

Final Evaluation Report for the ASTUTE (Advanced Sustainable Manufacturing Technologies) Project











Project Reference: P.1305ASTUTE-FE

Revision: 2.1 **Dated:** 10th June 2015



Final Evaluation Report for the ASTUTE (Advanced Sustainable Manufacturing Technologies) Project on behalf of:-

Aberystwyth University	
Bangor University	
Cardiff Metropolitan University	
Cardiff University	
Glyndŵr University	
Swansea University	
University of South Wales	
University of Wales Trinity Saint David	

Project Reference: P.1305ASTUTE-FE

Revision: 2.1 **Dated:** 10th June 2015



CONTENTS

Executive Summary

1. Introduction

- 1.1 Background to the ASTUTE Project
- 1.2 The ASTUTE Mid-Term Evaluation Summary
- 1.3 ASTUTE Project Re-Profile
- 1.4 The ASTUTE Final Evaluation Purpose

2. The ASTUTE Final Evaluation Overview

- 2.1 The ASTUTE Final Evaluation Objectives
- 2.2 The ASTUTE Final Evaluation Plan of Action
- 2.3 The ASTUTE Final Evaluation Methodology
- 2.4 The ASTUTE Final Evaluation Process

3. The ASTUTE Final Evaluation Findings

- 3.1 Performance against Targets – Findings
- 3.2 Achievements against Objectives – Findings
- 3.3 Project Indicators – Findings
- 3.4 Added Value – Findings
- 3.5 Market Need – Findings
- 3.6 Value for Money – Findings
- 3.7 SWOT Analysis – Key Stakeholders & Academic Findings

4. Discussion on Evaluation Findings

- 4.1 Aims & Objectives – Discussion
- 4.2 Outputs and Results – Discussion
- 4.3 Project Indicators – Discussion
- 4.4 Added Value – Discussion
- 4.5 Market Need – Discussion
- 4.6 Value for Money – Discussion
- 4.7 Moving Forward – Discussion

5. Conclusions & Recommendations

- 5.1 Conclusions
- 5.2 Recommendations Moving Forward
- 5.3 Executive Recommendations

Appendices

A	Feedback Questionnaire of supported Assists and Collaborative R&D Project participants.
B	Project Success Perception Comparison.
C	Evidence of World Class Expertise demonstrated by the ASTUTE Project

Executive Summary

This Final Evaluation comprises the findings of the external independent review. It incorporates data and information gathered throughout the Project including a Baseline Evaluation in May 2011, a Mid-Term Evaluation in late 2012 and ongoing data collected through to the completion of the project. This report incorporates the strategic position of ASTUTE looking forward and focuses on the impact achieved and the potential demand and positioning of a future ASTUTE.

The objective of the ASTUTE Project has been to enable the aerospace, automotive and high technology manufacturing industries in the convergence region of Wales to grow by adopting more advanced technologies and, at the same time, improve sustainability by reducing environmental impact.

The ASTUTE Project and its achievements are an exemplar of Industry/Academia collaboration. The findings of the Final Evaluation are that the latter half of the Project has built on and enhanced the results and impacts achieved at the Mid-Term Evaluation.

The Project has remained true to its ambitions and its achievements can be attributed to a number of key success factors which it is recommended are adopted as best practice for ASTUTE 2020 and also any further or future EU or government funded academia projects.

In summary these are:

- A clear vision combined with strong leadership focused on achieving impact and meeting defined targets;
- The marriage of academic expertise with full time commercial management;
- The use of clearly defined processes and pre-project evaluation and review to effectively set customer expectations and filter out projects which are not suitable for support;
- Open cooperation between the partner institutions on the project, with all partner institutions confirming their commitment to supporting the project.
- A focus on key areas of expertise and establishment of a network of external support organisations.

The ASTUTE Project has been restricted to the Convergence region of West Wales and the Valleys. However, numerous opportunities have been identified with businesses in East Wales. Thus the opportunity exists (with adequate funding support) for ASTUTE to become a flagship manufacturing support resource for the whole of Wales.

In respect of this, it is imperative that the future for ASTUTE is determined at the earliest possible stage to avoid any loss of Welsh Government investment made in the people, processes, procedures, infrastructure, and commercial goodwill which has made this project successful.

The tangible findings from the Final Evaluation as evidenced from the feedback provided from businesses participating in the programme (industrial collaborators), evidence both impact and the embedding of more advanced technologies into their manufacturing operations. This is demonstrated by the levels of projected additional business confirmed by the companies and the projected level of investment post intervention support. The improved sustainability has been evidenced by notable examples of reduced environmental impact included within this report. The successful cross cutting themes supports are evidenced by the number of businesses adopting Equality and Diversity and/or Environmental Management Systems.

As illustrated by the table of output and results below the ASTUTE Project has exceeded all re-profile targets and outputs as well as exceeding all original outputs and targets. Following the findings of the Mid-Term review a decision was made to concentrate activities more on Collaborative R&D and less on Enterprise Assists, and the targets were changed accordingly in the re-profile of 2014.

ASTUTE achievement against targets to 31st May 2015

Findings	Original Targets	Re-profile Targets	Achieved by 31st May15	% Achieved against re-profile targets	% Achieved against original targets
Outputs					
Enterprise Assist	350	277	294	106%	84%
Collaborative R&D	40	128	141	110%	353%
Innovation centres created	200 m ²	483 m ²	483 m ²	100%	241%
Results					
Jobs created	130	130	158.4	122%	122%
Enterprises created	5	10	11	110%	220%
Investment induced	£4,000,000	£5,750,000	£6,636,800	115%	166%
Enterprises adopting EQS	20	25	25	100%	125%
Enterprises adopting EMS	16	31	31	100%	194%
PPS registered	40	40	42	105%	105%
PPS launched	120	340	342	101%	285%

Evaluation of the impacts achieved by ASTUTE as evidenced from the data provided by the industrial collaborators in the Final Evaluation produces a picture of jobs created, future jobs expected, increased levels of business achieved, investments made or investment planned as a result of ASTUTE supports and interventions.

The following table summarises the key findings in respect to future impact resulting from the collaboration.

Impact	YES Future	Number / Value To date and Future Projection	YES Currently
Increased level of business	(58%)	Projection. £203,260,000	(13%)
Increased employment	(52%)	To date. 158 Projection. 251	(15%)
Increased Investment	(53%)	To Date. £6,636,800 Projection. £210,043,000	(19%)

Using International Monetary Fund (IMF) standard Economic multipliers and WG Statistics for average wage value and taking on the confirmed figures of employment created and investment induced captured and evidenced by the ASTUTE Project gives a total figure of almost £848m.

Taking a very conservative viewpoint that only 25% of the projected figures might arise, the return on investment calculation of the £14 million ERDF grant awarded to the ASTUTE project produces **a return on investment of £211,975,000.**

Executive Summary Conclusions

The evidence drawn through the independent external evaluation shows that the ASTUTE Project has been a success in every aspect of its operation with the following reasons cited:-

- **The ASTUTE Project has exceeded every one of the target levels of Results that were originally specified in the Business Plan.**
- **There has been a high level of Industrial Collaborative Partner satisfaction, including:-**
 - 91% reported that impact or improvement has been achieved or is expected as a result of the ASTUTE collaboration.
 - 92% rated the Speed of response to the enquiry as Good or Excellent;
 - 94% rated the ease of contact with ASTUTE as Good or Excellent;
 - 90% rated the overall experience with ASTUTE as Good or Excellent;
 - 87% rated the Quality of support from ASTUTE as Good or Excellent;
 - 78% of Collaborative R&D Projects, met, exceeded or far exceeded client expectations.
- **Best practice processes were put in place at an early stage including:-**
 - Strong leadership with robust governance
 - An experienced full time Project management team;
 - Filtering and selection processes for potential collaborations;
 - Documented evaluation processes to ensure there was no private sector displacement;
 - A documented processes and procedures manual which was shared with each of the eight academic partners;
 - Project staff with both academic and industrial expertise and experience;
 - Open cooperation between the partner institutions on the project.
- **Alignment with Welsh Government defined and documented objectives, priorities and funding streams as defined in:-**
 - *Science for Wales*¹
 - *Innovation Wales*²
 - *For our Future*³
 - *Programme for Government*⁴
 - *The Economic Prioritisation Framework for Welsh European Funds*⁵.
- **A projected financial contribution to the economy of Wales of almost £212m from an ERDF grant of £14m**

¹ <http://gov.wales/docs/det/publications/120306scienceen.pdf>

² <http://gov.wales/docs/det/publications/140313innovationstrategyen.pdf>

³ <http://gov.wales/docs/dcells/publications/091214hstrategyen.pdf>

⁴ <http://gov.wales/about/programmeforgov/?lang=en>

⁵ <http://gov.wales/docs/wefo/publications/141216economicprioritisationen.pdf>

Executive Summary Recommendations

The following is a summary of recommendations resulting from the Final Evaluation based on evidence and discussion with sections 3 and 4 of this report respectively.

➤ **Initiate ASTUTE 2020 for a bold and ambitious future**

The success of ASTUTE in meeting its impact targets and producing a return into the Welsh Economy of almost £212m from an Investment of £27m is a compelling reason for a bigger and more ambitious ASTUTE programme into the future.

➤ **Maintain Industrial/academic Collaboration Momentum**

Ensure an early commitment from WEFO for ASTUTE 2020 to ensure key staff and Industrial Collaborators in Wales see a seamless integration from the current to future project

➤ **Remove Assists as a discrete target.**

It is recommended that the Assist is removed as a target in its own right but retained as an exploratory process with the budget to undertake a sufficient number to seed and develop into collaborative R&D projects with the resultant greater impact.

➤ **Carefully evaluate Projects with micro companies**

Introduce a more definitive evaluation process to select micro companies only with the potential to create impact as a result of the intervention

➤ **Support a hybrid model for Cross Cutting supports**

Develop a hybrid model for cross cutting supports where the intervention is managed by ASTUTE with use made of sub contracted or external supports.

➤ **Provide an Intellectual Property Support**

Given that 42% of the industrial collaborators indicated they would be interested in receiving Intellectual Property support, it is recommended that an IP support provision is an integral part of ASTUTE 2020.

➤ **Target and monitor Referrals**

Introduce a formal referral process for introductions to/from other Projects or Programmes (in academia or WG) with guidelines of the referral process and a process for keeping record and following up on the referral success and outcomes.

➤ **Explore the opportunity for a Welsh Centre of Manufacturing Excellence**

With Wales lagging behind the rest of the UK in its manufacturing output, a facility with a dedicated building and resources would be a clear statement of Wales' ambition to bridge this gap and attract high value manufacturing to the Principality.

1

Contents

Introduction

The ASTUTE Final Evaluation Overview
The ASTUTE Final Evaluation Findings
Discussion on Evaluation Findings
Conclusions & Recommendations
Appendices

Introduction

1.1 Background to the ASTUTE Project

ASTUTE Project – Advanced Sustainable Manufacturing Technologies.

The objective of the ASTUTE Project has been to enable the aerospace, automotive and high technology manufacturing industries in West Wales and the Valleys to grow by adopting more advanced technologies and, at the same time, improve sustainability by reducing environmental impact. Led by Swansea University, the strong collaboration brings together the Universities of Aberystwyth, Bangor, Cardiff, Glyndŵr, University of Wales Trinity Saint David, Cardiff Metropolitan and the University of South Wales (originally University of Wales Newport), providing the ASTUTE initiative with an exceptional range of skills across a broad spectrum of engineering and science, thus being able to address many of the technical challenges facing Welsh companies in the current and future economic environment. ASTUTE has the defined aim of helping manufacturing industry face the challenges of the 21st century.

ASTUTE has been made possible with £14m from the Convergence European Regional Development Fund through the Welsh Government with an additional £13m funding from the partner higher education institutions. ASTUTE proposed to engage with as many companies as possible, particularly in the high value sectors of aerospace, automotive and manufacturing to identify ways of improving their competitiveness and creating new jobs.

To put the importance of this in perspective, it is estimated that the Welsh manufacturing sector contributes around £32 billion to the economy and employs circa 193,000 people.

1.2 The ASTUTE Mid-Term Evaluation Summary

The full findings of the Mid-Term Evaluation can be found in the published Report dated January 2013. The Mid-Term Evaluation Executive Summary has been included in the Appendix. The evidence collected during the Mid-Term Evaluation confirmed that ASTUTE was achieving its original aims and objectives.

Feedback gained from participating companies relating to the quality of collaboration and future growth potential revealed the following pattern:

As a rule the assisted companies understand that the Assist^A intervention is an exploratory one. This is indicative of the improvement achieved by ASTUTE in latterly setting the customer expectations more appropriately. It is also acknowledged that the level of support (min 7 hours) would not usually lead to an increase in employment or impact in any measurable way on the future growth potential of the business. Analysis of the results confirms this and shows that the main source of employment and future growth potential has arisen and will arise from the Collaborative R&D Projects^B undertaken by ASTUTE.

The Mid-Term Evaluation process involved interviewing both the business and the Senior Technical Managers associated with each collaborative R&D project, the results showed that of 47 project interviews, 38 participants confirmed that the project had either met or exceeded expectations.

Essentially, at the Mid-Term stage, it was concluded that the primary reasons that companies gave for engagement with the ASTUTE Project were Product/process development needs, Requirement for R&D investment and their Technical expertise requirements. Their main reason for maintaining contact with ASTUTE was the ongoing access to research expertise – with 66% stating this would encourage them to maintain the relationships at the HEI.

The Mid-Term Evaluation also reported that the partnership arrangement of ASTUTE had the effect of making each of the educational establishments even more determined to meet (and beat) its targets than it would if the project was based at one institution. This determination to achieve and make a contribution to the overall targets strongly suggests that the indicators for ASTUTE will be achieved and in many instances exceeded by the end of the project.

^A Throughout this report the term Assist will be used as a differentiator to indicate companies that have received a lower level of support (min 7 hours) as compared to:-

^B Collaborative R&D projects that have received significantly more time. Throughout this report these will be referred to as Projects.

1.3 ASTUTE Project Re-Profile

Following completion and analysis of the results of the ASTUTE Mid-Term Evaluation in January 2013, a submission was made to WEFO in September 2014 for a re-profile of the ASTUTE Project. In particular this was to increase the number of Collaborative R&D Projects to be undertaken with a corresponding reduction in the number of Assists. This followed from the identification that the significant majority of impacts resulted from the former intervention. This re-profile was approved by WEFO in September 2014. The re-profile decreased the number of Assists and increased the number of Collaborative R&D Projects upon recognition that the outputs generated from more in depth collaborations generated a greater Return on Investment.

1.4 The ASTUTE Final Evaluation Purpose

The Final Evaluation objectives are as defined in the ASTUTE Terms of Reference Document dated 2012 and in a series of discussions and planning meetings with the ASTUTE management team and with WEFO.

The Evaluation is an important part of the process and serves to provide the sponsor with information regarding impacts generated from collaborative engagements and assessment as to whether ASTUTE has met its objectives. The process also intends to capture additional details regarding added value, benefits experienced beyond the scope of those originally identified and best practice demonstrated throughout.

The Evaluation also seeks to explore and understand market demand and more importantly – provide justification and evidence that support for a project such as this should be sustained via future funding such as Structural Funds, Research Council Grants or newly released initiatives determined by Market forces and Government Agenda.

2

Contents

Introduction

The ASTUTE Final Evaluation Overview

The ASTUTE Final Evaluation Findings

Discussion on Evaluation Findings

Executive Conclusions & Recommendations

Appendices

The ASTUTE Final Evaluation Overview

2.1 The ASTUTE Final Evaluation Objectives

Building on the evidence gained during the Mid-Term Evaluation, and following the Project re-profile approved by WEFO in September 2014, the Final Evaluation focused on gathering insight and feedback from stakeholders regarding project outputs. This enabled CIOTEK Ltd to report on the achievement of objectives under the following headings as detailed in the original Terms of Reference issued by ASTUTE in 2012 and subsequent internal discussions with the ASTUTE lead partner management team.

Final Evaluation aims and objectives;

- **Outputs and results** – Analyse levels of SME v larger business interactions, comment on project contribution to CCT (Cross Cutting Themes) and assess the quality of collaboration and future growth potential of the business based on ASTUTE interaction.
- **Indicators** – Comment on the appropriateness of the project indicators and the quality of the indicators achieved to date in line with the aims and objectives of the project and the ERDF indicator definitions;
- **Added Value** - Draw conclusions on how the project stimulated ideas, developed collaborative working relationships, integrated with other support networks, developed a sustainable future plan and provided legacy impacts;
- **Market Need** – Identify the needs from the perspective of the manufacturing businesses supported by ASTUTE.
- **Value for Money** – Identify where and how ASTUTE has shown value for money and added value to the Welsh economy.
- We have also made reference to the SWOT completed at Mid-Term and introduced comments where weaknesses/threats have been addressed and strengths/opportunities been capitalised upon.

2.2 The ASTUTE Final Evaluation Plan of Action

The plan of action for CIOTEK Ltd to complete the Final Evaluation was designed in agreement with the Swansea University ASTUTE team with input and guidance from WEFO. The focus was to provide an accurate and concise progress report to the team and funding body, building on the evidence gained at the Mid-Term Evaluation stage which highlighted achievements and impacts that ASTUTE has achieved midway through the project. The evaluation plan was also to evidence achievements as detailed in the business plan and highlighted by WEFO to recognise value added and discuss future sustainability and strategy beyond the conclusion of the existing ASTUTE Project.

A mix of research methods and elements were adopted, these were:-

- primary (questionnaires and face to face interviews),
- secondary (published documents and research already completed),
- qualitative (assessing the quality of the delivery),
- quantitative (capturing the figures and numbers)

Interviews and meetings were scheduled in accordance with the proposed timescales and availability of resources (i.e. staff and also availability of representatives from the businesses with whom ASTUTE worked).

2.3 The ASTUTE Final Evaluation Methodology

The evaluation methodology adopted enabled CIOTEK Ltd to assess the project operationally and strategically to capture both tangible and intangible outputs. This was achieved through the following five aspects:-

- From the perception of the business supported. This comprised organisations that have received support from ASTUTE either in the form of an Assist (min 7 hours) or as a Collaborative R&D Project;
- From an external perspective of the economy. This included research and review of selected WG publications, UK statistics and media reports.
- From the perspective of key stakeholders to the ASTUTE project within the lead partner institution.
- From the viewpoint of the principal partners and key leaders and managers of the ASTUTE Project at each of the eight partner Universities;
- From the perspective of the project officers delivering the support direct to the client SMEs as representatives of ASTUTE;

2.4 The ASTUTE Final Evaluation Process

In support of the method of evaluation, four discrete questionnaire processes were designed and agreed with the ASTUTE management team. An outline of these four questionnaire processes can be found in sections 2.4.1, to 2.4.4.

In addition, WEFO were consulted and provided guidance as to elements that they wished to have evidenced and included in the Final Evaluation process and report.

The interviews utilising a questionnaire were designed to capture added value and report on the factors stated above. This also allowed for benchmarking against results obtained during the Mid-Term Evaluation.

Experienced researchers were appointed to undertake the reviews and capture information first hand from the key decision makers, influencers and participants of the ASTUTE Project.

Finally the Evaluation assessed ASTUTE from the economic perspective of Wales.

2.4.1 Key ASTUTE Stakeholders and Welsh Government Interviews

In the Final Evaluation the Key Stakeholder and Welsh Government interviews focused on the strategic elements of ASTUTE; the stakeholder perception; view of the Welsh Government supports; perceived benefits to the ASTUTE partner Universities, SWOT analysis, lessons learned that might influence future projects; the role any future project might play and how ASTUTE will differ from the current operations if a future project is approved.

Table 2.4.1a Stakeholder and Welsh Government Interviews

Stakeholders interview and input from	Position	Institution
Professor Javier Bonet	Head of the College of Engineering	Swansea University
Professor Steve Wilks	Pro Vice Chancellor and Professor of the College of Science	Swansea University
Mr Mark Williams	ASTUTE PDO	WEFO
Mr Keith Parsons	Project Development Manager	WEFO
Mr Geraint Green	Head of Business and Innovation Branch	WEFO
Mr Philip Allen	Head of Knowledge Transfer & Commercialisation	Welsh Government

2.4.2 Academic Partners

In the final evaluation, the academic partner interview sought to elicit evidence to show that ASTUTE is different to other ERDF Projects; how it has benefited businesses in Wales; evidence and benefits of ASTUTE project inter university partnerships; supports from Welsh Government programmes; a SWOT analysis; lessons learned that might influence future projects; the role any future project might play and how ASTUTE might differ in the future.

Table 2.4.2a Academic Partner Interviews

Academic partner	Position	Institution
Professor Steve Brown	Deputy Director of ASTUTE	Swansea University
Dr Gavin Cawood	ASTUTE Lead P.I. Operations director	Cardiff Metropolitan University
Professor Richard Day	ASTUTE Lead P.I. Professor of Composites Engineering.	Glyndŵr University
Dr Jonathan Deacon	ASTUTE Lead P.I. Reader in Entrepreneurship & Marketing.	University of South Wales
Professor Kelvin Donne	ASTUTE Lead P.I. Dean, Faculty of Applied Design & Engineering.	University of Wales Trinity Saint David
Mr Andrew Hopkins	ASTUTE Technical Delivery Manager.	Cardiff University
Dr Jonathan James	Swansea Technical Coordination Manager.	Swansea University
Professor Mohamed Naim	ASTUTE Lead P.I. Head of Logistics and Operations Management Section Cardiff Business School.	Cardiff University
Professor Chris Price	ASTUTE Lead P.I.	Aberystwyth University
Professor Paul Spencer	ASTUTE Lead P.I. Professor and Head of College	Bangor University
Dr Brett Suddell	ASTUTE Project Manager	Swansea University
Professor Hans Sienz	ASTUTE Project Director. ASTUTE PI, Research Theme Leader Aerospace and Manufacturing, Aerospace Engineering Portfolio Director.	Swansea University

2.4.3 Senior Technical Managers:

The Senior Technical Manager questionnaire assessed the relative success of each collaborative R&D Project from the perspective of Senior Technical Managers at each of the ASTUTE partner HEIs and gathered feedback on how each project had developed. It also elicited the view of the Senior Technical Manager as to whether the collaborative project had exceeded or fallen short of expectations. Finally, the discussion explored the reasons for any problems experienced during the industrial collaborator/ASTUTE relationship and how these may have been overcome. The Senior Technical Managers are the ASTUTE Senior Project Officers who lead the individual Collaborative R&D projects on a day to day basis.

2.4.4 Industrial Collaborators:

The collaborative business questionnaire provided an evaluation from the perspective of the business in receipt of support from ASTUTE. In this report the term “business” has been used for both SME and larger businesses engaged. This questionnaire followed on from the Mid-Term Evaluation and was designed to verify evidence and solicit appropriate responses in 7 key elements of intervention, with a final section inviting comments relevant to the overall project and proposed future activity of the initiative.

These 7 key elements where input and opinion was elicited from industrial collaborator business are defined as:

- The process and quality of engagement with businesses;
- Interaction, communication and referrals to/from ASTUTE;
- Quality of the support provided by ASTUTE;
- Industrial collaborator business perception of University collaboration and future engagement opportunities;
- Impacts achieved by the industrial collaborators;
- Barriers faced by the industrial collaborators;
- Further support requirements identified by the industrial collaborators.

This business questionnaire was then used by members of the CIOTEK Ltd evaluation team in both face to face and telephone interviews to gain the businesses’ view on the collaboration, the quality of support, and the level of impact resulting from engagement. This process was adopted to standardise responses for benchmarking against the mid-term responses, whilst allowing for additional impacts to be captured which may not have materialised at the mid-term phase.

Using this questionnaire, CIOTEK Ltd made direct contact with the principals or organisation representatives of key businesses that have experienced further development on their project or initiated a project prior to the Mid-Term Evaluation in January 2013. During the Final Evaluation 86 businesses were contacted and interviewed with the responses collated and feedback/results highlights incorporated into Section 3 of this Report with the detailed collation in Appendix A.

It is important to note that a number of organisations have been involved in more than one R&D Project or have taken the opportunity to engage in both an Assist and a Project. Where possible, this evaluation has attempted to discern between these individual projects in order to gain a perspective of the value of each ASTUTE intervention from the perspective of the industrial collaborator.

The information collated provides evidence to report on the 5 key areas for address within the Terms of Reference originally issued by ASTUTE and from discussion with the management team of the ASTUTE lead partner and WEFO prior to the final evaluation (see section 2.1).

2.4.5 Economic Perspective

This element of the Final Evaluation examined ASTUTE from the perspective of the economy In Wales, Welsh Government objectives and priorities and wider UK publications and statistics related to manufacture and media reports. These included the documented future vision for Wales as defined within *For our Future*⁶ which defines the Welsh Government's Higher Education Strategy for Wales, the Welsh Government publication *Programme for Government*⁷, the *Economic Prioritisation Framework for Welsh European Funds*⁸ and the UK Technology Strategy Board publication *High Value Manufacturing Strategy 2012-2015*⁹.

⁶ <http://gov.wales/docs/dcells/publications/091214hestrategyen.pdf>

⁷ <http://gov.wales/about/programmeforgov/?lang=en>

⁸ <http://gov.wales/docs/wefo/publications/141216economicprioritisationen.pdf>

⁹ [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/362294/High Value Manufacturing Strategy_2012-15.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/362294/High_Value_Manufacturing_Strategy_2012-15.pdf)

3

Contents

Introduction

The ASTUTE Final Evaluation Overview

The ASTUTE Final Evaluation Findings

Discussion on Evaluation Findings

Executive Conclusions & Recommendations

Appendices

The ASTUTE Final Evaluation Findings

The outcome and findings of the Final Evaluation have been collated and presented in the following section. These have been aligned with the Terms of Reference originally issued by ASTUTE and comprise 5 key areas outlined in 3.2 to 3.6 below. These findings correlate with each heading in order that the reporting is directly against the objectives set for the Evaluation.

3.1 Performance against Targets – Findings

The objective of the ASTUTE Project has been to enable the aerospace, automotive and high technology manufacturing industries in the convergence region of Wales to grow by adopting more advanced technologies and, at the same time, improve sustainability by reducing environmental impact.

The findings from the Final Evaluation as evidenced from the feedback provided from businesses participating in the programme, evidence both impact and the embedding of more advanced technologies into their manufacturing operations. This is evidenced by the levels of projected additional business confirmed by the companies and the projected level of investment post intervention support. The improved sustainability has been evidenced by notable examples of reduced environmental impact included within this report. The cross cutting themes supports are evidenced by the number of businesses adopting Equality and Diversity and/or Environmental Management Systems.

Furthermore the focus of the ASTUTE Project, on advanced manufacturing aligns directly with one of the 10 key economic opportunities in Wales as defined by the EPF publication *The Economic Prioritisation Framework for Welsh European Funds*¹⁰. These opportunities are both thematic (relating to a specific business sector) and regional (relating to a specific region of Wales). These economic opportunities are aligned with Welsh government policy priorities.

¹⁰ <http://gov.wales/docs/wefo/publications/141216economicprioritisationen.pdf>

Table 3.1a illustrates the original targets as specified in the ASTUTE business plan, the re-profile targets and the levels achieved to 31st January 2015.

With the exception of Enterprise Assists, all of the original targets had already been achieved by 31st January 2015 and in many cases the target levels had been exceeded. Following the Mid Term Evaluation and after consultation with WEFO, it was agreed that emphasis would switch from Enterprise Assists to Collaborative R&D projects. Thus in the re-profile agreed in September 2014 the target levels for these two indicators were adjusted. There were also increases in the other targets where performance to Mid Term had been strong.

As can be seen from Table 3.1a, every one of the 10 areas for evaluation met or exceeded the ASTUTE re-profile target.

Table 3.1a ASTUTE achievement against targets to 31st May 2015

Findings	Original Targets	Re-profile Targets	Achieved by 31 st May15	% Achieved against re-profile targets	% Achieved against original targets
Outputs					
Enterprise Assist	350	277	294	106%	84%
Collaborative R&D	40	128	141	110%	353%
Innovation centres created	200 m ²	483 m ²	483 m ²	100%	241%
Results					
Jobs created	130	130	158.4	122%	122%
Enterprises created	5	10	11	110%	220%
Investment induced	£4,000,000	£5,750,000	£6,636,800	115%	166%
Enterprises adopting EQS	20	25	25	100%	125%
Enterprises adopting EMS	16	31	31	100%	194%
PPS registered	40	40	42	105%	105%
PPS launched	120	340	342	101%	285%

As can be seen in Table 3.1a key measures achieved by the ASTUTE Project to 31st May 2015 compared to the original targets shows that ASTUTE also exceeded all but one of its original targets are:-

- 141 Collaborative R&D projects (353% of Target)
- 294 Enterprise Assists (84% of Target)

Producing Results of:-

- Investment induced of £6,636,800 (166% of target).
- 158 Jobs created (122% of target).
- 11 Enterprises created (220% of target).
- 42 Products, processes or services registered (105% of target).
- 342 Products, processes or services launched (285% of target).

Further evidence to demonstrate achievement against original aims and objectives have been outlined in Section 3.2 of the report – Outputs and Results.

3.2 Achievements against Objectives – Findings

This section provides information and data evidenced which supports key achievements measured against the objectives defined in the initial ASTUTE business plan. It should be noted that the technical details of specific collaborative projects are commercially confidential to the participating businesses and data has been collected and presented in a collated format to evidence the achievements of the ASTUTE Project. Accordingly the evidence in Section 3.2 has been collated and evaluated as an indication of the achievements of ASTUTE against these objectives and in line with our Data Protection Policy does not refer to, or name, specific business or individuals. The exception to this is data on publications and other information which already exists in the public domain. Appendix A of this report provides the detailed findings from the participant business evaluation questionnaires and the feedback and perceptions of the industrial collaborators receiving support under the ASTUTE Project. This has assessed the industrial collaborators' needs and priorities as well as an assessment of the value and quality of support provided by the ASTUTE Project.

3.2.1 Analysis level of SME Vs larger business interactions

The Final Evaluation analysis of industrial collaborators showed a wide range of size (based on number of employees) and the figured below show the adaptability of ASTUTE in supporting businesses from the micro size through to organisations of 500+ employees.

Table 3.2.1a No. of employees within each of the organisation interviewed

Number of Employees	Project	Assist	Total No.	%
0-5	26	1	27	31
6-10	6	0	6	7
11-15	5	1	6	7
16-20	4	0	4	5
21-30	4	0	4	5
31-50	7	2	9	10
51-100	8	0	8	9
101-250	12	0	12	14
251-500	4	0	4	5
500+	6	0	6	7
				100

Fig 2.3.1a Comparison of number of ASTUTE industrial collaborators by size (Number of employees)

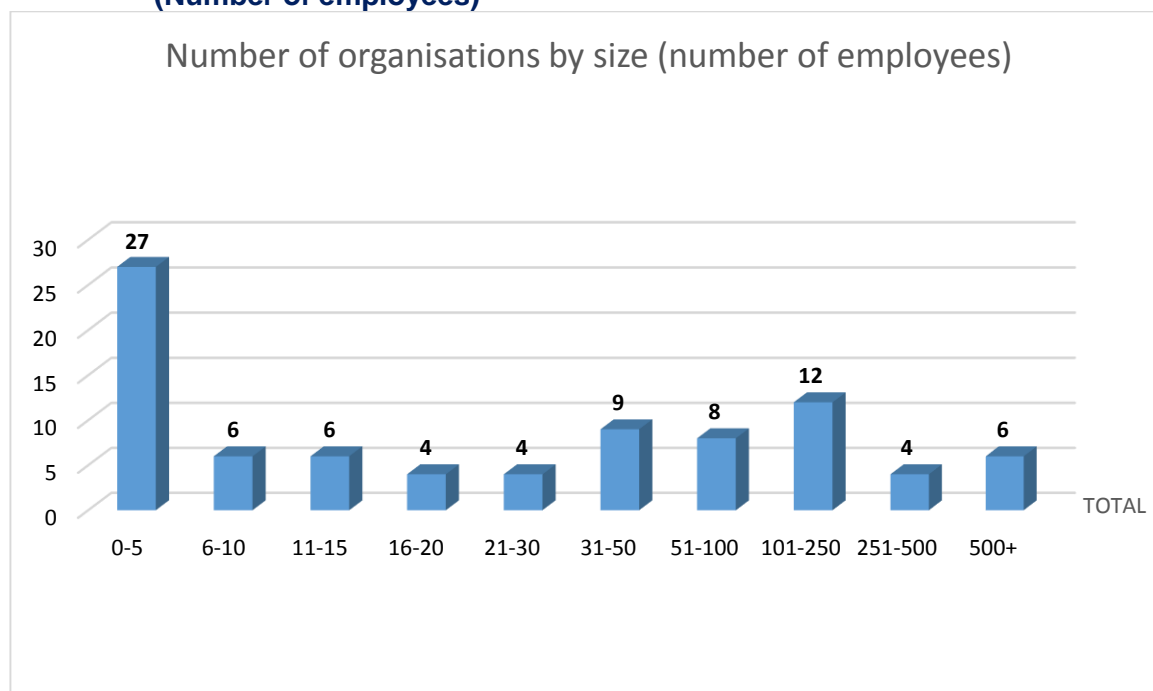
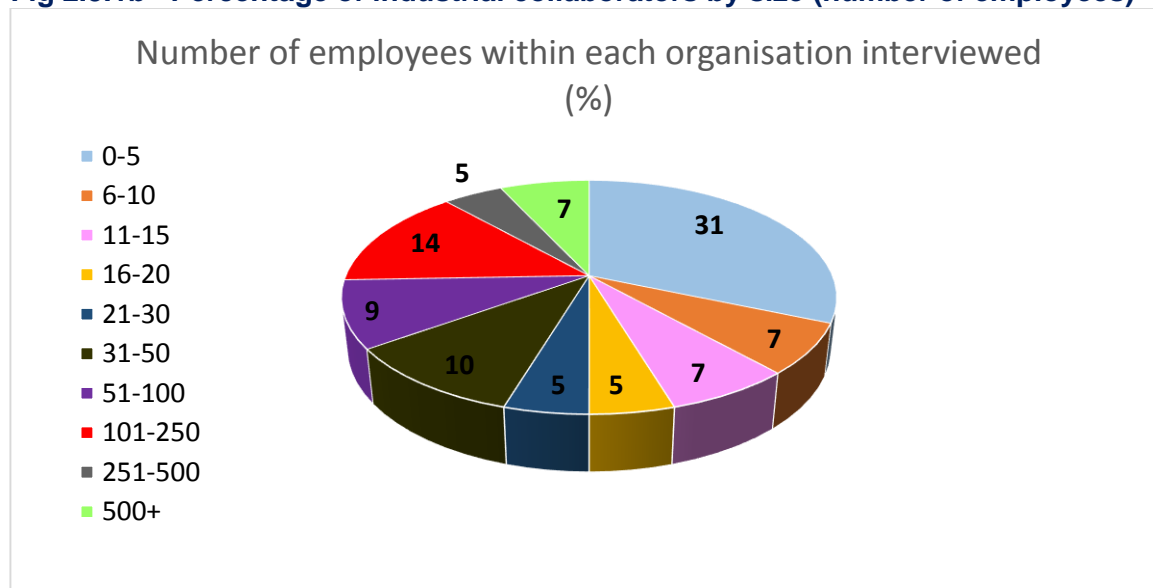


Fig 2.3.1b Percentage of industrial collaborators by size (number of employees)



3.2.2 Contribution to Cross Cutting Themes

The CCT Targets and achievement against these targets is highlighted in the table below.

Table 3.2.2a Cross Cutting Theme Targets

Findings	Original Targets	Re-profile Targets	Achievements to 31st May 2015	Percentage Achieved against re-profile targets	Percentage Achieved against original targets
Enterprises adopting Environmental Quality Systems	20	25	25	100%	125%
Enterprises adopting Equality Monitoring Systems	16	31	31	100%	194%

This table illustrates the success of the approach taken by ASTUTE in respect of Cross Cutting Themes which has achieved results over and above both the Original and Re-Profile Targets. This was made possible through the close working relationship within the ASTUTE team. The cross cutting interventions also contributed to targets in Table 3.1a. Notably one collaborative partner created a new employment position and made an investment of £28K as a result of this intervention.

3.2.3 Quality of collaborations and future growth potential of the businesses based on the interactions from ASTUTE.

Data collated within this section highlights quality of support provided, project success, perception of academia/industry collaboration plus impacts experienced as a result of ASTUTE intervention. We have also explored reasons for future engagement and demand for additional services.

A high level of satisfaction with the ASTUTE Project was indicated by participants, with the majority of respondents stating that the four aspects of ASTUTE listed above were either “good” or “excellent”. No companies selected the option to rate any of the above aspects of ASTUTE as “poor”. 90% of respondents indicated that their overall experience with ASTUTE was either “good” (42%) or “excellent” (48%), with

the remaining 10% stating that their experience was “acceptable”. The ease and speed of initial response was found to be exceptionally positive, with 92% stating that the speed of response was good or excellent, and 94% stating that the ease of response was good or excellent.

The following tabular and graphical representation of the above results highlights the positive responses received from companies with regards to the various performance aspects of ASTUTE researched.

Table 3.2.3a Business responses in relation to the engagement performance aspects of ASTUTE.

On a scale of 1 to 4, where 1 = poor, 2 = acceptable, 3 = good and 4 = excellent, please rate the following aspects of ASTUTE.				
Responses	Poor	Acceptable	Good	Excellent
Ease of initial response	0 (0%)	5 (6%)	31 (36%)	50 (58%)
Speed of initial response	0 (0%)	7 (8%)	34 (40%)	45 (52%)
Quality of ongoing support or communication	0 (0%)	11 (12%)	34 (40%)	41 (48%)
Overall experience with ASTUTE	0 (0%)	9 (10%)	36 (42%)	41 (48%)

Figure 3.2.3a Quality of engagement support received by companies under ASTUTE.

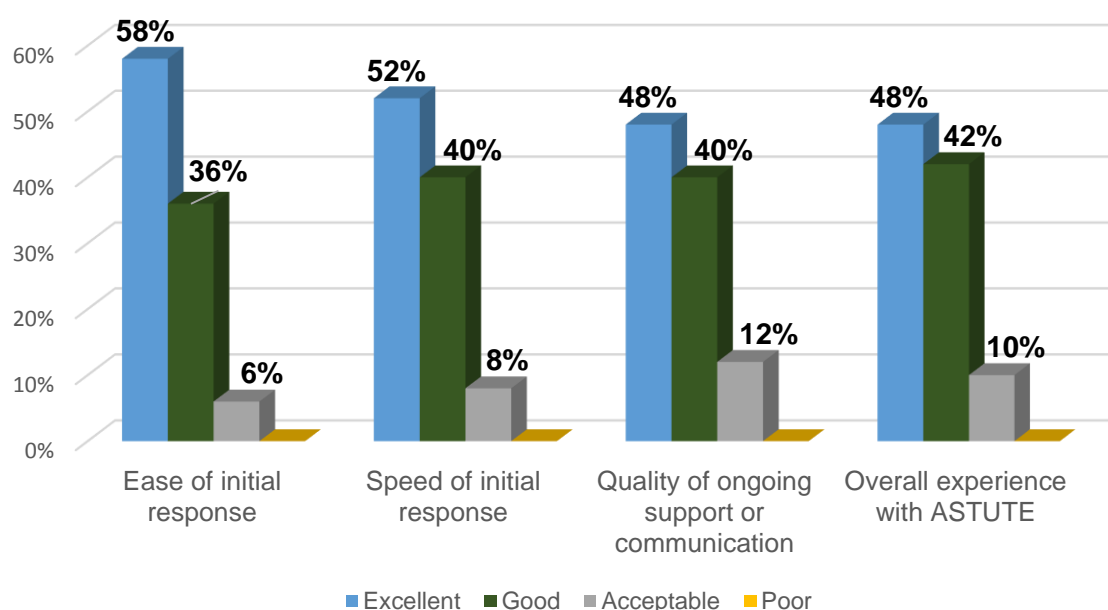
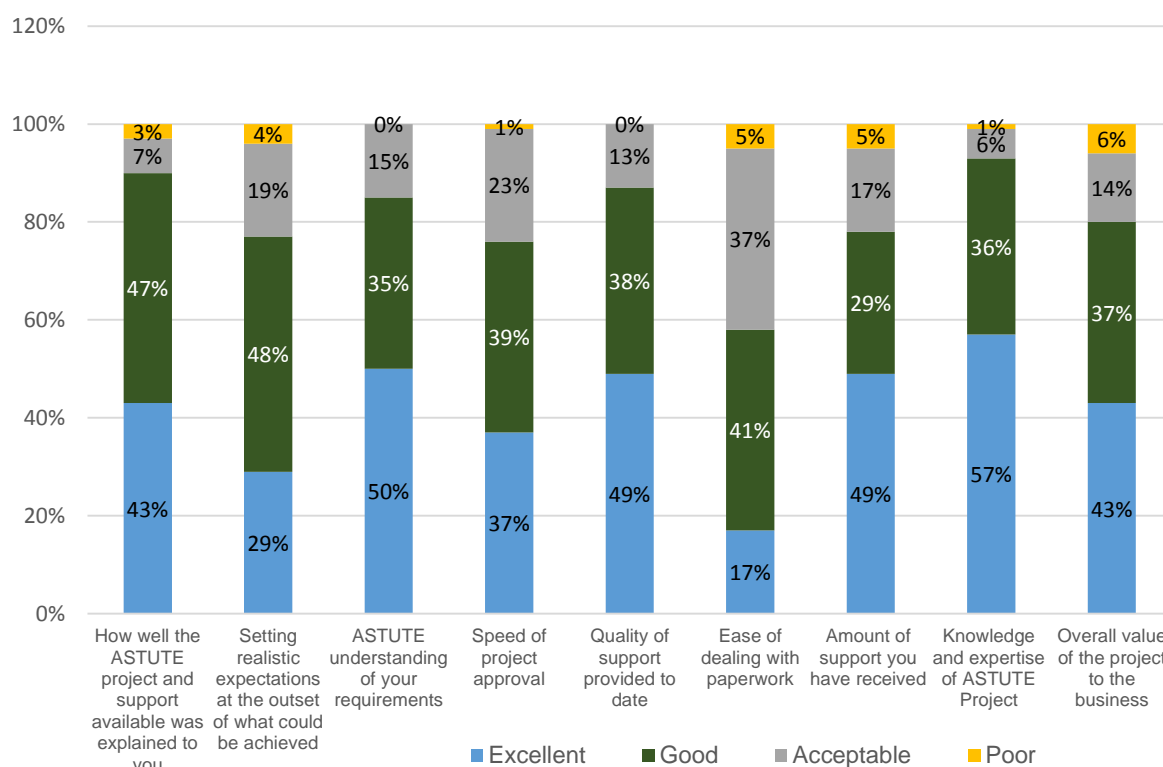


Table 3.2.3b Business responses in relation to the quality of the supports provided by ASTUTE.

On the scale of 1 to 4, where 1 = poor, 2 = acceptable, 3 = good and 4 = excellent, please rate the following aspects of ASTUTE.					
Responses	Poor	Acceptable	Good	Excellent	NA
How well the ASTUTE programme and support available was explained to you	2 (3%)	6 (7%)	37 (47%)	34 (43%)	
Setting a realistic expectation at the outset of what could be achieved	3 (4%)	15 (19%)	38 (48%)	23 (29%)	
ASTUTE understanding of your requirements	0 (0%)	12 (15%)	28 (35%)	39 (50%)	
Speed of getting the project approved	1 (1%)	18 (23%)	31 (39%)	29 (37%)	
Quality of the support provided to date	0 (0%)	10 (13%)	30 (38%)	39 (49%)	
Ease of dealing with the paperwork	4 (5%)	29 (37%)	32 (41%)	14 (17%)	
Quality of the support you have received	3 (4%)	12 (14%)	20 (23%)	51 (59%)	
Amount of the support you have received	4 (5%)	15 (17%)	25 (29%)	42 (49%)	
Knowledge and expertise of ASTUTE project staff	1 (1%)	5 (6%)	31 (36%)	49 (57%)	
Overall value of the project to the business	5 (6%)	12 (14%)	32 (37%)	36 (42%)	1 (1%)

The results in the table above highlight the highly positive feedback gained from industrial collaborators who engaged in a collaborative R&D Project with ASTUTE. Whilst 86 companies were interviewed, the first six questions were asked to companies at the MID Term Evaluation and companies who were not involved in a Collaborative R&D Project at this stage would not have provided a response to this question. This explains the discrepancies in the number of responses. 49% of companies ranked the quality of support received as excellent, with a further 38% rating it as good. Similarly the rating given for the knowledge/expertise of ASTUTE staff was overwhelmingly positive with 93% rating this as “good” (36%) or “excellent” (57%). These results are demonstrated in Figure 3.2.3b, showing the distribution of responses.

Figure 3.2.3b Quality of project support received by companies under ASTUTE



The Final Evaluation interviews elicited views and opinions relating to the contribution made by ASTUTE and the relative success of each of the collaborative R&D Projects from the perspective of the Senior Technical Manager. This compares the perception of the Senior Technical Manager with the perception of participating business in two ways. The first of these is the relative success of the Project and the second is relation to meeting expectations. A table of these 86 projects has been listed in Appendix B of this report.

Table 3.2.3c R&D Project Success Perception Comparison.

Senior Technical Manager & Business perception MATCHED i.e. both said Exceeded Expectations	Senior Technical Manager perception lower than that of Business i.e. STM said Met Expectations & Business said Exceeded Expectations	Senior Technical Manager perception higher than that of Business . i.e. STM said Exceeded Expectations & Business said Met Expectations
47%	25%	28%

Table 3.2.3d Industrial collaborator perspective of Collaborative R&D project success

<i>In your opinion has the project to date:-</i>				
<i>Far exceeded expectations</i>	<i>Exceeded expectations</i>	<i>Met expectations</i>	<i>Fallen short of expectations</i>	<i>Fallen far short of expectations</i>
6 (7%)	18 (21%)	44 (50%)	14 (16%)	5 (6%)

Figure 3.2.3c – Industrial collaborator perspective of Collaborative R&D project success (%)

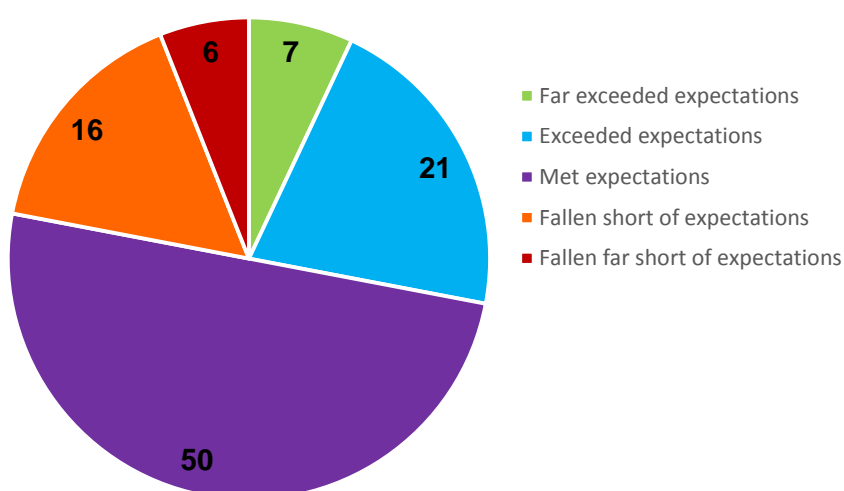


Figure 3.2.3c above show the industrial collaborator perception of whether the collaborative R&D Project, fell short, met or exceeded expectations. This analysis showed that 78% of the Projects met, exceeded or far exceeded business expectations.

Where individuals/companies felt there were barriers/difficulties faced during the collaborative working (R&D Projects), these were captured and reported in Table 3.2.3e. Of the 86 companies interviewed, 74% stated there were some barriers to overcome during the project.

Table 3.2.3e Barriers faced during engagement on a collaborative R&D Project with ASTUTE.

Barriers Faced	% respondents.
Project Timescales	37%
Overcoming technical challenges	31%
Paperwork Processes	30%
Availability of Business time	30%
Business's own technical resource	28%
Availability of Business staff	16%
Limitation of ASTUTE resources	16%
Identifying technical expertise	12%

Areas where ASTUTE support has or is expected to contribute.

Table 3.2.3f highlights the areas where ASTUTE has made a tangible contribution or where a tangible impact is expected in the future as result of ASTUTE involvement. The most frequent improvement was an increased level of business, with 71% of respondents stating a future and/or current increase. 19% of the respondents indicated a current increase in investment with a further 53% stating that future investment was projected. Additional employment currently was advised by 14% of the respondents with a further 53% indicating future employment was projected as a result of the ASTUTE collaboration. Together these give 72% with current or future investment and 67% of collaborations resulting in additional employment.

Table 3.2.3f Business responses in relation to the current of future contributions resulting from the ASTUTE intervention.

Has your involvement with ASTUTE brought about or contributed to any of the following? Answer either “NO”, “YES, currently” or “YES, expected in the future”.			
Responses for Projects and Assists	YES Future	YES Currently	NO
Increased level of business	52 (59%)	11 (12%)	26 (29%)
Increased employment	47 (53%)	13 (14%)	30 (33%)
Increased Investment	48 (53%)	17 (19%)	26 (28%)
Launch of new products or services	45 (51%)	16 (18%)	28 (31%)
Introduction of new processes or procedures	41 (47%)	21 (24%)	25 (29%)
Promotion of Equal Opportunities	4 (5%)	9 (10%)	74 (85%)
Promotion of Environmental sustainability	8 (9%)	10 (12%)	69 (79%)
Links to other business in the Convergence area	6 (7%)	15 (18%)	64 (75%)

The following chart is a graphical representation of the table above and highlights the areas which have been contributed to within companies as a result of ASTUTE involvement. The most frequent improvement was an increased level of business, with 71% of respondents stating a future and/or current increase.

Figure 3.2.3d. Graphical representation of the feedback from the industrial collaborators in respect of current and future areas where ASTUTE supports have or will contribute.

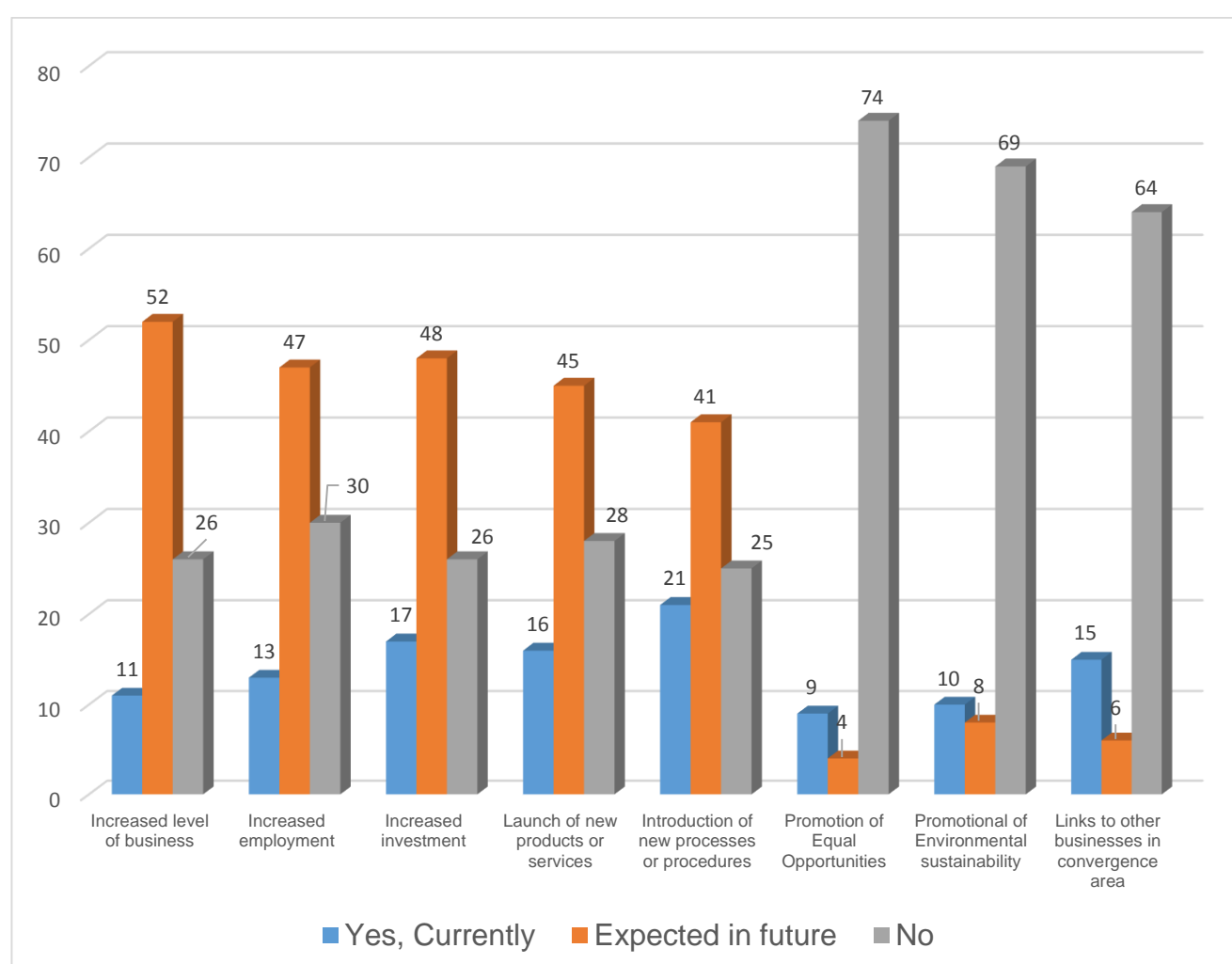


Table 3.2.3g Quantified impacts achieved to date and future projections by industrial collaborators as a result of ASTUTE supports.

Has your involvement with ASTUTE brought about or contributed to any of the following? Answer either “NO”, “YES, currently” or “YES, expected in the future”.				
Breakdown for Collaborative R&D projects only	YES Future	Number / Value To date and Future Projection	YES Currently	NO
Increased level of business	52 (59%)	Projection. £203,260,000	11 (12%)	26 (29%)
Increased employment	47 (52%)	To date. 158 Projection. 251	13 (15%)	30 (33%)
Increased Investment	48 (53%)	To Date. £6,636,800 Projection. £210,043,000	17 (19%)	26 (28%)
Launch of new products or services	45 (51%)		16 (18%)	28 (31%)
Introduction of new processes or procedures	41 (47%)		21 (24%)	25 (29%)
Promotion of Equal Opportunities	4 (5%)		9 (10%)	74 (85%)
Promotion of Environmental sustainability	8 (9%)		10 (12%)	69 (79%)
Links to other business in convergence area	6 (7%)		15 (18%)	64 (75%)
Any Other				
Please See Appendix A for comments and observations collected from industrial collaborators during the Final Evaluation Process.				

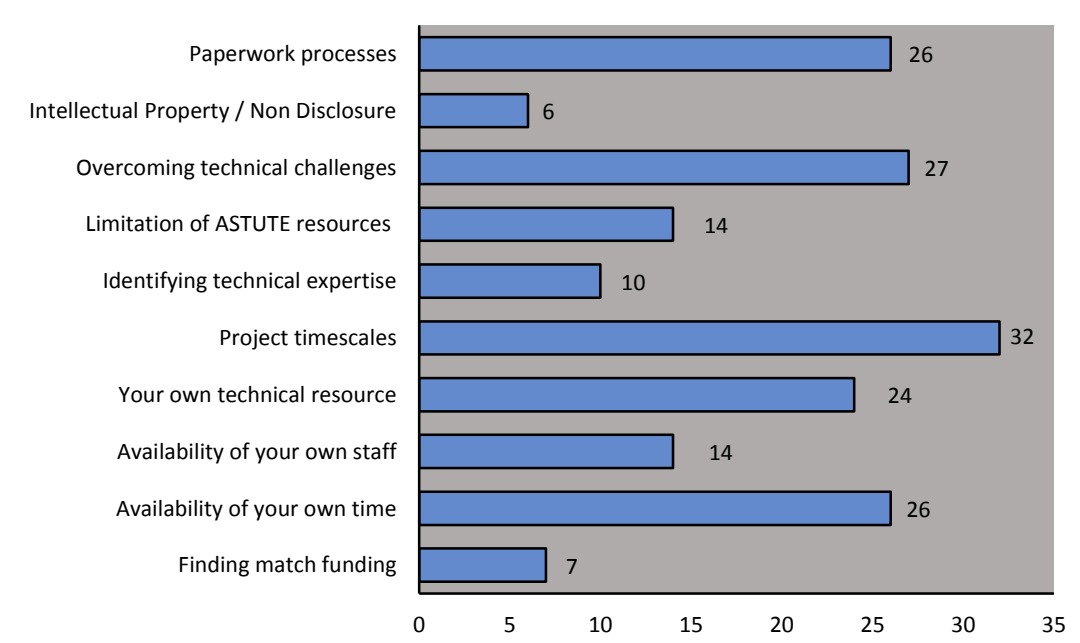
The information within this table represents data collected from industrial collaborators on the ASTUTE Project and has been used as a basis for the calculation of Value for Money in Section 3.6 of this report.

Table 3.2.3h Timeframe for realisation of benefits

Are the benefits of your involvement or project with ASTUTE?							
Long Term	50 (56%)	Medium Term	25 (28%)	Short Term	8 (9%)	No Benefits	7 (7%)

The important finding here is that 56% of the businesses interviewed indicated that the benefits of their collaboration with ASTUTE are long term (defined in this process as greater than 3 years) with a further 28% indicating benefits were medium term (defined in this process as 1 to 3 years). This aligns with the quantified results for projected increased investment and projected increased level of business relating to the 84% citing medium or long term benefits expected. This serves to further underline the value of the longer term impact projected by the businesses involved in Collaborative R&D projects.

Figure 3.2.3e Graphical representation of the barriers faced by the 86 businesses during the collaborative project with ASTUTE



The main barrier faced by businesses were the project timescales, with 50% of those who indicated that they faced barriers to their project with ASTUTE selecting this option. Other significant barriers included overcoming technical challenges, paperwork processes and the availability of the respondent's own time. In addition to the barriers represented above, one respondent expressed an issue with their geographical location, with a further two respondents having issues due to company relocation. One also stated that the contacts with Welsh Government overseas services were not as had been promised, and hence posed a barrier to developments.

Table 3.2.3i Intellectual Property Issues

ASTUTE do not currently offer services in respect of Intellectual Property. If such a provision was available via ASTUTE would your business be interested in making use of such a provision?			
YES	36 (42%)	NO	50 (58%)
If NO Please advise the reason why not.			
The business has no IP to protect			9 (18%)
<i>NOTE if this response is given there is no need to continue further</i>			
The business is not concerned about protecting its IP			0
The business has its own in house IP specialists			11
The business has already appointed specialists to look after its IP requirements			23
Other			7
<p>42% of participants indicated that they would be interested in making use of services in respect of Intellectual Property, were it on offer by ASTUTE. Of the remaining 50 participants who indicated that they would not be interested, 9 of these were businesses with no IP to protect, and 34 either had their own in house IP specialists, or already have appointed specialists to look after its IP.</p>			

The issue of Intellectual Property has arisen with a greater frequency during the latter part of the ASTUTE project as Collaborative R&D projects were reaching fruition at which time there is increased awareness of the potential value of novel and innovative techniques and collaborative developments. This has been discussed in Section 4 with recommendations regarding IP made in Section 5.3

3.3 Project Indicators – Findings

The findings of the Final Evaluation confirm that the project indicators adopted, and defined by the metrics in Table 3.1a are, in general, relevant for measuring the performance and impact from this type of intervention project. There are three that have been found to be less relevant are those relating to Number of Assists, Enterprises adopting EMS, and Enterprises adopting EQS.

In addition the business interviews identified that there was significant increased investment by many of the industrial collaborators which has been discussed in Section 4.3 as a potential impact measure in the future. The Final Evaluation also identified that there were very few active referrals to or from other Projects and Programmes. This issue has been discussed in Section 4.3 and recommendations in respect of referrals for any future intervention project or programme have been made in Section 5 of this report.

3.4 Added Value - Findings

This section will draw on evidence regarding how the project added value in a number of areas as defined in the Terms of Reference. The data reported in Section 3.4 details the improvement areas which include increased level of business, increased employment, increased investment, launch of new products or services and introduction of new processes or procedures as this section explores the stimulation of ideas and translation of involvement into wider improvement impacts for both business and economy. Figure 3.4.5a specifically highlights how the ASTUTE project has initiated developments and improvements to various aspects of their business currently, and how they propose impact will be experienced in the future.

3.4.1 Stimulation of ideas within companies, and assessment as to what extent these have developed into collaborative projects.

The ASTUTE Project has provided individuals and organisations with an opportunity to explore innovative ideas and undertake feasibility studies/research to make improvements or launch new processes/products or services.

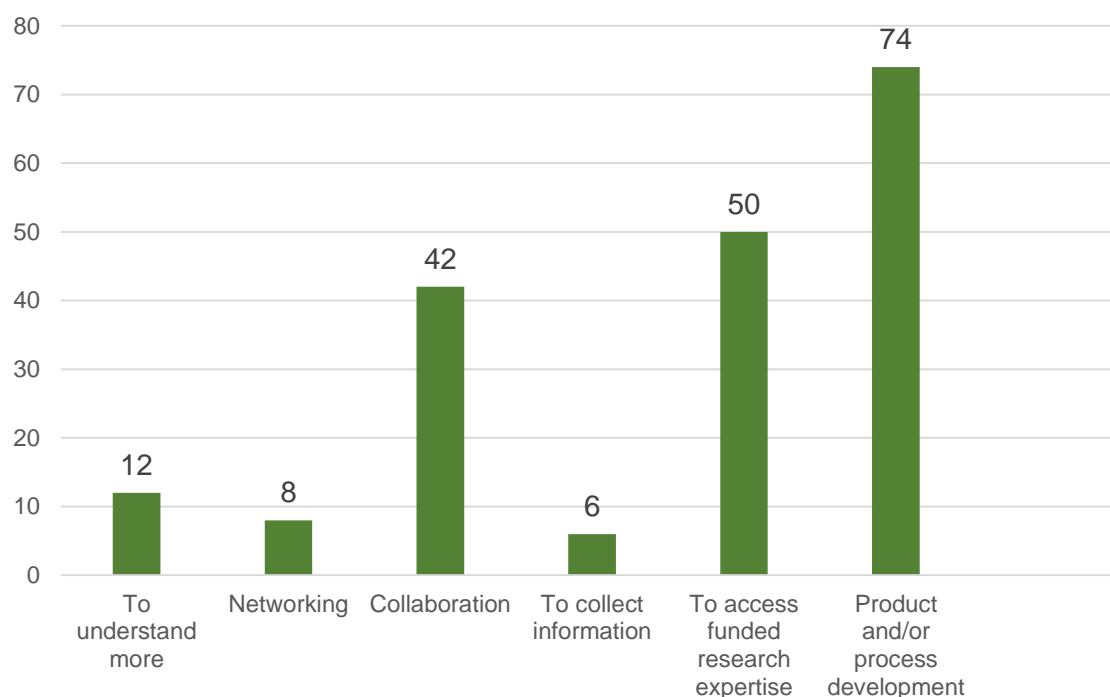
From the data provided by ASTUTE, they have worked with over 140 organisations on collaborative R&D projects with outputs ranging from increased investment, increased business, enhanced processes and procedures plus new ideas launched commercially.

As of January 2015, ASTUTE supported nearly 300 Assists, claimed 11 new Enterprises launched, nearly 500m2 of innovation space created, adoption of new systems (environmental quality and equal opportunities management) and investment induced of over £6m.

The detail regarding outputs can be found later on in this report and demonstrates how ASTUTE has supported the stimulation of ideas through provision of resources, facilities, advice and guidance.

We collated information to ascertain the primary reason for participating companies engaging with ASTUTE to explore the motivations and demands of the market place – this also helps to indicate how open organisations are to acquisition of knowledge, developing expertise and exploring NPD (new product development).

Figure 3.4.1a. Primary reasons for participating companies engaging with ASTUTE (number of responses).



3.4.2 Development of collaborative working between university partners in order to meet the needs of businesses.

The Final Evaluation identified evidence of 16 collaborative projects involving two or more ASTUTE partner HEIs. Each of these projects had a nominated lead partner with expertise from the supporting partner being accessed to address specific issues and contribute with specialist expertise.

Evidence provided by the Academic Partners regarding inter University collaboration and benefits arising from this included:

- Joint workshops with Software Alliance Wales;
- Collaboration with the Wales Centre for Behaviour Change;
- Inter University links and referrals based on identification of expertise (including engagement with Oxford University);
- Grant Proposals Submitted (Horizon 2020, UK Research Council Funding and Innovate UK);
- Enablers for Knowledge Transfer Partnerships (KTPs);
- LEAD Wales Programme referrals;
- Strategic Insight Programme.

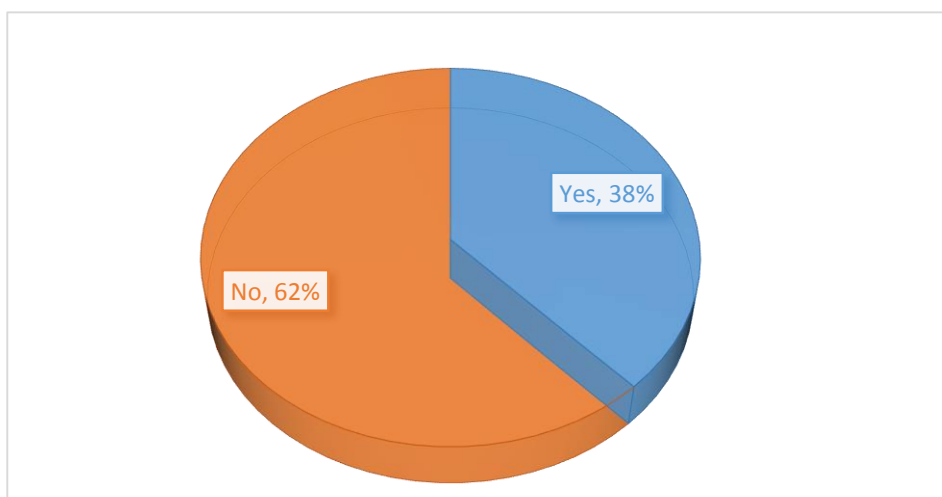
In relation to Academic Partner Interviews, the research revealed the following:

- ASTUTE is considered different from other ERDF projects because of the access to an extensive knowledge based across eight University partners;
- ASTUTE is a vehicle for communication/speculative investigation with commercial organisations for mutual benefit, and has served to break down cultural barriers which may have existed between academia and manufacturing industry;
- ASTUTE has encouraged academics to approach collaborative projects within commercial time frames;
- ASTUTE has delivered outputs above and beyond those defined in the targets;
- ASTUTE has enabled businesses to access facilities and resources with which they are unfamiliar and can benefit from;
- ASTUTE has enabled the development of relationships via the network of collaborative projects as well as via promotion, public relations and digital media. This has created a strong asset in terms of a database for research and future use.

3.4.3 Integration with wider business support network.

Table 3.4.3a Wider business supports received

Other than ASTUTE are you currently working with or receiving support from any other University or Welsh Government project?	Yes	No
	33 (38%)	53 (62%)



The University/WG and wider supports referred to include the following:

University of Wales Trinity Saint David WG WDP x3 WG R&D Grant x2 WG Innovation Wales Economic Growth Fund Coleg Sir Gar x2 Skills Growth Wales WG SMART	Cardiff University x3 PDR, Cardiff KTP & Network 75 Swansea University x 4 Strathclyde University Coleg Cwmcoed Glyndŵr University KTP Carbon Trust WG HPC	Universities of Reading & Sheffield CIRP Access to Masters Grants for equipment performance improvement Bangor University Business in Focus CNH and CAN (SU) KESS
---	---	--

From those who responded negatively to the former question, 83% stated they would be interested in receiving more information on what is available within the market to support their business.

ASTUTE reported that there has been a very low level of referrals from the Welsh Government to the ASTUTE project and accepted that likewise a low number of referrals had been made to Welsh Government Programmes. There was also recognition that there is no formal or effective process to encourage and monitor

leads generated or referrals made by either party. One partner recorded 2 referrals from the Welsh Government which resulted in 1 project over the 5 years period.

Additionally many of the partners highlighted that there is competition with regards to claiming targets in respect of many of the ERDF Projects or Welsh Government Programmes. The result of this is that many of the Projects are protective, examples being projects such as Jobs Growth Wales, the Welsh Government Business Innovation Programme and the High Growth Entrepreneur Programme all of which themselves claim jobs created. The result of this is there are few referrals as these inevitably lead to conflict and competition as to where the impact should reside. An example being jobs created after an ASTUTE Project via Jobs Growth Wales for a business on the High Growth Entrepreneur Programme! In an ideal world there would be sharing of impacts, however in reality every single Project or Programme needs these impacts for themselves to meet their own performance targets.

Other individuals and organisations which were mentioned included:

- HSSMI – High Speed Sustainable Manufacturing Institute.
- Welsh Government Chief Scientific Officer
- College of Physical and Applied Science
- Digital Wales
- Quinetiq
- A4B

In relation to Intellectual Property – the Academic Partners reported:

- There are shared Intellectual Property (IP) Agreements with industrial collaborators and therefore no IP issues preventing projects proceeding;
- Improvements are needed to the current Non Disclosure Agreements;
- Recommend a centralised, more effectively managed process for exploiting IP;
- Two stalled projects due to IP issues;
- Universities operating different IP policies

Please also see Section 4 and 5.3 regarding Intellectual Property issues

Throughout the ASTUTE Project there have been ongoing interactions and meetings with the Welsh Government at both ministerial and operational levels; to raise awareness of ASTUTE; to share information on achievements and to share and explore possible collaboration and referrals to/from other supports in Wales. ASTUTE have maintained a record of interactions, dates and persons involved which has been evidenced as a part of this evaluation process. It was also determined that there was no advantage or need to publish this evidence.

These ministerial and operational meetings had a time period from the 9th of May 2012 until November 2014. These various interactions with the Welsh Government happened over 64 dates during the course of the time period. These meetings involved over 60 points of contact, ranging from WG Support deliverers to Finance Ministers. Also at one of the interactions events over 50 delegates were in attendance.

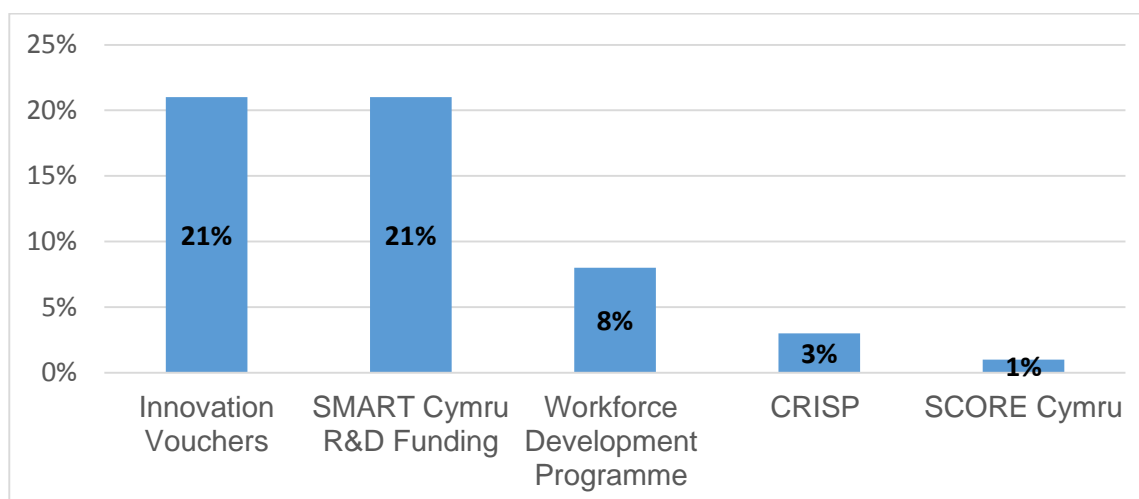
During the Mid-Term Evaluation it was identified that during the first half of the Project, ASTUTE had, as matter of course, been declining, but not recording evidence of, projects which were deemed as being unsuitable or ineligible for ASTUTE support. In the latter part of the ASTUTE Project all enquiries have been captured to evidence the following:-

- **Referrals to the private sector** (where it was adjudged that the project could be delivered by a private sector organisation and was therefore ineligible for ERDF funded support to avoid potential displacement). The latter part of the ASTUTE Project has evidenced 11 referrals to the private sector. As an ERDF funded Project the policy of ASTUTE has been to remain independent and impartial in this matter and as such have adopted the same policy as the Welsh Government departments of not recommending any particular organisation over any other. Additionally the businesses making the initial enquiry remain commercial in confidence.
- **Referrals to other ERDF projects** where the match of the requirements was more aligned to an alternative Project in Wales. Data was evidenced of 6 referrals to other ERDF Projects.
- **Referrals to other specialisms within HEI departments** better placed to meet the defined requirements. The evaluation identified 3 further referrals to other specialist departments within HEI.
- **Referrals to Welsh Government initiatives, supports and projects.** In addition to the general guidance and advice offered by ASTUTE on Welsh Government supported initiatives relating to employment and training supports (such as GoWales, Jobs Growth Wales and the Workforce Development Programme), evidence was provided of 3 specific instances of referrals to Welsh Government Innovation initiatives. It should be noted at this point that the businesses involved in collaborative R&D Projects with ASTUTE that were interviewed as a part of the Final Evaluation were in general very well informed and aware of many of the Innovation supports provided by the Welsh Government including the Research Development and Innovation supports (RD&I Programme, now re-named SMART) and

Innovation Vouchers. In addition the proactive marketing by ASTUTE through social media and events has provided guidance to companies of these initiatives and possibly resulted in a direct approach from the companies within the network. These may therefore not have been tracked back to ASTUTE as a referral source.

- **Other potential Assists or Projects that have been declined.** In addition to the above details were evidenced of enquiries for support being declined by ASTUTE as being unsuitable for ERDF funding supports, out of area, technically unachievable or unsustainable.

Figure 3.4.3a Additional support utilised by ASTUTE industrial collaborators



3.4.4 Exit strategy and sustainable progression of the project.

ASTUTE have been proactive in documenting an exit strategy and plan for application for additional funding to take ASTUTE forward to 2020. This document is currently being finalised by the ASTUTE management team.

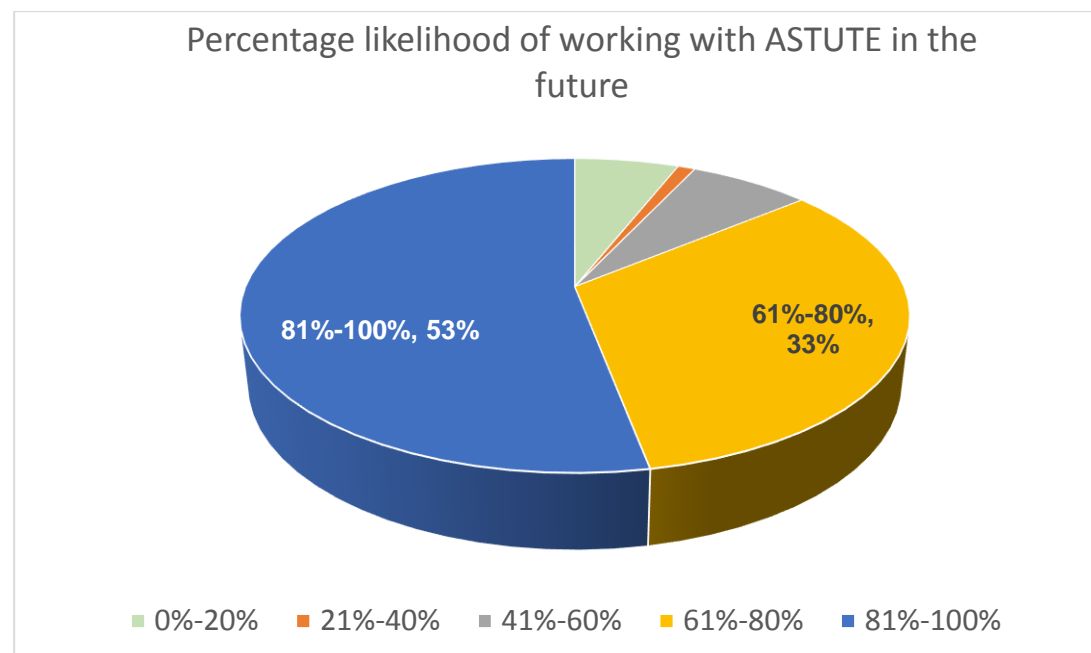
In order to ascertain if there is demand for the services offered by ASTUTE in the future, a number of questions were asked and responses can be utilised to support any application for future funding as it reveals an extensive willingness and a strong need for continued collaborative opportunities.

The question asked and responses have been illustrated below

Table 3.4.4a Percentage likelihood of working with ASTUTE in the future

What is the % likelihood of you working with ASTUTE again in the future									
0-20%	5 (6%)	21-40%	1 (1%)	41-60%	6 (7%)	61-80%	28 (33%)	81-100%	46 (53%)

Figure 3.4.4a What is the % likelihood of you working with ASTUTE again in the future?

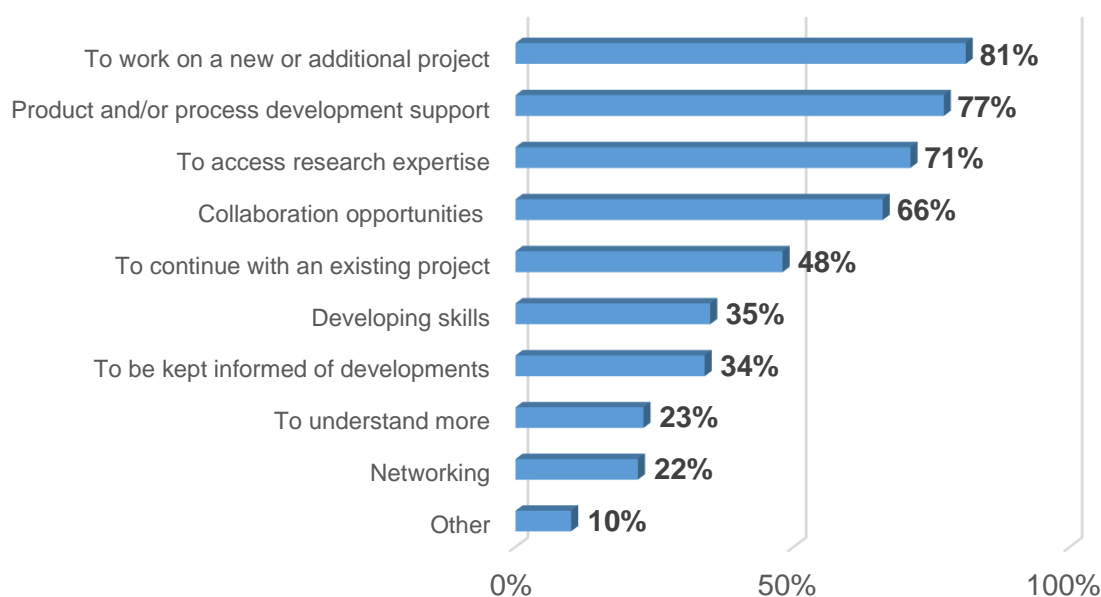


In relation to the future, the reasons industrial collaborators gave for maintaining contact with ASTUTE (with an existing awareness of what they are able to provide and knowledge of the quality of delivery/resources available), the following responses were obtained – see Table 3.4.4b.

Table 3.4.4b Reasons for maintaining contact with ASTUTE (out of 86 interviewed)

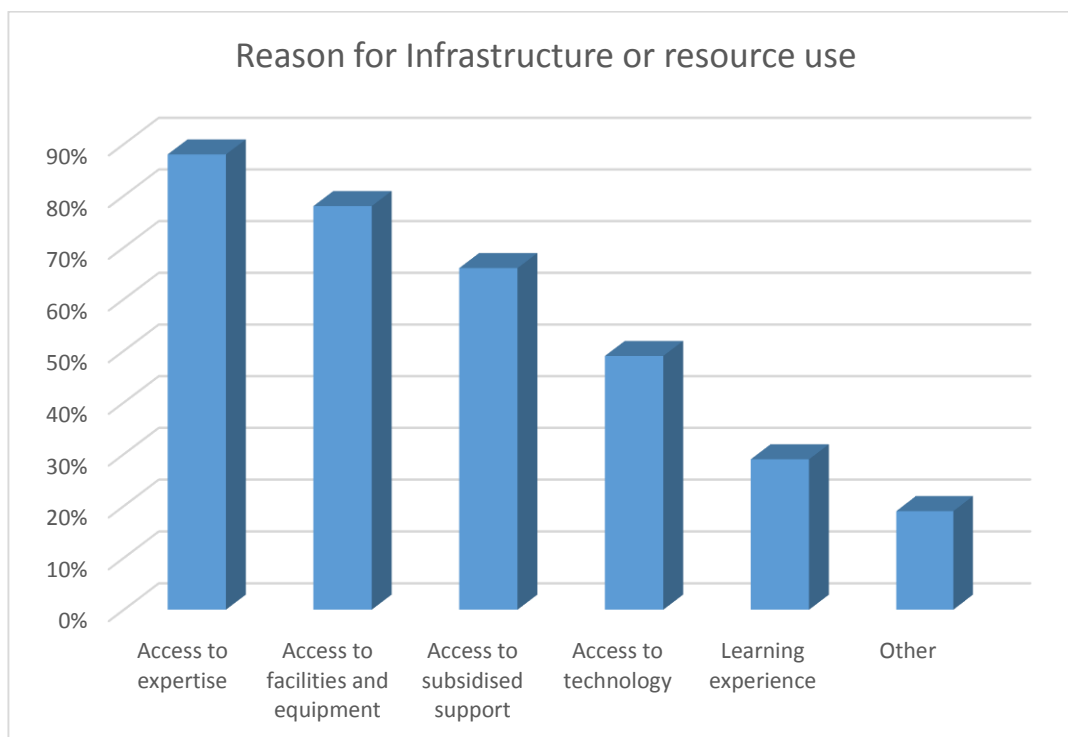
What will be your main reason for maintaining contact with ASTUTE?			
Please tick all that apply.			
To understand more	20 (23%)	To be kept informed of developments	29 (34%)
Networking	19 (22%)	To access research expertise	61 (71%)
Collaboration	57 (66%)	Product and/or process development	66 (77%)
Developing skills	30 (35%)	To continue with an existing project	41 (48%)
Other	9 (10%)	To work on a new or additional project	70 (81%)

Figure 3.4.4b Reasons for maintain Contact with ASTUTE



As well as the reasons for maintaining contact, industrial collaborators were asked what would encourage them to make greater use of the infrastructure or resources of ASTUTE. Figure 3.3.4c shows the main reasons and the % of industrial collaborators that cited these. This information provides a valuable insight into business motivation and should be taken into consideration in the design and delivery of any future ASTUTE Project.

Figure 3.4.4c What would encourage you to make greater use of the infrastructure or resources of ASTUTE?



Industrial collaborators were also asked about their current business development needs. The findings from this are outlined below.

Table 3.4.4c Current business needs

How would you best describe your current business development needs? (Please tick all that apply)			
Technical expertise needs	48 (56%)	New product and/or process development needs	70 (81%)
Need for access to support	35 (41%)	Investment in research & development	43 (50%)

Legacy impacts

These include:-

- Contribution to a structural and sustained impact on the targeted sectors/businesses; raised the level of spend related to R&D and design and development in the targeted sectors/businesses; and if any wider environmental benefits have accrued from the activity.

When asked if their involvement with ASTUTE had brought about, or contributed to, improvements within the organisation in a range of areas, the following responses were obtained.

3.4.5 Impacts achieved or expected

As a part of the evaluation industrial collaborators were asked about impacts they had achieved or were expecting as a result of their engagement with ASTUTE.

Table 3.4.5a gives the numbers and percentages from the 86 respondents and Figure 3.4.5a represents this graphically.

Table 3.4.5a Impacts achieved or Expected as a result of ASTUTE intervention

Impacts Achieved or Expected	Yes, Currently	Expected in future
Increased level of business	11 (12%)	52 (59%)
Increased employment	13 (14%)	47 (53%)
Increased investment	17 (19%)	48 (53%)
Promotion of Equal Opportunities	9 (10%)	4 (5%)
Promotional of Environmental sustainability	10 (12%)	8 (9%)
Launch of new products or services	16 (18%)	45 (51%)
Introduction of new processes or procedures	21 (24%)	41 (47%)
Links to other businesses in convergence area	15 (18%)	6 (7%)

Figure 3.4.5a Impacts experienced/proposed as a result of ASTUTE engagement.

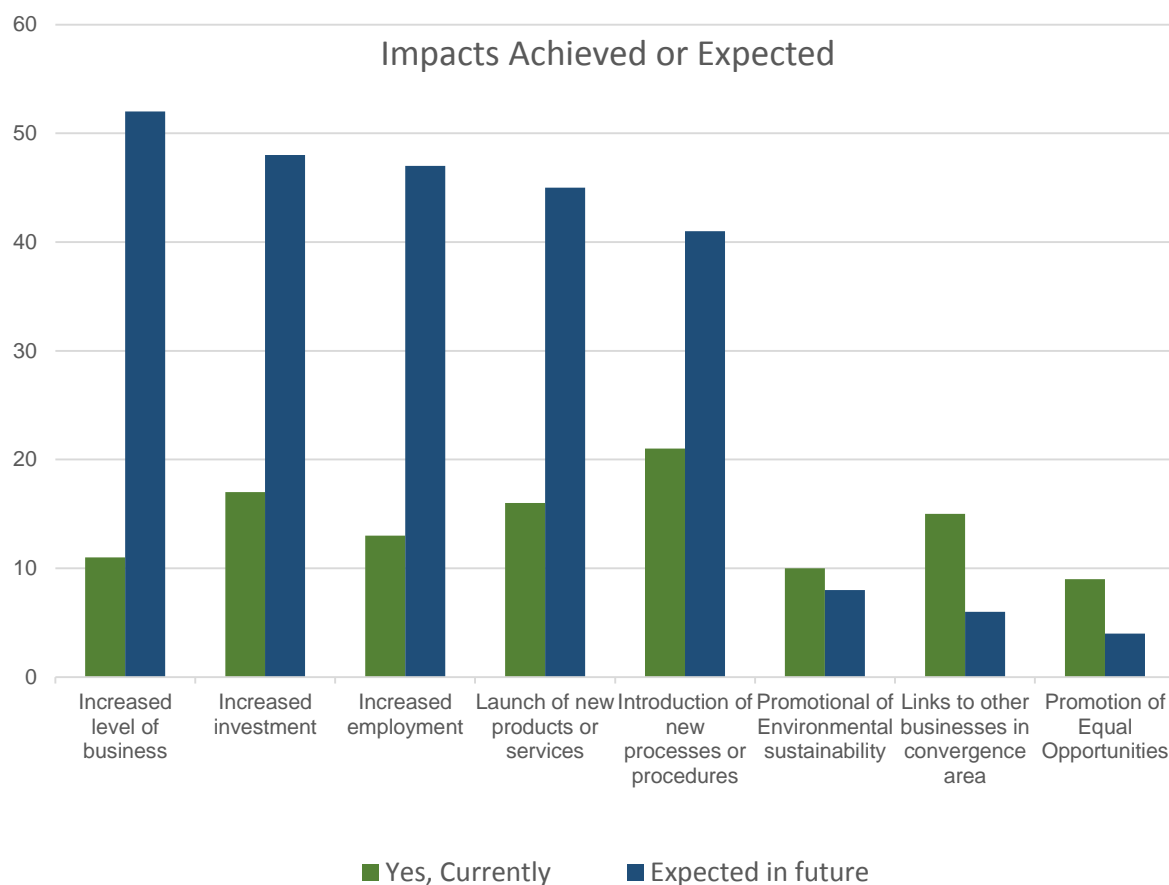


Figure 3.4.5a refers to the number of responses relating to each of the impacts. Please see Table in 3.4.5a for the related percentages.

3.4.6 Improvement and Impact

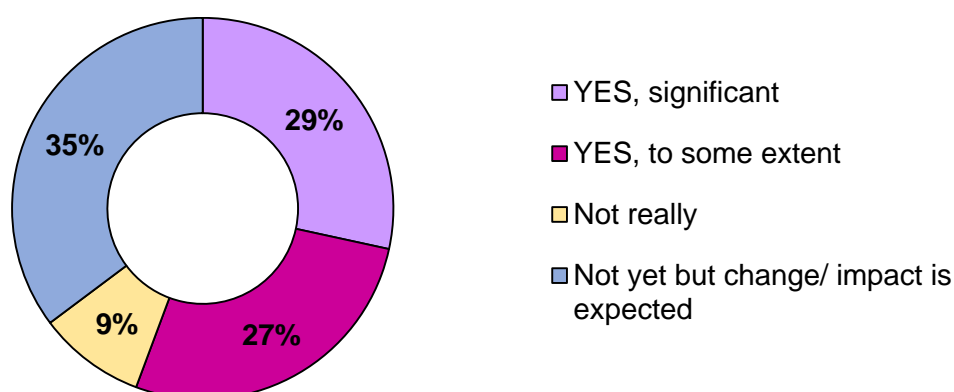
When asked about whether their involvement with ASTUTE had brought about, or contributed to improvements of impact within the organisation the following responses were obtained.

Table 3.4.6a Improvement and impact responses from the 86 Collaborative R&D participants interviewed during the Final Evaluation

Has your involvement with ASTUTE brought about any improvement or impact to your organisation / product / service or processes.			
YES, significant	25 (29%)	YES, to some extent	24 (27%)
Not really	8 (9%)	Not yet but change/ impact is expected	31 (35%)

Figure 3.4.6a illustrates the specific improvements and impacts cited by industrial collaborators as the number of responses to each impact or improvement.

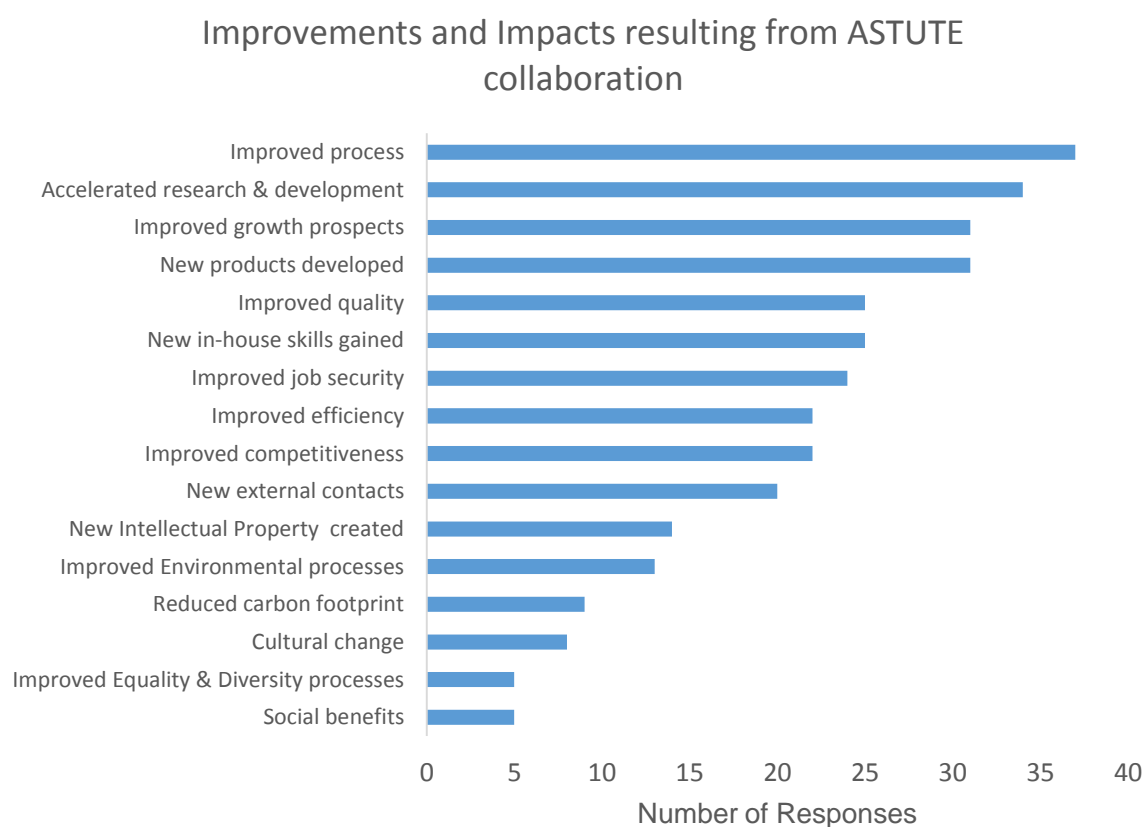
Figure 3.4.6a Improvements or impacts to your organisation/product/service or process?



Areas of Improvement achieved through ASTUTE collaboration

Figure 3.4.6b highlights the areas of improvement or evident impact for those organisations who stated ASTUTE did contribute to organisational development. The most evident improvements experienced by companies were improved processes, accelerated research and development, improved growth prospects and new product developments.

Figure 3.4.6b Graphical representation of the feedback from those companies who stated ASTUTE did contribute to organisational development.



3.4.7 Further benefits and impacts.

Further benefits and impacts have been summarised in the table below and outlined in the subsequent paragraphs.

Table 3.4.7a Further benefits or impacts achieved

Area	Impact
Supply Chain	7 created
World Class Expertise	50 published journals, 19 in preparation, 57 conference papers and a book published
Funding Applications	£49,882,644
Energy savings	10,000 tonnes of CO ₂ per year
Embedding good practice	See discussion below
REF 2014	2 ASTUTE Partners in the top 10 for Engineering

Supply Chain: Evidence was examined during the Final Evaluation of 7 discrete supply chains created as a result of ASTUTE interventions. It was noted that 5 of these involved high profile organisations and multiple suppliers with 1 project involving 19 discrete private sector suppliers in Wales being a part of the supply chain.

World Class Expertise: The ASTUTE Project has resulted in preparation of 70 peer reviewed Journal publications of which 50 have been submitted and published. A further 19 are in preparation or have been accepted and are awaiting publication. There was a further publication which was prepared but subsequently withdrawn from publication for Intellectual Property reasons. Additionally there have been 57 conference papers produced of which 53 have been written, submitted and published and a further 4 that have been accepted or are currently in preparation. As a final example of World Class expertise resulting from the ASTUTE Project, a book has been written and published by four of the academic partners in the ASTUTE Project.

Funding Applications: The Final Evaluation evidenced 33 Collaborative R&D Projects which led onto additional funding applications submitted by participating companies. At the time of writing this report the total funding application value was £49,882,644. Details of these funding applications are commercially confidential and have not therefore been included within this publication.

Energy savings: Evidence was examined of 10 projects where tangible savings of energy have been achieved as a direct result of ASTUTE intervention. Whilst the ASTUTE business plan defined the saving of energy and reducing greenhouse gases as an ambition, it was not defined as a quantifiable objective. Nevertheless this ambition has been realised with one project alone indicating the potential of saving over 10,000 tonnes of CO₂ per year in the UK alone. These details are commercially sensitive and have therefore not been included within this report.

Embedding good practice: Data was evidenced in the Final Evaluation of collaborative R&D Projects which had resulted in the embedding of good practice within participating companies. The novel nature of these interventions and its collaborative nature has meant that this information is specific to the participant business manufacturing operation. It was therefore deemed not appropriate to publish this evidence.

Evidence of sustainable good practice has been seen in the form of new or improved processes and procedures many of which have been captured and evidenced to WEFO as part of the performance measurement metrics.

Research Excellence Framework (REF) Results: Novel research is high on the agenda for HEIs in terms of both national and international recognition, prestige and competitiveness. Collaborative business centric intervention such as ASTUTE serve to exercise the expertise, knowledge and capabilities within Academia – providing both HEI and external businesses with the opportunity to explore and exploit new commercially beneficial developments. The measure of the power and quality of academic expertise is measured in the UK by the Research Excellence Framework (REF). During the course of the Final Evaluation REF 2014 results were released. REF 2014 results are based on gathered information assessing the quality of research in the UK's higher education institutions.

REF 2014 results show exceptional performance from the Welsh Universities, and in particular the two foremost partners of Swansea and Cardiff Universities. More specifically the excellent results related specifically to the Engineering Departments of Swansea and Cardiff and Cardiff Business School allied to the ASTUTE Project.

The results of the REF showed that Swansea University has risen to position 26 in the list of UK universities for the quality of its research. This is rise from 52nd in 2008, the largest leap amongst research intensive institutions and achieving a position of 22nd in the UK for research impact. More importantly for ASTUTE the Research Excellence Framework (REF) 2014 ranks Engineering at Swansea as 10th in the UK for the combined score in research quality across the Engineering disciplines. For the first time, REF judged universities on the effect their research has on the wider world. 90% of Swansea research was judged to be internationally excellent in its

impact, demonstrating its contribution to the city region, the Welsh economy, and internationally.

Amongst UK Universities Cardiff rose 17 places since 2008 and now ranks 5th only behind Imperial College, LSE, Oxford and Cambridge for the quality of its research. For the first time the funding councils have sought to measure the impact of research, and again the University has performed outstandingly on this indicator, ranking 2nd in the UK, with only Imperial College scoring higher. Cardiff are a part of the Russell Group¹¹ which represents the 24 leading research-intensive universities in the UK. In 2011/12, the Russell Group universities accounted for 73% (over £3.3 billion) of UK universities' research grant and contract income and 75% (over £1.1 billion) of total income from the Research Councils.

Table 3.4.7a College of Engineering UK Top 10 Research Ranking (Source: Research Excellence Framework 2014¹² (weighted average across the four Engineering Units of Assessment))

University	FTE	Panels Combined GPA	Rank
University of Oxford	127.91	3.53	1
University of Cambridge	243.06	3.49	2
Imperial College London	344.10	3.38	3
King's College London	53.34	3.37	4
Cardiff University	48.10	3.35	5
University of Dundee	33.25	3.31	6
University of Edinburgh	91.80	3.30	7
University of Bristol	123.38	3.30	7
Heriot-Watt University	108.84	3.30	7
Swansea University	74.83	3.29	10

Please NOTE. The combined Cardiff GPA Engineering score has been derived from the following:

Unit of Assessment 14 - Civil & Construction Engineering 3.44 (ranked 1st) Unit of Assessment 15 - General Engineering 3.31 (ranked 7th=)

¹¹ <http://www.russellgroup.ac.uk>

¹² <http://www.ref.ac.uk/>

Examples of the world-class research submitted by Swansea University for REF 2014¹³.

Examples of the world-class research submitted by Cardiff University for REF 2014¹⁴

From the perception of **Key Stakeholders** interviewed:

- ASTUTE was efficiently managed and resourced with strong communication in terms of targets.

The benefits to the University cited by key stakeholders included the following observations:-

- ASTUTE has raised the profile of Engineering Expertise within Welsh HEIs and established a strong vehicle for liaising with strategic organisations with whom collaborative relationships have been identified as beneficial;
- ASTUTE has encouraged a culture of innovation and commercialisation within academia.

Stakeholders also made the following observations:

- Adequate resourcing of the ASTUTE Project is critical in terms of time, management, expertise and physical resources;
- Early and continuous evaluation of progress against targets would also be advantageous;
- Any future Project should focus on the successes achieved increasing the potential of high impact targets (less incremental and more transformative);
- It should be seen that ASTUTE has provided the HEIs with a platform for industry recognition;
- The strategic benefits arising from any future Project will include support for a stronger Supply Chain Strategy for Wales based organisation (encouraging export), as well as actively promoting opportunities for inward investment via the credibility and outputs generated by ASTUTE.

¹³ <http://www.swansea.ac.uk/research/ref-2014>

¹⁴ <http://www.cardiff.ac.uk/research/impact-and-innovation/quality-and-performance/ref-2014/academic-schools>

3.5 Market Need - Findings

3.5.1 Is the market need the same now as it was when the project was developed?

Academic Partners made observations on how they believe the market need has changed since the inception of ASTUTE:

- Technological advancement continues to dramatically impact the market demand for academic support;
- Progression in ALM (Additive Layer Manufacturing) – various additions to the resources since the start of the Project via new technological advancements presenting opportunities to companies;
- Regional support is becoming increasingly important;
- The economy has improved – therefore driving innovation and more progressive thinking;
- Organisations originally were more focused on survival – latterly they have been more willing to engage in investigative/exploratory relationships/projects (again, related to the economy);
- Recognition amongst smaller companies that they do require expertise which is available within the HEIs and they now have a vehicle for communication;
- Requirement to adapt and utilise technology more quickly – sense of urgency amongst businesses to tap into expertise, research and technology.

In terms of future demands, we also provided participants with the opportunity to highlight areas of support they would appreciate and make use of. 38% of those who said they would require further support and specified a range of different topics. 80% of participants also stated they want to be kept informed of up and coming events as they arise.

Market Demand

Feedback from academic partners has confirmed that there is a high level of interest from manufacturing organisations within the competitiveness region of Wales that cannot be supported currently by the ASTUTE Project. (Due to limitation on budget). If the Welsh Government have the ambition to support manufacturing in Wales it needs to be recognised that these geographical constraints and resources are limiting the benefit and impacts that could be realised.

3.5.2 Provision of expertise offered by each partner University against the needs identified by the enterprises assisted and the R&D collaborative projects initiated to date.

Figure 3.5.2a Evaluation of businesses current development needs (number of responses)

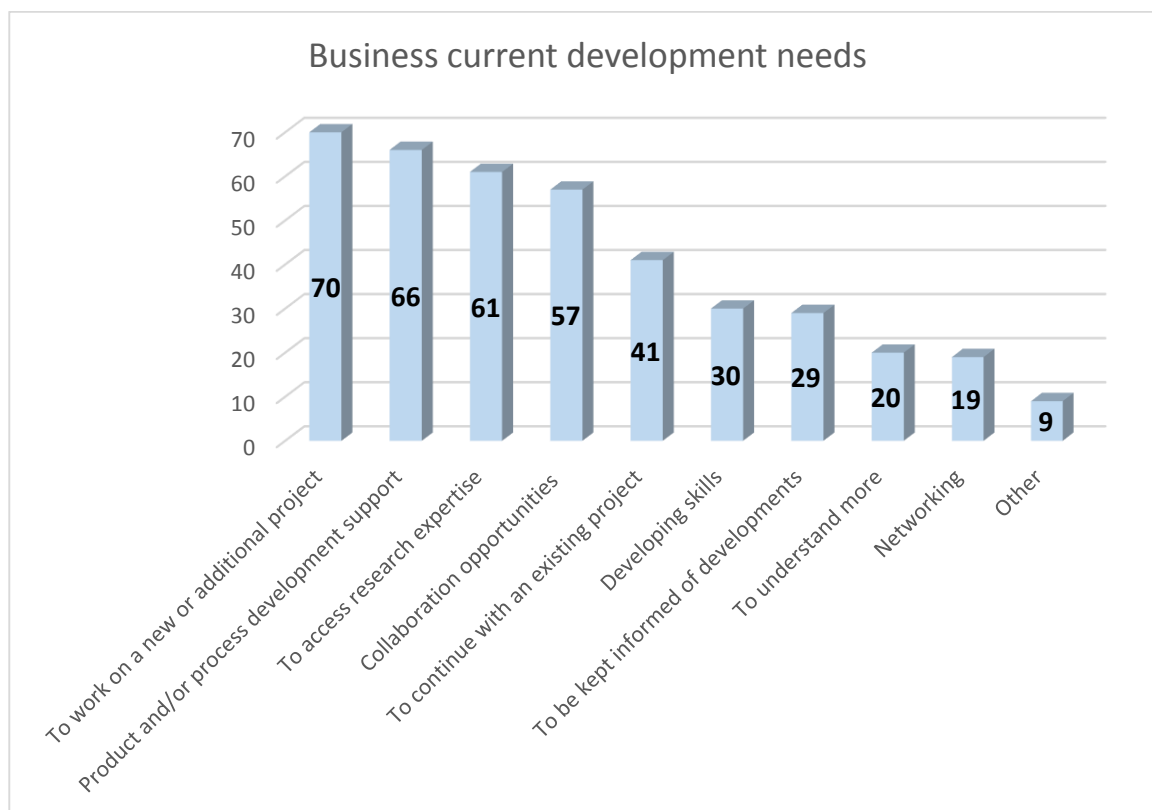


Figure 3.5.2a refers to the defined business development needs in order of the number of responses given by each of the 86 industrial collaborators interviewed.

Businesses reported that the general perception of academia/industry collaboration has also been enhanced as a result of their engagement with ASTUTE with 52% reporting they have a more positive perception. 43% reported their view is unchanged and 4% stated as a result of their engagement, they had a less positive view of collaboration with academia.

Industrial collaborators also observed that the support for networking was excellent, and made reference to the contacts established as a result of engagement with ASTUTE which otherwise would not have been achieved.

3.6 Value for Money - Findings

Evaluation of the impacts achieved by ASTUTE as evidenced from the data provided by the industrial collaborators in the Final Evaluation produces a picture of jobs created, future jobs expected, increased levels of business achieved, investments made or investment planned as a result of ASTUTE supports and interventions.

In addition to the 158 jobs created and captured by ASTUTE, the evaluation exercise undertaken with industrial collaborators also revealed a projection into the future of between 237 and 261 additional jobs to be created in the businesses inspired by ASTUTE. This evidence was collected as a part of the interview process of both Mid-Term and Final Evaluation.

Additionally the businesses interviewed confirmed that increased business resulting from developments supported by ASTUTE is projected at just over £203 million. Furthermore additional investment to be made by the industrial collaborators in Wales over the next 5 years exceeds £210 million.

The International Monetary Fund (IMF) has produced standard Economic multipliers¹⁵ for developed countries which take into consideration issues relating to projected recession. In calculating the value of the ASTUTE intervention we have also evaluated economic multipliers for the sectors involved of aerospace, automotive and advanced manufacture (excluding energy, agriculture, mining and minerals). These multipliers have been applied to the employment created, (158 jobs), the average figure for employment projected (250 jobs), the investment induced, (£6,636,800), the investment projected (£210m) and additional business projected (£203m) to produce a calculated return on investment figure.

The Welsh Government published statistics¹⁶ on the average wage in Wales varies by region from £472 to £568 per week equating to an average annual wage of £24,544 to £29,536. In the projection of the value for money of ASTUTE a conservative average wage figure of £25,000 has been used for the calculation.

Taking on the confirmed figures of employment created and investment induced captured and evidenced by the ASTUTE Project gives a total figure of almost £848m. Taking a very conservative viewpoint and allowing for the fact that only 25% of the projected figures might arise, the return on investment calculation of the £27 million ASTUTE project projects that it will produce a return on investment of just below £212 million (£211,975,000).

¹⁵ <http://www.imf.org/external/pubs/ft/wp/2014/wp14213.pdf>

¹⁶ <https://stats.wales.gov.uk/Catalogue/Business-Economy-and-Labour-Market/People-and-Work/Employment/Jobs/Whole-Workforce/WorkplaceEmployment-by-Industry-Area>

3.7 SWOT Analysis - Key Stakeholder & Academic Findings

During the Final Evaluation process, face to face and telephone interviews were conducted with 11 key stakeholders within the partner institutions plus 4 Welsh Government and WEFO representatives with an interest in the project. The process assessed both Operational and Strategic issues and perceptions of key elements of the ASTUTE Project. This built on the SWOT analysis undertaken at the Mid-Term Evaluation stage. The findings from these interviews have been summarised into the section below and involved the participants in Table 2.4.1a and 2.4.2a.

The SWOT undertaken at mid-term phase served to support justification for modifying certain processes, minimising/eliminating any future potential risks, capitalising on various opportunities and actively promoting the elements which were perceived, and recognised by clients, as major strengths for the benefit of the remainder of the project and any potential future bid.

Capitalising on the Strengths identified in the Mid-Term Evaluation

The second part of the ASTUTE Project evidenced a consolidation of the identified strengths with increased co-operation between partners, embedded good practice as discussed in section 4.4 of this report and management processes and procedures as evidenced by the documented procedures and processes manual resulting in the effective and consistent management of enquiries and interventions.

During the Final Evaluation, the following strengths were highlighted by the key Stakeholders interviewed:

- ASTUTE is a unique Pan Wales Partnership – Multidisciplinary and extensive access to research knowledge and facilities Expertise of the ASTUTE staff – industry knowledge, experience and enthusiasm plus understanding of key strengths
- Well structured, resourced and managed Project with strong core team and great reputation.
- Quality and Expertise as evidenced by REF2014
- The capability to support rapid response processes to support Welsh Industry.
- Collaborative opportunities with commercial enterprises which wouldn't exist without ASTUTE as the vehicle for engagement.

Minimising the Weaknesses identified in the Mid-Term Evaluation

The second phase of the ASTUTE Project also took action to address the weaknesses identified during the Mid-Term Evaluation. Although the restriction on the convergence region remained, ASTUTE have identified organisations outside this region who would be keen to participate and collaborate should the opportunity arise. A similar line applies to industry sectors and accordingly any new funding application should take these factors into consideration.

Although many of the issues (such as WG referrals) were beyond the control of ASTUTE significant effort was made to address this through proactive engagement with the Welsh Government. In addition ASTUTE took the lead following the Mid-Term Evaluation in submitting a re-profile to WEFO to reduce the number of Assists and increase the number of Collaborative R&D Projects.

From the Final Evaluation, the key weaknesses were perceived to be as follows:

- Restrictions on the geographical area in which ASTUTE can operate.
- Competition with other projects (for targets such as employment created).
- EU Paperwork requirements – bureaucratic, inconsistent and not as lean as it could be.
- Absence of a physical legacy which will remain beyond the deadline of the project.

Capitalising on the Opportunities identified in the Mid-Term Evaluation

Various opportunities were also highlighted at mid-term where ASTUTE was able to take action. Examples of these are:-

- re-profiling and the flexibility this enabled (focus on Collaborative R&D Projects rather than Assists),
- Increasing the profile of ASTUTE in Wales via various media sources, networking and public relations plus the opportunity to collate success stories to date to form a strong justification for a future bid.

The Key Stakeholders also fed back comments on the opportunities they recognise have arisen from ASTUTE at the Final Evaluation stage.

- Opportunities to collaborate more effectively with various institutions and organisations i.e. Industry Wales, A4B and other Universities, especially now that the ASTUTE brand is higher profile.
- Demonstration and promotion of expertise which has led to increased research opportunities, publications and links with various organisations with whom collaboration may not have been possible previously.

Minimising the Threats identified in the Mid-Term Evaluation

Key threats to the Project have largely remained unchanged in the Final Evaluation although the following four identified at the mid-term stage have been addressed during the second part of the Project.

Not showing value for money.

The ASTUTE Project can now confidently eliminate this threat when the level of employment and investment induced resulting from ASTUTE inventions is added to the projections given by the participating businesses during the Final Evaluation. This has shown an impact on the Welsh economy of just under £212m from the investment in ASTUTE of £27m. See sections 3.6 and 4.6 of this report.

Make sure ASTUTE is collaborating with industry on a wider scale – not replacing commercial services.

Data evaluated during the Final Evaluation has evidenced wide collaboration with industries and businesses in new areas and developments not offered by existing commercial services.

Displacement or duplication of services available in the private sector.

Evidence collected during the Mid Term and Final Evaluations has confirmed a documented process to ensure there is no displacement of services which could be provided by the private sector. In addition records were evidenced of projects declined and referred to the private sector. A question arises in respect of Cross cutting themes which could be provided by private sector. See Sections 4.3 and 5.1 It should be noted that the close integration in ASTUTE was highly effective and is seen as an exemplar of good practice.

Missing targets.

This no longer a threat as the Final Evaluation is able to confirm that all targets have or will be met or exceeded by the conclusion of the project.

Risks

The high level risks which remain have been noted from the stakeholder interviews as follows:

- Discontinued/disjointed funding which has a detrimental knock on effect to momentum, management and resources.
- Paperwork infrastructure – a necessity but could be streamlined.
- Greater communication and interworking relationships required between HEIs – although these have improved there may be missed opportunities in the future if expertise are not capitalised upon.

4

Contents

Introduction
The ASTUTE Final Evaluation Overview
The ASTUTE Final Evaluation Findings
Discussion on Evaluation Findings
Executive Conclusions & Recommendations
Appendices

Discussion on Evaluation Findings

This section of the report will present an analysis of the Evaluation Findings including discussion relating to the achievement of objectives, lessons learned and demonstration of best practice. The content of Section 4, Discussion on Evaluation findings and subsections align with the Findings in Section 3. i.e. 4.1 Discussion aligns with 3.1 Findings etc. therefore reporting directly against the objectives set for the Evaluation

4.1 Aims and Objectives – Discussion

To assess to what level the project is meeting its original aims and objectives;

The aim of ASTUTE as defined in the original project application and remit is:-

To enable the manufacturing industry in West Wales and the Valleys to grow by adopting more advanced technologies, and at the same time improve its sustainability by reducing its environmental impact etc. This will be achieved by a partnership of Universities throughout Wales that will harness the engineering expertise within them for the benefit of the economic prosperity of the Convergence Region.

In respect of this, the data collected during the course of both Mid-Term and Final Evaluation evidences that this defined aim is being achieved. The focus of the project has remained throughout on the development and application of advanced technologies to support sustainable solutions within manufacturing industry in the convergence region. Knowledge, skills and expertise of academic staff and resources are being promoted to encourage engagement with commercial enterprise for strong dissemination of information, transfer of knowledge and participation in collaborative opportunities for mutual benefit. The partnership of Universities utilising their respective engineering expertise has continued to develop and strengthen as the project has progressed. Active promotion of sustainable practices and a raised environmental profile has also formed an integral element of the ASTUTE Project.

The objectives of ASTUTE as defined in the original project application and remit to meet the challenges of growth and sustainability are as follows:-

- Increase R&D, knowledge and the ability and quantity of the people employed as inputs.
- Increase quality (and quantity) of high-value, knowledge-intensive products output.
- Reduce the quantity of natural resources (raw materials and energy) consumed in producing each unit of useful output.
- Reduce, re-use and recycle waste and minimise emissions of CO₂ and other greenhouse gases.

In respect of these objectives, the evidence collected during the course of the Final Evaluation confirms that as a result of ASTUTE interventions 158 jobs have already been created with a further figure of between 237 and 261 being predicted in the next 3 years by businesses interviewed. It is recognised that much of the development work undertaken will require time to embed new processes and procedures which supported the predicted additional job creation and is therefore envisaged as a medium term impact rather than short term. It should be noted that the number of new jobs created exceeded both the original and re-profiled target as illustrated in Table 3.1a.

The dissemination of knowledge and skills imparted as a result of the collaboration was also identified with 58% of participants listed access of research expertise as one of the primary reason for engagement with ASTUTE with 48% citing collaboration and 86% confirming the reason for engagement being product and/or process development.

Similarly, the results of this question regarding current business development needs also highlights product/process development needs as important, with 81% of respondents selecting this as a current need.

Requirements for technical expertise and investment into R&D were also highlighted as important to the organisations interviewed, with 56% and 50% of respondents respectively choosing these as current needs. The evidence accordingly confirms that ASTUTE is meeting its original aims and objectives.

4.2 Output and Results– Discussion

The data captured and analysed highlighted the strengths of the Project, areas for development/refinement in the future, impacts and outputs achieved as well as interesting feedback regarding the collaboration opportunities presented.

Quality of collaborations

The companies interviewed reported positively on the quality of engagement support, with high numbers reporting ease of initial response, speed of initial response, quality of support and overall experience as either good or excellent. Key stakeholders also report strong management infrastructure and efficient team dedicated to the processing of documentation and support for collaborations. Paperwork is frequently mentioned in relation to projects of this nature due to funding regulations, data capture requirements for accountability and transparency purposes.

Figure 3.2.3b demonstrates business perception of the support from a number of angles with a high percentage rating good or excellent, confirming that the ASTUTE team are delivering quality support, managing expectations and engaging positively with the “consumer” of the resources.

Project Success

Table 3.2.3c details project success perceptions where we measured the understanding and agreement of outcomes between Senior Technical Managers and companies. 47% reported outcomes which matched, 25% underestimated the success of the project – where STM reported lower meeting of expectations than the business. 28% rated the projects more successful (meeting expectations) than the business. This does demonstrate the importance of managing expectations and effective communication between client and ASTUTE.

Of the 86 clients interviewed, 50% reported that the ASTUTE collaboration had met their expectations, 21% exceeded and 7% far exceeded expectations. In instances where ASTUTE may have fallen short of expectations, reasons were provided and flagged up in Table 3.2.3f. This table shows that project timescales were the main barrier to project success. This further highlights the requirement for strong customer expectation management so that both academic and commercial organisation are aware of the constraints, resources and estimated completion times. It also shows the need for sufficient resource to be able to respond in commercial timeframes.

Other factors which were also highlighted as barriers that are beyond the control of ASTUTE i.e. Paperwork processes, availability of business time and availability of the business’s own technical resource.

Impacts

Of the 86 organisations interviewed, 56% reported some improvement brought about as a result of ASTUTE engagement. 29% rated this as significant, 27% rated some improvements and 35% stated they are expecting to experience improvements in the future.

These improvements were recorded and results revealed in Figure 3.4.5a. Increased levels of business, employment, investment, launch of new products or services, processes and links were all reported – demonstrating impact as a result of ASTUTE intervention and contribution to achieving original aims and objectives. 72% reported an expected increased level of business, 55% reported expected increase in employment, 56% reported an expected increase in investment and 53% are expecting to launch a new product/service in the future as a result of the ASTUTE support. 24% had already launched a new product or service as a result of the ASTUTE support, 20% had already experienced an increase in investment, 13% had increased level of business and 15% had increased their number of employees as a result of collaboration.

Intellectual Property

Of the 86 organisations interviewed, 50 (58%) indicated that they would have no interest in making use of IP services through ASTUTE. However the reasons cited showed that 23 (27%) had already appointed specialists to provide this service and further 11 (13%) had in house expertise in IP.

Significantly however 26 (42%) of participants indicated that they would be interested in making use of services in respect of Intellectual Property. This is a significant % of the total and recommendations as to how this might be managed in the future are within Section 5.3 of this Evaluation Report.

4.3 Project Indicators – Discussion

In looking at future intervention and collaborative project of this nature there are a number of potential areas for improvement. These include three project indicators that should be removed or have a significant change of emphasis in any future project as they have been shown to result in a low economic impact. Additionally, there are two indicators that would be more relevant in measuring the impact of any future intervention Project.

These have been discussed below with recommendations relating to each within Section 5.2:-

- Having Assists as a discrete target. It has been identified during both the Mid-Term and Final Evaluation that Assists in general do not produce measureable impact sufficient to justify the investment made in delivery. The target therefore of having to provide a low level of support for a large number of companies has been seen as being ineffective. This was identified during the Mid-Term Evaluation with a subsequent re-profiling of the targets accepted by WEFO to increase the number of Collaborative R&D Projects and reduce the number of Assists. This has undoubtedly contributed to the high level of achievement of ASTUTE against its targets.

It is important however to recognise that the assisted companies understand that the (Assist) intervention is an exploratory one. This is indicative of the improvement achieved by ASTUTE latterly in setting the customer expectations correctly. It is also acknowledged that the level of support (min 7 hours) would not usually lead to an increase in employment or impact in any measurable way on the future growth potential of the business. Analysis of the results confirms this and shows that the main source of employment and future growth potential has arisen and will arise from the collaborative R&D Projects undertaken by ASTUTE.

In respect of this, it important to recognise that the seeding of ideas during Assists has been a fundamental source of collaborative R&D projects and should therefore remain as a process to evaluate the potential of a Collaborative R&D Project

- Projects with micro companies. This addresses the smallest sized SMEs and whilst support for these micro companies might fit with a cautious political agenda (to be seen to be supporting all businesses equally), it is neither visionary nor ambitious as micro companies in general have been shown to produce the lowest economic impact. It is important to recognise that interaction with micro companies rarely produced significant impact and accordingly a Project which is supporting a high number of micro company projects is likely to show adversely in meeting impact targets.
- In respect of these however it is important that they are not excluded totally in any future Programme or Project as with any rule there are exceptions. Indeed a small number of the very small industrial collaborators undertaking a collaborative R&D Project with ASTUTE showed significant growth, employment and investment induced.

- Cross cutting supports. The impact resulting from these interventions is again seen to produce modest economic return. However, the integrated solution developed within ASTUTE of engaging with a specialist has proved to be effective. This ensured that ASTUTE made best use of relevant expertise and that attention was not focused away from the collaborative R&D project.
- Cross cutting supports of this nature does raise the question and concern regarding displacement as there are consultancies in Wales that are able to offer these cross cutting supports and services to business on a commercial basis. There is however an opportunity for a hybrid model where the intervention is managed by ASTUTE with use made of sub contracted or external supports.
- In addition there is one further Project Indicator which might be considered for future Projects or Programmes. This indicator relates to increased investment made by the industrial collaborator as a result of the intervention. Both the Mid Term and Final Evaluation of ASTUTE identified businesses providing data on significant investments as a result of the collaborative project. The impact of such investments has a cumulative effect on the economy as defined by the IMF (International Monetary Fund) information and data on economic multipliers in developed countries and economic multipliers from multiple sources on the roll over effect of investment in an economy. The figures used within this report are based on data and statistics relating to general manufacture, automotive and aerospace but specifically exclude mining and minerals, power generation and agriculture.
- A final process where it is seen that benefit could accrue is the formal monitoring of referrals to and from any Project or Programme as a documented introduction which is recorded and monitored.

4.4 Added Value – Discussion

4.4.1 Stimulation of Ideas

The evidenced outputs confirm that ASTUTE have completed over 140 collaborative R&D projects and nearly 300 Assists. As a result of these engagements, new products/services have been launched, investment has been induced and improvements have been made to processes and procedures. 11 new enterprises have been created as a result of this intervention – all factors which highlight how the exploratory opportunities of the ASTUTE project has resulted in long term relationships and a plethora of outputs. 74 of the 86 interviewed highlighted that their initial engagement requirement was to improve products/processes, 18 were looking to expand their knowledge base and 50 were keen to access research expertise to capitalise on opportunities in their sector/business.

4.4.2 Collaborations – Inter University

A number of inter University collaborations have occurred – capitalising on each other's expertise and bringing in the best team to approach client needs. As stated in section 3.4.2 the Evaluation evidenced 16 collaborative projects involving two or more ASTUTE partner HEIs. Each had a nominated lead partner with expertise from the support partner being accessed to address specific issues and contribute with specialist expertise. A number of other programmes offered within the University were referenced (see section 3.4.2) including Knowledge Transfer Partnerships, Access to Masters Students, Software Alliance Wales, LEAD programme, Strategic Insight Programme, Wales Centre for Behaviour Change and SEACAMS.

4.4.3 Integration with wider support network.

The ASTUTE Project has operated alongside a plethora of business supports offered by Local Authorities, Welsh Government, Higher Education, Further Education and private sector organisations. All of these supports often confuse or overwhelm individuals and organisations and the Project brands can lose identity. More importantly there is still no one body currently that has sufficient understanding of Welsh Government projects, Local Authority supports, Academia based projects and supports or sector initiatives to adequately offer an advisory or signposting operation. As a result, these projects often work in “silos” with little or no reference to other projects whilst they focus inwardly on their own targets. This results in a very low incidence of active referrals, cross-fertilization of projects or introductions. As an illustration of this, the findings from interviewing the 86 Collaborative R&D Projects

indicated that only one Collaborative R&D Project directly resulted from a Welsh Government referral. Records kept by the ASTUTE Project Management team themselves indicated that this was three.

As a part of this evaluation, an interview with the Head of Knowledge Transfer & Commercialisation within the Welsh Government showed a great deal of insight into Welsh Government supports and of academia/industry projects including a good awareness of ASTUTE. There was also a perception that more than 20 referrals had been made directly to ASTUTE. This is conflicting data from the both documented records held by ASTUTE and data gathered during interviews with companies. This mismatch of numbers suggests one of the following:-

- The quality of the referrals was extremely low and/or unsuitable for ASTUTE support thus not resulting in a conversion from lead to Project/Assist;
- The business did not grasp what was being offered adequately to follow up the referral;
- Mentioning ASTUTE and/or the passing of a brochure is not enough of a referral to initiate action.

38% of respondents indicated that they would be interested in receiving additional support from various other providers – these are mentioned in section 3.4.3. Some reported accessing Innovation Vouchers (21% of respondents), SMART Cymru R&D Funding (21%), CRISP (Collaborative Research and Innovation Support Programme) (3%), SCORE Cymru (Supporting Collaborative Research and Innovation in Europe) (1%) and Workforce Development Programme (8%).

To encourage referrals and generate profile, ASTUTE utilised a range of marketing communication tools to increase visibility. The latter part of the ASTUTE Project has seen more effective marketing communications, resulting in the brand becoming more recognised entity by both stakeholders and participating companies. As a part of this marketing strategy ASTUTE have made effective use of social media and have been active on LinkedIn, Twitter, YouTube and Facebook.

The direct impact of social media is difficult to differentiate from other marketing as it forms a part of the overall marketing mix. The profile of ASTUTE however is reinforced through these channels and analysis shows the ASTUTE Twitter account has 627 followers, 1069 tweets, Facebook has 49 likes and at least fortnightly posting. LinkedIn has 158 members of the group and discussions engaged. Also active on Flickr 315 photos and members on an account open since 2012.

The ASTUTE website is relevant, up to date and easy to navigate. In addition, using Google as a search engine and using ASTUTE as a search term in Google shows the ASTUTE Project in number one position of more than 13 million results for this

search term. In respect of this any future Project should maintain this level of marketing activity to ensure effective continuity; to take advantage of the recognised branding and to build on the positive image associated with the ASTUTE Project.

It is also noted that ASTUTE have (with approval from individual participants) published some of the many positive comments given during the Mid-Term Evaluation process as testimonials and case studies to highlight the positive outputs and achievements of the support provided.

Section 5 of this report has made a specific recommendation to ensure a more effective referral process exists in Wales between support resources and that companies in Wales are better informed of the plethora of available initiatives from which they might benefit.

4.4.4 Exit Strategy

ASTUTE have captured information and data to justify funding a future project of similar objectives. This information has been collated over the duration of the programme for both accountability and success of leadership and management. The ASTUTE Team was advised at Mid-Term stage to commence preparations for a new bid to avoid inconsistencies and minimise the threats which come with gaps in project transmission i.e. loss of key members of staff, decrease in confidence regarding support and loss of brand recognition. The ASTUTE team are working on a future plan to incorporate the strengths of this project and accommodate changes which have been recommended or seen as areas for development in any ongoing support delivery.

Response from companies was positive in that there was a high percentage who would work with ASTUTE again and their reasons for engagement have been highlighted in Figure 3.4.4b as well as what would encourage them to make better use of the resources in the future (Figure 3.4.4c). 88% indicated that the main attraction to engagement was the access to expertise and 78% would engage to capitalise on the access to facilities and equipment.

4.4.5 Legacy Impacts

A number of the findings and discussion above already highlight the legacy of ASTUTE in terms of its outputs, current and expected. The increase in investment is evident – with over £6m investment induced having already been confirmed and recorded. See section 4.7 for additional legacy impacts emerging from the ASTUTE Project. The following have also been included to explore wider impacts experienced as a result of ASTUTE.

Best Practice: In addition to the targets achieved, the ASTUTE Project has taken the lead in introducing processes and procedures which can be classified as “**best practice**”. These should be considered not only for any future ASTUTE Project but recognised as best practice for adoption in future initiatives which involve academic/industry collaboration. These best practice issues identified during the Final Evaluation have been listed below:-

- A strong lead partner with a clarity of vision and ability to manage the Project.
- Full time employed Senior Technical Managers that have the synergy of academic expertise and commercial experience.
- Full time commercial Project Management and full time administrative support. ASTUTE has illustrated the benefits that accrue from having a properly resourced team with focus on delivery.
- Multiple partners to allow access to specialist expertise as and when needed.
- A clear lead partner for each project (feedback from companies indicated a preference for one lead partner).
- Open cooperation between the partner institutions on the project, with all partner institutions confirming their commitment to supporting the project.
- The documentation and issue of a detailed Standard Operational Procedures manual for ASTUTE Staff. This manual incorporated the processes and procedures to be followed and the documents to be used by each of the eight partners in engaging with companies; delivering support and capturing impacts

World Class Expertise: The evidence of the publications listed in Appendix D demonstrating World Class expertise is in the very nature of academic publications which are essentially only accepted if they relate to new findings and are breaking new ground. These evidence the new developments in sustainable advanced manufacturing that the ASTUTE Project has supported.

4.5 Market Need – Discussion

Whilst the downturn has had an inevitable effect on businesses in making trading conditions more difficult and demanding, analysis of the results of the evaluation reveals that the priorities and defined needs of businesses are unchanged from the inception of ASTUTE to the current time and into the future. The following table contains information extracted from the business feedback as detailed in Appendix A of this report.

Table 4.5a Summary of industrial collaborator feedback

	New Product/Process development	Access to technical expertise
Reason for engagement	74 (86%)	50 (58%)
Current business needs	70 (81%)	48 (56%)
Business priorities	68 (79%)	45 (52%)
Future requirements	66 (77%)	61 (71%)

These represent the two highest scoring responses in each instance (see below) and illustrate that the priorities and needs are essentially unchanged from the start of the ASTUTE Project. It should be noted that during the Final Evaluation the main requirement that emerged from business interviews was:-

- To work on a new or additional project.

This requirement was given by 70 of the 86 industrial collaborators interviewed during the Final Evaluation as a current business need. This equates to 81% of the respondents.

This highlights that the benefits achieved during the initial engagement with ASTUTE have influenced the business to continue with their investment in collaborative R&D. This is not a change in the market but is perhaps a realisation that through and with ASTUTE there lies an opportunity to achieve more.

Additionally, both organisations and institutions recognised the need to continue shifting perceptions and enhance the collaborative opportunities through more positive reporting on the outputs of academic engagement. This forms significant linkages with the demands of the organisations involved with ASTUTE Projects or Assists in the past. The pressures on the economy, public purse and individual expectations will inevitably place greater emphasis on performance and a focus on commercially operating an academically led initiative to align with private sector enterprise demands.

4.6 Value for Money - Discussion

The ASTUTE project will provide Wales a return of almost £212 million (£211,975,000) from the £27 million investment in ASTUTE. Additionally it should be noted that this figure is based on just 25% of the projected figures being realised. Raising this % to a 30% achievement produces a return of almost £251 million (£250,690,000).

Furthermore it should be noted that this figure has been calculated based solely on the businesses interviewed during the evaluation and it is recognised that there will inevitably be additional contributions (albeit more modest) arising from many of the other businesses supported. It is also recognised that whilst the impact is not immediate, it is reinforcing and building on the foundation of advanced manufacturing technology businesses in Wales that underpin the economy.

Furthermore, there will be a multiplier effect to this figure should some of the projected jobs created, investment planned and increased business projected be realised sooner rather than over the 3-5 years projected.

4.7 Moving Forward – Discussion

The focus of the ASTUTE Project, on advanced manufacturing aligns directly with one of the 10 key economic opportunities in Wales as defined by the EPF publication *The Economic Prioritisation Framework for Welsh European Funds*¹⁷.

These opportunities are both thematic (relating to a specific business sector) and regional (relating to a specific region of Wales). These economic opportunities are aligned with Welsh government policy priorities.

The key opportunity in this publication relevant to ASTUTE is Section 5 titled “ADVANCED MANUFACTURING” which sees this as an economic opportunity for the following reasons:-

Manufacturing is a larger proportion of the Welsh economy than the UK as a whole and has been undergoing a transition from low skilled high volume, to more advanced manufacturing capability built on high skills in emerging clusters and areas of expertise. Advanced manufacturing is closely linked to research and innovation strengths and attracts a large amount of research and innovation funding, particular the development and production of advanced materials for a range of industries. Manufacturing is further characterised by high salaries and high levels of exports, and Wales has several blue chip large employers in this sector.

¹⁷ <http://gov.wales/docs/wefo/publications/141216economicprioritisationen.pdf>

To put this in context within the UK The Technology Strategy Board publication *High Value Manufacturing Strategy 2012-2015*¹⁸ confirms the following statistics:-

- Manufacturing contributes over £6.7tr to the global economy and the UK is a major competitor.
- In terms of manufacturing Gross Value Added (GVA), it is in the world's top 10, generating 10% of UK GVA.
- UK manufacturing directly employs 2.5 million people, generates half of UK exports and accounts for three quarters of business R&D conducted in the UK.
- The UK ranks second only to the US in the aerospace industry.
- The resurgent UK-based auto industry exported a record breaking 84% of production in 2011.

Why is high value manufacturing a priority for Wales?

Reminding ourselves that manufacturing is a larger proportion of the Welsh economy than the UK as a whole, the publication continues by confirming that manufacturing in general represents an important strategic competence within the UK economy.

It also confirms that:-

It is high value manufacturing specifically where we see the most opportunities for innovative businesses to succeed long-term. 'High value manufacturing is the application of leading-edge technical knowledge and expertise to the creation of products, production processes, and associated services which have strong potential to bring sustainable growth and high economic value to the UK.

The document continues by confirming:-

The UK retains a world-class science and technology base and this is particularly important for high value manufacturing which is becoming increasingly knowledge based. Recent research indicates that a country's ability to innovate in manufacturing is strongly linked to the presence of an indigenous manufacturing base, where the opportunities for innovation can be quickly identified and acted upon, ensuring that local manufacturing technologies remain globally competitive (the learning curve effect), as we still demonstrate today in our aerospace and pharmaceutical industries.

This is key factor in reinforcing the need for the ASTUTE intervention and support to become a model for building growth in Wales through embedding expertise into the manufacturing base on which the economy can be built.

¹⁸ <https://www.gov.uk/government/publications/high-value-manufacturing-strategy-2012-to-2015>

4.7.1 Policy Fit

The ASTUTE Project has been delivered against a background of Welsh Government defined objectives within the “*For our Future*”¹⁹ document defining the Welsh Government’s Higher Education Strategy for Wales and building on and replacing the previous “*Reaching Higher*”²⁰ publication. The strategy and plan within this has set out the strategic direction for higher education in Wales.

This published vision is one of a higher education community which, through the combined efforts of its members, transforms lives and livelihoods across Wales.

In particular, the ASTUTE Project is directly aligned to three of the specific vision statements within this document. These statements are:-

- fostering a culture of exploration, discovery and intellectual challenge that generates international recognition, respect and engagement;
- exploiting their knowledge base effectively through working with businesses and employers in and beyond Wales;
- contributing to the future renewal of the Welsh Economy by raising the skill level of the Welsh workforce and by supporting businesses to become increasingly innovative and competitive.

The Welsh Government publication “*Programme for Government*”²¹ has stated clearly that one of its objectives is the creation and growth of sustainable jobs and plans to work with European Commission funding initiatives and supports to stimulate sustainable growth and jobs through investing in skills, infrastructure and job creation.

The vision for this includes collaboration between our universities and with the best universities outside Wales, and the scientific knowledge and expertise of our world-leading academic groups to be made available to support innovation and job creation in companies in Wales. One of the defined key delivery partners in this objective being Higher Education establishments.

This objective has been underlined in recent announcements by Natalie Crawley Academia Engagement Manager at the Welsh Government who stated “*I am committed to establishing new forms of interface between businesses and academic institutions and developing relationships and knowledge management as vital tools in the knowledge sharing process*”.

The position in the UK follows a similar commitment. In June 2014 a House of Lords communication confirmed that manufacturing output for the year to April 2014 rose

¹⁹ <http://gov.wales/docs/dcells/publications/091214hestrategyen.pdf>

²⁰ <http://gov.wales/topics/educationandskills/publications/guidance/reaching/?lang=en>

²¹ <http://gov.wales/about/programmeforgov/?lang=en>

by 4.4% - the fastest rise since 2011. Industrial production rose by 3% over the same period.

There was agreement that the manufacturing sector is probably the most important in leading Britain's growth and the most optimistic in terms of our growth in exports. It stated that manufacturing is one of the two sectors able to drive productivity growth across the economy through cross-sectoral supply chain linkages. That means potential economic benefits at every stage of the manufacture of a product, from the beginning of an idea to its development and production, through the supply chain to eventual consumer use. The discussion concluded with the statement that the (UK) Government are proud of the steps they have taken to support and advise the manufacturing sector but acknowledge that there is still more to be done.

In addition, an article published by the CBI in October 2014 Titled "*Stronger supply chains could boost economy by £30bn*"²² indicated that there is the potential in the UK to create 500,000 jobs across Britain's Regions.

Pulling Together recommends ways to kick start the UK's supply chains, and solutions to reinvigorate Britain's industrial strategy. Based on new research carried out by A.T. Kearney, the global management consultancy firm, the report reveals underinvestment in research and development (R&D), a growing skills crisis and weakened foundation industries that are key to advanced manufacturing - such as plastics, metals and chemicals.

To tackle these issues, the CBI is urging the Government and business to act together to strengthen supply chains, focusing on innovation, better quality products, and excellent customer service.

²² <http://www.cbi.org.uk/media-centre/press-releases/2014/10/stronger-supply-chains-could-boost-economy-by-%C2%A330bn-cbi/>

4.7.2 An Economic Strategy for Wales.

The timely and insightful report “An Economic Strategy for Wales”²³ published on 22 March 2015 by the Institute of Welsh Affairs was direct in its approach and advised:

“Ambitions to close the wealth gap between Wales and England will remain elusive unless Ministers set out an ambitious plan for economic growth backed up by actions.

There is "little evidence" that devolution has had much effect on the Welsh economy, with the value of the goods and services from Wales being 72.4% of the UK average in 1999 and 72.2% 13 years later.

It is time for the country to take a clear-eyed look at how ambitious it wants to be for its economic future and what sort of changes would be required to achieve its ambitions. There is no point espousing unrealistic targets and no point in specifying any target whatsoever without a strategy that might achieve it.”

The Economic Strategy for Wales report concluded by suggesting this uninspiring performance is likely to continue unless ministers are bold not only in their ambitions but in their actions in investing in supporting Wales to at least achieving equivalence in the UK and beyond. It should also be noted that in a BBC radio interview on the day the report was published, Professor Holtham specifically mentioned the ASTUTE Project as one which was there to support companies in Wales with an ambition to innovate and develop competitive advantage. This is of particular interest in respect of this evaluation as ASTUTE was the only project in Wales mentioned by name by Professor Holtham in this interview.

The report has been produced for the think-tank, the Institute of Welsh Affairs (IWA), where Professor Holtham - a former Welsh government adviser - is chairman of its economy group.

In respect of this Wales should be proactive in supporting its most successful projects and in particular those that align with the ambitions of both UK and Welsh Governments to re invigorate manufacturing as a key foundation stone for the country’s future. ASTUTE has proved its capability in this area and should be bold in going forward with a stronger and more ambitious Project running through to 2020.

Whilst ASTUTE need to be bold in their ambitions and committed in their determination to develop and improve academic/industry and inter-partner collaboration; WEFO need to be equally committed in recognising the successes and achievement to date of ASTUTE and to plan in advance to support this successful Project without a “break in transmission”.

²³ http://www.clickonwales.org/wp-content/uploads/IWA_EconomicStrategyforWales.pdf

4.7.3 A 2020 Vision

In looking at ASTUTE beyond 2015, this section of the evaluation report examines how the current ASTUTE Project has complemented the Welsh Government vision and strategy for alignment of the science base in Wales and its role in supporting Welsh Industry. It also examines how it aligns with the Welsh Government defined priority areas and its documented need for collaboration.

The 2012 Welsh Government publication *Science in Wales*²⁴ stated:

“We (the Welsh Government) recognise the vital links between the research and science skills base in Wales, and the processes of innovation, development and commercialisation that transform scientific outputs into economic advantage for Wales. A strong, advanced industrial sector depends critically on the science base. They each should feed one another. We need to invest in the science base in Wales, because, as we identify in this document, it needs strengthening if we are to be competitive”.

The defined aim of ASTUTE “of helping manufacturing industry face the challenges of the 21st century” aligns directly with this statement. It is relevant in particular to any follow on Project from ASTUTE in that it recognises the link between innovation and commercialisation and secondly, recognises that it needs strengthening if Wales is to be competitive.

The publication continues in this theme by confirming that:

“Having reviewed current strengths in Wales we will launch a programme in three Grand Challenge priority areas: Life sciences and health; Low energy and environment; and Advanced engineering and materials. These build on areas where Wales already has a track record of excellence, and where the route from research to commercialisation is reasonably clear.

“Our programme in these three Grand Challenges builds on a base of four vital underpinning capabilities: fundamental research; STEM outreach; the e-infrastructure; and exploitation of intellectual property. These also must be maintained in excellent shape. Much has already been done through the foresight of our universities, funding agencies and businesses”.

²⁴ <http://gov.wales/docs/det/publications/120306scienceen.pdf>

The key issue here is the third of the three Welsh Government defined challenges of “*advanced engineering and materials*”, core to the ASTUTE Project. Whilst the publication did not specifically refer to specific funding agencies it can reasonably be assumed in this context the support of WEFO under the forthcoming Horizon 2020 ²⁵ support is amongst these. In particular for the updated call for Advanced Manufacturing. Factories of the Future ²⁶

It is furthermore gratifying to see that the Welsh Government continue in the report by recognising and stating clearly:

“but much more is needed”.

The later (2013) publication of *Innovation Wales*²⁷ recommended a new, forward-looking innovation strategy for Wales; one which researched and explored the relevance of much of the new thinking and concepts being developed around the nature of innovation and how best to encourage it. The publication stated that the strategy should also take account of recent innovation-related initiatives at the UK and European level. The result is *Innovation Wales*, which introduces some important departures in the way the Welsh Government and its partners in innovation will address the issue going forward. The report advised that:

“The Welsh Government is unique in that it has adopted sustainable development as a central organising principle in all that it does.

The report also concluded that:

“Innovation is one of the best tools to help us to deliver a more sustainable Wales”.

Following this agenda the report specifically recognised and stated:

“Our universities and colleges need not only to continue to break new ground through original research but also to collaborate productively with others to turn ideas and technology into economic gain”.

This objective is directly relevant to ASTUTE as it aligns directly with the both the defined objectives and achievements of ASTUTE to date. **More importantly it underlines and highlights the necessity to ensure the continuation and development of ASTUTE to support and enable this Welsh Government ambition.**

²⁵ <https://www.h2020uk.org/>

²⁶ http://ec.europa.eu/research/industrial_technologies/factories-of-the-future_en.html

²⁷ <http://gov.wales/docs/det/publications/140313innovationstrategyen.pdf>

Supporting this ambition, in an interview with [Horizon2020projects.com](http://horizon2020projects.com)²⁸, Jane Hutt, Welsh Finance Minister, summarising the importance of RDI funding to Wales by stating:-

“It is important that we increase current research and innovation investment levels in relation to GDP so that we can create a globally competitive nation, which our ambitious ‘Programme for Government’ and innovation and science strategies are seeking to deliver. Providing better advice and support to help businesses and higher education institutions increase their participation in European framework programmes is one way to help us achieve this goal. With a likely budget of around £60bn for Horizon 2020, I am keen, as Finance Minister, that we are proactive in leveraging this funding for the benefit of the Welsh economy.”

²⁸ <http://horizon2020projects.com/pr-interviews/wales-ambition-to-score-in-h2020/>

5

Contents

Introduction
The ASTUTE Final Evaluation Overview
The ASTUTE Final Evaluation Findings
Discussion on Evaluation Findings
Conclusions & Recommendations
Appendices

Conclusions & Recommendations

5.1 Conclusions

As the current round of funding for the ASTUTE Project draws to a close, conclusions can be drawn as to the success of the initiative.

The evidence drawn through the independent external evaluation shows that the ASTUTE Project has been a success in every aspect of its operation and the following reasons are cited for this:-

- **The ASTUTE Project has exceeded every one of its Project Outputs and Project Impacts;**
- **High level of Industrial Collaborative Partner satisfaction** including:-
 - 92% rated the Speed of response to the enquiry as Good or Excellent;
 - 94% rated the ease of contact with ASTUTE as Good or Excellent;
 - 90% rated the overall experience with ASTUTE as Good or Excellent;
 - 87% rated the Quality of support from ASTUTE as Good or Excellent;
- **High percentage of collaborations leading to Impact achieved or projected**
 - 91% reported that impact or improvement has been achieved or is expected as a result of the ASTUTE collaboration.
 - 78% of Collaborative R&D Projects, met, exceeded or far exceeded client expectations.
 - 72% of respondents projected current or future investment.
 - 67% of collaborations confirmed additional current or future employment.
- **Best practice processes were put in place at an early stage** including:-
 - An experienced full time Project management team;
 - Filtering and selection processes for potential collaborations;
 - Documented evaluation processes to ensure there was no displacement;
 - A documented processes and procedures manual which was shared with each of the eight academic partners;

- Staff with a relevant combination of academic and industrial expertise and experience;
 - Open cooperation between the partner institutions on the project.
- **Alignment with Welsh Government defined and documented objectives, priorities and funding streams** as defined in:-
- *Science for Wales*²⁹
 - *Innovation Wales*³⁰
 - *For our Future*³¹
 - *Programme for Government*³²
 - *The Economic Prioritisation Framework for Welsh European Funds*³³.
- **A projected financial contribution to the economy of Wales of £212m from an initial investment of £27m**

5.1.1 Key Success Factors moving Forward – ASTUTE 2020

The following paragraphs outline some of the key success factors for ASTUTE 2020 that should be taken in to consideration for any future bids. These conclusions have been drawn from both the Mid-Term and Final Evaluations of ASTUTE and insight gained as external evaluators to other ERDF and ESF funded projects in Wales as key success factors.

- A strong lead partner with a clarity of vision and ability to manage the Project;
- Full time employed Senior Technical Managers that have the synergy of academic expertise and commercial experience;
- Full time commercial Project Management and full time administrative support. ASTUTE has illustrated the benefits that accrue from having a properly resourced team with focus on delivery;
- The synergy of academic expertise supported by full time commercial management;
- Multiple partners to allow access to specialist expertise as and when needed;
- A clear lead partner for each project (feedback from companies indicated a preference for one lead partner);

²⁹ <http://gov.wales/docs/det/publications/120306scienceen.pdf>

³⁰ <http://gov.wales/docs/det/publications/140313innovationstrategyen.pdf>

³¹ <http://gov.wales/docs/dcells/publications/091214hstrategyen.pdf>

³² <http://gov.wales/about/programmeforgov/?lang=en>

³³ <http://gov.wales/docs/wefo/publications/141216economicprioritisationen.pdf>

- Open cooperation between the partner institutions on the project, with all partner institutions confirming their commitment to supporting the project;
- The documentation and issue of a detailed Standard Operational Procedures manual for ASTUTE Staff. This manual incorporated the processes and procedures to be followed and the documents to be used by each of the eight partners in engaging with companies; delivering support and capturing impacts;
- Documented and clearly defined processes for pre-project evaluation and review to effectively set customer expectations and filtering out projects which are not eligible;
- Funding and support for more ambitious high level projects which have greater impact;
- Funding for a systematic examination of information to identify potential threats, risks, emerging issues and opportunities, beyond the immediate term, allowing for better preparedness and the incorporation of mitigation and exploitation into the policy making process. The term used for this is “Horizon scanning” and is an overall term for analysing the future: considering how emerging trends and developments might potentially affect current policy and practice. This helps policy makers in industry and academia take a longer-term strategic approach, and makes present policy more resilient to future uncertainty. In developing policy, horizon scanning can help policy makers to develop new insights and to think ‘outside the box’;
- Funding to establish a research infrastructure capable of attracting corporate inward investment into R&D in Wales. There have in the past been isolated examples of corporate organisations establishing an R&D facility in Wales to partner with academic expertise. This has been successful throughout England but Wales has yet to be adequately funded to establish a Centre of Expertise with sufficient critical mass to attract key corporates into Wales;
- Ensuring that any future project does not become reliant on a single sector but is able to support all aspects of sustainable manufacturing.

5.1.2 A Welsh Centre for Manufacturing Excellence.

With the advent of the new Swansea campus, there remains a one off opportunity to establish a Centre for Manufacturing Excellence in Wales and with the country lagging behind the rest of the UK in its manufacturing output, a facility with a dedicated building and resources would be a clear statement of Wales’ ambition to bridge this gap. This is a clear opportunity for ASTUTE 2020 to play a role in such a facility.

5.2 Recommendations Moving Forward

5.2.1 Involvement of External Supports

The structure of WEFO funded projects to date has been to define the need for an independent external evaluation organisation or organisations to undertake a Mid-Term Evaluation and then a Final Evaluation of the Project. It is suggested that a more continuous relationship with an external evaluation organisation appointed at the outset of the project would be both more effective and add greater value. This would allow recommendations for enhancement and change to be made from a different perspective and allow issues to be raised and resolved earlier in the project than at Mid-term stage. The ASTUTE Project had the foresight to commission a Baseline Evaluation just one year into the Project which served to provide recommendations for change that could be implemented prior to the Mid-Term Evaluation.

It is suggested that this external involvement from the outset would, in addition, provide better feedback to both the Project Management itself and to WEFO of progress against plan. This would not remove the need for the Mid-Term and Final Evaluation reporting process which, in their content, would not need to be different. It would however have the benefit of involving the evaluation organisation from the outset. It is also suggested that the cost of this should be no different to the current process, just that the same level of work is spread over a longer period with more continuous and regular interaction. It is furthermore suggested that in addition to this, the WEFO person responsible for the project take a more active role in supporting the Project on a more continuous basis.

5.2.2 Business Engagement.

It is recommended that any future ASTUTE Project maintains the selective engagement processes that has proved effective in evaluating and validating the Assist or Project support request and ensures that this is embedded within the processes at all partners. This will continue to ensure that the profile of the companies and support is appropriate and that companies have the resource and ability to work collaboratively with ASTUTE. This process has also proved effective in setting and managing customer expectations. This has been evidenced by the results in Section 3.2 and Appendix B of this report.

5.2.3 Additional Collaborative activities.

There remains an opportunity for ASTUTE partners to collaborate closely with some of the forthcoming Welsh Government supports. It is recommended that a clear understanding of all new projects is gained by all key external business facing staff within any future ASTUTE Project.

One of the unique aspects of ASTUTE is the combined academic and commercial experience of full time Senior Technical Managers which is recognised and appreciated by client companies who engage in the ASTUTE support. This would be further enhanced by providing these individuals with a fuller knowledge of complementary support projects in Wales and beyond.

A second opportunity arises from the collaborative ethos that has been established between the ASTUTE partners with active referrals and combined resources when deemed relevant.

5.2.4 Follow up support

Ensure the proactive follow up process and integrated review meetings with companies at defined periods after Project completion is retained, to ensure longer term impacts (achieved beyond the timeline of the current Project) are quantified and captured. This gives further opportunity to obtain feedback, respond to requests and retain a strong ongoing loyal relationship with that organisation.

5.3 Executive Recommendations

The following is a summary of recommendations resulting from the Final Evaluation based on evidence and discussion with sections 3 and 4 of this report respectively.

➤ **Initiate ASTUTE 2020 for a bold and ambitious future**

The success of ASTUTE in meeting its impact targets and producing a Return into the Welsh Economy of almost £212m from an Investment of £27m is a compelling reason for a bigger and more ambitious ASTUTE programme into the future.

➤ **Maintain Industrial/academic Collaboration Momentum**

Ensure an early commitment from WEFO for ASTUTE 2020 to ensure key staff and Industrial Collaborators in Wales see a seamless integration from the current to future project

➤ **Remove Assists as a discrete target.**

It is recommended that the Assist is removed as a target in its own right but retained as an exploratory process with the budget to undertake a sufficient number to seed and develop into collaborative R&D projects with the resultant greater impact.

➤ **Carefully evaluate Projects with micro companies**

Introduce a more definitive evaluation process to select micro companies only with the potential to create impact as a result of the intervention

➤ **Support a hybrid model for Cross Cutting supports**

Develop a hybrid model for cross cutting supports where the intervention is managed by ASTUTE with use made of sub contracted or external supports.

➤ **Provide an Intellectual Property Support**

Given that 42% of the industrial collaborators indicated they would be interested in receiving Intellectual Property support, it is recommended that an IP support provision is an integral part of ASTUTE 2020.

➤ **Target and monitor Referrals**

Introduce a formal referral process for introductions to/from other Projects or Programmes (in academia or WG) with guidelines of the referral process and a process for keeping record and following up on the referral success and outcomes.

➤ **Explore the opportunity for a Welsh Centre of Manufacturing Excellence**

With Wales lagging behind the rest of the UK in its manufacturing output, a facility with a dedicated building and resources would be a clear statement of Wales' ambition to bridge this gap and attract high value manufacturing to the Principality.