



UPDATE TO THE INTERIM REVIEW OF THE CONNECTING CAPABILITY FUND PROGRAMME

**To inform the case for continued public funding for shared best practice,
capability, capacity and collaboration in university commercialisation**

Authors: Elaine Eggington, Rupert Osborn and Emma Walker, IP Pragmatics Ltd

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About IP Pragmatics Limited

IP Pragmatics (www.ip-pragmatics.com) helps our clients to create, progress and realise value from their intellectual property assets through the provision of integrated commercialisation and intellectual property management services. We are a specialist IP and technology management consultancy which combines intellectual property, technical and commercial expertise with a practical and pragmatic approach.

Working in technology transfer for over 20 years, IP Pragmatics is a trusted, independent partner to universities, research institutes, public sector organisations and companies in over 20 countries. Our team of experienced ex-industry, university TT and IP specialists has active global industry networks and contacts. We use this collective expertise alongside extensive market, IP and scientific information resources, to provide analytical rigour and practical insights.

London | Edinburgh | Sydney
+44 (0) 203 176 0580
elaine.eggington@ip-pragmatics.com



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1 EXECUTIVE SUMMARY

The Connecting Capability Fund (CCF) Programme is a £100 million Government-funded initiative to encourage collaboration between universities in their research commercialisation activities. The programme has funded 18 innovative projects, each involving at least three Higher Education Institutions (HEIs) in England. This funding was allocated to complement and build on established Higher Education Innovation Funding (HEIF) mechanisms and is administered by Research England (RE).

The projects began in April 2018, and are now due to run for just over three years until June 2021. Last year, IP Pragmatics delivered an independent interim review of the CCF programme as a whole in order to understand the potential impact of the programme, and to inform discussions about future spending on initiatives of this kind. Research England has now commissioned an update to this earlier review to gather evidence of further activities, outputs, outcomes and impacts from the programme over the past year. The aim is to provide evidence of the potential value of a programme that supports collaborative commercialisation practice. This will complement later assessments which are planned for the evaluation of the individual projects.

As before, progress over the last year has been assessed against the same logic model that was used in the previous report, reflecting the objectives of the CCF programme, which are:

To strengthen the contribution of English HEIs to productivity and economic growth and to delivery of the objectives of the Government's Industrial Strategy, *by*: enhancing effectiveness in use of the university knowledge base to deliver commercial and business applications and wider applications for the economy and society, *through*: stimulating strategic collaboration between HEIs across England which:

- delivers pooling of KE expertise and capabilities so that businesses and other users can access a range of KE offers or critical mass of knowledge
- builds capacity to provide cross-university responses to technological or industrial sectoral or inter-disciplinary challenges, or to regional alignments and challenges
- incentivises sharing of expertise in KE and commercialisation and dissemination of good practice across the HE sector.

This update to the interim review is based on insights from telephone interviews with representatives from each of the CCF projects and selected other stakeholders which took place in September and October 2020. This has been supplemented by an analysis of documentation provided by RE and the CCFs, including key performance indicators (KPIs), case studies, websites and other relevant background information. At this stage, quantitative evaluation is not appropriate, and instead an anecdotal approach has been taken to identify illustrations of positive outputs and outcomes.

This report does not repeat the background and findings reported in the previous interim report, and should be read in conjunction with that document: [Interim Review of the Connecting Capability Fund Programme](#), by Elaine Egginton and Rupert Osborn, IP Pragmatics Ltd.

Key Findings

- Progress against the Key Performance Indicators for individual projects can be used to demonstrate some of the activities and outcomes achieved by the CCF programme as a whole to date. **Note:** these figures are estimates only due to incomplete data, and difficulties of comparison across projects.
 - Number of people trained: 4,761
 - New products/services in development: 1,523 projects
 - Number of spin-outs created: 49
 - Number of businesses engaged: 735
 - Number of businesses networked: 4,377
 - Project leverage: £152,059,034
- Following on from the successes reported in the previous review, further evidence was found of good outputs and outcomes spanning training & skills; commercial readiness; spin-outs; industry engagement; and investment.
- Over the past year, many more case studies of positive outcomes have emerged, particularly of good progress with enhancing the commercial readiness of translational projects, and of positive outcomes from industry engagement.
- Although spin-outs and raising investment funds are expected to take longer to achieve, probably longer than the 3-year timespan of the CCF scheme, progress has been made in these categories too, in particular the successful raising of the £1.7m Northern Accelerator Seed Investment Fund which will form the basis for fundraising for a larger £80-100m fund by their VC fund partner NorthStar Ventures.
- All of the CCF projects have emphasised how the programme has incentivised the sharing of expertise and skills both within and between the CCF projects. There was a common desire to continue these relationships beyond the current programme term, and also a wish to expand the opportunities to share experiences more widely. The systems and processes that the projects had put in place to enable smooth collaboration have stood them in good stead and allowed a seamless switch to remote working.
- Over the past year, the biggest challenge has of course been the global Covid-19 pandemic, which has had both positive and negative effects across all aspects of the CCF projects. Some training and networking events were cancelled, but these have now been reconfigured for online delivery, and the projects are generally finding this has increased participation and widened the geographical spread of participants, including internationally. Cheaper delivery costs have also allowed events to be bigger and more frequent.
- There has been a knock-on effect on a number of ongoing proof of concept projects, but the extension to the overall programme timeline has allowed most of these to be reconfigured or extended to allow them to work around the restrictions. The healthcare-related CCFs have faced the biggest challenges, as access to labs has been severely curtailed, staff have been seconded and taken off to work on key government Covid-19 response work, and clinicians had changed priorities.
- The effects on potential SME partners for the projects has similarly been mixed. Some CCFs reported a slow-down in SME engagement, as the companies entered survival mode or tackled other Covid-related priorities with a decreased appetite to commit staff and funds, However, others found higher levels of SME engagement during Covid-19, which they believe is due to a

combination of companies having more time to consider collaborative approaches, and actively seeking new product and revenue opportunities. There are already a number of examples of CCFs supporting projects which exploit the new opportunities posed by the Covid-19 pandemic, including diagnostics and treatments, as well as facilitating new ways of working.

- Two of the CCF projects launched specific funds to enable businesses to respond to the Covid-19 pandemic, or support those looking to overcome current business challenges. The rapid introduction of these new schemes is testament to the flexibility and responsive approach built into the CCF programme.
- There are expected to be similar opportunities for further engagement between academia and industry as they respond to the challenges and funding opportunities presented by Government efforts to kick-start the economy again. With their existing networks and support schemes, the CCFs should be ideally placed to take a leading role in supporting this activity.
- Sustainability remains a key concern, particularly given the very ambitious initial 3-year time frames and subsequent impacts from the changed economic environment. The very strong message received from all the projects was that considerable time and effort have been expended in getting them to a point where they are functioning effectively and delivering on their ambitions, and that it would be short-sighted and counter-productive to withdraw all funding at this point before they have had a chance to demonstrate their full potential and deliver on their sustainability ambitions.
- Collaboration is at the heart of the CCF programme, with its emphasis on collaborative delivery of Knowledge Exchange (KE) across different HEIs. Further examples of various types of collaboration have emerged since the last review, spanning: KE to KE, CCF to CCF, collaborative funding bids, KE to academic, academic to academic, joint translational projects, closer working with HEI central services, as well as SME to large company or SME to SME, through interactions brokered by the CCF projects.
- Further examples of positive effects on the regional economies have emerged during the past year, supporting the governments “levelling up” agenda, which aims to even out the economic imbalances across the country.

Conclusions

- In our interviews, the responses to the scheme remain universally **extremely** positive. We found a high level of enthusiasm about the projects and a firmly held belief in the benefits that they are already delivering.
- One common theme from all the CCFs was that the projects have now got significant momentum and have put the earlier delays in setting up behind them. Many projects commented that they want to build on this momentum, and not lose the skills, procedures and connections that they have built.
- CCF funding is clearly complementary to (and not a replacement for) the long-established HEIF funding, as it enables new and innovative approaches to KE which would not be possible to encourage through HEIF with its focus on individual HEIs.
- The evidence collected to date and outlined in this report suggests that over the past year, the CCF projects have taken a clear and significant step forward. At this time last year, there was good evidence of a wide range of activities, which were beginning to demonstrate useful outputs and some outcomes. One year on, and there are now many more examples of positive outcomes,

spanning all the likely routes to impact, and emerging evidence of concrete impact on increased productivity and enhanced economic growth.

- Further positive benefits can be expected from the CCF projects over the next few years. The CCF programme is successfully delivering on all its original objectives, impacting regionally and nationally. We recommend that the scheme is continued, through a mixture of further funding for existing projects which are now working well and additional funding to allow other HEIs to engage in the scheme and explore other new collaborative KE approaches.

2 INTRODUCTION

The Connecting Capability Fund (CCF) programme has a stated objective to incentivise Higher Education Institutions (HEIs) to collaborate in commercialisation. This funding was allocated to complement and build on established Higher Education Innovation Funding (HEIF) mechanisms which support knowledge exchange (KE) activities within HEIs that reach a certain threshold of KE achievement. Both CCF and HEIF are allocated by Research England (RE).

The objectives of the CCF fund are:

To strengthen the contribution of English HEIs to productivity and economic growth and to delivery of the objectives of the Government's Industrial Strategy, *by:*

enhancing effectiveness in use of the university knowledge base to deliver commercial and business applications and wider applications for the economy and society, *through:*

stimulating strategic collaboration between HEIs across England which:

- delivers pooling of KE expertise and capabilities so that businesses and other users can access a range of KE offers or critical mass of knowledge
- builds capacity to provide cross-university responses to technological or industrial sectoral or inter-disciplinary challenges, or to regional alignments and challenges
- incentivises sharing of expertise in KE and commercialisation and dissemination of good practice across the HE sector.

The £85 million funding allocated to the collaborative CCF programme has been used to support 18 projects through a competitive funding process. These projects aim to share good practice and capacity internally across the higher education sector, to forge external technological, industrial and regional partnerships, and to deliver the Government's industrial strategy priorities. CCF is specifically focussed on commercialisation, including working with business; and collaboration between universities, as well as with external partners to commercialisation. The projects began in April 2018, and were scheduled to run for three years until the end of March 2021, but have since been given a no-cost extension in response to the disruption caused by the Covid-19 pandemic. The projects will now complete by the end of June 2021.

2.1 AIMS OF THIS EVALUATION

Last year, at the halfway point in the CCF programme, Research England commissioned an interim review of the CCF programme as a whole, which was carried out by IP Pragmatics. The outcomes of this review were published in February 2020 by Research England: Interim Review of the Connecting Capability Fund Programme¹, by Elaine Eggington and Rupert Osborn, IP Pragmatics Ltd.

¹ <https://re.ukri.org/documents/2020/interim-review-of-ccf-report/>

An analysis of the characteristics of the CCF projects can be found in this original interim report, along with an assessment of their alignment with the aims of the government's Industrial Strategy.

Research England have now commissioned IP Pragmatics Ltd to carry out a follow up review, which focuses on the further progress that has been made by these projects over the last 12 months. The primary aim of this updated evaluation is to update our assessment of the potential impacts and outcomes which may arise from the CCF program, with a view to informing decisions about future funding and continuation of a programme of this sort. As before, the update has focused on the likely contribution of the overall CCF programme, rather than the success of each individual project. It does, however, take into account the experience of individual projects to provide evidence and understand how they contribute towards the objectives of the complete programme. We also comment on the success of types of project, including whether it is possible to identify specific types of commercialisation challenge that are being effectively addressed through a CCF approach.

The main themes addressed in the evaluation are:

- Potential key impacts
- Best practice and lessons learnt, including current and future impacts of Covid-19
- Added value

This report should be read as an addendum to the previous interim report, and much of the background analysis and commentary in that report has not been repeated here.

2.2 METHODOLOGY

During this evaluation, we have undertaken a number of activities:

- Analysis of background information on each of the 18 separate projects, including:
 - key performance indicators (KPIs) agreed for each project,
 - reports of progress to date included in wave 2 funding bids
 - public sources, including websites, press releases, etc
- Telephone interviews with each of the 18 project leads or equivalent to understand their views of the scheme and the progress to date of their specific project
- Discussions with Research England programme management staff

The information gleaned from these sources has been assessed to identify potential anticipated outputs and outcomes from the individual CCF projects and from the CCF programme as a whole. These have been reviewed and clustered into similar groups of potential key impacts on business, the economy, wider society, and so on.

The anticipated outputs driving each of these outcomes has been collated, and examined to understand the potential return on investment (i.e. the extent to which impacts exceed inputs), and on what timescales these may be achieved.

During the interviews with the individual CCF projects, we have used a semi-structured questionnaire to supplement the factual data with more qualitative viewpoints on the programme. These interviews have been used to elicit views on some or all of the following aspects:

- Further progress and achievements of the project since the last review
- Major challenges faced and how these have been overcome
- Approaches to developing commercialisation best practices and lessons learned
- The impact of Covid-19 on delivery and achievement, and new and anticipated challenges from the economic crisis and recovery pressures
- Unexpected benefits
- Perceived value of the CCF scheme

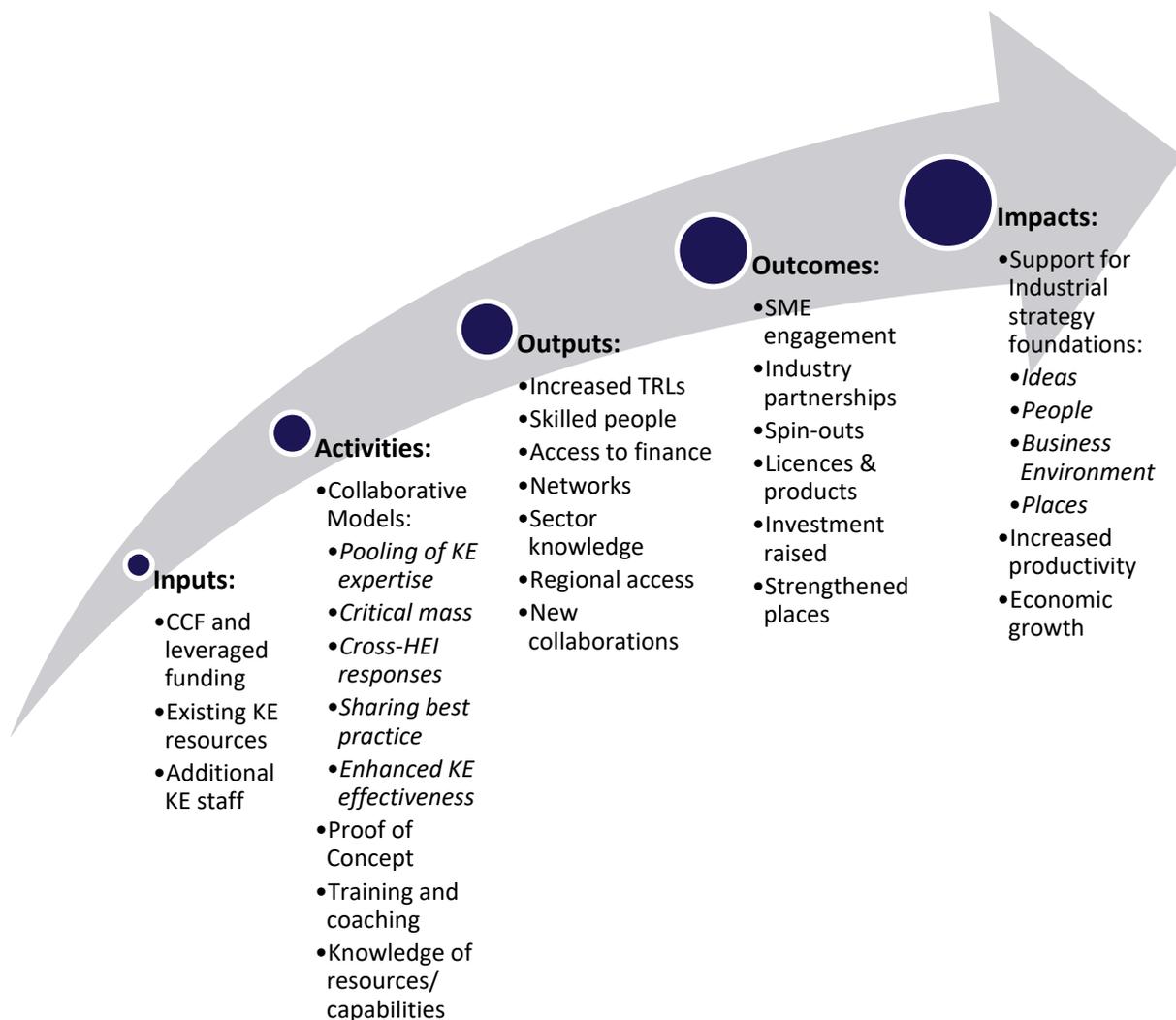
As in the previous review, it is important to note that the evidence collection has been anecdotal, not systematic and exhaustive. The figures reported in this study relate to the state of play in the projects as was reported at the time of the interviews (September - October 2020).

Appendix 2 lists the individuals who were interviewed during this project.

3 POTENTIAL KEY IMPACTS OF THE CCF PROGRAMME

To understand the context of how the aims of the CCF programme can lead to the outcomes and impacts that it hopes to achieve, we have used the same logic model as in the previous report, shown in the figure below. This works backwards from the desired impacts (increased productivity and economic growth) to understand the outputs and outcomes that will deliver those impacts, the activities that will promote those outputs and outcomes, the skills and knowledge needed to support those activities, and the resources that must be applied to build those skills.

Figure 1: Logic model for the CCF programme



This model allows suitable metrics to be identified to monitor progress of the programme across its lifespan. Both qualitative and quantitative measures are discussed in the following sections. Further details about the potential impacts of the programme are given in the previous report.

Some quantitative data on the potential scale of the overall programme can be provided by understanding the outputs that will be achieved if all of the individual projects are able to deliver on their target Key Performance Indicators (KPIs) which were agreed with RE at the start of the project. These have been set in isolation, and so it is not straightforward to compile and compare different

categories of data across the projects. The figures below are therefore open to alternative interpretations. Some of the relevant KPIs contributing to relevant areas of impact include:

Training & skills

Key Performance Indicator	Total anticipated by Year 3	Progress to date (partial data)
Number of people trained	-	4,761

Commercial readiness

Key Performance Indicator	Total anticipated by Year 3	Progress to date (partial data)
New products/services	50	1,523 projects in devt. (not yet commercial products/services)

Spin-outs

Key Performance Indicator	Total anticipated by Year 3	Progress to date (partial data)
Number of spin-outs created	124	49

Industry engagement

Key Performance Indicator	Total anticipated by Year 3	Progress to date (partial data)
Number of businesses engaged	462	735
Number of businesses networked	4,449	4,377

Investment

Key Performance Indicator	Total anticipated by Year 3	Progress to date (partial data)
Project leverage	£93,155,000	£152,059,034

Note: none of the figures for progress to date are complete, but have been compiled from the KPIs that were reported at the end of July 2019 for all the projects, supplemented with additional unofficial (and often unaudited) KPI information provided by the projects and updating on progress to the end of July 2020. The official KPI reporting from all projects to the end of July 2020 will not be collated until early in 2021.

All the individual CCF projects believe that delivery of their objectives is increasing in the second half of the project, which means that the delivery of outputs and outcomes will be back-end loaded. Despite the disruption to the projects caused by the Covid-19 pandemic, they all believe they will hit their goals on budget (though perhaps not by the formal end of the project).

4 KEY OUTPUTS AND OUTCOMES TO DATE

The interim review published in February 2020 examined the outputs and outcomes that had emerging from the each of the individual projects by September 2019, and how these were contributing to the impact of the CCF programme as a whole. In this update, we concentrate on additional outputs and outcomes which have arisen in the year since the original review.

These outputs and outcomes are categorised into different themes: effects on skills, on commercial readiness, on spin-outs, on industry engagement and on investment. This includes benefits to business, to the economy, and to wider society, as well as back to the CCF participant HEIs themselves.

As in the previous report, it is still too early to fully assess the potential long-term value of the CCF scheme, although all of the CCF projects have reported a significant increase in activity and outputs over the last year, and are predicting a further acceleration as ongoing projects complete in the next 9 months. The examples, data and case studies presented in this report are illustrative of the emerging outcomes, but are not intended to be a comprehensive account of all that has been achieved. The websites and social media accounts of the projects are full of similar examples of interesting case studies and examples of real-world impact from their activities. The amount of information available on the different projects is uneven, because not all have provided updated KPI information to the end of July 2020, and some have more comprehensive websites and communication strategies than others. We expect that similar progress will have been made by the projects that have provided less information. We also expect that the scale of outputs will continue to accelerate over the remainder of the project period, as the support delivered earlier in projects begins to deliver returns.

For all the effects discussed, it can be difficult to determine the direct influence of the CCF scheme, because good projects will use multiple sources of support to develop their commercial prospects. The CCF projects are not acting in isolation, but also depend on the leverage that they have attracted.

4.1 TRAINING & SKILLS

Our research found further evidence of positive outputs over the past year relating to enhanced skillsets in three sectors:

- KE professionals
- Academics
- Small & Medium Enterprises (SMEs)

Training for KE professionals are covered in section 5.1.

Teaching, training and mentoring are an important activity in most of the CCF projects, and include online training materials, bootcamps, workshops, accelerator programmes, and internships. As a result of the restrictions imposed by the Covid-19 pandemic, many of the face-to-face events have been adapted to allow them to be delivered online. This has generally been very successful, with most of the CCFs reporting that they have had higher attendance numbers and from a wider range of HEIs and a wider geographical area than before. Several commented that they would have been unlikely to make the move to online workshops without this necessity, but that they now plan to continue with at least some online or mixed training delivery even when restrictions are relaxed. Nevertheless, the

serendipitous aspects of face-to-face events, described by one CCF as the “creative spark” from mixing diverse talents has been missed.

The table below gives some examples of positive outputs in academic training in the past year.

Project	Output / Outcome
ASPECT	The 2020 Annual Event has moved online with a substantial increase in attendees, a broader range of HEIs (outside the original partnership) and a doubling of international attendees compared with 2019.
MICRA	2,287 academics received enterprise training or TTO support in the past year (4,265 cumulative since 2018).
EIRA	Training provided to 183 individuals – a wide range of professional services staff and early career researchers – which has covered topics including commercialisation, value proposition and Intellectual Property Rights (IPR) and accessing/applying for funding. Quick guides developed to continue to support further work during- and post-project.
Northern Accelerator	112 academics in total have now been through their Academic Programme of Support which has two tracks: <ul style="list-style-type: none"> • support for ERCs to understand and engage with routes to commercial impact • training programme for more senior researchers which focuses on the knowledge, understanding and commercial skills academics need to establish spin-out enterprises 200 academics are expected to have been trained by the end of the program, which has now been successfully adapted for online delivery They are also delivering tailored workshops on IP Awareness and Company Director Duties.
THYME	3 further workshops have been held for bioeconomy researchers to enable them to identify commercial possibilities in their research and understand the first steps to build a bioeconomy business, bringing the total number of early career researchers trained in the project up to 60.
SWCTN	Commercialisation and business training is provided for individuals through the Fellowship programme. A cohort of industry, academic and new talent fellows from across the region collectively explore the challenges, opportunities and areas of growth within the respective theme. Each cohort engage in collaborative workshops and individual research. The learnings are shared publicly via an industry showcase, as are the prototypes. There have been 75 individuals awarded innovation fellowships across the three themes/years.
SWCTN	One partner runs a ‘Talent Development Programme’ and another co-ordinates a ‘Prototyping the Business’ seven-part programmes with experts and practice workshops to provide business development training. SWCTN also has a ‘Routes to Investment’ fund which connects members with financial and legal experts to learn about IP, accountancy services and access to finance.
ASPECT	Partner Zinc launched its part-time Academy Programme, to support those looking to have greater impact through current roles. The first programme is on mental health support, going live with 25-30 participants.
Bloomsbury SET	3 Innovation Fellowships of £300,000 have been awarded. These projects are up to two years, and are designed to support early and mid-career researchers working in veterinary and/or human health to develop skills in the priority areas.

Other CCFs run training which is aimed at increasing the skills of the SMEs that they work with:

Project	Output / Outcome
Advanced Therapies	3 new collaborative training programmes underway. These aim to train the next generation of workforce needed to develop and deliver gene and cell therapy products. They were designed in response to a scoping assessment to identify skills gaps.
Scale-Up Programme	57 events have been run to date, including their Innovation Workouts – fully-funded workshops for SMEs to identify new markets and areas of growth and develop their business model with expert mentors and researchers from a partner university.

4.2 ENHANCED COMMERCIAL READINESS

As reported in the previous review, one of the most valued support mechanisms used by most of the CCF projects is Proof of Concept (PoC) funding which can fast-track the development of academic research out of the lab and into the “real-world”. Over the last year, most of the CCFs have allocated or planned to commit their final rounds of this funding, to give the individual PoC projects time to complete before the formal end of the programme. The process of identifying, coaching and then selecting which projects will be supported is helped in many cases by external experts, which adds further value to the process. Professor Hans Stauss, who is director of the Institute of Immunity and Transplantation at UCL, said: *“It is important that most projects funded through London Advanced Therapies are at an early stage of research. Conventional research funding might not support them, and it is impossible to say with certainty that they will succeed. But the beauty of supporting projects through London Advanced Therapies is that funding is decided by a board of experts, who can decide on the projects that have the best chance of success.”* Northern Accelerator also commented on the

invaluable input of independent thematic experts from across the region.

CLEANING UP BIOMASS ENERGY

Researchers at the University of Hull have had support from a PoC grant from **THYME**, which has allowed them to develop faster pre-treatment methods to make biomass energy production cleaner and more energy efficient.

The researchers have collaborated on this work with the open-access Biorenewables Development Centre in York and local company Jesmond Engineering. This grant followed on from earlier funding from the EPSRC and Energy Works Hull.

The research found that treating biomass wastes with low-energy ultrasound helps to optimise their properties for energy production and cut down harmful emissions. The PoC funding was able to accelerate the uptake of these technologies to improve the performance of local industry – producing greener energy.

Whilst the timescales from the start of a PoC project to eventual launch of a product or service through an industrial partner or spin-out company will vary depending on the field, in many cases the development required will extend beyond the three-year CCF project. The CCFs have reported varying effects of the Covid-19 pandemic on their PoC projects. For many, the projects have been modified, adapted or extended to allow progress to continue to progress through remote working restrictions. Hardest hit have been the life-science projects, where lab-based experiments are essential and have been either delayed or cancelled altogether. This will inevitably have a knock-on effect on the time to the launch of commercial products or services, but following a careful return to the labs, most of the

CCFs now report that they are currently on track to complete all their individual PoC projects by the end of the extended period in June 2021.

A number of interesting case studies are now beginning to emerge where PoC support has led to tangible outcomes and impacts. The CCF projects which are working directly with SMEs and other businesses may be earlier to produce evidence of these commercial effects. Further exciting examples are expected to follow over the next year and beyond, as the technologies mature and continue down the commercialisation pathway.

Some other examples of successful case studies which have been reported include:

- **Clean Growth** has supported the development of 105 new products in the past year.
- **Grow MedTech** have progressed around 40 technology development opportunities arising from face-to-face discussions with companies or other investors at meetings and workshops, with the company being the primary contact for the project.
- **MICRA** supported Aston Vision Sciences (AVS) in the commercialisation of a portable, early-stage, eye impairment diagnostic instrument with an initial MICRA grant of £25k in June 2019. AVS has now raised an additional £650K, and leases premises in the Jewellery Quarter of Birmingham employing four staff with two additional engineers joining soon.
- A £25k PoC grant from **MICRA** is progressing the development of a non-contact, non-destructive forensic evidence retrieval technology through the creation of a spin-out Smytec Ltd. Mentoring from the CCF helped Smytec to secure a £300k Innovate UK grant with further grants totalling £800k currently awaiting approval. Smytec will recruit 4 staff in 2020.
- **NTI** supported a project to develop anti-scale products for use in oil-wells. This has led to initial discussion with potential licensees and securing on site oil-well trials with an industrial partner.
- Another **NTI** project is developing quantum computing hardware in collaboration with business partners through Innovate UK funding. Their business plan is under review by multiple VC funds whilst further technical de-risking is being funded by NTI.
- **EIRA** support has resulted in the launch of 10 new products/services to date, with an addition 54 currently in development.
- One of the first projects that received investment from **Ceres** has now been licensed.
- Of the technology development projects supported by **Grow MedTech**, 38% have carried out Patient and Public Involvement (PPI) activities, 29% are planning to carryout PPI activities as part of the funded GMT project, 18% have developed a plan for PPI at the next stage of development and as a deliverable of the funded GMT project, and only 15% have not engaged with PPI.
- Through their Flagship Programme, **UK SPINE** are supporting a project to deliver a working 'porous' model of ageing therapeutics discovery, providing multiple entry points for stakeholders across the pharmaceutical discovery chain.
- Projects funded by the **Bloomsbury SET** have led to the development of various data linkage tools, 2 vaccine candidates, 5 diagnostic products and 2 new antimicrobial/antimalarial drugs. They have formal partnerships with 10 companies for these projects, including industry leaders MSD Animal Health, as well as prominent non-commercial partners including APHA and international research institutes.
- **Pitch-In** conducted a 'Social Prescribing' mini-project to develop protocols and guidelines for large-scale Internet of Things (IoT) deployment to inform public health policy decisions.

Collaboration with the Royal College of GPs developed an understanding of using IoT in social prescribing which has led to the development of a National Social Prescribing Observatory and further projects.

- **Pitch-In** have also conducted a number of demonstrator projects in areas of high priority for the Government, including a ‘Obesity in Children’ mini-project revealing the scale of lack of exercise in primary schools (previously unquantified), and a project investigating how live IoT data can inform understanding of, predict and minimise battery degradation (applicable to electric vehicles and grid energy storage), relevant to HMG’s Clean Energy agenda.
- In collaboration with Cornwall Museum Partnership and the Local Enterprise Partnership, Falmouth University received £700K from **SWCTN** to develop immersive experiences in five regional museums to engage visitors.
- Building on **SWCTN** research, an academic fellow was awarded a fellowship with Magic Leap (industry) and the Royal Shakespeare Company (RSC) to work with other Fellows to create novel immersive experiences. She has been invited to present the work at the RSC and has presented her research in Budapest and Canada.
- An Industry Fellow has received **SWCTN** Prototype funding for a project to develop an interactive audio-visual mixed reality app that explores natural soundscapes through play, experimentation and creation in collaboration with a local creative technology firm and a UWE academic and Immersion Fellow. The project has been selected to showcase how immersive technologies can influence human behaviour in relation to conservation and ethical responsibilities at a number of prominent public events in the UK and US. Over 500 people have experienced the prototype at these events, and the fellow has set up a company with support from SWCTN’s business development advisor.

The examples of PoC activity below show that there is a very healthy pipeline of projects and activities which are being progressed further down the pathway to commercial readiness, and are expected to produce similar success stories of new products, industrial. Several of these are also leveraging other sources of funding to support their journey.

Project	Output / Outcome
ASPECT	Partner Zinc has won the tender to deliver the Healthy Aging Catalyst Programme for UKRI, expanding their university relationships and will support 60 academics over three years. In addition, Rachel Carey (Chief Scientist at Zinc) secured a £1.2m Future Leaders Fellowship, co-hosted by Zinc and LSE, which will enable scale up of social science innovation at Zinc over the next four years.
Ceres	55 new opportunities (84 cumulative total) have been identified and developed, with 12 presented to the Investment Committee of which 10 new projects are being supported.
Grow MedTech	Over the full project term, 51 Proof of Market studies, 25 Proof of Feasibility studies (+9 conditional), and 13 Proof of Concept studies have been funded. They have also supported 11 translational projects at TRL 5+. A high volume of earlier stage opportunities (224) are being validated and advanced.
MTSC	Incubator programmes have progressed 7 technologies towards clinical and user trials, and 8 patents have been filed.
NTI	Funding is provided at different levels: Pathfinder projects (<£10K), and Proof of Principle projects (<£250K). 37 exploratory projects have been commissioned with 18 completed, and 20 Proof of Principle projects commissioned.
EIRA	PoC fund provides 6-12 months of early stage R&D support between £10-£40K – 9 PoC awards have been made or are planned.

Project	Output / Outcome
Northern Accelerator	39 PoC projects and an additional 8 feasibility studies have been supported, representing an overall investment of £1.99m.
UK SPINE	£1.6m PoC fund with two streams: <ul style="list-style-type: none"> • a Flagship Programme funds high impact strategic projects (>£300K) with higher translational potential. Four projects are currently underway. • A Bridge Programme for higher risk innovative projects (>£75K) conducting translation-focused scientific research for healthy aging. Seven projects are currently underway with four more expected to start in year 3.
THYME	PoC fund has awarded grants to 20 projects totalling almost £1m in funding. Grants of up to £50K are made to collaborative projects involving academics at the partner universities together with at least one industrial partner.
Bloomsbury SET	8 PoC grants of up to £300K per project, 8 seed awards of £2K each, 5 small grants of £30K each, 6 grants of up to £20K and 5 follow-on awards of up to £100K each for projects with good translational potential for commercial applications.
SWCTN	Open call for funding (240k in each round) to develop new products and services with commercial potential addressing industrial, societal, cultural and environmental challenges. 8 immersion prototype commissions were funded in year-one, and an additional 4 microgrants; 9 automation prototypes were funded in year-two. Further funding is expected during year 3.

4.3 BENEFITS TO SPIN-OUTS

Several CCF projects are providing support to establish new high-growth spin-out companies from their HEIs, which will bring benefits in terms of jobs and local economic growth as well as introducing valuable products and services to the market. Several CCFs provide clinics and workshops to promote entrepreneurial skills amongst academics, students and graduates, for example the Future Founders training provided by Northern Accelerator. This is a long-term route to market, and the full impacts of these activities will not be realised until well after the completion of the initial CCF programme. Early indicators of success can be seen in new spin-outs which have been founded and are beginning to trade and grow, in some cases attracting early investment from venture capital, business angels and other funding sources. Investment is discussed further in section 4.5.

The Northern Accelerator CCF has a number of particularly well-developed and integrated support programs for their spin-outs, and are talking to a number of other CCF projects about how some of their approaches could be adopted in other regions. The project has led to a sustained increase in the number of spin-outs founded by their partner HEIs. Northern Accelerator's *Executives into Business* programme has supported spinouts to engage high-quality business leaders at an early stage through

ATELERIX

Atelerix was the first **Northern Accelerator** spin-out. The company has a patented technology that offers the safe storage and transport of viable cells at ambient temperatures, overcoming the barriers and limitations of the current need for cryo-shipping.

The CEO for the company was recruited through the CCF's 'Executives into Business' programme which led to progression through the stages of business plan formation, company set-up and product development.

In May 2019 Atelerix closed their second round of funding of £700K to accelerate development of its products to market; growing the team, increasing revenues and expanding the business. This is in addition to £425K raised in 2018 in a seed investment round specialist investor, UK Innovation & Science Seed Fund (UKI2S).

developing a model that de-risks the executives’ participation by offering remuneration for the achievement of key deliverables in addition to the traditional offer of sweat equity. Their approach has proved successful, providing access to a strong candidate pool of executives (currently 85) with a diversity of highly relevant experience and knowledge which has improved investment readiness for university spinouts. So far, 16 executives have been recruited. They also provide free *Innovation Assessment* support to potential spin-out companies and other commercialisation prospects at partner universities. There are three options available: a detailed commercial readiness assessment which highlights priorities for future development and supports the development of a commercialisation action plan; a detailed assessment plus additional consultancy; or a specific consultancy with a bespoke brief. The support provided has evolved over the course of the CCF project into a more flexible model which is being well received

Other support mechanisms at Northern Accelerator are *Pre-incorporation Funding* to develop research ideas towards commercial outcomes, and the *Future Founders* course as part of the Ideas Impact Hub, which gives academics the knowledge, understanding and commercial skills to establish successful spin-out enterprises or licensing opportunities. Taken together, these programs address the main areas of risk that are typically encountered by a new spin-out, giving them a greater chance of survival and success.

The table below highlights some of the other spin-out activity successes from the CCF scheme:

Project	Output / Outcome
Ceres	2 new spin-outs have been launched, with 6 additional projects under consideration
MTSC	9 spin-outs and companies have been formed, with these ventures employing at least 12 people
EIRA	Providing start-up grant support of up to £3K for 7 months for students and recent graduates across the EIRA network. 32 grants have been issued or are in process. EIRA also run an Enterprise Accelerator for developing entrepreneurship skills for EIRA students.
MTSC	55 Early Career Researchers from 8 HEIs have been supported through funding, training, mentorship and access to industry partners. 44 ventures have been supported through the incubator.
Northern Accelerator	Supporting a novel breath diagnostic device that has the potential to revolutionise the non-invasive diagnosis of certain diseases, including Covid-19. This project has received pre-incorporation funding for rapid prototyping of the device, the lead academic has attended the Future Founders course, and has used the Executives into Business support to recruit a management team. The technology is now ready to spin-out and be further engineered for scalable manufacture and improved clinician and patient use.

4.4 ENHANCED INDUSTRY ENGAGEMENT

Many of the CCF projects have an aim to increase engagement with industry for their partner HEIs. As described in more detail in the previous interim review, this can take a number of forms, including:

- Joint collaborative research projects, leading to increased uptake of technology and ideas for commercial exploitation
- Expanding into new markets, gaining new customers, new product development

- Training to increase skills and knowledge within industry
- Networking, especially sector-specific interactions
- Employment of secondment of students and researchers
- Targeting SMEs with limited prior experience of working with academia
- Removing barriers and speeding up engagement times
- Linking up the supply chain
- Directories, sharing contacts, joint industry days
- Enabling access to skills and identify cross-university expertise

As well as the direct outcomes arising from these activities during the CCF project lifespan, long-term relationships are expected to be developed with some of these companies, to mutual benefit.

MAFIC – IMPROVING SAFETY FOR HEAVY INDUSTRY WORKFORCES

Mafic is an innovative information company, based at the Surrey Technology Centre, that uses a combination of machine learning, cloud services and Internet of Things (IoT) to improve health, safety and productivity in the construction industry.

Mafic has worked with the University of Southampton to exploit established space-based technology for data collection and transmission, as well as developing new machine learning architectures with lower computational power and bandwidth demands.

As a result of the SPRINT project, Mafic's technology has been incorporated into wearable devices worn by the workforce as well as positioned on vehicles and materials. Validation of this technology has enabled introductions for the company to a number of major industrial construction customers – Amey, Errigal Contracts, Siemens Gamesa and Sir Robert McAlpine. Other benefits include a shorter product development lifecycle, additional job creation, and introductions to new funding opportunities.

Mafic has now signed up for a second SPRINT project to support the commercialisation of its novel Safeguard technology.

This year, some of the CCF projects commented on the success of using social media to raise awareness with SMEs, as well as the KONFER platform (<https://konfer.online/>) especially for making contacts outside known sectors. SPRINT, for example, have been so successful in finding SME projects to support, that they have had to expand their project funding pot using support from the UK Space Agency.

Some common themes have emerged on ways to make SME engagement with universities easier. This includes providing significant guidance and consultation up-front, so that only projects with a high chance of being funded are progressed to the application stage. Companies appreciate this as they receive valuable input without their time being wasted. For the university partners, the involvement of companies looking for expertise means that collaborative projects are market-led, and more likely to be translated and taken up in a commercial setting. SPRINT, IBbD and others also noted that a dynamic, quick-responding process is essential to attract industry. At SPRINT, the whole process from initial approach to funded project takes 6-8 weeks, which is much quicker than many other funding streams, and fits well with SME timeframes.

Other projects have been engaging with larger industry partners to ensure that their programmes are industry-led. For example, EIRA have worked with PepsiCo, and MTSC have worked with GSK Consumer Health to develop industry challenge-led innovation programmes for their researchers.

Pitch-In actively work with industry, utilities and local government to ensure that their IoT solutions are installed and tested in real world situations, which can have unexpected knock-on benefits. One

of their industrial test sites reported that the systems in installed in their demonstration project had allowed them to switch more quickly and easily to working remotely during the Covid-19 pandemic lockdown period.

The table below outlines some of the other successes of the CCF projects relating to industry engagement during the past year:

Project	Output / Outcome
ASPECT	Through the Zinc programme, ASPECT is providing social science input into 65% of their currently active ventures. A key priority for Zinc is activating and expanding its community of applied social scientists (working in businesses and other settings as well as in academia), developing collaboration and disseminating opportunities across the network.
Clean Growth UK	2,808 new network company members have been recruited over the project lifetime, who can then access Clean Growth's innovation, commercialisation and funding support services
EIRA	The Innovation Weekender event held in March 2020 involved 59 students from across the partner HEIs, who worked together to produce innovative and creative solutions to a real-life business challenge set by PepsiCo. Digital Hubs provide skills development for start-ups with short term projects up to 12 weeks. Students/graduates also have the opportunity to gain commercial experience through the Innovation Internships with industry which has led in some cases to employment opportunities, benefiting both the companies and the interns. Have networked with over 2,000 businesses and supported 192 through direct engagement (43 engagements over the past year). Networking meetings have continued via Zoom. 103 academics have engaged with business-focused EIRA projects, working with 186 students to date.
Scale-Up Programme	Another 104 SME members have been added in the past year, who have developed proposals with HEIs (216 cumulative with signed contracts). 69 SME-HEI projects are now underway (110 cumulative).
SPRINT	This year they have engaged with 149 new business (393 cumulative), to assess and develop innovation plans. 58 new business interventions have taken place over the last year (85 cumulative). This may be at the entry level stage with up to £20K of innovation activity, or at the advanced stage with up to £150K of innovation activity. Thus far £6.3m of R&D has been enabled between businesses and the partner universities.
Grow MedTech	Of their 89 technology development projects, 78% have a development partner (41% industry/3rd sector), 65% have direct clinical engagement, and 49% are convergent technologies. These involve a broad range of individuals, including: 280 academics, 138 clinicians/healthcare professional, 50 clinical and health care organisations, 65 industrial/commercial organisations, and 74 industrial individuals.
Advanced Therapies	Within hours of an approach from one of the many UK life sciences companies working in advanced therapies, they can be put in touch with relevant experts in the partner HEIs. A second round of MedCity's Collaborate to Innovate fund has been awarded with matched funding from ERDF. SMEs are matched to HEI expertise to develop research collaborations up to a value of £150k for 12 months to progress advanced therapy products.
MTSC	Launched their 4 th and final incubator programme cohort in July 2020, supporting 13 early career researchers. This cohort explored relevant and industry-led themes set in consultations with GSK Consumer Healthcare.

Project	Output / Outcome
SPINE	Engage with industry partners through events and active brokerage activity Ten pharma partners, nine SMEs, three venture capital and four charity partners have contributed to the UK SPINEs mission through: AIMdays, PoC project delivery; knowledge sharing and providing vital resources.
IBbD	The SMEs working with the project are often engaging with design consultancy for the first time, and are now beginning to expand into innovation strategy rather than just individual product projects.
SWCTN	Holds industry showcases to share the prototypes invested in by SWCTN with the industry.
Pitch-In	Conduct mini-projects to demonstrate the benefits and practicalities of IoT in different industry contexts, helping to de-risk and promote the adoption of IoT. Their 67 mini-projects have involved 56 external collaborators to date.
Pitch-In	A collaborative project between Sheffield (partner), AMRC (Catapult) and IoeTech (SME) demonstrated the feasibility of securely migrating a legacy manufacturing plant to IoT at low cost. This prompted multiple collaborations with IoeTech, highlighting the sustainable benefit of small-scale collaboration seeding and how universities can leverage the reach of the Catapult demonstrators. Similarly, Pitch-In's 'Low Cost Automation' IoT work has impressed senior healthcare executives, prompting a follow-on mini-project investigating the use of IoT-based devices for non-critical support in hospitals.
THYME	Cluster activities have resulted in 5 SMEs developing new manufacturing processes and/or products, 4 businesses generating greater economic value, and the creation of 2 new biobased start-ups.

4.5 INVESTMENT

Outcomes linked to investment relate both to Access to Finance initiatives to raise funds which can support future spin-outs, as well as direct investment into the spin-outs themselves and other commercial opportunities from the CCF projects. Leveraged funding for the projects from grants and industry is also one of the key KPIs for all the projects, as discussed in section 3.

In the previous interim report, we emphasised the long timescales required both to develop a promising pipeline of investable spin-outs and to raise the legacy venture capital (VC) funds to support these. Nevertheless, there has been significant progress made during the past year by a number of the CCFs which are trying to raise such funds.

The most advanced is probably the Northern Accelerator, which has made great progress towards their investment fund over the past year. A VC fund partner (NorthStar Ventures) has been appointed, following an OJEU procurement process across the four partner universities. A limited partner vehicle has now been set up, and a £1.7 million Northern Accelerator Seed Investment Fund has been launched as the basis for fundraising for a larger £80-100m fund. The seed fund is focused on backing scalable, innovative spin-out companies from the four Northern Accelerator partnership universities. The first three seed investment deals are in process and are expected to be executed in the autumn 2020, with 5-8 investments expected by June 2021.

The Northern Triangle CCF has also made progress towards establishing a new independent investment company called Northern Gritstone, which expects to raise up to £500 million from strategic corporate partners, institutional investors, alumni and entrepreneurs, creating one of the

largest investors into university spin-outs in the world. The significant size anticipated for this fund is aiming to be large enough to make a real difference to the companies emerging from the three universities.

Whilst these CCF projects have had Access to Finance as the cornerstone of their projects from the outset, others have developed this approach during the project. The Scale Up Programme at SETSquared is an example of this. The project has built up a base of 200 SME members, and identified that the biggest block for these SMEs in working more closely with universities is a lack of available funding. They are planning to address this by raising an investment fund to work alongside the programme, and are working closely with other CCFs, such as MICRA and the Northern Accelerator on common strategies and approaches.

Some other examples relating to both investment funds and investment into individual spin-out projects and companies are shown below:

Project	Output / Outcome
Northern Accelerator	Successful launch of £1.7m Northern Accelerator Seed Investment Fund, and ongoing fundraising for a larger VC fund.
ASPECT	Zinc-led missions to date have resulted in 46 ventures which have secured £15.5m in equity investment, £1.9m in grants and created 167 jobs. The portfolio is currently valued at around £69.9m.
MTSC	Have raised £2.42m+ in VC and grants.
Scale-Up Programme	SMEs have leveraged around £25m in R&D funding and around £75m in investment.
MICRA	Supported Zayndu to conduct product testing of their innovative seed sterilisation equipment for industrial partners and to rent incubator space at LU Science & Enterprise Park. Zayndu is now finalising a £1m VC investment round, has created four jobs and plans to create two more before the end of the year.
NTI	Supported Opteran in the development of 4th wave AI for autonomous technologies. The company completed an initial raise of £215k pre-seed investment from various High Net Worth individuals and is now in the final negotiations for a ~£1m seed VC investment round.
SPRINT	The Space Agency have recognised the value of the SPRINT project and brand, and so are investing into it and are planning to adopt the model as part of their spending review application for evolved regional support work.
IBbD	3 SMEs supported by the IBbD project have raised investment from angel, VC and crowd funding sources.

5 BEST PRACTICE AND LESSONS LEARNT

In the interim review, we highlighted a range of best practice and lessons learnt during the set-up and early phases of the projects. Most, if not all, of these findings have remained valid for the projects over the past year, and in this section we focus on new insights and examples, rather than repeating these earlier findings.

All of the CCF projects have emphasised how the programme has incentivised the sharing of expertise and skills both within and between the CCF projects. There was a common desire to continue these relationships beyond the current programme term, and also a wish to expand the opportunities to share experiences more widely. The annual events organised by Research England were warmly received, with a desire for more to be done in the same vein. It was suggested that Research England, PraxisAuril and others could help connect the CCFs, for example using online workshops that make it easy for people to connect and tap into the inevitable wealth of common learning and sharing of tools, approaches, networks etc.

5.1 ENHANCED KE PRACTICES

In the first phase of the CCF projects, the member universities reporting working hard to build governance structures, relationships and working methods that facilitate collaboration and encourage the sharing of good practice and knowledge. This foundation has proved invaluable in ensuring that the teams could continue to work together remotely during the Covid-19 pandemic. Several CCFs mentioned that they were already well set up for remote collaboration, and were able to shift seamlessly to the new requirements.

For ASPECT, the lockdown coincided with the appointment of their marketing manager, appointed in March 2020. In March, ASPECT's website received 360 visits, 190 of which were new users. Since then traffic has averaged at 1300 per month with over 800 new users per month. Similarly, social media followers have risen from 97 in March across Twitter and LinkedIn to over 500, with the average number of engagements across both platforms rising from 50 to 370 per month. Likewise, newsletter subscribers have increased from 170 to over 230. ASPECT is active in creating new content, including original insight and project related materials. The increased visibility of this content is making this a more impactful means of knowledge exchange with a wider network. A number of other CCFs also highlighted the importance of marketing and communications in ensuring not only that their support programmes are well utilised, but that others are able to share in their positive KE experiences. A targeted session involving around

GLOBAL BIOBASED BUSINESS PLAN COMPETITION

THYME is working in expanding its reach to learn from and spread good practice beyond the UK. In partnership with the Turku Science Park in Finland and the Cluster Industrial Biotechnology in Germany, THYME is involved in the organisation of the Global Biobased Business Plan Competition (G-BiB). This is a competition for undergraduate and graduate students in the UK, Finland and Germany to create a pitch deck based on a design for sustainable production of bio-renewable products.

The object of G-BiB is to stimulate entrepreneurship and innovation developing a bio-renewable chemical, material and/or fuel product. The winning team will receive a financial award to further develop their business idea.

6 CCF projects was found to be very useful in allowing the projects to share their different approaches to marketing and communication.

In the previous review, we found that the CCF funding was strongly additive to existing translational research and KE mechanism and funding streams, such as the Higher Education Innovation Fund (HEIF), and was supporting activities that would not be funded from these sources because of competition for funding between universities. This year, the EIRA project has quantified the additional benefits from the CCF scheme that can arise for their partner universities that do not receive any HEIF funding at all, and so do not fund KE support. So far, EIRA has enabled 66 KE interventions to a value of £278K for these non-HEIF funded institutions who were unable to access similar funding prior to EIRA. The University of Essex has also offered support to these institutions in bid development and contracts management, enhancing their KE skills. Another example of a CCF which adds to HEIF funded support was given by SPRINT, which provides university agnostic innovation and BD support, in which all partners are equal with the innovation advisors shared across the network, rather than embedded within one – a model which is also used by other CCFs. SPRINT that this has worked very well with the support of university management, and the SPRINT team works well alongside core university KE resources.

For some of the CCF projects, this programme has been an opportunity to experiment with different models of KE intervention, to see which works best. For example, MTSC has experimented with different approaches to accelerators, and published a report² summarising their experiences, which concluded:

- Challenge-led acceleration models led to better institutional buy-in and support from industry, whereas Technology Push acceleration models had less industry buy in and support, but attracted research projects with a greater depth of IP.
- Industry challenges formed by a single large industry partner have been most successful in securing industry buy-in, in-kind contribution and knowledge exchange.
- MTSC report that they have realised significant value in connecting and sharing best practice across HEIs - development of best practice, new opportunities, staff development, commercial opportunities.

Several of the projects have reported that they have extended their partnerships during the last year, expanding the scope of their influence on KE practices. For example, UK SPINE expanded during 2019/20 to include 29 primary stakeholder organisations from industry and academia. A legal framework agreement was developed collaboratively and adopted in December 2019. This allows partners to exchange knowledge within the UK SPINE whilst guarding ownership of IP and know-how of individual partner institutes and promotes an agile approach to commercialisation. It includes a library of templates to streamline contract negotiations and avoid duplication of effort. This is available for widespread adoption to enhance frictionless knowledge exchange in other complex, multilateral meta-organisations that aim to accelerate innovation under a set governance structure (e.g. academic consortia, large research institutes, private sector collaborations, etc). THYME has also

² <https://medtechsuperconnector.com/knowledge-exchange/cohort-two-learning-from-experimenting-with-models-of-acceleration/>

extended its events beyond the partner HEIs and into their respective wider innovation clusters. For SWCTN, the KE managers employed on the project work with all types of network members, whether they are artists, academics, technologists or companies. They broker connections, prepare funding applications and support increased impact for the entire network, for academics and SMEs alike. They also work with Creative Producers and Business Development advisors to spread KE support approaches throughout the entire Network.

Some of the active approaches being taken by the CCF projects to spread the KE knowledge they possess and have gained are highlighted in the table below:

Project	Output / Outcome
ASPECT	<p>Disseminating Annual Learning Reports, highlighting:</p> <ul style="list-style-type: none"> • toolkit development and early lessons from SUCCESS, a pilot enterprise and commercialisation programme designed specifically for social scientists and their research • lessons from establishing the LSE TTO “from scratch”, including how to build academic ‘investment / interest’; capacity building when projects focus on know-how and Data; models for social sciences commercialisation process and outputs and how they may differ from those for STEM activity. <p>They are also developing toolkits and case study programmes for commercialisation, entrepreneurship and KE communications for Social Scientists.</p>
Ceres	An external review carried out in July 2020 confirmed that Ceres has a valuable role in transferring KE experience and expertise across partner HEIs. Cambridge Enterprise’s experience in spin-out creation and licensing was widely cited as valuable learning for the other partners.
EIRA	University of Essex have given support to non-HEIF institutions in bid development, project costing and contracts management.
Grow MedTech	Partnering on translational training courses, showcasing and exhibiting at sector specific conferences, through Grow MedTech’s translation annual conference. Two good practice guides have been identified to develop on Proof of Market activities and how to build a successful collaboration across the consortium.
MTSC	Partner TTOs share outputs and lessons learned from each of the incubator programmes to create an evidence base for best practice in knowledge exchange and medtech translation. These are publicly disseminated via the website and newsletters.
SPINE	A £200K Knowledge Exchange Fund was set up in June 2019 with the aim of funding systems that support, amplify, or scale flow of knowledge & resources for greater collaboration in innovation for healthy ageing. So far, they have funded community building platforms, policy papers, and academic-industry workshops. Six projects of up to £30K each are underway which focus on creating the infrastructure for growth of discoveries rather than just directly funding research/translation projects.
THYME	Have extended events to the innovation clusters associated with each THYME university – BioVale (York), NEPIC (Teeside) and CATCH (Hull) – which between them can connect THYME researchers to over 500 regional businesses. This includes several open innovation events with specific topics and a ‘pitchfest’. Workshops are directed towards particular areas of interest.
Advanced Therapies	Have now introduced their set of protocols and contracts for rapid resolution of IP problems, allowing third parties to interact with multiple parties in a single, swift transaction. Two new contracts have been put in place, and a methodology is being established to demonstrate their goal of reducing IP resolutions times by 25%.

Project	Output / Outcome
Northern Accelerator	Scale-Up Programme, Northern Accelerator and MICRA have worked together on sharing strategies and common approaches to investment funding. This, along with CCF networking meetings, have been very helpful in sharing problems and discussing solutions. These three CCFs are looking to create a shared platform of executives, based on the Northern Accelerator “Executives into Business” programme, who can work with SMEs and start-ups; sharing a pool of experts who can work with start-up businesses.
MTSC	Exploring whether elements of their programmes could be packaged into a transferable approach which could be shared with or licensed to others, akin to Stanford’s BioDesign concept. MTSC visited Stanford to learn how they rolled out the BioDesign concept, and have already seen an interest from other parties and in other sectors to adopt the programme for their own use.
SWCTN	Held 58 presentations, 25 exhibitions and performances, 10 industry publications, 12 academics papers, and 4 keynotes to disseminate the learnings and activities of the project. This includes sharing learning from collaborative workshops and research by the fellows, and sharing the funded prototype commissions.
Bloomsbury SET	Project has introduced Entrepreneur in Residence at RVC, and resulted in LSHTM taking their TT support back in-house, partly as they now have wider support from across the CCF. They have also seen a wider uptake of translational funding (Wellcome Trust awards) and GCRF applications that are more KE focussed.

5.2 CHALLENGES FACED

In the previous report, the main theme reported was the challenges around getting the projects up and running, where most of the CCFs found that they had underestimated the time and effort that this would need. These challenges have now been solved, but have left some of the projects with a shorter time-frame than they had hoped to deliver all the benefits of the project which was already a challenge within the 3-year timescale. The CCFs which are supporting new spin-outs in particular still face significant difficulties with full delivery by the end of the programme, and further outcomes and benefits are expected to arise from these projects way beyond June 2021.

Over the past year, the biggest challenge has of course been the effects of the global Covid-19 pandemic, and this has already been mentioned in several of the previous sections, where it has had both positive and negative effects. **ASPECT** was amongst the CCFs who had training events cancelled due to Covid restrictions, but have found that the transfer to online platforms has increased the breadth and size of the audience; albeit ~3 months delayed. Similarly, **Scale-Up Programme** commented that moving training formats to online has increased SME and academic attendance, widening the geographical range of engaging SMEs, and is cheaper meaning events can be more frequent and with a greater capacity than previously. **The Bloomsbury SET** and **Clean Growth** also commented on higher attendance with online events. **MTSC** view the widespread accelerated adoption of digital and online learning, virtual classrooms and online collaboration as a new opportunity for scaling and delivering their learning content and support beyond London, nationally and potentially internationally.

Many of the CCFs were able to adapt their PoC projects to longer timescales or to work around restrictions caused by Covid-19 working practices. The healthcare-related CCFs have faced the biggest challenges in this respect, as access to labs has been severely curtailed, staff have been seconded and taken off to work on key government Covid-19 response work, and clinicians on projects had changed

priorities. For **SPINE**, researchers were unable to get into their labs to work on 70% of the 30 funded lab projects.

LESSONS FROM NOW

Between May and June 2020 a new fund, Lessons From Now was created to support **SWCTN** alumni whose livelihoods were impacted by Covid-19 to continue their professional practice.

Grants between £1000-£2500 were available to SWCTN alumni who had previously received funding from the network. These addressed questions such as:

- Is there a creative technology experiment that you can achieve from a position of social isolation?
- Is there R&D you can do now for a future project?
- Is there some future-gazing that you'd like to undertake?

Eight projects were funded from across the South West, including a grant to Harry Willmott to explore the communities around digital immersive exhibitions and cryptoart, enabling him to spend more time building digital exhibitions and sharing activities with people also interested in exploring those realms.

The effects on potential SME partners for the projects has similarly been mixed. **Ceres** have been unable to meet their goal of generating new KTPs due to limited appetite for early stage innovation in regional SMEs. **Scale-Up Programme** reported a similar slow-down in SME engagement, as the companies entered survival mode in response to Covid-induced pressures. **MTSC** anticipate a decrease in willingness from commercial and industry partners to commit resources and funds, so staff are being deployed and realigned to find more resources or funds, and to tackle other Covid-related priorities. However, **IBbD** found that the SMEs that they work with have remained engaged and successfully moved to providing design support via remote working. If anything, SME productivity has gone up. **SPRINT** also reported higher levels of SME engagement during the Covid-19 pandemic, which they believe is due to a combination of companies having more time to consider collaborative approaches, and actively seeking new product and revenue opportunities. **SWCTN** developed an emergency R&D fund, Lessons from Now (see sidebar), which makes grants up to £2500 available for network members to address and creatively respond to the present crisis. Similarly,

EIRA created a new Enabling Recovery Fund to enable businesses to respond to the coronavirus, or support those looking to overcome current business challenges. Funds for Enabling Recovery projects are available up to £6k, for projects worth up to £7.5k. EIRA will fund 80% of the total value of the project, with companies funding the remaining 20%. The rapid introduction of these new schemes is testament to the flexibility and responsive approach built into the CCF programme.

Many of the CCFs speculate that there will be similar opportunities for further engagement for academia with industry as they respond to the challenges and funding opportunities presented by Government efforts to kick-start the economy again. With their existing networks and support schemes, the CCFs should be ideally placed to support this activity. There are already a number of examples of CCFs supporting projects which exploit the new opportunities posed by Covid-19, including diagnostics and treatments, as well as facilitating new ways of working. Several of the CCFs are thinking about how they can support businesses in different sectors to rebuild, develop and thrive in future months and years.

5.3 SUSTAINABILITY

The conclusions that we drew in the interim review about the challenges of sustaining the projects beyond their three-year funding period remain unchanged in this update. As the CCF projects approach the end of their term, all the CCFs are trying to plan for their next phase, and this planning has been focused by the current call for 2nd wave funding for the existing CCFs from Research England. The mechanisms which could be employed to support the schemes in the short- to long-term also remain the same as outlined in the previous report, but with the additional caveat that funding from the partner HEIs themselves is likely to be more difficult than was anticipated, due to the financial constraints they are facing with the Covid-19 crisis. Many of the job positions that are funded by the CCF projects are provided on fixed-term contracts, and there is a very real danger that the expertise that has been built up in the CCF programme could be lost as people begin to seek other jobs as their employment term comes towards an end. The very strong message received from all the projects was that considerable time and effort have been expended in getting them to a point where they are functioning effectively and delivering on their ambitions, and that it would be short-sighted and counter-productive to withdraw all funding at this point before they have had a chance to demonstrate their full potential and deliver on their sustainability ambitions. There is still significant opportunity to share their successful approaches and interventions more widely across the KE sector. This does not mean, however, that CCFs should not be encouraged to supplement RE grant funding with alternative income sources when and where this is feasible.

Some of the projects have concluded that grant funding is the only valid model for funding of some of their activities, as these will never become self-sustaining, and they are actively seeking additional sources of funding from complementary grant schemes.

SUSTAINABILITY GAP

The IBbD project has had sustainability built into its approach from the outset, with a requirement that the projects that it supports with SMEs will pay back the grant funding received once the products reach a certain level of commercial success and generate a multiple of the funding received.

The team has modelled the potential returns to the CCF, assuming a conservative 50% success rate of the projects. The average time they see from project completion to a product reaching the market is 2.4 yrs. From these parameters, they project that the returns to the fund will be:

- £25k in 2022
- £200k in 2023
- £300k in 2024

This would allow the CCF to support a further 25-30 projects on the same basis, and move towards a self-sustaining model, but shows a clear funding gap during 2021/22.

6 ADDED VALUE

As described in the previous report, there have been a range of unexpected outputs and outcomes that have emerged from the CCF scheme, that would not have been expected without this funding. Below we give further examples of these relating to increased collaboration across the board, and regional benefits. The benefits to KE Policy described in the previous report remain valid and unchanged over the update period.

6.1 INCREASED COLLABORATION

Collaboration is at the heart of the CCF programme, with its emphasis on collaborative delivery of KE across different HEIs. The previous report explored different aspects of further collaboration that have been stimulated by the projects, such as KE to KE, CCF to CCF, collaborative funding bids, KE to academic, academic to academic, joint translational projects, and closer working with HEI central services. Further examples of all these types of collaboration have emerged since the last review.

Another category of collaboration that has emerged more strongly over the past year is the relationships between companies, whether SME to large company or SME to SME, through interactions brokered by the CCF projects.

Some examples of new collaborative approaches over the past year are:

Project	Output / Outcome
ASPECT	The project began with 3 funded partners and four additional founder members. Since then they have had 4 UK universities join, are in discussion with 7 other potential members, including some from outside the UK, and have had expressions of interest from ~15 others
Ceres	Has catalysed a number of new collaborations, examples include: collaboration between UEA and Uni of Lincoln on EPSRC's Internet of Food Things Network; collaborations between Uni Hertfordshire and Syngenta in pesticide pollution and between the University of Hertfordshire and Rothamsted in airborne pests. Facilitated 5 new research collaborations (7 cumulative), involving a mix of HEIs, government research institutes and SMEs. Project proposals have involved academics from 21 different disciplines, not just traditional ag/plant science departments.
Bloomsbury SET	Sandpit events with >40 participants are used to develop ideas for KE PoC projects. These sandpit events helped academics from across the universities to engage and come together to discuss ideas and develop joint projects (which require academics from at least 2 HEIs). These events have led to academics forging new links across the HEIs that have knock-on benefits e.g. applications for joint research funding grants, sometimes in new areas and/or for larger joint grants. They have achieved a cultural shift in their academics, away from single-discipline approaches to tackling infectious disease, towards interdisciplinary teams as a preferred way of approaching complex issues in human and animal health through 'best with best' collaborations between life sciences and social sciences/humanities.
Clean Growth	An SME offering electric courier services is now expanding into medical waste in collaboration with another SME member within the network. Similarly, academics across the partnership are collaborating on additional research projects; for example, a new water bid under Horizon 2020 to look at pollution involving all three universities.

Project	Output / Outcome
MICRA	98 IP cross-referrals between the 8 TTO sites (202 cumulative).
Grow MedTech	Technology development projects involve 27 universities outside of Grow MedTech (15 of which are involved in funded projects).
SWCTN	Falmouth University, in partnership with Exeter University, have been awarded ERDF funding to deliver a £2m Immersive Business project in Cornwall. SWCTN's Immersion theme highlighted potential development themes that now underpin this follow-on project.

6.2 BENEFITS TO LOCAL ECOSYSTEMS

BIG DEAL COMPETITION

Engagement with local schools is a fundamental part of the THYME project, which runs an annual "Big Deal Competition" with year 9 and 10 students, to support their exploration of bio-economy business and enterprise. The 2019 winners, BIO-HEX were invited to a one-day entrepreneurial workshop held by THYME partners, to mentor the team in business and enterprise.

In the past year, one of the government strategic priorities has been the "levelling up" agenda, aiming to even out the economic imbalances across the country. This builds on the "Places" foundation in the Industrial Strategy.

The interim review discussed some of the impacts that regionally-focused CCFs have on their local ecosystem, and further examples of positive effects on the regional economies have emerged during the past year.

Project	Output / Outcome
THYME	THYME has developed KE materials which have been disseminated to 14 regional schools. They have developed a Bioeconomy Outreach Centre to provide an educational learning space for school groups and teachers and bioeconomy-related outreach events, activities and meetings. Thus far 31 events have been held there. THYME partners have also created an online bioeconomy quiz which has had over 1100 players, and they have sold 107 educational board games (as at April 2020). They have produced some additional education material about the bioeconomy for primary- and secondary-aged children during lockdown.
THYME	Researching the graduate employability skills gaps in regional bioeconomy businesses; working with industry and education stakeholders to better inform university education programs and the development of a new, research-informed bioeconomy curriculum framework to provide a talent pipeline for the sector. This will benefit both local SMEs and graduate employability prospects.
THYME	Combined CCF expertise on the bioeconomy with gaming expertise in the partner HEIs to create the Virtual Thyme Region (VTR). They have worked with a consultancy to design and build this as a virtual map of facilities and expertise in the region which have created lots of interest and won money from EPIC Mega Grant (\$50K) to develop it further.
EIRA	Innovation Internships have placed 102 interns in local businesses, with 29 students and graduates being offered internal positions. This allows the businesses to gain temporary access to a technically skilled individual, and expands the skillset of the interns.
SPINE	The number of primary stakeholders and project partners for the CCF has expanded nation-wide but disproportionately so in areas where the initial UK SPINE partner presence was the strongest.

Project	Output / Outcome
SWCTN	SWCTN has catalysed local investment into innovation spaces. A brand-new creative technology-focused incubation space has gained University support at Bath Spa University, mixing free and paid-for desk space for students, graduates, researchers, freelancers and SMEs working on creative technology projects. With SWCTN Fellows, microgrant recipients and associates among the first residents, it provides development space for new businesses emerging from the Network. The University of Plymouth has launched a New Digital Fabrication Lab and Immersive Visualisation Lab to develop skills, resources and programmes for students, industry and cultural partners to catalyse innovation.
Pitch-In	IoT is now core to Oxfordshire's Local Industrial Strategy and Energy Strategy, highlighting the CCF's local governmental influence.
Northern Accelerator	Now recognised locally as the central method by which the universities are supporting spin-out creation in the region and a key part of how they deliver their impact, civic agenda and support levelling up. The emergence and successes of the programme has supported the universities' voice in regional strategic discussions.

6.3 OVERALL VALUE

In our interviews, the responses to the scheme remain universally **extremely** positive. We found a high level of enthusiasm about the projects and a firmly held belief in the benefits that they are already delivering. One common theme from all the CCFs was that the projects have now got significant momentum and have put the earlier delays in setting up behind them. Many projects commented that they want to build on this momentum, and not lose the skills, procedures and connections that they have built.

The evidence collected to date and outlined in this report suggests that over the past year, the CCF projects have taken a clear and significant step forward. At this time last year, there was good evidence of a wide range of activities, which were beginning to demonstrate useful outputs and some outcomes. One year on, and there are now many more examples of positive outcomes, spanning all the likely routes to impact: Licences & products; Spin-outs; SME engagement; Industry partnerships; Investment raised; and Strengthened places. Evidence of concrete impact on increased productivity and enhanced economic growth is also beginning to emerge. One CCF has commissioned an external Economic Impact Assessment of their project, which is already showing a benefit:cost ratio of 3.65 (for every £1 invested, £3.65 is generated for the local economy).

As we stated in the previous review, and re-iterate here, further positive benefits can be expected from the CCF projects over the next few years. The CCF programme is successfully delivering on all its original objectives. CCF funding is clearly complementary to the long-established HEIF funding, as it enables new and innovative approaches to KE which would not be possible to encourage through HEIF with its focus on individual HEIs. We recommend that the scheme is continued, through a mixture of further funding for existing projects which are now working well and additional funding to allow other HEIs to engage in the scheme and explore other new collaborative KE approaches.

APPENDIX 1: ACRONYMS AND ABBREVIATIONS USED IN THE REPORT

Acronym	Description
CCF	Connecting Capabilities Fund
EPSRC	Engineering and Physical Sciences Research Council
ERDF	European Regional Development Fund
EU	European Union
HEI	Higher Education Institution
HEIF	Higher Education Innovation Fund
IP	Intellectual Property
IoT	Internet of Things
KE	Knowledge Exchange
KPI	Key Performance Indicator
LEP	Local Enterprise Partnership
OJEU	Official Journal of the European Union
PoC	Proof of Concept
RE	Research England
SME	Small or Medium-sized Enterprise
TRL	Technology Readiness Level
TTO	Technology Transfer Office
UKRI	UK Research & Innovation
VC	Vice Chancellor
VC fund	Venture Capital fund

The abbreviations used for the individual CCF projects are as follows:

Abbreviation	Full Project name
Advanced Therapies	London Advanced Therapies
ASPECT	ASPECT (A Social sciences Platform for Entrepreneurship, Commercialisation and Transformation)
Bloomsbury SET	The Bloomsbury SET: Connecting Capability to Combat the Threat from Infectious Disease and Antimicrobial Resistance
Ceres	The Ceres Agritech Knowledge Exchange Partnership
Clean Growth	Clean Growth UK
EIRA	Eastern ARC 'Enabling Innovation: Research to Application'
Grow MedTech	Grow MedTech: Collaborating for a Competitive Future
IBbD	Impacting Business by Design
MICRA	Midlands Innovation Commercialisation of Research Accelerator
MTSC	MedTech SuperConnector
Northern Accelerator	The Northern Accelerator – Integrating Capabilities in the North East
NTI	Transforming UK IP Commercialisation Through Collaboration in The North of England: The Northern Triangle Initiative
Pitch-In	Promoting the Internet of Things via Collaborations between HEIs & Industry
Scale-Up Programme	SETsquared scale-up programme
UK SPINE	UK SPINE KE: free flow of knowledge to accelerate innovations in ageing
SPRINT	SPRINT (Space Research & Innovation Network for Technology)
SWCTN	South West Creative Technology Network
THYME	THYME Project (Teesside, Hull and York - Mobilising Bioeconomy Knowledge Exchange)

APPENDIX 2: LIST OF THOSE INTERVIEWED

Project	Interviewees
Advanced Therapies	Prof Simon Howell – Project Lead and grant holder Francesca Gliubich – Director- London Advanced Therapies
ASPECT	Julia Black – Lead PI, and head of commercialisation, entrepreneurship, student entrepreneurship
Bloomsbury SET	Ray Kent – Director of Research Administration (RVC) and CCF Lead Emma Tomlinson – CCF partner lead RVC
Ceres	Iain Thomas – responsible for communication between the project and the lead University Louise Sutherland– Director of Ceres project Geoff Elliot – Ceres Project Lead
Clean Growth	Zoe Osmond, Director Clean Growth UK
EIRA	Rob Singh –Director of Research & Enterprise – involved with bid and Steering Group Kirstie Cochrane – EIRA Director Maricia Klincke – Programme Manager
Grow MedTech	John Fisher - Director of EPSRC Medical Technologies Innovation and Knowledge Centre Danielle Miles – Programme Lead
IBbD	Guy Bingham – Prof of Design at DMU and project lead Emily Hancock– Project manager
MICRA	Simon Jones – Lead Project Manager
MTCS	Hiten Thakrar – Consortium Manager Charles Mallo – Consortium lead Imperial
Northern Accelerator	Tim Hammond – Project Lead Jenny Taylor – Head of Economic Devt at Durham Edwin Milligan – Programme Manager
NTI	Andrew Wilkinson – UM Innovation Factory CEO, CCF lead
Pitch-In	John Clark – PI and academic lead for the project. Professor of Computer and Information Security at the University of Sheffield Chris Baker – within Sheffield KE team Sarah Cullen – Pitch-In Operations Manager
Scale-Up Programme	Simon Bond, SET Squared Innovation Director and CCF Lead Stephen Mayers – Head of Scale Up
SPINE	Beverly Vaughan – Programme Director
SPRINT	Martin Barstow, SPRINT PI and Director of the Leicester Institute of Space & Earth Observation Ross Burgon – Head of the SPRINT Programme
SWCTN	Jonathan Dovey, Professor of Screen Media on Dept of Creative Industries, Director REACT (Research & Enterprise for Arts and Creative Technologies)
THYME	Debbie Smith – Chair of Thyme Board Joe Ross – Director of the Biorenewables Development Centre (BDC)

