialisation. This is consistent with the pre-market nature of support (and the State Aid Framework rules in place).
- The case studies illustrate the important role played by the A4B programme, in bringing partners together to conduct innovation projects. They do, however, indicate that company and academic partners are generally experienced in conducting collaborative R&D projects. This points to the importance of prior

experience in providing the pre-conditions for innovative activity, and opens up the potential for A4B projects to share knowledge through interactive learning.

- There are important challenges and barriers faced in exploiting knowledge from academia. Here, the A4B programme addresses key imperfections in the innovation process, notably the provision of funding that encourages partners to take risks, and by conducting innovative projects which might not otherwise be funded by the market. This is evident in the research and development on early stage technologies, and support for their exploitation.
- Case study participants are generally satisfied with the support available from A4B and would value its ongoing availability. They would, however, value a more streamlined 'paperwork' process for the programme. In this respect several case studies indicate that this impacted on their ability to conduct and deliver the projects efficiently. Companies, interviewed as part of the case studies, also make the general comment that the university partners do not always appreciate the time pressures faced, and the importance of speed to market.
- University partners have been able to gain important benefits, with publications and leverage of additional research funding. Jobs have also been created at universities, providing the opportunity for (often) young researchers to develop their careers. Participation in A4B has also strengthened and enabled academics to strengthen existing areas of expertise, and capacity to conduct further research, produce publications and so on, as well as making new contacts.
- Examples of A4B projects helping to lever in further funding area also evident in the case studies. This includes examples of significant funding for university partners from a range of sources including; company match funding, research councils, charities and so on. This suggests that the programme is correctly focused on supporting the development of early stage research, development and innovation activity, helping to get projects to a stage where further investors are willing to invest. In this way A4B support addresses one of the primary market failures associated with the innovation process – namely the risk to businesses of investing in such early stage R&D, without a solid understanding of the potential returns.

- Company partners have similarly benefited by accessing specialist expertise, solving problems and developing new product, processes and services. Through project elements such as CIRP and Knowledge Exchange projects the A4B programme has provided opportunities to exchange knowledge interactively across the commercial / academic interface.
- On the question of project additionality, the evidence from the case-studies suggests that the majority would not have been undertaken without the support of A4B. This points towards low levels of deadweight, and indicates effective targeting of support.

Summary

- 4.110 The results of the fieldwork suggest that the project beneficiaries view the A4B programme as an important source of funding for knowledge transfer and IP exploitation, and has built on a legacy of supports that have been developed in Wales (e.g. KEF).
- 4.111 At the level of the HE Institutions, the A4B programme has helped (alongside other funds such as those provided by HEFCW) to address their innovation and engagement capacity and activity. This is becoming increasingly important in relation to research assessment methods (e.g. REF). The A4B programme, alongside the institution's own capacity programme have also provided important delivery mechanisms for the programme, not least the provision of industrial liaison capacity to support the identification of, and filtering of ideas, into strong project (proposals).
- 4.112 The institutions generally recognise the challenges faced by the Welsh Government in delivering A4B, and value the flexibility adopted by the programme in responding to the needs of institutions and wider policy and strategies. Concerns are raised, however, regarding the administrative burden of the programme (in comparison with other programmes) and the operational and monitoring interface (provided by IPM).
- 4.113 The academics and business survey results provide an important perspective on the programme delivery and achievements. The results here suggest a strong levels of prior collaborative R&D engagement by both academics and business, and evidence of multiple project participation by both parties. This suggests that project partners typically enter the programme to build on prior experience.
- 4.114 Reasons for engaging in A4B programmes for academics are principally to address institutional knowledge transfer objectives and to understand industry needs. For

businesses, the main reasons were to develop and improve products, processes and improve the skills base.

- 4.115 Project achievements were identified including the development of new products, process and services, increasing jobs/safeguarded jobs and increase in sales, development of new collaborative links. These findings are supported by the case studies, which show that many of the projects supported continue to require further development work in order to achieve full commercialisation.
- 4.116 Academics similarly benefited in key areas such as strengthening industry links and understanding of needs, and securing further collaborative projects. Evidence of the A4B programme supporting more traditional research results were also noted, including research papers and research activity, teaching inputs, and exploitable IP.
- 4.117 The results also show that the A4B programme has the potential to produce further impacts, with both businesses and academic respondents indicating that they intend to collaborate in future and have developed positive attitudes towards such collaboration, with the expectation that new jobs, products, processes and services are likely to emerge in the next three years.
- 4.118 High levels of satisfaction with the programme were reported by the companies. Academics reported similarly strong levels of satisfaction, but would generally like to see the application and monitoring process of the (successor) programme streamlined in future, and communication processes strengthened. General support for greater industry involvement and contribution to future projects was also supported by the academics.

5. Impact analysis (including cross-cutting themes)

5.1 In light of the gross outputs reviewed above the following section assesses the potential for (net) impacts in the following areas:

- Economic
- Innovation
- Environmental and social (cross-cutting themes)

Identified impacts

5.2 This analysis uses established impact calculation methods (full details of the methods can be found in Annex 1).

Economic Impacts

5.3 A key aim of the A4B programme is to support knowledge transfer and IP exploitation, with the potential to ultimately benefit the Welsh economy. This economic benefit has the potential to be expressed in relation to jobs, launch of new products, processes and services, and so on.

5.4 An assessment of economic impact was undertaken comprising:

- Employment impacts to date, projected future impacts and total impacts.
- The impacts of both A4B projects (KECD and KTCIR) and their collective impact.
- Total public cost impacts.
- Employment related GVA impacts.
- Gross and net impact.

5.5 The net impact is the difference between what would have happened anyway and the benefits generated by the support, adjusted for displacement, leakage, substitution, and multiplier effects. In order to move from gross impacts to net impacts, a number of questions were asked to identify deadweight and displacement with benchmarks used to calculate other adjustments.

5.6 The analysis is based on assumptions drawing on the reported job creation outputs and business survey responses from 36 of the KECD funded project and 61 of the KTCIR funded projects (in total 97 businesses/organisations that have received support of one form or another through the programme).

5.7 A summary of the analysis method is provided in the table below. Further technical detail about the assumptions underpinning the economic impact assessment is provided in the Annex.

Table 5.1: Additionality Logic Chain

Term	Definition
The Intervention Option	This is the level of gross impacts generated through the intervention (in this case employment creation impacts of both projects).
Deadweight	The proportion of total employment impact that would have occurred anyway. An additionality factor was applied to account for various degrees of pure, scale and time additionality. This was informed directly by the survey findings.
Displacement	The number or proportion of impacts that reduce value elsewhere in Wales. A benchmark displacement factor was applied to account for the number of firms or demand affected.
Leakage	The number or proportion of impact that benefits economies outside Wales (using a benchmark).
Substitution	This is a negative effect that arises when a firm substitutes one activity for another to take advantage of public sector support (again a benchmark was used for this adjustment factor).
Multipliers	This is further economic activity associated with additional income to those employed by the beneficiaries, with local supplier purchases and with longer term development effects. A benchmark was used for this factor.

5.8 The impacts have been calculated for all public sector investment (Typically, ERDF accounts for just under half total investment). The following sections look at the employment impacts using the employment - jobs created and safeguarded and combined - for each of the two projects and their total impacts.

Table 5.2: Summary Employment and GVA Impacts: KECD

KECD	To Date	Future	To Date & Future
Gross Jobs Created	17.8	21.4	39.2
Total Net Jobs Created	12.7	15.3	28.0
GVA	£462,487	£554,985	£1,017,472
Gross Jobs Safeguarded	3.3	5.0	8.3
Total Net Safeguarded Jobs	2.4	3.5	5.9
GVA	£85,742	£128,613	£214,355
Total Jobs Created & Safeguarded	21.1	26.3	47.4
Total Net Jobs Created & Safeguarded	15.1	18.8	33.9
GVA	£548,229	£683,598	£1,231,827
Total Costs			£10,360,164

5.9 Project KECD has therefore created or safeguarded 15 net jobs to date and is predicted to generate an additional 19 (through persistence²¹) giving a total of 34 jobs. This it is estimated will generate GVA employment impacts of some £1.2m (total costs to date amount to £10.4m).

Table 5.3: Summary Employment and GVA Impacts: KTCIR

KECD	To Date	Future	To Date & Future
Gross Jobs Created	152.8	366.7	519.5
Total Net Jobs Created	80.2	192.5	272.77
GVA	£2,915,172	£6,996,413	£9,911,5855
Gross Jobs Safeguarded	126.1	365.7	491.8
Total Net Safeguarded Jobs	71.8	208.3	280.1
GVA	£2,610,869	£7,571,521	£10,182,390
Total Jobs Created & Safeguarded	278.9	732.4	1011.33
Total Net Jobs Created & Safeguarded	152.0	400.7	552.7
GVA	£5,526,042	£14,567,934	£20,093,976
Total Costs			£20,157,763

5.10 Project KTCIR has created or safeguarded 152 net jobs to date and is predicted to generate an additional 401 (through persistence) giving a total of 553 jobs. This will, it is estimated, generate GVA employment impacts of some £20.1m (total costs to date amount to £20.2m).

Table 5.4: Summary Employment and GVA Impacts: KECD and KTCIR

KECD and KTCIR	To Date	Future	To Date & Future
Gross Jobs Created	170.6	388.11	558.71
Total Net Jobs Created	92.9	207.88	300.78
GVA	£3,377,65959	£7,551,398	£10,929,057.5
Gross Jobs Safeguarded	129.4	370.55	500.0
Total Net Safeguarded Jobs	74.2	211.8	286.0
GVA	£2,696,611	£7,700,134	£10,396,745
Total Jobs Created & Safeguarded	300.0	758.7	1058.7
Total Net Jobs Created & Safeguarded	167.1	419.5	586.6
GVA	£6,074,271	£15,251,532	£21,325,803
Total Costs			£30,507,927

²¹ See table 21, Annex I for the definition of persistence employed in the evaluation.

- 5.11 Collectively the A4B programme (KECD and KTCIR) has created or safeguarded 167 net jobs to date and are predicted to generate an additional 420 (through persistence) giving a total of 587 jobs.
- 5.12 This will, it is estimated, generate GVA employment impacts of some £30.5m (total costs to date amount to £30.5m).
- 5.13 The table overleaf summarises the full economic impact calculations.

Table 5.5: Gross and Net Employment Related GVA Impacts to date, future and predicted (KECD and KTCIR and total)

	To Date			Future			To Date & Future		
	KECD	KTCIR	Total	KECD	KTCIR	Total	KECD	KTCIR	Total
Gross Jobs Created	17.8	152.8	170.6	21.4	366.7	388.0	39.2	519.5	558.6
Less Deadweight	16.8	105.6	122.4	20.1	253.4	273.5	36.9	359.0	395.9
Less Displacement	12.6	79.2	91.8	15.1	190.1	205.2	27.6	269.3	296.9
Less Leakage	11.3	71.3	82.6	13.6	171.1	184.6	24.9	242.3	267.2
Less Substitution	8.5	53.5	61.9	10.2	128.3	138.5	18.7	181.8	200.4
Plus Multipliers	12.7	80.2	92.9	15.3	192.5	207.7	28.0	272.6	300.6
Total Net Jobs Created	12.7	80.2	92.9	15.3	192.5	207.7	28.0	272.6	300.6
GVA	£462,487	£2,915,172	£3,377,660	£554,985	£6,996,413	£7,551,398	£1,017,472	£9,911,586	£10,929,058
Gross Jobs Safeguarded	3.3	126.1	129.4	5.0	365.7	370.6	8.3	491.8	500.0
Less Deadweight	3.1	94.6	97.7	4.7	274.3	278.9	7.8	368.8	376.6
Less Displacement	2.3	70.9	73.3	3.5	205.7	209.2	5.8	276.6	282.5
Less Leakage	2.1	63.8	65.9	3.1	185.1	188.3	5.2	249.0	254.2
Less Substitution	1.6	47.9	49.5	2.4	138.8	141.2	3.9	186.7	190.7
Plus Multipliers	2.4	71.8	74.2	3.5	208.3	211.8	5.9	280.1	286.0
Total Net Safeguarded Jobs	2.4	71.8	74.2	3.5	208.3	211.8	5.9	280.1	286.0
GVA	£85,742	£2,610,869	£2,696,611	£128,613	£7,571,521	£7,700,134	£214,355	£10,182,390	£10,396,745
Tot Jobs Created & Safeguarded	21.1	278.9	300.0	26.3	732.4	758.7	47.4	1011.2	1058.7
Less Deadweight	19.9	200.2	220.0	24.8	527.7	552.5	44.6	727.9	772.5
	To Date			Future			To Date & Future		
	KECD	KTCIR	Total	KECD	KTCIR	Total	KECD	KTCIR	Total
Less Displacement	14.9	150.1	165.0	18.6	395.8	414.3	33.5	545.9	579.4
Less Leakage	13.4	135.1	148.5	16.7	356.2	372.9	30.1	491.3	521.4
Less Substitution	10.1	101.3	111.4	12.5	267.1	279.7	22.6	368.5	391.1
Plus Multipliers	15.1	152.0	167.1	18.8	400.7	419.5	33.9	552.7	586.6
Total Net Jobs Created & Safeguarded	15.1	152.0	167.1	18.8	400.7	419.5	33.9	552.7	586.6
GVA	£548,229	£5,526,042	£6,074,271	£683,598	£14,567,934	£15,251,532	£1,231,827	£20,093,976	£21,325,803
Total Costs							£10,350,164	£20,157,763	£30,507,927

Innovation impacts

- 5.14 Research, development and innovation impacts represent a key focus for the A4B programme. This area of impact contributes towards economic and wider impacts discussed in this section of the report, and are confirmed by the programme logic models set out in section 2.
- 5.15 The results of the surveys indicate that the results of A4B projects have generated:
- Launch of new products, processes and services (30%)
 - Creation of new jobs (30%)
 - Increase in sales (28%)
 - Registration of IP (55%)
- 5.16 In addition to these current innovation impacts the business survey results indicate the potential impacts of the next three years:
- Launch one or more products, processes or services in the next three years (59%)
 - Create or safeguard jobs (53%)
- 5.17 The results (from the surveys and monitoring data) are further underpinned by:
- Positive attitudes towards future collaboration between business and universities or colleges (84% of businesses and 79% of academics report a positive impact on attitude towards collaboration)
 - Investment in new infrastructure and centres of expertise in support of applied R&D, knowledge transfer and exploitation.
 - Leverage of substantial investment in further applied R&D and commercialisation activity (induced) as a result of A4B projects (£9.5 million)
- 5.18 The scale of the current innovation impacts associated with the A4B programme are substantially lower than those anticipated in the next three years.
- 5.19 While these future figures are estimates, they give some confirmation to the research, development and innovation process being a medium-to-long-term activity. In this respect the evidence of attitudinal change, experience developed and investment all point towards the potential for such impacts to emerge.

Environmental and social impacts – cross-cutting themes

- 5.20 A range of potential environmental and social impacts of the A4B programme are evident from the case studies. These suggest examples of projects which are addressing key environmental and societal challenges in areas such as:
- Improving the efficiency of waste recycling. The Accomplish project, for example, is working with partners to reduce costs / improve efficiency of operations in Wales through energy generation. The AAPBS project is similarly working with partners to better harness the potential of waste recycling through anaerobic digestion.
 - Addressing important health issues. The Ad-Oat project is working with commercial partners to identify ways to reduce harmful bacteria in poultry (Campylobacter virus). Elsewhere a number of projects of supporting research, development and innovation into new medical devices and products (including artificial lungs, training aids and patient specific medical products).
 - Facilitating social interaction and idea generation. The VocalEyes platform is working with local community bodies (schools, FE, HE institutions) to develop new ways of crowdsourcing ideas interactively.
- 5.21 The wider focus of the programme on the cross-cutting themes has been limited. In this respect the plans set out in the initial business plan to encourage the adoption of environmental management practices and equality and diversity processes were not fully implemented. For example, there was limited in-house expertise available to introduce the key activities identified in the business plan, including:
- Promotional document being produced.
 - Training for the delivery team being done.
 - Review at the end of year three to inform future delivery plans.
- 5.22 This weakness was identified during the latter stages of programme, with a review that identified a number of challenges. This noted that the programme's primary beneficiaries (the institutions) already had well developed policies and procedures with respect to environmental management and equality and diversity. Second, the programme did not have direct contact with the businesses involved in A4B projects. This made it difficult for the programme to ensure consistent attention to the cross cutting themes issues were fully addressed.
- 5.23 Despite these challenges the programme did, however, seek to ensure that institutions were implementing up to date procedures in the area of the cross-cutting

themes (through the collection of materials). It was also recognised that the programme was likely to have more impact with respect to environmental monitoring systems given the technical nature of projects in this area and potential synergies with the applied R&D focus of the A4B programme. Discussions have also taken place with specialist providers of project support for cross cutting themes (Bangor University), with the potential for future programme support.

- 5.24 In many respects the approach of the A4B programme towards the cross-cutting themes has been largely reactive. This is consistent with the approach adopted by many innovation-related programmes supported by the Welsh Government and beyond. The emergence of more specialist providers of cross-cutting themes support provides a model for such programmes to provide more proactive support in this area in future.

Summary

- 5.25 The results of the analysis suggest that the A4B programme has produced a range of economic, innovation and environmental / social benefits. These benefits primarily concern the development of new knowledge transfer and exploitation capacity within the HE/FE sector, establishment of collaborative R&D activity and partnerships, and the development of new products, processes and services.
- 5.26 Evidence of environmental and social impacts are illustrated by the results, with many A4B projects addressing important environmental and societal challenges. The programme's support for these projects has not, however, been complemented by wider activity to address the cross-cutting themes.
- 5.27 While many of the products, processes and services supported by the A4B programme are still in the development stage, the evidence from the evaluation points to ongoing partnerships and development activity, and strong levels of investment induced. While the research, development and innovation impacts show positive potential, the fact that many projects are subject to further development activity account for the project's relatively modest economic impacts (break-even).

6. Value for money

6.1 This section of the report considers the value for money of the A4B programme using the so-called '3 Es' approach:

- **Economy** - How much has the intervention cost; how was this decided on; have the funds been used for the stated activities and, what additional funds have been levered in?
- **Efficiency** - Have activities been delivered in line with expectations including: were the funded activities delivered in line with the plan; what additional activities were delivered; was the cost of delivery as expected?
- **Effectiveness** - Have the funded activities achieved the expected results or outcomes; what additional outcomes have been achieved, if any; and, how has effectiveness been maximised?

Economy

6.2 The A4B programme was delivered to a total budget of £30.5 million (based on expenditure claims at the end of December 2014). The ERDF contribution to the overall programme costs was £13.8 million. ERDF represents 45 per cent of the overall project cost.

6.3 The budget for the programme was determined by the Welsh Government team based on their experience of previous programmes, and a new assessment of need and demand. The Business Plans for the Convergence and Competitiveness programmes suggest that reasonable steps have been taken by managers to ensure the accurate planning of the programme and its 'economy'. This has included the following:

- Funding is fixed in terms of public grant aid application through WEFO
- Positive synergies have been achieved with other Convergence funded projects, including SMARTCymru, Business Innovation, and other ERDF projects such as WISE, ISD and ASTUTE.
- Ongoing monitoring of the programme fund and outputs, and a flexible approach to implementation (reprofiling spend and outputs).²²

²² See section 2.4 for details of the original / reprofiled funding and targets.

Efficiency

- 6.4 As a centrally managed programme, A4B is required to provide a balance of institution-facing staff, and internal management and administration staff. Ensuring coordination across these has been challenging and the absolute size of the programme has been compounded by the large number of projects supported, which has stretched the A4B team at times.
- 6.5 The evaluation research, informed by discussions with the A4B team as well as the experiences of academic institutions and partners, has identified a number of areas where lessons have emerged as well as opportunities for possible future efficiency gains. There are, therefore, a number of areas where delivery efficiency challenges and issues are evident, including, inter alia:
- The administrative burden of the programme which, while associated with institutions' own experience of the challenges of managing EU funding, also gives rise to a perception by a number of institutions that this is a particular concern with respect to the A4B programme.
 - Communication issues and the institutions' need for frequent clarifications around, for example, eligibility, timescales, contractual matters, claims and payments at key points in the programme's delivery. (This in part linked to the centralised structure of the programme and the multiple contacts made between the A4B team and the institutions).
 - Technology challenges, with the majority of institutions pointing to the 'antiquated nature' of the IPM system.
 - Difficulties implementing the cross-cutting themes approach set out in the business plan, with no evidence of the initial 'hearts and minds' documentation being disseminated. (NB. Later discussions with Bangor University identified a mechanism for the programme to collect data and support companies to address the cross-cutting themes).
- 6.6 The delivery of the A4B programme has three distinct but overlapping activities with specific team responsibilities allocated to ensure efficient delivery and to assist academic beneficiaries in communicating appropriately with WG staff at different stages of their project development and delivery.

6.7 The three main areas of delivery are:

- Development of projects.
- Appraisal and approval of project applications.
- Validation of progress and monitoring of claims and payments.

6.8 The discussion below does not present a full process description but instead covers those areas which have given rise to specific focus by the A4B team or where, from the evaluation research, it appears that efficiency issues and opportunities may arise.

Development of projects

6.9 When the A4B strands were removed, the programme suddenly had greater flexibility and this, after some bedding in and understanding period, led to increased volume and also increased quality of projects being proposed. The speed with which the change in approach was made did cause some confusion – even amongst the A4B team. The most frequent question asked of the development managers was, “*What makes a good project?*” Some HEIs found this easy to answer themselves while others sought frequent reassurance from the development managers.

6.10 A number of approaches were developed to respond to this question. These ranged from a very early involvement of development managers with academic researchers through to a type of institution based ‘dragons den’ when academics would ‘pitch’ their project ideas to the A4B development manager. In some institutions, this process was internalised so that the Commercial/ ILO team would only allow projects to be developed that they perceived to be likely to gain A4B funding.

6.11 The lesson from this was that the aim of encouraging higher quality, more strategic projects from HEIs was to some extent achieved and that, with support from the A4B managers, most institutions have found processes that they regard as ‘fit for purpose’ and suitable to their own culture and organisational arrangements. Development managers perceive that this process of requiring institutions and academics to think more carefully and fully about the quality of their project applications has been positive and that there is, as a result, a more ‘demand-focused’ environment where the key question most frequently asked is “what do the companies get out of this project?”

- 6.12 However, development managers are also mindful of the significantly increased workload that the change in approach brought them within the programme period and are keen to avoid being any risk of being seen as ‘bottlenecks’ in the development of projects in the future. To this end, there is a possibility that, in future, their time allocations to the various institutions and projects may need to be better structured and even, to some extent, rationed. This could mean that they are only able to spend a set (or a maximum) number of hours/days on individual projects unless, as the projects emerge, some are deemed to have very significant impact potential, in which cases exceptions could be made.
- 6.13 During evaluation interviews with the A4B development managers, it was recalled that a system such as this was in place, albeit informally, when the calls-based application process was being implemented. This grew up naturally because of the large number of potential projects being discussed with the institutions and the specific time deadlines that accompanied the calls. This system was not however regarded as particularly efficient because as the deadline approached, the amount of time available for the development managers to spend on development of projects naturally became ‘squeezed’.
- 6.14 As a new programme round is developed however, it will be important that such an approach or something with a similar effect is considered further so that the expertise and inputs available from the development managers can be efficiently allocated and their impact, on high quality project applications, maximised.

Appraisal and approval of project applications

- 6.15 The appraisal process instituted for the A4B programme has operated throughout the programme period with adjustments and modifications being made as appropriate.
- 6.16 Key issues relating to the efficiency of the appraisal process fall into two areas:
- The management of the ‘pipeline’ of projects seeking approval.
 - The efficiency of the approval process itself.
- 6.17 In the former case, the management of the ‘pipeline’ of projects seeking approval, the most recent WEFO Project Inspection Visit in January 2015 identified this as area where ‘smoothing out’ peaks and troughs in the flow of projects through the appraisal process should be further considered.
- 6.18 There are already a number of elements where the A4B team have made changes to their operating procedures to cope with sometime significant peaks in the flow of

projects through the appraisal process. For example, the appraisal manager is, more often than not, consulted by the development managers on the eligibility and identification of other appraisal issues that may have been identified as projects are being developed by the academics and institutions. Here, the early warning also allows the appraisal manager to schedule, to some extent, the likely flow of projects through the appraisal process.

- 6.19 The distribution of project applications for review by a range of departments and experts falls to the appraisal manager. These reviewers may range from internal Welsh Government teams to the Patent Office (on IP issues) and the WG Sector teams as relevant. It is noted that the responses and speed of response from these reviewers is variable and time-dependent but that, in general terms, a targeted timescale for the full appraisal process is between six and eight weeks although this may vary (positively and negatively) depending on the peaks and troughs in the pipeline.
- 6.20 In the case of the efficiency of the appraisal process itself, one aspect of the process that has not been significantly changed in the move to an open call application and appraisal process is that, despite there being no specific deadlines for submission of project applications, the assessment panel necessarily meets on a set timetable. Therefore, at the approval end of the pipeline, projects still have to be 'bundled' and submitted in groups. This may cause some projects to be approved in a relatively short timeframe while others, that may have missed an assessment panel meeting, will need to wait much longer.
- 6.21 The nature of the panel process for making appraisals is that there is unlikely to be a simple way of avoiding this aspect although clear communication to project applicants of when projects are scheduled for discussion by the assessment panel or, possibly, an electronic appraisal process for some smaller or less controversial projects could be considered.
- 6.22 A further issue arising from the work of the assessment panel is that there are no 'independent' members on the panel apart from a representative from HEFCW. The assessment panel is appropriately named as such and can only 'advise approval', since it does not have delegated authority or accounting officer responsibilities. However, clearly the views of the panel are the key elements in the decision by the A4B programme managers to approve or decline applications for support. In broadly comparative circumstances, where significant financial support or investment packages are being appraised by government, it would be expected that

a strong degree of external, expert advice would be incorporated in the approval process.

- 6.23 In a future iteration of the A4B programme, it would be advisable the role and extent of responsibilities of the assessment panel is carefully considered and, where appropriate, further developed with a view to engaging further independent expertise in the appraisal.

Validation of project progress and monitoring of claims and payments

- 6.24 The most significant issue identified during the evaluation research relates to the efficiency of the validation and monitoring activities within the A4B programme and, in particular, the extent, timing and handover of project relationships between the development managers and the validation team within the A4B team.
- 6.25 In the best of worlds, as projects are developed and judged by the development manager and appraisal team as likely to proceed, the A4B validation team will be able to consider the project details and advise the development managers on issues around the A4B contractual requirements, monitoring processes and handover arrangements etc. It is understood that this procedure has been adopted in the past but that as the workloads for all concerned has accumulated over a number of years, this is now only rarely achievable.
- 6.26 The validation team therefore becomes engaged typically when the project has been approved and the post approval phase has begun. At this stage, meetings with the institution and the academic partners will be held to explain and agree the contract and to set up progress reporting arrangements and monitoring and financial claim procedures. Following on from this, the validation team will send a representative to attend project steering group meetings as well as maintaining contact and dialogue with the designated project managers and administrators on a day-to-day basis.
- 6.27 The issue arises however when, because of their pre-existing contact and discussions with the academic partners and project managers, the A4B development managers continue to be seen, quite naturally, as contact points within the A4B team. There are clearly occasions when this has and continues to, cause either confusion or duplication in communications and relationships between A4B and the projects although it should be noted that this is by no means inevitable or so frequent as to be an issue in all or even most projects.

- 6.28 However, it is worth considering that, as A4B moves into a future phase of activity, the possibilities of this confusion and/or duplication occurring will continue to arise and may even multiply as relationships from past projects and activities remain in place. To help mitigate this possibility, it should be possible for A4B to instigate a designated case officer role that could be taken up by either a development manager or a member of the validation team as most appropriate so that project managers and academic partners would be clearly directed to the case officer in the first instance for any queries or issues arising from the progress of the project or the contractual relationship with the A4B programme.
- 6.29 While it is not realistic to expect a development manager to be able to answer all questions around the detail of contracts or claims, and it is equally not likely that a case officer drawn from the validation team is likely to be able to pronounce a technology or knowledge transfer issue, that is not the point at issue. Rather, a single case officer point of contact is a concept that the institutions will be familiar with in a range of commercial and even internal contexts and should therefore equally be feasibly understood by them in relation to the A4B programme.
- 6.30 A similar approach could be developed using a periodic (tri-semester or quarterly) institution-level A4B project case review meeting. For each institution this would need to involve each institution's commercial/industrial liaison officers plus the project managers appointed by the institutions for their A4B projects and the relevant A4B development manager and validation team plus all A4B case officers for that institution's A4B projects. This would be similar to the approach taken by the KTP programme at an institutional level.
- 6.31 The ongoing monitoring of projects faced a number of challenges associated with managing the project claims process. While the requirement for projects to submit quarterly claims at set points during the year worked initially, the later increase in project numbers meant that the monitoring team were faced with substantial 'peaks and troughs' in processing claims. This points to a clear area where the efficiency of future monitoring could be improved through greater 'smoothing' of the claims timetable, for example linking claims dates to individual project start dates.

- 6.32 Clarifying definitions of indicators presented additional problems for the monitoring of A4B. Here, the evolving interpretation of key indicator definitions and eligibility made it difficult to both capture data and monitor progress effectively. Indeed in a number of cases subsequent clarifications of indicator definitions meant that data collection for indicators such as 'investment induced' was deemed to be redundant.
- 6.33 Finally, the interface between the A4B monitoring team and project partners was felt to be inefficient in many cases. While the central A4B contact point mechanism simplified communications to a certain degree, it also hindered the ability of the monitoring team to interact directly with project partners. This 'distance' prevented the monitoring team from fully capturing project activity and achievements, and to understand wider issues and needs of the key company partners. While efforts were made throughout the A4B programme to address this weakness the potential to improve the interface with projects is an area where future monitoring efficiency could be improved.

Effectiveness

- 6.34 The aims of the A4B programme are to strengthen and maximise the capabilities of higher (and where appropriate, further) education institutions to support businesses through knowledge transfer, and the commercialisation of research and encouraging the development of innovative technologies (p.4). This includes the focus on building capacity for commercialisation in the higher and further education sectors, and supporting the implementation of knowledge transfer and exploitation activities with business through collaborative projects and networks, with the goal of impacting on the Welsh economy.
- 6.35 In delivering against these goals the A4B programme was intended to contribute towards the cross-cutting themes of equality and diversity, and environmental sustainability practices.
- 6.36 In assessing effectiveness against these aims and objectives the results of the surveys, case studies and indicators point to a range of emerging impacts including:
- **Capabilities to support the knowledge transfer and commercialisation process** – the support of the A4B programme, building on previous ERDF investments (e.g. KEF), and those of partners such as HEFCW have helped institutions to strengthen their links to industry, and increase their applied R&D and knowledge transfer activity. The evaluation findings point to developments in capabilities through providing opportunities to gain experience in knowledge

transfer to business, strengthen ‘track records’ of such work, and in some cases support this capacity with investments in equipment and the reputation of institutional units/departments/research groups. These represent assets that have the potential to be built on in future.

- **Investing in collaborative R&D** – here the evaluation findings point to businesses and institutions using the A4B programme to address strategic R&D&I goals, and to make investment in follow-on collaborative research projects. This was evident in both undertaking A4B projects, but also in the strong levels of investment induced achieved for follow-on and related innovation projects. Such findings highlight the success of the A4B programme in supporting the generation of new knowledge, and the relationships to further exploit it for commercial benefit. This includes a significant contribution of funding by institutions and business partners to A4B projects (£37.8 million), as well as the subsequent leverage of funding for follow-on R&D (£9.5 million).
- **Embedding innovation awareness and attitudes** – alongside the investments made by the institutions and businesses in follow-on collaborative R&D, the results also point towards the development of positive attitudes towards R&D and collaboration with the higher and further education sector partners. In this respect the businesses and institutions reported high levels of satisfaction with the programme, and intention to continue to work with both the programme and with the partners. This, again, was evident in the ongoing collaboration reported amongst partners, whose A4B projects had come to an end. Such attitude and behaviour changes are a key ingredient of so-called behavioural additionality – and an indicator of the lasting potential left by the A4B programme on both businesses and institutions.
- **Developing new products, process and services** – while the indicators point to strong results with respect to registrations of new products, process and services, the case studies and survey results illustrate the medium-to-long-term nature of the RD&I process. In this, A4B projects will often require further development and funding before reaching full commercialisation. This can take both time and funding, particularly, in the difficult economic circumstances that have faced the programme in its earlier stages. This was clearly evidenced in the case studies, which highlighted the iterative and interactive nature of the R&D process, and the success than many projects had in leveraging in subsequent funding.

- **Producing wider multifaceted impacts** – the results of the evaluation indicate the role of the A4B programme in supporting a number of projects that have current and future potential to impact on important economic, societal and environmental challenges. Examples of these wider impacts are illustrated in the case studies, where example include projects addressing health challenges (Ad-Oat CIRP, Patient Specific Medical Products KTC), and renewable energy / reduction of emissions (Accomplish, Green Odour). In this respect the support of A4B is making a contribution to a range of important strategic considerations, beyond those of the immediate ERDF Strategic Framework and Innovation Wales considerations. Other projects, as noted earlier, have the potential to make significant impacts, but much of this will depend on further R&D and commercialisation activity.
- **Building and strengthening collaborative linkages** – here the A4B programme has produced many examples of new collaborations between business and academia, and evidence that these partnerships and networks are continuing beyond the life of the programme. The survey results also indicate that partners are more likely to seek out such links in the future. In this respect the programme is helping both to support new and sustain existing partnerships. This ongoing relationship building is a central feature of the interactive innovation process and one that helps partners to build trust based relationships over time.
- **Producing HE and FE benefits** –the results suggest that the A4B programme is producing multiple benefits for both HE and to a lesser extent FE institutions. For HE partners the A4B programme has helped to build the track record and experience of academics in applied R&D. It has also, in some cases helped academics to secure subsequent jobs within the sector, as well as publications and contributions towards teaching. Reputational benefits are also evident in case studies and are reflected in the intention of businesses to continue collaborating with their HE partners. Benefits for the FE partners are comparatively limited by the difficulties they have faced in actively participating across all programme activities. A number of FE institutions, however, have been able to benefit from ESDF and Strategic funding to identify ideas and put in place a framework to support strong links to business.
- **Contribution to the cross-cutting themes** – the evidence from the evaluation suggests that the programme has faced significant difficulties in fully implementing the business plan activities in support of the cross-cutting themes.

This weakness was recognised in the second half of the programme and resulted in discussions with a specialist partner (Bangor University's cross-cutting themes team). This has not been able to redress the lack of progress in the A4B programme, but has provided the basis for subsequent programmes. The evidence with respect to 'multifaceted impacts' does, however, suggest that the programme is likely to make contributions towards environmental benefits. Much, however, will depend on the commercialisation success of projects such as Accomplish.

- 6.37 The results of this analysis suggests that the A4B programme has been largely effective in addressing its key aims and objectives. In this respect the support has been appropriately targeted in helping institutions to support knowledge transfer and exploitation activities, as well as building lasting capacity.
- 6.38 The results discussed above point to activity and support that would not generally be undertaken in the same size or scale had it not been for A4B. The evidence indicates, however, that many of the projects supported by A4B are long-term in nature and will require support beyond the lifetime of the project if they are to achieve substantial economic impacts. In this respect the role of A4B has, in many cases, been to reduce the risk for companies in undertaking early stage industrial research, develop a better understanding of the potential for new products, processes and services, and to build longer term collaborative partnerships underpinned by trust and reciprocity.
- 6.39 The role of A4B in providing other funding with evidence and confidence to support institutions with further development funding is a further important indicator of effectiveness. These achievements are important in the context where Wales is characterised by comparatively low levels of business R&D activity.

Summary

- 6.40 The results of this analysis suggest that the A4B programme has supported some 255 projects to a budget of £30.5 million (and grant value of £40.6 million). The budget was developed based on evidence collected from earlier activities, and active steps taken to ensure economy in the programme's delivery.
- 6.41 The programme's delivery efficiency has been strongly influenced by external policy and economic context changes. This has required it to evolve its delivery approach over the programme period, and respond to the needs of instructions and emerging lessons. This flexibility has enabled it to learn and implement lessons and evolve

an effective delivery of project funding. Key challenges faced by the programme, and noted by participants, concern the administration and monitoring elements of the programme. These aspects of the programme are shaped by the requirements for European funding. Communication issues have also been raised by participants, with a general desire for future programmes to address these areas.

6.42 Against the aims and objectives set for the A4B programme the evaluation provides evidence that projects are contributing to:

- Capabilities in support of the knowledge transfer and commercialisation process.
- Investing in collaborative R&D.
- Embedding innovation awareness and attitudes.
- Developing new products, processes and services.
- Producing wider multifaceted impacts.
- Building and strengthening collaborative linkages.
- Producing HE and FE benefits.

6.43 At the end of project stage many of the projects supported by the A4B programme have yet to reach full commercialisation. In this respect the economic impacts of the programme are modest (£30.5 million GVA and 586.6 FTE jobs) relative to the programme budget. The focus on building capacity and supporting projects to achieve commercialisation indicates that there is potential for these economic impacts to improve significantly with further monitoring. An indication of this future potential is the ongoing funding secured by partners to continue many projects initially funded by the A4B programme.

6.44 The main weaknesses of the programme relate to its treatment of the cross-cutting themes, and the limited implementation of initial business plan activities. The programme's administration and communication have, by a number of stakeholders been identified as weaknesses, however, there is a general recognition that the Welsh Government has sought to learn lessons.

7. Strategic Added Value

- 7.1 The concept of SAV seeks to identify the effects of the wider co-ordinating, catalytic and influencing role of a project, which is not captured in the outputs of direct project support.
- 7.2 The key aspects of SAV primarily applies to the work of regional economic development agencies, and can be summarised as²³:
- **Strategic leadership and catalyst:** Articulating and communicating regional development needs, opportunities and solutions to partners and stakeholders in the region and elsewhere.
 - **Strategic influence:** Carrying out or stimulating activity that defines the distinctive roles of partners, gets them to commit to shared strategic objectives and to behave and allocate their funds accordingly.
 - **Leverage:** Providing financial and other incentives to mobilise partner and stakeholder resources – equipment, people as well as funding.
 - **Synergy:** Using organisational capacity, knowledge and expertise to improve information exchange and knowledge transfer and coordination and/or integration of the design and delivery of interventions between partners.
 - **Engagement:** Setting up the mechanisms and incentives for more effective and deliberative engagement of stakeholders in the design and delivery of regional and sub-regional priorities and programmes.
- 7.3 The A4B programme arguably plays a strong role in helping to addressing and supporting each of the main categories of SAV. Its main role is one of catalysing knowledge transfer and exploitation activity in Wales, helping to support the activities and wider agenda of key organisations such as HEFCW and Finance Wales (in addition to giving expression to the Welsh Government’s own strategies for Science and Innovation).
- 7.4 For much of the A4B programme period a ‘dual funding’ approach has been in place with HEFCW’s Innovation and Engagement fund for knowledge transfer and exploitation infrastructure operating alongside A4B’s largely ‘project’ funding. The Innovation and Engagement fund is designed ‘to stimulate and direct the application and exploitation of knowledge to the benefit of social, cultural and economic

²³ DTI (2006) ‘Evaluating the impact of England’s Regional Development Agencies: Developing a Methodology and Evaluation Framework’. Available from: <http://www.berr.gov.uk/files/file21900.pdf>

development of our society’.²⁴ The Fund allocates funding to Wales’ higher education institutions through a combination of ‘formula’ and competitive bidding. HEFCW were a member of the A4B assessment panel, helping to ensure synergies between the two organisations. The future synergies between Welsh Government’s A4B-type funding and HEFCW, however, are likely to change, given the decline of Innovation and Engagement Funding.

- 7.5 In the later stages of the programme, as discussed in section 2.3, the programme has also contributed towards the priorities established by the Science for Wales strategy. This resulted in it adopting a more strategic focus to KEP funding, to support the development of the National Research Networks associated with the Grand Challenge areas.
- 7.6 Finance Wales’s Early Stage Development support is a further area of potential synergy, which has operated during the life of the A4B programme. This invests in technology-led businesses with potential to become market leaders, and has provided investment in a number of university spinouts through follow-on funding. Finance Wales were also represented on the A4B panel, for the initial part of the programme, providing opportunities for interaction.
- 7.7 Other areas of synergy include the Welsh Government’s Business Innovation Support Programme (BIP) and the SMARTCymru programme. This provided support for business R&D and innovation, including access to advice (via the BIP Innovation Specialists), as well as funding from SMARTCymru (for business to undertake R&D) and Innovation Voucher (for businesses to access expertise from higher and further education specialists). While the A4B team indicated that there were relatively few follow-on projects such as SMARTCymru there is significant potential for any new programmes to facilitate strong synergies.
- 7.8 The integrated nature of the A4B Programme provides the opportunity for a strong level of leverage of funding from a range of complementary UK and European strands including:
- 7.9 Innovate UK’s funding for activity such as Knowledge Transfer Networks, Collaborative Research and Development, Knowledge Transfer Partnerships and so on. Innovate UK shares a similar focus to A4B, however, its projects are business-led and typically larger in size than many A4B projects.

²⁴ HEFCW (2011) Innovation and Engagement Funding Arrangements 2011/12 to 2013/14.
http://www.hefcw.ac.uk/documents/publications/circulars/circulars_2011/W11%2010HE%20Innovation%20and%20Engagement%20funding%20arrangements%202011_12%20to%202013_14.pdf

- 7.10 Outside the UK synergy is also evident with European funding sources, notably EU Framework Funds for Research and Technological Development (Horizon 2020). This provides funding to organisations such as university research groups, companies intending to innovate, SMEs and researchers. It provides support and funding in a number of technology themes and areas with the main focus around the development of collaborative R&D and innovation.

Summary

- 7.11 The preceding section suggests that the A4B programme has produced a high level of Strategic Added Value in Wales, principally in the areas of promoting synergies between, and engagement with, a range of complementary activity. This has seen the programme work closely with key organisations in a targeted manner to increase the overall level of support, and complementary of funding vehicles available to knowledge transfer and exploitation activity in Wales, while reducing the potential for overlap.

8. Conclusions and Recommendations

- 8.1 This section provides a summary of the end of programme evaluation conclusions and lessons for the A4B programme. The evaluation findings reported are based on analysis of project documentation, interviews/workshops with the management and delivery team, and fieldwork with institutions, academics and business beneficiaries.
- 8.2 The results of this analysis suggest that the project was established with a **sound programme logic model**, based on an identified need, clear objectives and support focused on capacity building for HE and FE knowledge transfer and exploitation (KECD), and collaborative R&D and applied research / knowledge transfer activity (KTCIR). This logic model was based on both building sustainable access to specialist knowledge and research in the HE and FE sector through a range of tailored support mechanisms, delivered in an integrated manner by a central A4B team.
- 8.3 The **programme supported some 255 projects** (KECD – 161 and KTCIR – 94), providing grant funding of £40.6 million. KTC and CIRP projects accounted for the largest proportion of projects (by size). All HE and nine FE institutions in Wales received funding from A4B, although HEIs accounted for the vast majority of projects funded (86%). In sectoral terms advanced material and manufacturing, and life sciences business sectors accounted for more than half of all projects supported.
- 8.4 At the end of programme stage the programme has helped to generate **reasonably strong outputs against its core target indicators** with strongest performance found in relation to innovation-related outputs: collaborative R&D activities, products, processes and services registered and launched, spinout formation. Both projects, however, are below many of their agreed targets. This is particularly evident in the KECD project, where core economic impacts such as jobs created are substantially below target. Perhaps the most successful performance against target is in relation to investment induced as a result of A4B. This has achieved more than £20 million in follow-on funding, and points to A4B supporting further R&D activity, and reducing the risk for subsequent investors and funders. Output indicators for the cross-cutting themes are similarly below the target. However, the project is currently in discussion with WEFO to revise these targets to zero.

- 8.5 The programme's output indicators provide only part of the picture when assessing effectiveness against objectives. The results of the fieldwork suggest that the **A4B programme has begun to address its overall objectives** in a number of areas. This has included providing important support for HE and FE to strengthen their *innovation and engagement capabilities* to support industry (large and small) through new infrastructure and expertise. These represent assets which have the potential to be built on in future. The programme has also supported *collaborative R&D activity*, helping companies to address strategic RD&I goals. In doing so a particular strength of the programme has been its role in helping companies to induce further R&D activity (£9.5 million). The developments have been accompanied by companies building on their expertise, and embedding their understanding and *attitudes towards RD&I*.
- 8.6 The findings, as indicated by the outputs data, point to role of A4B in helping industry to develop new products, processes and services, and new spin-out enterprises. They also suggest that many of the products, processes and services supported by the programme have yet to be fully commercialised. This has resulted in further ongoing development activity, with A4B helping partners to lever further funds from a range of external sources. These results explain the limited achievements against the project's core economic targets, such as jobs created. The findings also indicate that while project partners are seeking to ensure the future availability of projects and services established with A4B funding, much will depend on the availability of future funding, including a successor to A4B. Indeed, many activities such as KTCs are unlikely to be 100% funded through core HE or FE budgets.
- 8.7 A range of so-called 'unexpected' benefits have also been achieved from the A4B programme, with evidence of it helping academics to develop publications, experience of working with industry/career development, as well as potential contribution towards the emerging research impact agenda (REF).
- 8.8 The results of the survey and case studies indicate the role of A4B in producing both actual and potential **economic, innovation and environmental impacts**. This includes supporting projects that address a range of key challenges in areas such as health and environmental sustainability. This support for environmental projects represents a key contribution towards the cross-cutting themes, and represents an important outcome anticipated in the business plan. The programme's impacts, however, are partly dependent on the ability of the institutions to sustain the

collaborative R&D and commercialisation capacity (including the business partnerships, centres and so on), and for the results of the project activity supported by the programme to be successfully commercialised. These areas represent long-term processes, and highlight the likelihood that many outcomes will occur after the formal end of the programme.

- 8.9 At the end of the programme, however, the following economic impacts can be identified:
- £30.5 million net additional GVA.
 - 586 net additional FTE jobs.
- 8.10 The programme was delivered to a budget of £30.5m (December 2014). This figure is substantially below the original budget and follows the financial decommitment, resulting in an £18 million reduction in overall budget (for the European projects). The results of the analysis suggest that the A4B programme has followed appropriate steps to ensure **programme economy**.
- 8.11 It was **delivered in a relatively efficient manner** in light of the substantial challenges faced in centrally managing what were previously separate projects. It has also had to respond to substantial context changes in policy (the ERP, Science for Wales and Innovation Wales) all of which required it to adapt its activities and restructure its delivery approach. The first part of the programme was also delivered in the context of a wider economic downturn. Despite these challenges, the project team were given the opportunity to reshape the programme in light of demand and needs. The A4B delivery process has continued to evolve and adapt to changing circumstances. Key challenges faced by the programme, and noted by participants, concern the administration and monitoring elements of the programme. These aspects of the programme are generally recognised as being shaped by the requirements for European funding. Communication issues have also been raised by participants, with a general desire for future programmes to address these areas.
- 8.12 The A4B delivery process has continued to evolve and adapt to changing circumstances. The evaluation research and, in particular the discussions with both A4B staff and partners of the A4B programme, identified areas where the overall efficiency of the delivery process should be considered, including balancing the need for flexibility in calls for proposals and the efficient allocation of A4B development manager resources, the composition of assessment panel, and the format of project contacts and structures of review meetings.

8.13 The **sustainability of the A4B programme** is currently subject to an application for ERDF funding (Priority 1). The view of the stakeholders interviewed / surveyed as part of this evaluation, however, suggest there is a clear and ongoing demand for A4B-type funding in Wales' HE and FE institutions, and businesses. In this respect the support provided by the programme was felt to be central to provide knowledge transfer and exploitation activity in Wales. Sustainability of the projects funded by the programme is less certain, and will also depend on its success in attracting funding.

8.14 Many stakeholders recognise that the Welsh Government intend to target future support on a smaller number of centres and projects. This is in line with the targeting approach identified in Innovation Wales' (smart specialisation).

8.15 The key **recommendations** for future programme activity in the area of knowledge transfer and exploitation are set out below:

Recommendation 1: Welsh Government should continue to fund knowledge exploitation and knowledge transfer activity with a strong focus on collaborative R&D.

8.16 The research findings indicate that without A4B-type funding much knowledge exploitation and knowledge transfer activity would not take place. This is due to the lack of other forms of funding, and the inherent 'risky' nature of the R&D process. The evidence suggests that collaborative R&D projects and knowledge transfer centre activity are areas which have the potential to produce greatest impacts. Here the potential for innovative models of funding such as the Fraunhofer-type model (1/3rd industry, 1/3rd government and 1/3 competitive funding) may provide a mechanism to target future funding on key areas of expertise, existing capabilities, and societal challenges should also be considered.

Recommendation 2: Welsh Government should balance the needs of larger and smaller HE/FE institutions in Wales when designing future funding programmes for knowledge transfer and exploitation.

8.17 Here, the findings indicate differing capacity and delivery needs of smaller and larger institutions, and HE and FE institutions in Wales. Institutions, on balance, value the less restrictive approach to project funding, in which project applications can be developed to meet both the overall objectives of the programme, and can be shaped to maximise outcomes. It will be important that a balance is sought, however, between an open and restrictive approach, and ensuring that more

defined funding formats (e.g. strands or sub-projects) are used to address challenges faced in engaging smaller institutions (FE and HE). This should consider the potential for FE institutions to support SMEs with current technologies. Likewise consideration should also be given to supporting large firms, SMEs and start-up businesses to develop future technologies.

Recommendation 3: Welsh Government should continue to develop strong working relationships with Wales' HE and FE institutions, underpinned by robust communication mechanisms.

- 8.18 Here, communications between Welsh Government and the institutions have, on occasions, been challenging with reports of multiple contacts and contact points in both HE and Welsh Government, leading to 'mixed messages'. These instances are, in part, linked to the centralised structure of the programme, and the multiple level of Welsh Government contacts required to deliver a project. In future Welsh Government should examine the potential for a designated case officer role (either a development or validation team member) to allow for project managers and academic partners to be clearly directed on key issues and queries. It should also consider the introduction of periodic institution-level A4B project case review meetings involving the commercial/industrial liaison officers, plus project managers appointed by the institutions and the relevant A4B development / validation team members, and A4B case officers for the institution.

Recommendation 4: Stronger synergies between the support programmes of the Welsh Government's Innovation team should be established.

- 8.19 While the A4B programme has arguably produced a strong level of strategic added value, with its integrated approach and alignment with other strategic priorities (Innovation, Science and so on) and support (e.g. HEFCW), there is significant potential for it to encourage delivery synergies between its core innovation programmes for business R&D and knowledge transfer. This should ensure that there is potential for providing 'follow-on' funding routes and maximising the potential for commercialisation outputs to be achieved from business innovation and collaborative innovation projects.

Recommendation 5: Project appraisal should introduce a greater degree of independence.

- 8.20 The appraisal of projects through an assessment panel helps to bring together a range of expertise and perspectives to advise on funding decisions. While HEFCW

represented the main ‘independent’ panel member in the life of the programme, it would be beneficial to add to this independent membership, particularly where there is likely to be significant financial support or investment packages to be approved.

Recommendation 6: Future projects should ensure a greater focus on smoothing out the flow of new project applications.

8.21 Here the appraisal process employed by A4B faced substantial challenges to manage and respond to the flow of projects. Efforts have been made throughout A4B to improve the efficiency of this process (e.g. greater ‘early warning’ from development managers). It will be important that any future programmes examine ways to further improve this process through clearer communication with project applicants on when projects are due for discussion by the panel, or the use of an electronic appraisal process for smaller projects.

8.22 Minimising the peaks (or bottlenecks) in applications should also help to stretch resources in the development team. In this respect consideration should also be given to setting specific numbers of development manager hours or days for individual projects.

Recommendation 7: Communication should be underpinned by modern monitoring technologies and systems.

8.23 The IPM system employed to collect monitoring data lacks the functionality associated with more modern systems, including limited flexibility and difficulties in flexible data extraction. Both HE and FE institutions view the IPM system as being ‘out of date’. Addressing this will help to improve the overall delivery efficiency of future programmes (and contribute to recommendation 3).

Recommendation 8: Future programme monitoring should be structured to ensure efficient claims processing and collection of data.

8.24 Monitoring is a particular challenge for a large, integrated, programme such as A4B. In the course of the programme the A4B team experienced substantial challenges in managing the claims process effectively, with substantial peaks and troughs associated with fixed claims dates. In this respect consideration should be given to setting claims dates in relation to actual project start dates.

8.25 Improving the monitoring interface with key project partners is a further area where efficiency could be improved, and will help to better understand project activity and achievement. This is likely to benefit from establishing a direct monitoring interface with project partnerships in future. Other efficiency areas include the early

clarification of indicators and eligibility. This will help to ensure clarity with project partners, and the avoidance of redundant data collection.

Recommendation 9: Future innovation programmes should primarily address the cross-cutting themes through their support for innovative projects in the area of environmental sustainability and equality and diversity products, processes and services.

- 8.26 The findings from the evaluation indicate that the programme has faced difficulties in addressing the cross cutting themes objectives and targets for raising awareness via the institutions' and signposting businesses to support. They do, however, illustrate how the primary activity of the programme – development of new products, processes and services – has contributed to key areas such as renewable energy and reduction of emissions, and social processes. In this respect the focus of some projects on addressing societal grand challenges indicates a way in which future programmes can be structured to support the cross-cutting themes.

Annex 1: Methodology

The final evaluation of the A4B programme was based on a series of methodological stages. These stages were designed to review the management and delivery process, outputs and results, initial and projected impacts, and value for money.

Management and delivery review

The review of management and delivery was based on interviews and discussions with key A4B staff, including:

- Phil Allen, Head of Knowledge Transfer and Commercialisation.
- Tony Guile, Head of A4B.
- Terry Stubbs, A4B Development Manager (South West).
- Julie Cunnington-Hill, A4B Development Manager (South East).
- Sam Williams, A4B Development Manager (North).
- Eleri Jones, Operations Manager.

In addition a facilitated workshop was carried out with A4B appraisal, monitoring and finance staff (13th May 2015).

Monitoring data analysis

Monitored data collected by the Welsh Government and reported to WEFO was reviewed to identify performance achievements. This included the project delivery outputs/results data; achievements of cross cutting themes, as well as project expenditure and income data. The monitoring data was used to understand and analyse the performance and profile of project activities, as well as the achievements against the forecasted targets.

Economic impact calculations

The economic impact method draws on good practice guidance provided by a range of EU, UK and Welsh organisations²⁵. The method employed is listed below is designed to calculate:

- Current benefits (those achieved at the end point of the A4B programme).
- Future potential impacts (the likely future annual impact).

These economic impact calculations are based on jobs created and safeguarded by the A4B programme, and the resulting GVA generated. GVA is a composite measure and is

²⁵ BIS (2009) practical guide <http://www.bis.gov.uk/assets/biscore/economics-and-statistics/docs/09-1560-rda-evaluation-practical-guidance-appendix1>
Toolkit for the Evaluation of EMDA Strategic Programmes 2007/08-2009/10
http://irep.ntu.ac.uk/R/T88A44L4PXUNXK656Q6JAAY6X6SBR4V8DKH2SI9EXB22YYFIKL-00862?func=collections&collection_id=1301

considered to be the primary indicator of sub-national economic performance in the UK. The table below provides further details.

For research, development and innovation programmes, however, this indicator should not be treated in isolation, and should be viewed alongside the research, development and innovation impacts generated.

Table 0.1: Technical Note on Key Aspects of the Net Impact Methodology

Aspect	Approach
Employment Impacts	Companies provide their job creation impacts to the A4B team (jobs created and safeguarded). These figures have been used
Additionality	Survey respondents were asked about the degree to which the impact would have happened anyway. From these answers an assessment was undertaken on the indicative level and type of additionality from pure additionality (where none of the impacts would have occurred) to scale and time additionality (they would have occurred at a smaller scale or later date) or instances where no impacts would have occurred at all. The answers were converted to an appropriate additionality factor and applied to each project.
Persistence	Survey respondents were probed about the lengths of attributable future employment benefits in future years (those that said more than five years were capped at 5 years).
Displacement	Using English Partnership Guidance the displacement effects were calculated using intelligence from the survey about the perceived degree to which other firms or demand might be affected elsewhere in Wales. The displacement effects were generally found to be low.
Substitution	The substitution effects were assumed to be low (at 25%).
Leakage	Using English Partnership Guidance the leakage effects were assumed to be low (at 10%).
Multiplier	Again using English Partnership Guidance we calculated a supply chain multiplier. This was assumed to be medium (generating a multiplier of 1.5). Whilst other adjustments are taken away from the gross estimates, multipliers are the only adjustments generating additional impacts.
GVA	GVA per employee has been calculated using regional level BRES data and Regional Gross Value Added NUTS1 ONS data for Wales for high tech industries.

Annex 2: Case studies

Case study 1: Swansea University: Development of responsive control system for artificial lung.

Title of project: Development of responsive control system for artificial lung

Project reference: HE 09 COL 1029

Project type: CIRP

Lead Institution: Swansea University

Company partner(s): Haemair Ltd

Project period: July 2010 – April 2013

Academic contact(s): Dr Michael Lewis



Overview of the project

The objective of the A4B Collaborative Industrial Research Project was to develop a prototype small-scale respiratory aid and scalable automated respiratory control systems to regulate blood oxygen and carbon dioxide levels to meet rapidly changing metabolic requirements. These small-scale respiratory aids would facilitate in-vitro control system tests and, ultimately, the development of external respiratory aids that supplement residual lung function in mobile patients.

Lung disease is a major cause of premature death, and with 4 million people dying worldwide from it every year, future development of this equipment is crucial. The project was therefore seen as being strategically important and providing the potential for significant health benefits for patients, as well as efficiency savings for healthcare providers.

Partners and Roles

The industry collaboration partners, Haemair and its subsidiary company, Haemaflow were, respectively, developing respiratory aids capable of supporting ambulatory activity and developing micro-sensors suitable for measuring rapidly changing parameters within blood.

Haemair Ltd is a small R&D company that, in 2006, decided to move its operations to Swansea to be closer to Swansea University where there is a specialist expertise in the

area of blood rheology and clotting - essential for any device that contacts directly with the blood flow .

Haemair Ltd was to produce a device to entirely replace lung function. This is intended to provide for a higher recovery rate from Acute Respiratory Infection, and the reduction of lung damage for those who do recover, permitting chronic sufferers to conduct active lives. It also has the potential to act as a bridge to lung transplants, by giving healthier patients the chance of better recovery prospects. In the long run, the company aims to provide a full alternative to lung transplants.

Haemair Ltd owns patented technology for a Blood/Air Mass Exchanger to be used as either a prosthetic (artificial) lung, or as an external respiratory aid. The patents also include the control mechanisms for the device as well.

Prior collaborative links

Haemair and the University and the Abertawe Bro Morgannwg University NHS Board have also been awarded a Health Technology Devices (HTD) grant through funding made available by the National Institute of Health Research (NIHR).

Haemair also benefitted from a WG SMARTCymru award in 2006-2008.

Research / support delivered

A Collaborative Industrial Research Project with Swansea University and Haemair Ltd received support from the A4B programme.

This had the overall of producing a mobile device to act as an artificial lung. The University helped the company to create a prototype that aims to act like a natural lung. This device was intended to act like 'a service area' with oxygen is passed through tiny permeable fibre hairs in the device into the blood. As part of this process blood is taken out of the patient first to allow more oxygenated blood to build up again and then a few days later they put the blood back into the body after having oxygenated it.

The University also assisted in helping to test the theory behind the prototype. This made use of volunteers from the Sports Science department at Swansea University for experiments looking into how the oxygenated blood reacted when put under strain during exercise. The results were used to try and understand the research behind underlying blood clotting issues.

Satisfaction with support received

Haemair Ltd described itself as being extremely satisfied with the support they received from the University and A4B programme, and were left with a lasting positive attitude towards working on future projects with universities. More specifically they were very satisfied with the quality of the support, suitability of the support for their company, quality of the research and support from the university, and the outcomes of the project.

Follow-on R&D / commercialisation activities

The company believe that Great Ormond Street are very interested in the device after the NHS has provided grants to cover the additional research surrounding the device. They have also established a long-term collaborative relationship with the University of Swansea, and anticipate that developments will continue on in the coming years, as well as working with any other Universities that were to offer their services to them.

There are three immediate strands to their ongoing development programme:

- The device must achieve design mass transfer rates from oxygen and carbon dioxide. Mass transfer targets sufficient to support life have been achieved.
- The materials and design must show adequate biocompatibility. The initial version of the device is being constructed of materials already shown to have acceptable biocompatibility.
- The device must be fully integrated with the natural mammalian respiratory control mechanism.

Results and Impacts

The company anticipate significant economic benefits from the commercial launch of their product in future. Following the award of a £1.2 million grant from Innovate UK they are now seeking a matching investment of £800,000 to take the prototype device into full scale production by 2017.

As the company are still in the prototype and testing stages no new products, processes or services have yet to result from A4B projects. However the company estimates that the A4B programme is responsible for the company creating 8 jobs and safeguarding 4 jobs. The company also revealed that in the future they aim to employ 20+ manufacturing staff, on long term contracts, to help them with the distribution of the device, rather than employing additional research staff members which is what they currently have.

Approving any product involved in medical enhancements is, however, a long term process, involving regulatory approval at various experimental stages including human trials. These will need to be undertaken in full before the product can be introduced commercially.

Additionality Considerations

The company believe that without the help of the A4B programme these impacts would not have occurred, suggesting a high level of additionality.

Lessons

In terms of lessons and areas for development, the company stated that match funding is a challenge associated with all government schemes. They also said that government programmes such as A4B can't truly value the time that people are putting into the projects, and that commercial rates need to be fairly valued in terms of wages.

IP results

The results were extremely positive for this product and are treated as commercially confidential at this stage

Case study 2: Aberystwyth University: Added Value from oats

Title of project: Added Value from oats (AD-OAT) project (16 1001) and High value compounds for the fractionation of oats (COL 1007)

Project reference: Aber HE 11 16 1001 and Aber HE 11 COL 1007

Project type: CIRP & 16

Lead Institution: Aberystwyth University

Company partner(s): Oat Services Ltd & Phytatec UK Ltd

Period: August 2009 – September 2014.

Academic contact: Dr Sandy Cowan.



Phytatec (UK) Ltd

Overview of the A4B project

This project sought to develop advanced oat ingredients to use in the cosmetic and food industry.

The project comprised two individual projects – a CIRP and follow-on project - focusing on making oats more economically viable, by maximising the value from all aspects of oat processing including the hull which is traditionally removed. In particular, the A4B funding enabled the partners to explore the potential for removing the hull more effectively.

The work of the partners subsequently resulted in the development of a new product for the chicken feed industry. The results also suggest that the new feed has the potential to produce significant health benefits with respect to reductions in the potential for chickens to carry the campylobacter virus. This has become a critical food safety issue, resulting in a high number of food poisoning cases, associated with the preparation of raw chicken, and one that the supermarkets are giving a high priority.

Partners and Roles

The project was led by a team Aberystwyth University's Public Good Plant Breed unit.

This unit has a long track record in oat-related research, including the development of many oats breeds currently in use today.

As a CIRP the project also included a range of commercial partners including Oat Services and Phytatec (UK).

Prior collaborative links

The companies involved in the project already had collaborative links with the university, developed over a number of years. This included prior work on the DEFRA-funded OATLINK project.

Research / support delivered

The project supported the development of high value compounds for the fractionation of oats for the agricultural sectors in Wales. It did so by drawing together Aberystwyth University's expertise in new oat variations, working with supply chain partners in developing new oat crop variations.

Satisfaction with support received

The company partners were generally satisfied with the support provided to the project by the A4B programme.

For example, Oat Services Ltd indicated that, given the risks, they would have been unlikely to have sought to commercialise a project in this area without A4B support and described the role of the University as helping to 'bridge science with an opportunity'.

Phytatec UK Ltd were similarly satisfied with the quality of the research and support they received from the University. However, the company also felt that such projects could benefit from greater commercial focus.

Follow-on R&D / commercialisation activities

The company partners reported good levels of synergy with the other partners involved, and intends to continue collaborating in future.

To this end the project partners are due to meet in May 2015 to discuss the next step in bringing the product to market. Regulatory limits are perceived to be the primary challenge with respect to achieving the full commercial benefits. Consideration is being given to a possible Innovate UK project, with similar partners, focusing on the animal feed potential.

Results and Impacts

The project has enabled the partners to develop a novel concept, with the potential to address important health challenges and gain commercial benefits. The results of the process require further development and approval before it can be launched commercially.

There is also potential for a natural preservative to be developed from the research. These opportunities will require further development and are therefore pre-market in nature.

The project has also produced benefits for the HE partner, with forthcoming publications planned, and IP (plant breeding rights) registered. A number of jobs (potentially 5) are likely to be safeguarded as a result of the project.

Additionality Considerations

The commercial partners indicated that they would not have sought to develop the product, without the support of A4B. This suggests that the project carries a high degree of additionality.

Lessons

The collaborative nature of the project was said to work extremely well, linking the university experts to a range of supply chain partners, with common objectives.

The main lesson from Phytatec's perspective was that there is a need to develop 'tighter' IP agreements at the start of any future project, to ensure equitable sharing of project results.

IP results

None to date, however, new plant breeding rights are anticipated in future.

Case study 3: Bangor University: Up-grading of Welsh Timber to Fulfil Future Market Potentials

Title of project: Upgrading of Welsh timber to fulfil future market potentials

Project reference: HE 06 COL 1023

Project type: CIRP

Lead Institution: Bangor University

Company partner: Numerous

Project period: 01/11/12 - 31/12/14

Academic contact: n/a

Overview of the project

The A4B Collaborative Industrial Research Project drew together nine timber users and associated companies to work with Bangor University in product development.

Thermal modification of wood is gaining widespread acceptance in Europe, and a unique thermal treatment system developed in Wales demonstrated great potential for production of an attractive, joinery quality, high value timber based on softwoods such as Western hemlock, which are rarely sought for commercial production. The opportunity to add value to these timbers would support the forestry sector in Wales, but also the UK wood processing industry with a novel and competitive product which will excite architects and designers.

The strategic aim was to develop these modified timbers for use in high value joinery timber and other value added markets; and as such to understand issues such as machinability, jointing and adhesion which may affect operating procedures within the joinery workshop of future customers; and to engage Welsh companies in using the novel timber and understanding the benefits of modified wood.

One of the key aims was to engage carpenters, joinery manufactures and furniture makers to test and feedback on the thermally modified timber produced by two of the project partners.

Research / support delivered

During the project, laboratory and pilot scale experiments were conducted to investigate a range of timbers, from which larch and western hemlock were selected for thermal treatment, and birch was selected for resin treatment. Subsequent dissemination and market development activities demonstrated tangible interest in this treated timber.

The product development and monitoring of process parameters to optimise and ensure quality was supported by the University. In addition, quality of products was by testing, and all aspects relating to future use within joinery, cladding or other applications were monitored by feedback from SMEs using the timber, and from laboratory tests.

Partners and roles

To achieve these objectives, a consortium was built which ranged from raw materials suppliers, timber merchants, companies with experience in treating timber, and small businesses engaged in practical woodworking and joinery. The development of a supply chain to support future product stability in the market was considered an essential aspect of the project from the outset, and the breadth of expertise and complementary roles within the timber market and associated industries was carefully balanced.

- Coed Cymru: This company had prior experience in thermal modification and data and took a lead role in supply chain development, especially the Welsh forestry and sawmilling sectors. Their interest within this project was: establishing the enhanced machinability as a benefit in low-temperature modified wood; driving the technology forwards to support enterprises which invested in kilns as a result of the initial study; and creation of opportunities for increased use of Welsh grown timbers to support the forest and timber industry in Wales. Their extensive contacts within the Welsh forest sector are essential to the supply chain development aspect of the project (WP5).
- Coed Môn: prior experience of thermal treatment. Coed Môn have a full size thermal treatment kiln but required some advice and guidance to ensure safe and reliable operation. Their aim was to produce thermally treated timber from locally grown wood, which can be used within their workshop or sold. Ideally this would be full commercial production of a reliable high quality product.
- Kitchen and Bathroom Studio: a small business who use timber in challenging interior environments. Both kitchens and bathrooms are exposed to fluctuations in humidity and temperature on a daily basis. This is an ideal test bed for modified wood, where dimensional stability is enhanced, making it likely to perform well. As a result they were engaged in the project for their potential to provide insight into the requirements of a modified wood product in these applications. Design and aesthetic aspects are essential to KBS's customer base, and the opportunity to find a high quality, highly stable timber which machines well was an attractive prospect to the company.

- Menter Môn: is the sister company of Annog cyf, which owns Coed Môn. There was a keen interest in the success of thermal modification at the Coed Môn site, and the potential to develop commercial products to boost economic growth and sustainable employment on Anglesey. Through Menter Môn the Coed Môn product is likely to achieve the branding and marketing support that it needs. By working with project partners, the product is likely to be better understood and better represented to the potential customer base.
- Momentive Specialty: has experience in the field of wood modification using resin systems. The suitability of Welsh timbers such as poplar, birch, beech and sycamore is previously unknown. Momentive has a large resin manufacture facility in South Wales, and the development of a system which could be used to treat timber a short distance from the production site in conjunction with BSW was a key driver in the project development.
- Vintage Joinery: manufacture a wide range of high quality interior and exterior joinery products. Their window and door production has led to previous collaborations with Coed Cymru. Their workshop and paintshop are sophisticated and coupled with the desire to manufacture a high quality product led to their inclusion in the consortium to evaluate the modified timbers, offer comments on the practical and aesthetic aspects of the timber, especially within the window joinery context.
- Vistacraft: website the company produces a fully demountable, portable shelter system based upon eco design principles (known as The Caban). This is an Eco Cabin that is modular, versatile and underpinned by the desire to “tread lightly on the land”. The Eco Cabin utilises various timber components to form a moveable structure with low environmental impact. The potential of modified wood to perform in this exterior joinery application, whether structural or non-structural, made the feedback from this company an interesting complement to the other SME wood users within the project. Support for the project in the preparation and painting of treated timber samples and feedback on aesthetic and structural aspects brought useful insights.

Non Welsh engagement was also achieved in the consortium membership of **Arnold Laver (Sheffield, South Yorkshire)**: one of the main traditional timber merchants in the UK and have a strong interest in new developments within the market. With their high turnover and strong position in the sector, their expertise provides a very useful bridge as the products move from the small production scale to more commercial production.

Prior collaborative links

Coed Cymru pioneered thermal treatment of Welsh hardwoods in conjunction with Bangor University in the past; there were also links through the WISE project with Coed Môn.

Satisfaction with support received

From a University perspective there was a high degree of satisfaction with the support on offer; with opportunities to link to other projects encouraged and facilitated. There was proactive involvement from the industrial partners, but this was balanced with a culture of empowerment from the A4B team in Welsh Government; allowing the University and its partners to get on with the job.

Results and impacts

At least three of the partner companies were able to report on results and impacts from the project. For example, Coed Cymru reported that the project allowed them to demonstrate large scale production of thermally treated timber, while Kitchen and Bathroom Studio were pleased that the project has meant that timber has been shown suitable for many interior joinery applications while the testing of the timber in kitchen units is under way.

Finally, Coed Môn were satisfied that full scale up was achieved and they were able to achieve many improvements to increase product quality and uniformity. Culturally, Coed Môn felt that the project has helped them grow in confidence from being a dependent workshop running at a low level, to a high confidence independent operation with significantly upscaled capacity. It has also led to one member of the team setting up in business.

From the university's perspective the project helped with establishing connections to its specialist knowledge of the heat treatment process to a point of being able to commercially produce a good standard of product. On the basis of this work, it has successfully applied for an Innovate UK grant to provide further market research into the home grown cladding potential sector.

Additionality considerations

Essentially it would not have gone ahead at all. It took a significant amount of time to get the green light for the project, but without it there would have been no tangible partnership between industry and the University in relation to this project.

Lessons

The business model, for example scale of production of the thermally modified wood, requires consideration, and potentially investment in increased capacity to establish a presence in the UK timber market

IP results

Too early to be assessed

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Case Study 4: Swansea University: ACCOMPLISH - Algal carbon capture and biomass production linked supply chain

Title of project: Algal Carbon Capture and Biomass Production Linked Supply Chain

(ACCOMPLISH) & Alga Biotechnology for Advanced Bio-Products

Project reference: Swan HE 09 COL 1037 / Swan HE 09 16 1004

Project type: CIRP / 16

Lead Institution: Swansea University

Company partner(s): TATA Steel Strip Products Ltd, Dŵr Cymru Welsh Water, and Axiom Process Ltd

Project period: 2011-2014

Academic contact(s): Alex Keay (CSAR Operational Manager) and Prof Geoff Parfit
Director of CSA



Overview of the project

ACCOMPLISH was a 3.5 year project (2011-2014) supported by A4B and led by Swansea University referred to as the Algal Carbon Capture and Biomass Production Linked Supply Chain (CIRP) project.

The global biomass market is in its infancy but is rapidly developing in line with the increasing need for environmentally friendly forms of waste remediation as a result of a growing population and increased consumption by developing countries. This project looked at ways of addressing these challenges with a goal to valorise wastes using microalgae, creating a supply chain between waste emitters, algal processing and a final useful algal product.

The specific ACCOMPLISH project objectives were to:

- Build and deploy a mobile algal growth laboratory
- Develop and evaluate methods for microalgal-based flue gas CO₂ capture at TATA Steel Strip Products Ltd
- Concentrate algal biomass using technologies developed by Axiom Process Ltd

- Create sustainable carbon neutral biomass feedstock for bioenergy production via Anaerobic Digestion process at Dwr Cymru

Research / support delivered

The project established a bespoke algal growth laboratory at the TATA Steel industrial site in order to establish an integrated waste to biomass to bioenergy value chain. This was intended to improve the environmental performance of TATA Steel and Dŵr Cymru in addition to providing market diversification in filtration technologies for Axium.

Partners and Roles

All of the ACCOMPLISH industrial partners, including TATA Steel Strip Products Ltd, Dŵr Cymru and Axium Process Ltd have participated in numerous A4B projects - with involvements in seventeen, ten, and seven projects respectively.

The three industrial partners also collaborated with Swansea University in another A4B project - the Algal Biotechnology for Wales KTC - which aimed to provide applied research and development for a broad spectrum of enterprises across Wales. The KTC is part of Swansea University's Centre for Sustainable Aquaculture Research (CSAR) and supports companies with new product, process and service development; access to demonstration and training facilities; information on biotechnology funding opportunities and policy/strategy; and finally alternative waste remediation and carbon capture technology.

Tata Steel Strip Products Ltd is a global company with operations in 26 countries and commercial offices in over 35 countries. The Indian-owned company is Europe's second largest steel producer with operations in the Netherlands, in Scunthorpe, and in Port Talbot. Its Wales operation includes producing slab, hot rolled, cold rolled and galvanised coil. The company serves various markets including aerospace, automotive, construction, consumer products, defence & security, energy & power, lifting & excavating, packaging, rail, and shipbuilding.

In order to sustain its position in the market, TATA Steel has placed innovation as one of its five strategic priorities in Europe. This is key in their strategy of pursuing market differentiation; developing cutting-edge manufacturing and product technology; and customizing products for their customers' benefit. Collaboration with academics on R&D activity through A4B projects has been part of this strategy.

Fiona Abbott, Lead Environmental Engineer at TATA, acted as the main liaison between the company and its partners in their A4B projects.

TATA's key driver in undertaking this project was to improve their environmental performance in order to comply with the EU emissions trading scheme and its cap on carbon emitted by business. This was also part of a strategy to avert from the negative light of being part of the climate change problem. The opportunity to leverage funding was also one of the main reasons for accessing A4B support as direct funding cannot be accessed in the steel industry.

TATA Steel were the 'main contributors' to the project as they had the capacity to commit more time towards the R&D activities. The company built and deployed a mobile algal growth laboratory (AGL) and contributed towards developing and evaluating methods for microalgal-based flue gas CO₂ capture at their industrial site.

TATA contributed £195k of funding which was £12K more than the original budget figure.

Dŵr Cymru is responsible for both supplying drinking water and dealing with wastewater for over three million people in Wales, making it the sixth largest of the ten regulated water and sewerage companies in England and Wales. Dŵr Cymru is the fourth largest company in Wales employing 3,000 people in the country.

The Dŵr Cymru Innovation Team participated in the project to investigate novel methods for waste water remediation and possible integration with anaerobic digestion technology. It was an opportunity to use external research facilities at both Swansea University and TATA Steel making the research project less costly. The company contributed towards the R&D activity in flue gas CO₂ capture and algal biomass production.

Dŵr Cymru contributed £42k towards the project.

Axium Process Ltd is described as a 'one stop engineering house' providing high value membrane filtration system solutions to treat effluent and customized stainless steel pipe work fabrication. Established in 2002, Axium Process were acquired by the current management in 2005 and currently have 57 employees. The company supplies custom built processing equipment, components, tube and pipe fittings in the industrial engineering sector.

Axium Process had a key role in the ACCOMPLISH project as an advanced manufacturer by developing technologies to concentrate algal biomass. The company were responsible for the installation of filtration equipment for dewatering and concentrating algal biomass to address a technology gap in separating algal biomass from the algal culture. The harvesting process can cost up to 30% of production costs (exceeding 50% when combined with oil extraction) but this project was an opportunity for Axium to trial, optimise and validate the use of their technology.

In terms of their financial contribution, Axium contributed £123k towards the project which is £90K higher than the original budget figure.

Prior collaborative links

As two of Wales' largest organisations, both TATA Steel and DCWW invest heavily in R&D activity and have had substantial collaborations with Universities in the process. The A4B programme feeds into TATA Steel's innovation strategy as they already had substantial R&D collaborations with Swansea University and its academics prior to the project. DCWW also view 'research and technology development' as an integral part of their activity and value collaborative projects as an 'opportunity for mutual benefit'.

Axium have also collaborated closely with Swansea University in the past including collaborations with the Chemical Engineering department and College of Bioscience 'for a number of years'. The company has regularly recruited graduates from the University for placement opportunities and longer term positions as well as collaborate on R&D projects.

All three industrial partners formed their relationship and subsequent ACCOMPLISH project following their previous links with Swansea University and the Algal Biotechnology for Wales KTC.

Research / support delivered

TATA initially received support from the ACCOMPLISH project team, comprising of Biologists and Chemical Engineers within the Centre for Sustainable Aquatic Research (CSAR), to identify an optimal location to site the algal growth platform.

This resulted in the Morfa coke oven being identified as the preferred site as the flue gas from this process contained a high proportion of CO₂ - the target for algal bioremediation. The team then collaborated with TATA engineers to design and build the facility at Swansea University before deploying the mobile algal growth laboratory at the TATA site.

Dŵr Cymru were able to use the external facilities and expertise through collaborating with their industrial partners and the ACCOMPLISH team at Swansea University in order to strengthen their R&D activity in reducing and valorising waste. Both Dŵr Cymru and TATA received flue gas CO₂ capture and algal biomass production R&D support during this project which resulted in useful findings.

Axium were able to install and commission pilot membrane filtration rigs in the transportable algal production facility. The Swansea University team provided support to the company by allowing the test of dewatering algal culture to be carried out at the University in the period where access to TATA's industrial site was delayed. The company received support to

conduct a series of trials using different rig configurations and membrane types to find the most efficient method for production of stable concentrates.

Satisfaction with support received

TATA were very satisfied with the quality of support received from A4B including the quality of research and support from Swansea University. The company were also satisfied with the outcomes of the project, although there were some issues with delivering the outcomes on time. This was because of the challenges of working at the AGL site which is a harsh working environment with consequential staff access and health and safety challenges. However, these challenges were resolved as a result of support from Swansea University who provided facilities to conduct the research in the early stages.

Welsh Government (A4B) were also supportive and flexible by extending the time scale and increase the funding in order to achieve the deliverables.

Axium also expressed satisfaction with the support, reporting the knowledge and expertise of the academics was useful and they would not have been able to undertake this work without A4B support as they lacked the capacity to do so.

Similarly, Dŵr Cymru were also satisfied with the support and valued the opportunity to use Swansea University and TATA Steel facilities.

Follow-on R&D / commercialisation activities

A4B support has had a positive impact on Axium's attitude towards collaboration with Universities which is demonstrated by the fact the company are currently working on three other collaborative projects with Universities following their experience with A4B. This includes two projects with IBERS at Aberystwyth University (including a P2P project) and one Innovate UK project with Bangor University.

The company have also developed their collaborations and close relationship with the Chemical Engineering department and College of Bioscience at Swansea University as a result of their A4B projects and have recruited three engineers from the department in the process.

Dŵr Cymru also reported the project has had a positive impact on their attitude towards future links with Universities and the three companies have a shared interest to develop their work further with funding opportunities actively sought at this time.

In terms of the ACCOMPLISH legacy, Enalgae is a partner project and will provide funding for ongoing research (staff time and consumables) at the TATA AGL site. This project,

funded by the Interreg IVB North West Europe, will apply for new funding under the Enalgae 2 banner and this project will directly include use of the AGL at the TATA steel site.

Finally, Swansea University are planning to expand their Algal Biotechnology facilities and project team over the coming years which will include building on the work undertaken in the ACCOMPLISH project. This has already attracted interest from major multinational organisations and UK funding bodies.

Results and Impacts

ACCOMPLISH has had a positive impact on the industrial partners with the research findings leading to good results.

The project has enabled Axium to optimise the application of their technology to access the growing biomass market. Following successful trials undertaken, the company were able to determine that their innovations would be a 'valuable service and technology to the industry' and could be 'easily developed'. According to Peter Esteban (Project and Process Engineer at Axium) the company gained 'very good data' on applying their membrane filtration system to algae and it is a market they had not considered or researched beforehand. Axium were able to use the data gained from the trials to demonstrate the effectiveness of their solutions when approaching businesses which has 'strengthened our marketing technique' and enabled the company to 'branch out'.

This support has contributed towards the high growth experienced by Axium from 2014 into 2015 with the company more than doubling in size by expanding from 28 employees in 2014 to 57 in 2015. A4B enabled the company to provide their solutions in different technology areas and the additional sales generated from this has been a factor in the company's growth. The support was also reported as a good networking opportunity as they were able to demonstrate to other companies 'what we can do'.

Results of the ACCOMPLISH project have included carbon footprints savings for TATA Steel and Dŵr Cymru with TATA developing a new process utilising photobiotics. These carbon footprints savings have had a positive PR impact on the two companies.

Further to this, TATA were able to safeguard two long-term jobs that were partly secured as a result of their A4B projects. Fiona Abbott (Lead Environmental Engineer) also reported some overlap with other projects as TATA were able to use their learning from A4B, including data and other findings, to feed into other research projects.

ACCOMPLISH also afforded networking opportunities for companies of various sizes and backgrounds including a large multinational in TATA Steel, one of Wales' largest companies in Dŵr Cymru, and a local SME with filtration expertise in Axium. This has led to the creation

of a sustainable local supply chain with the industrial partners looking to collaborate further in order to develop the progress made to date.

In total, ACCOMPLISH has produced three innovative solutions to address the complex challenges of firstly, utilising otherwise polluting waste gases to produce valuable biomass and secondly, developing a method to handle and process that biomass to gain value. ACCOMPLISH has also led to inducing £360k of R&D funding from industrial partners as well as securing £316K of grant funding.

ACCOMPLISH has also had a positive academic impact. From a reputational point of view, the project has contributed towards the reputation of Swansea University and its academics in developing 'world-class' technologies. Several papers are in preparation to be published following on from the project and the project is being used as a marketing tool to attract students and other projects.

Follow-on R&D / commercialisation activities

In addition to directly supporting the industrial partners and academics involved in the project, ACCOMPLISH has also led to the development of a top class research lab in one of the largest industrial complexes in Wales that has already attracted interest from other projects, research establishments and other potential industrial partners.

There is a high level of commercial interest in developing the project outputs as the ACCOMPLISH project results have illustrated that algal biotechnology can offer routes for waste treatment and energy production through biomethane production.

There has been interest from companies around the world, with a US company expressing interest in collaborating with the Accomplish project team and are now actively seeking to establish a new company located in Wales.

In addition, a spin out company (Aquatic Integrated Modelling Ltd) launched in February 2014 from Swansea University used data provided by the ACCOMPLISH project to build and validate its models.

The research and facilities have fed into other R&D projects such as the EnAlgae Interreg project with the EnAlgae pilots network using the research facilities and data set from ACCOMPLISH trials. Further collaborations and follow-on projects have also been conducted with The Scottish Association for Marine Science (SAMS) and with Algal Biotechnology Sheffield University.

Additionality Considerations

According to Axiom, without A4B support the company wouldn't have been able to develop their solutions, expand into new technology areas and benefit from resulting additional sales, as they didn't have the capacity to undertake trial work in new areas on their own. TATA Steel and DCWW reported they would have undertaken this research without A4B support but it would have taken longer to achieve.

Lessons

TATA Steel expressed strong views that the funding period should be longer, extended to a five year programme as opposed to the current three-year structure. In the view of TATA, the last round of A4B funding was too short as once the project was up and running the funding period would come to an end.

Axiom suggested changes to the way A4B projects are managed as there should be 'more of a commercial head on it'. Some of the academics managing A4B projects 'do not have the required business acumen' and there should be some project management training to address this issue. For example, there were some delays in the ACCOMPLISH project as the management team failed to anticipate the amount of time it would take to go through TATA Steel's rules and regulations. This reported lack of understanding in how businesses, and large businesses especially, operate was a slight issue, but Axiom also felt that the technical reports were too academic-focused, concentrating on academic outputs such as 'publishing pieces of work and IP issues' whereas there should be more of a focus on business development.

Dŵr Cymru commented adversely on the amount of 'paperwork which is very time-consuming'.

From the Swansea University perspective, a number of lessons have been identified, including that in working with large industrial partners, the time scales were often connected to other activities for which little or no control can be exerted by the project. For example, the Health and Safety requirements of industrial partners required considerable time and planning.

Similarly, working with third parties contractors can also prove complex as the client contractor relationship is not as clearly laid out. This, at times, led to delays and affected the original schedule. As a result, there was need for development of contingency plans that were successfully completed twice during the lifetime of ACCOMPLISH project.

IP results

In September 2014 a Patent Application was submitted for the design of PBR's lids while work has been done in collaboration with SAMS to assess the possibility of patenting an algal consortia for a particular purpose.

Case study 5: University of South Wales: Advanced Anaerobic Processes and Biogas Systems KTC

Title of project: Knowledge Transfer Centre for Advanced Anaerobic Processes and Biogas Systems

Project reference: USW HE 14 15 1009

Project type: 15

Lead Institution: University of South Wales

Company partner(s): Dwr Cymru

Project period: November 2014 to December 2014

Academic contact: Dr. Tim Patterson & Prof. Sandra Esteves,

Project value: £889,220



Overview of the A4B project

The project supported by the A4B Programme had the mission of increasing USW's Industrial R&D capacity to support organisations developing and deploying advanced anaerobic processes or integrated biogas systems and undertaking, in these technology applications, high quality and high impact collaborative R&D.

To achieve this, the Advanced Anaerobic Processes and Biogas Systems KTC project, (which was undertaken as part of the activity of the Wales Centre of Excellence for Anaerobic Digestion) procured analytical equipment and reactor systems and delivered R&D activities and knowledge transfer in three broad technical areas: Detailed AD Process Monitoring and Optimisation; Digestate/Effluent Characteristics and Dewatering Improvements and Advanced organics conversion, biogas upgrading, production of high calorific biogas and conversion of electricity into green gas.

The KTC project has specifically demonstrated advanced monitoring equipment and techniques and participated in collaborative R&D projects aimed at either improving existing processes or products or to develop new products or processes.

Nine collaborative R&D projects have been delivered so far, with A4B support with a further 15 collaborative R&D projects identified that will be developed in the months following the completion of the project.

Specific project example: Dŵr Cymru

This project formed part of the KTC for Advanced Anaerobic Processes and Biogas Systems. Its specific objective was to help Dŵr Cymru better understand the significance of data being collected at its advanced anaerobic digestion facilities in South Wales and to modify plant operations for optimum performance.

Partners and Roles

The project was undertaken by the University of South Wales KTC, funded by the A4B programme, and building on the expertise of its Wales Centre of Excellence for Anaerobic Digestion, and Sustainable Environment Research Centre.

Dŵr Cymru is the sixth largest regulated water and sewerage company in England and Wales. It is responsible for providing continuous, high quality supply of drinking water and for taking away, treating and properly disposing of the wastewater that is produced, they are fully committed to delivering a best quality service at least possible cost.

Prior collaborative links

Dŵr Cymru already had prior collaborative links with both the University of South Wales and Cardiff University. This had enabled a long term working relationship to be built up, leading to the identification of a number of collaborative R&D opportunities.

The company has also taken part in a number of other A4B projects, including prior work with the academics through the SuPER (Systems and Product Engineering Research for Polyhydroalkanoates). This project helped the company to better understand the role of polymers in their digesters, and to monitor biological peat and the aeration process that is involved.

Research / support delivered

The support delivered by the KTC to Dŵr Cymru included a demonstration event, technical assistance and the development of collaborative R&D project. As part of this the Centre undertook monitoring activities, laboratory investigations and review of data collected by Dŵr Cymru to provide feedback on operational issues. These have included ammonia removal impact evaluations, investigations of sludge storage impacts, value of residual digestates if they were re-digested, microbial profiling and insightful evaluations to improve digestate dewatering.

This work made use of equipment funded by the A4B programme, including analytical equipment and reactor systems.

The aim was to provide the company with advice as to how best to optimise their assets. Work undertaken so far has identified potential ammonia inhibition which is resulting in decreases in gas yield per mass of material added. Demonstration of modified operations at laboratory scale has limited this effect leading to increased gas yields, higher efficiency of the plants and more efficient utilisation of biosolids.

Satisfaction with support received

Dŵr Cymru were satisfied with the quality of the support, the suitability of the support for the company and the quality of research and support from the universities.

Follow-on R&D / commercialisation activities

The partners intended to conduct further follow-on work in order to fully quantify the benefits by taking into consideration of capex and opex for the new operations. This, however, this will be dependent on securing collaborative R&D funding.

Results and Impacts

The project has enabled Dŵr Cymru to develop a greater understanding of the factors that influence operational conditions of advanced anaerobic digestion and dewatering facilities and laboratory indications of great improvements based on process modifications. This has resulted in better management of its sludges, feeding regimes to their anaerobic digestion systems in Cardiff and Afan (Swansea), as well as improved biogas production through ammonia removal. These developments also provide lessons for management of its other assets across Wales.

However, the Dŵr Cymru projects are still ongoing, with final results and impacts not fully achieved yet.

Lessons

Dŵr Cymru were generally satisfied with the project and the wider programme, although they felt that the 'paperwork' was time consuming. They would like to see the project continuing, to enable the research to be completed.

IP results

None identified.

Case study 6: Cardiff Metropolitan University: Patient-specific medical product development KTC

Title of project: Patient-specific medical product development

Project reference: UWIC HE 01 KTC 1005

Project type: KTC

Lead Institution: Cardiff Metropolitan University.

Company partner(s): Abertawe Bro Morgannwg University Health Board, Morriston Hospital,

Project period: September 2010 – June 2012.

Academic contact: Dominic Eggbeer.



Overview of the A4B project

A4B provided funding for the “Patient Specific Healthcare” KTC at Cardiff Metropolitan University.

The KTC has helped medical manufacturing companies develop new services and products in the emerging patient specific market and was created to help in overcoming the barriers of traditional manufacturing processes and to and design products for individuals.

The project was designed to build on engagement activities by moving discussions with companies in project scoping discussions, advisory assistance and collaborative R&D projects. Thirteen convergence companies and 60 non-convergence companies collaborated with the KTC in R&D projects.

Specific project example (1): Maxillofacial Lab

The Maxillofacial Lab at Morriston Hospital received support from the KTC for the development of custom prototypes for patient specific (metal) implants for facial injury and reconstructions, using 3D modelling technology. The project aimed to support the design of new technologies that will save surgeons time in theatre, as well as enhance medical developments in the field of science.

Partners and Roles

Morriston Hospital is one of the largest hospitals in Wales and has a well-developed maxillofacial surgery unit and trauma services as well as a range of surgical specialities.

The hospital also has a paediatric unit with two teams caring for children undergoing plastic surgery, maxillofacial surgery, orthopaedics, trauma and general medical paediatrics.

Prior collaborative links

Prior to accessing A4B programme support, the Lab had collaborative research links with Cardiff Metropolitan University.

Research / support delivered

The Maxillofacial Lab accessed support from the KTC based at Cardiff Metropolitan University, including the use of facilities to develop products and services.

After the initial research stages, the A4B funding via the KTC helped the Lab to design prototypes that were then developed into products that are currently used by the NHS in hospitals throughout Wales. The types of products produced as a result of the support include, orbital jaw reconstruction, facial reconstruction and cranium implants. The Lab is constantly working with the NHS to help reach the demanding and specific targets set to help improve patient care.

The Lab's motivation in engaging with the KTC was the importance of continually improving their products and their processes based on patient specific data and design approaches.

Satisfaction with support received

Overall, Maxillofacial Lab were satisfied with the quality and the suitability of the support they received as well as the quality of research and support from the University, and outcomes of the project overall.

Follow-on R&D / commercialisation activities

The Maxillofacial Lab intend to continue collaborating with Cardiff Metropolitan University, and have been successful in securing funding from Innovate UK to work with Renishaw on a new medical device product. They also intend to seek collaboration with Swansea and Loughborough Universities in the future, as they are both "up and coming" institutions in their field of work. The Lab continue to gain major investment in the project and are working towards gaining funding from the Innovation Award.

Results and Impacts

Maxillofacial Lab report that their involvement in the A4B programme via the KTC has had a lasting positive impact and positive attitude of both individuals and the Lab overall to working on future projects with Universities.

As a result of the KTC support, the Lab has managed to create one specific long term job for one person to work on their 3D project work. Approximately 70% of this post was achieved as a result of the assistance received from the A4B project, although the Lab does not expect to increase the number of jobs further in the future. However, as a result of the A4B project they expect to receive additional sales for more than 5 years in the future.

Additionality Considerations

Maxillofacial Lab work as part of the NHS and, while they have managed to increase their 'sales' from the NHS as a result of the A4B support, they do not see the results as a financial impact directly. The Lab estimates that approximately 60% of this increase in sales would have occurred without the A4B support, but by a smaller amount and at a later date.

For the Lab, the main benefits to date have come from being able to access new technology at Cardiff Metropolitan University. The Lab are clear that they would not have been able to contemplate producing prototypes and design work if it wasn't for the KTC and the A4B programme.

Lessons

Future improvements that could be made to Welsh Government's support for knowledge transfer could be provide more investment. However, the Lab stated that the level of research support was good and well supported throughout which led to the Lab having very successful outcomes from the programme.

Specific project example (2): Trauma Simulation

Trauma Simulation Ltd is accompany founded by Professor Ian Pallister, a leading Trauma and Orthopaedic consultant (and former surgeon) from Morriston Hospital, as a result of working with the KTC to develop a high fidelity, surgical simulation model. The model was developed in response to the recognised need to improve orthopaedic surgical training methods.

Partners

Morriston Hospital is one of the largest hospitals in Wales and has a well-developed trauma services and a range of surgical specialities.

The hospital also has a paediatric unit with two teams caring for children undergoing plastic surgery, maxillofacial surgery, orthopaedics, trauma and general medical paediatrics.

Prior collaborative links

Professor Pallister has worked with PDR over a number of years as part of his work to develop new orthopaedic surgical training methods. This has included collaborations to improve patient outcomes from new technologies, for example development of custom implants and intraoperative templates.

Research / support delivered

Professor Pallister identified the need to utilise patient medical scan data to create a virtual model of the bones, muscle groups and surrounding soft tissues including the skin. This medical scan data segmentation was undertaken by the KTC in collaboration with Professor Pallister and his surgical colleagues.

The KTC subsequently used computer modelling skills to design a complete lower limb assembly ready for mould production.

The complexity of the design enabled each component to be fabricate in materials that accurately replicated the physical properties of the lower limb.

Satisfaction with support received

Professor Pallister reported a high degree of satisfaction with the PDR KTC team, which has helped to develop a training model which is said to go far beyond what was previously available, with respect to accuracy and fidelity. The KTC team were described as able to work at short notice, with good technological know-how, and sub-contracting capability.

Follow-on R&D / commercialisation activities

The resulting product has been successfully used in multiple-stage test simulations for the MSc students which examine the ability to assimilate and process information, and then make decisions and execute procedures as a logical progression.

A contract has also been secured from the Centre for Defence Enterprise to develop the model further to stimulate lower limb trauma resulting from improvised explosive devices. This is intended to be used by military medics, allowing for training to be undertaken on a

realistic model. To date three models have been produced, and these are planned to be used in the training of medics at the Royal College of Surgeons later in 2015.

Results and Impacts

Professor Pallister formed Trauma Simulation Ltd specifically to enhance the development of the limb trauma training models produced in prototype form in the course of the MSc Trauma Surgery Programme. The lower limb trauma model has resulted in a strong level of UK military interest and it is hoped that the use of the model in practice will help to generate further global sales. The company is currently looking at trade marks for the product.

Additionality Considerations

It was indicated that without A4B KTC support the company would have had to rely on the maxillofacial lab's expertise, and would have lacked the specialist CAD expertise of the PDR. It is likely that this would have taken longer, with comparably poorer fidelity.

Lessons

This project illustrates the potential of the project to produce multiple benefits, ranging from (potential) economic benefits of commercialisation, as well as knock-on health benefits. They also show how support can lead to the creation of a new company.

IP results

None.

Case Study 7: University of Wales Trinity Saint David: Moving Images Wales

Title of project: Moving Images Wales 1 & 2

Project reference: HE 04 16 1001 and HE 04 KTC 1003

Project type: KTC/16

Lead Institution: University of Wales Trinity Saint David

Company partner(s): Gritty Realism

Project period: September 2009 to May 2013 (MIW 1) and July 2013 to December 2014 (MIW2)

Academic contact: Chris Holtom and James Moxey



Overview of the project

Moving Images Wales (MIW), based in Swansea Metropolitan University's Creative Industries Research and Innovation Centre (CIRIC), was established to develop new IP proposals from Welsh media companies (TV, film and new media). It was driven by research outcomes of an earlier project – CIRIC (2005-2008) and the findings of an earlier A4B feasibility study.

The focus of the project was to support creative businesses in the Wales Convergence area to develop commercially viable ideas.

Specifically, the MIW project offered scoping discussions, diagnostics, demonstrations and seminars and collaborative R&D projects.

MIW worked with over 50 businesses helped generate 14 new products and processes in the sector and conducted more than 20 collaborative R&D projects.

Specific project example: Gritty Realism

Gritty Realism approached the centre with a need to develop a film pilot to secure future investment.

The company had developed a pilot concept for a feature length animated version of Joseph Conrad's *Heart of Darkness*. This used motion stop animation techniques and the medium of sand. Feedback from international trade shows, however, suggested that the pilot would benefit from stereoscopic 3D animation.

Partners and Roles

The project drew on MIW's specialist researcher expertise in 3D technology and members of CIRIC (Creative Industries Research and Innovation Centre).

Prior collaborative links

The company had no prior collaborative links with a university or college.

Research / support delivered

The MIW team provided research and development support to create a 3D pilot. This included analysis of techniques for enhancing the existing 3D film, with an additional perspective. As a result of this, a second 'virtual' camera was used to add the additional 'eye' to the film.

The MIW team also assessed presentation approaches for the 3D film, with a particular focus on how best to present the film to potential investors. This expertise enabled the company to take the pilot to international markets.

Satisfaction with support received

The company described itself as being highly satisfied with the suitability and quality of support provided by MIW. In particular it felt that MIW understood their business well. The company's work was shown in the National Museum of Wales for several months which, the company felt, may not have happened if it wasn't for the status of the University's support provided.

Follow-on R&D / commercialisation activities

No further R&D was undertaken post-MIW support, with the main focus being on promotion and marketing of the pilot film.

Results and Impacts

Overall, the effects were described as being 'more dramatic than expected'. The specialist support provided by MIW has enabled the company to secure significant investment of over €1.5 million for the film.

Additionality Considerations

The project was unlikely to have gone ahead without the support and expertise of MIW.

Lessons

The main lesson from this project is that impacts can be secured from projects that have not typically been supported by A4B. In this respect the support for creative industry business illustrates that subsequent commercialisation and leverage of funding can be achieved from providing R&D and technical support.

IP results

The technology used in the project is subject to a patent application.

Case Study 8: Swansea University: SUPER- Sustainable Product Engineering

Title of project: SUPER Sustainable Product Engineering

Project reference: Swan HE 09 16 1005

Project type: 16

Lead Institution: Swansea University

Company partner(s): Tata Steel, NSG Pilkington and BASF

Project period: 9/13- 12/14

Academic contact: Professor David Worsley



Overview of the project

Swansea University hosts SPECIFIC – the Sustainable Product Engineering Centre for Innovative Functional Industrial Coatings which is an academic and industrial consortium led by Swansea University with Tata Steel, NSG Pilkington and BASF as strategic partners. The SPECIFIC Innovation and Knowledge Centre is funded by the EPSRC, Innovate UK and the Welsh Government.

The SPECIFIC project's main aim has been to develop functional coated steel and glass products for roofs and walls that generate, store and release renewable energy - transforming buildings into power stations and delivering significant environmental and economic benefits. In its first two years SPECIFIC developed a full pilot manufacturing facility to enable the manufacture of one square meter panels of functional coated materials such as glass, steel, aluminium, plasterboard or wood, which can be applied to buildings at demonstration scale.

SPECIFIC is a capital project that has resulted in a unique site in the UK and has attracted key researchers and businesses that wish to work with the Centre. SPECIFIC currently works with two professors from Imperial College, although most of the work is with businesses, and the site will be hugely important for Swansea in terms of future REF impact (2020) and research.

SUPER is an A4B-funded programme whose objectives were to develop the upscaling capabilities of SPECIFIC in order to deliver manufacturing solutions for the next generation of coated functional products.

A4B through SUPER provided SPECIFIC with the ability to build capacity and provided a foundation for ongoing work for a range of businesses and a range of technologies.

“Universities such as Swansea need these types of programmes to elevate their research and provide support to regional businesses. This in turn allows us to build local supply chain, thus materially affecting the region economically.” (Professor Dave Worsley:

SPECIFIC Research Director / Sêr Cymru Joint Chair)

Research / support delivered

SUPER has allowed the creation of the PMRC (Pilot Manufacturing Resource Centre) allowing high quality R&D space to be located directly adjacent to reel to reel (R2R) pilot manufacturing capabilities thereby providing world class measurement science at the point of manufacturing development.

To complement the large sheet line, the SUPER project also installed a reel to reel line in the clean room in Baglan which is capable of printing / coating thick and thin films to steel and plastic substrates. Some of the capabilities of the machine were demonstrated through the continuous manufacture of test volume samples.

Partners and Roles

SPECIFIC has core clients that currently include three industry giants who, over the next four years, will invest £1m each. The Centre believes that working with the likes of BASF, TATA, and NSG Pilkington provides access to supply chains and makes the Centre attractive to small companies who have IP to introduce to the strategically important and anchor companies.

SUPER has also allowed a number of engagements with SMEs in Wales and these have led to new business opportunities as well as reinforcing the importance of R & D within these companies.

For example, a collaborative research project has been fully funded by Cogent which has developed and demonstrated a new coating material for high tension electrical steels. This new material set eliminates chrome (reducing toxicity) and improves electrical performance. The pilot coating facilities and PMRC laboratories were used extensively in the developments and this has helped to support ongoing engagement with business and income generation.

Results and Impacts

10 jobs have been created to date as a direct result of A4B intervention but, more importantly, Professor Worsley states that, *“We are likely to generate 30 jobs in the next two to three years and this will be the legacy of the current A4B funding, hopefully enhanced by future A4B support.”*

Professor Worsley believes that a positive outcome of A4B intervention, which wasn't expected, is the increased recognition of technology transfer as a worthwhile activity, commenting:

“Our scientists have traditionally been very ‘scientific’ in their thinking of research, with even those scientists who are used to working with large companies not fully appreciating the benefits of technology transfer, as they do now. Getting university scientists to work with SMEs has been an eye opener and a very positive experience, not only for the scientist, but also for the Centre and the University. They now appreciate the dynamism of SMEs and this allows us to work with the whole supply chain rather than just with the prime mover.”

The pilot line installation and the new PMRC facilities provided by SUPER has allowed significant additional public funding to be secured, representing research income to Swansea University of circa £4m within the timescales of the project.

Lessons

Professor Worsley believes that SPECIFIC is now critical to the overall strategy of the University in terms of knowledge transfer activity and, going forward, the Centre will look to move towards the Fraunhofer model and aim for a position of self-sustainability.

SUPER has been able to achieve the objective of SUPER through its close collaboration with its industrial partners who share SPECIFIC's vision and have full confidence in the team to deliver the project.

IP Results

None

Case study 9: Pembrokeshire College: VocalEyes pilot

Title of project: VocalEyes pilot

Project reference: FE 16 15 1001; FE 16 15 1002

Project type: Strategic plan (1001) & Technical and Commercial Feasibility (1002)

Lead Institution: Pembrokeshire College

Company partner: VocalEyes Digital Democracy Limited

Project period: July 2013 – September 2014.

Academic contact: n/a



Overview of the project

VocalEyes (VE) Digital Democracy is a decision-making, crowd-sourcing and crowd-funding platform. It was developed to help engage communities in decision-making, idea generation, action planning and, where appropriate, securing crowd-funding for ideas. The concept seeks to support active citizenship and grass roots democracy, and contribute towards the sustainability agenda.

The platform has wide applicability across a range of community sectors, enabling people sharing a common interest, to 'rate, debate and prioritise' ideas. It has particular applicability to the educational sector, where institutions are responsible for capturing so-called 'learner voice', and to increase engagement, efficiency and innovation.

A4B supported Pembrokeshire College to assist the development of a scaled version of VocalEyes through an in-house pilot. The College's input into the project builds on an earlier ESDF project, which sought to develop a strategic plan and action for generating ideas for future knowledge transfer and commercial income (A4B Project's 1001 and 1002).

Partners and Roles

The VocalEyes Digital Democracy Ltd was founded in 2014, following an extensive period of development. It currently has three Directors, and employs a total staff complement of 15. This includes a number of staff funded by the Jobs Growth Wales programme.

Pembrokeshire College's support was provided by its marketing and project development support. This included technical support for the launch and operation of the platform within the College, as well as subsequent promotion²⁶. The project formed part of the College's desire to strengthen links to industry and improve opportunities for knowledge transfer and commercial income.

Prior collaborative links

While the VocalEyes platform had been developed prior to engagement with Pembrokeshire College and the A4B programme, the project represented the first such collaboration with a further or higher education institution.

Research / support delivered

The College provided support for the pilot and testing of the platform to capture 'learner voice'. This included embedding VocalEyes Digital Democracy in the College's existing learning platform ('moodle'). The intention here was to develop the VocalEyes service to and enable subsequent role out to the further and higher education sectors.

Satisfaction with support received

The company was generally satisfied with the support provided by the College, with the pilot helping to test the system and develop a case study of successful operation within a further education setting. It felt, however, that this could have been delivered faster. It also helped to secure funds to use VocalEyes as part of the Welsh Government's 'Big Conversation' for the Wellbeing of Future Generations Bill.

Follow-on R&D / commercialisation activities

The company has continued to develop the VocalEyes platform with the support of the College. This has helped to raise the profile and use of the platform in the higher and further education sector.

Following the A4B-funded piloting, the College supported the commercial launch of the project, through the provision of promotional resources. This approach sought to develop a

²⁶ Note, A4B support funded the proof of concept piloting. The subsequent marketing and promotion support was funded by the College directly.

commercial income stream for the College, based on the provision of training services to VocalEyes clients.

The company has recently become a 'spin-in' to the University of Wales Trinity Saint David, where it will further develop the platform and roll out within the sector. It is in negotiation with an equity finance provider to secure funds to strengthen its team and expand into new sectors (e.g. housing).

Results and Impacts

As a result of the work supported by A4B, the College created a twelve month, part-time post, supporting some promotional activities and also delivering training for which it receives an income stream. It estimates that the initial pilot of VocalEyes at the College will produce some £28K in saving from the ideas generated. Attitudes towards working with companies are also felt to have been impacted positively, and provided a new way for the College to interact with business.

The company has now sold the platform to 30 organisations, seventeen of which are higher or further education institutions. The role of the College has been central to the sales secured in the further and higher education sector.

Additionality Considerations

Had it not been for A4B, the company believes that it would have sought alternative support and routes to market. This is illustrated by its subsequent relationships established by organisations such as the University of Wales, Trinity Saint David and their partners, and points towards relatively low levels of additionality.

Lessons

The company, as noted above, recognise that colleges do not tend to be 'business minded'. Indeed, while the support of Pembrokeshire College has helped to pilot and provide evidence of VocalEyes success, greater coordination and colocation are being sought in the subsequent roll-out of the platform.

IP results

No IP results were achieved by the project.