IP PRAGMATICS

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

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February 2020

UKRI Research England

Commissioned by Research England

ACKNOWLEDGEMENTS

IP Pragmatics would like to thank all those who have provided input into this study, including the project team at Research England, the external stakeholders and in particular all those within the CCF project teams who have contributed information to the work. We acknowledge the efforts made by these individuals to provide the requested information and arrange in-depth interviews over the summer holiday period.

About IP Pragmatics Limited

IP Pragmatics (www.ip-pragmatics.com) is a specialist consultancy that provides a range of intellectual property management and commercialisation services to assist universities, government research institutes and companies to increase their commercial revenue from their research, expertise and facilities. The company helps clients to create and realise value from their intellectual property assets through the provision of integrated intellectual property and business development services.

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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 due to run for three years until March 2021. 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 commissioned an independent interim review of the CCF programme as a whole. 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 the projects are only just half-way through, it is recognised that it is still too early to assess the full outcomes and impacts that may be expected. Progress to date has been assessed against 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 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 August and September 2019. This has been supplemented by an analysis of documentation provided by RE and the CCFs, including the original project bid documents, key performance indicators (KPIs), 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.

Key Findings

- Overall the CCF projects involve 54 HEIs collaborating with each other and directly with more than 120 individual businesses and investors, as well as wider business and investor networks.
- Twelve of the projects are regionally based, with a good geographic spread across England. Two HEI partners from Scotland and one from Wales are also involved.

- The projects include creative, social sciences, and design-led approaches and are not just confined to traditional areas for commercial knowledge exchange. The industry sectors covered include 9 of the sectors prioritised for interventions in the Industrial Strategy.
- A logic model for the impacts and outcomes that may be anticipated from the CCF programme has been devised to identify a number of themes in which impact can be expected. These align with the five foundations which support the government vision for a transformed economy outlined in the Industrial Strategy.
- **Training & skills** are being enhanced in three sectors: KE professionals, academics, and industry (in particular SMEs). Most of the CCF projects include some formal teaching mechanisms to increase the commercial skills of the academics and students, such as online training materials, bootcamps, workshops, accelerator programmes, and internships. Upskilling of companies is also happening, for example through participation in design-led projects or understanding of State Aid and how to access funding. The skills of thousands of people are expected to be enhanced during the programme, enabling them to deliver the outcomes in the other categories.
- At the core of all the projects are schemes aimed at increasing the c**ommercial readiness** of HEI or industry ideas. Proof of Concept (PoC) funds aim to reduce the uncertainty around their commercial value or importance to society. The eventual aim is to produce successful products or services which are available in the marketplace, and/or to spin-out successful companies, but this may only occur after the end of the projects. Ultimately, these licensed products will return a revenue stream in the form of milestones, development fees and royalty payments to the HEI. Within the programme lifetime, many examples of individual technology projects are expected to be successfully progressed further down the pathway to commercial readiness. The first prototypes from these PoC projects are now being tested in the real world.
- **Spin-outs** are another way in which higher risk technologies may be taken to the market. The benefit from these includes new products and services, as well as more high growth companies, employing staff and returning value to the country through taxes and economic growth. A new spin-out is likely to take 10-15+ years before it reaches an exit point, but within the programme lifetime, several new spin-outs are expected to be founded and begin to grow. Some specific interventions include accelerator programmes which have already led to new companies, initiatives to identify suitable management support for early companies, and further support to enable existing spin-outs to scale and grow. One project has reported a 4-fold increase in spin-out activity, whilst another has supported the first ever spin-out from one of its member HEIs.
- **Industry engagement** is core to the commercialisation of technologies, and the CCF projects are demonstrating new ways to improve interactions and make it easier for industry to engage. Many of the schemes that are being used by the CCF projects require leveraged funding from the industry partner, through cash and/or in-kind effort, and significant funding has already been received to support many collaborative projects.
- Six of the CCF projects include a specific aim around improving Access to Finance and bringing in **investment**. With advice from the British Business Bank, some are trying to raise a legacy venture capital (VC) fund that will continue to invest in its pipeline of spin-out projects. This requires the CCF project to be able to demonstrate that they have sufficient deal flow and scale to justify a dedicated fund, whilst maintaining their unique identity that will attract investors. The timescales needed to close these funds are likely to be longer than the three-year CCF

timeline, but good progress is expected to building an attractive pipeline and attracting potential investor interest.

- The third aim of the CCF programme is to incentivise sharing of expertise in KE and commercialisation and dissemination of good practice across the HE sector. This is most obviously being achieved through face-to-face, person-to-person interactions at all managerial and operational levels as cited by 9 of the CCFs. Many of the projects are now harmonising selected procedures to take the best from each of their members' approaches, for example identifying the most effective way to run an opportunity assessment panel and how to structure an investment pitch. Sharing of best practice is now extending beyond interactions within a CCF project to CCF-CCF collaborations and more widely amongst the KE sector through a parallel session at the PraxisAuril conference. Several projects are also developing and publicising best practice guides and KE support materials.
- The most common challenge (reported by 13 CCFs) was caused by delays to the start of the project because of difficulties in recruitment and in getting agreement on the mechanisms for collaboration between the partners. Now that these processes are in place, this learning should smooth future collaborations between these HEIs. Other issues relating to the KE mechanisms that the projects are trying to support include how to generate enough demand from SMEs to engage with the programmes, and how to manage over-subscribed PoC funding.
- Twelve projects were concerned about the length of time that it will take for the support that the CCF projects are providing now to manifest as successful outcomes and impacts that can be used to garner further support and funding for the CCF projects. The more valuable impacts are expected to take longer than the project lifetime to become apparent. This leads directly to the biggest ongoing challenge for the projects of how to achieve sustainability.
- A range of different approaches to achieving sustainability are being explored by the different projects, and many elements of the changes introduced are expected to be embedded by the end of the programme. Nevertheless, it is likely that if there is no further CCF funding forthcoming, then many of the current projects will have to scale back on their current activities. Longer-term, there is an increasing chance that alternative funding mechanisms will be able to take over some or all of the CCF grant funding for individual projects.
- Some unexpected outputs and outcomes that would not have been possible without the CCF funding include the level of collaboration that has been enabled, with several comments that these projects are more truly collaborative than other projects that the interviewees have come across in the HEI sector. This includes KE-KE collaboration, KE-academic, academic-academic within and between HEIs, and academic-industry. Several new funding bids have already been developed and some successfully funded based on the CCF relationships.
- Eight of the CCFs have found that the project has significantly boosted the profile of KE within their institutions at senior management level, increasing an awareness of the potential benefits that it can bring.
- External interest is also being increased through the scale that is achieved by combining the approaches of universities that alone may not be traditionally seen as "research power-houses". This extends to allowing easier ways for government, industry and others to interact with and understand the HEI sector.
- The programme as a whole makes a very interesting collection of the breadth and challenges of KE. The group of 18 projects is a manageable number to be explained to external policy makers

and interested parties, and provides a good cross-section of the huge variety of activities, approaches and successes of KE in the HEI sector.

- Over half the projects have a regional focus that is outside the traditional innovation hotspot within the Golden Triangle. These are strengthening their local ecosystems as a natural arena for their commercialisation activities, and the relationships that have been developed in the CCFs are now leading to new bids with a regional focus.

Conclusions

- In our interviews, the overall responses to the scheme were universally **very** positive. There was a high level of enthusiasm about the projects and a firmly held belief in the benefits that they are already delivering.
- Most importantly, all the participants and external stakeholders stressed that the CCF programme was additive to (and not a substitute for) the existing regular HEIF funding that is received by many of the participating HEIs. HEIF funding is an essential mechanism to provide the fundamental services and facilities that enable the organisations to manage their individual KE activities. Without this underpinning capability, they would not be in a position to benefit from the additional activities and collaborations that CCF has funded.
- We found strong support across the board for a continuation of the CCF programme. The evidence collected to date and outlined in this report suggests that there are already positive benefits coming from the scheme with more expected to come. The projects are contributing well to all aspects of the overall objectives of the programme. Continued support for future rounds of the scheme would allow the projects that have started to be refined and optimised and deliver additional impact. Further value could also be gained by extending the scheme to some other HEIs that are not yet participants, through funding new schemes and/or through supporting some of the existing schemes to expand their membership.

2 INTRODUCTION

The £100 million funding for the Connecting Capability Fund (CCF) was allocated by the Government in 2016, with 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.

£15 million of the CCF was used to increase the KE capability of all the HEIS which receive HEIF funding, through an additional 10% addition to their existing HEIF allocations. This element of the CCF funding has not been evaluated in this report.

The remaining £85m 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 are scheduled to run for three years until the end of March 2021. Each project had to involve a consortium of at least three named English HEIs, with a named lead university. Each individual HEI was only allowed to submit one bid as a lead institution, and to participate in one other bid as a non-lead partner. The projects were awarded in two phases: the first awards were to four projects which were ready to proceed to a full bid when the CCF programme was announced; the second to the remaining 14 projects which passed an Expression of Interest (EoI) stage before progressing to full bids.

The successful project bids and their partners are shown in the table below:

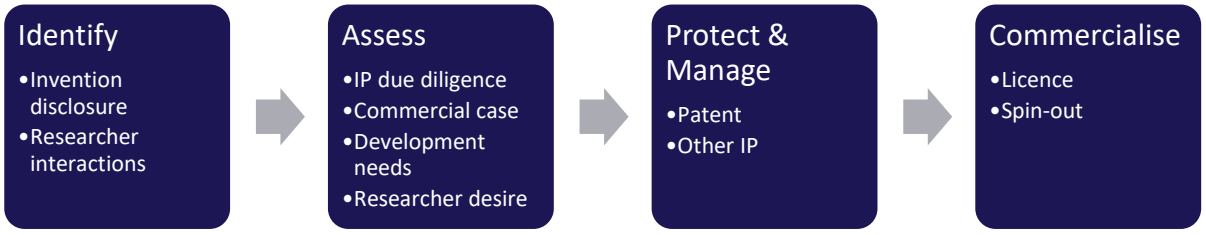
Lead institution	Partner institutions	Project name & Acronym	Amount of funding
University of Bath	University of Bristol; University of Exeter; University of Southampton; University of Surrey	SETsquared scale-up programme **Scale-Up Programme**	£5,000,000
University of Birmingham	Aston University, Cranfield University, Keele University, University of Leicester, Loughborough University, University of Nottingham and University of Warwick	Midlands Innovation Commercialisation of Research Accelerator **MICRA**	£4,990,000
University of Brighton	University of Portsmouth; Liverpool John Moores University	Clean Growth UK **Clean Growth**	£3,500,000
University of Cambridge	University of East Anglia; University of Hertfordshire; University of Lincoln; University of Reading	The Ceres Agritech Knowledge Exchange Partnership **Ceres**	£4,781,000
De Montfort University	Brunel University London; Nottingham Trent University	Impacting Business by Design **IBbD**	£4,648,000
Durham University	Newcastle University, Northumbria University, University of Sunderland	The Northern Accelerator – Integrating Capabilities in the North East **Northern Accelerator**	£4,933,767
University of Essex	University of East Anglia; University of Kent	Eastern ARC 'Enabling Innovation: Research to Application' **EIRA**	£4,696,000
Imperial College London	Buckinghamshire New University; Institute of Cancer Research; Queen Mary University of London; Royal College of Art; Royal College of Music; Royal Veterinary College	MedTech SuperConnector **MTCS**	£4,947,000
King's College London	University College London; Imperial College London	London Advanced Therapies **Advanced Therapies**	£4,922,055
University of Leeds	University of Bradford; Leeds Beckett University; Sheffield Hallam University; University of Huddersfield; University of York	Grow MedTech: Collaborating for a Competitive Future **Grow MedTech**	£4,995,000
University of Leicester	Open University; University of Surrey; University of Edinburgh; University of Southampton	SPRINT (Space Research & Innovation Network for Technology) **SPRINT**	£4,796,000
London School of Economics and Political Science	University of Manchester; University of Sussex	ASPECT (A Social sciences Platform for Entrepreneurship, Commercialisation and Transformation) **ASPECT**	£5,000,000

Lead institution	Partner institutions	Project name & Acronym	Amount of funding
University of Manchester	University of Leeds; University of Sheffield	Transforming UK IP Commercialisation Through Collaboration in The North of England: The Northern Triangle Initiative **NTI**	£5,000,000
University of Oxford	University of Birmingham; University of Dundee	UK SPINE KE: free flow of knowledge to accelerate innovations in ageing **SPINE**	£4,820,000
Royal Veterinary College	London School of Economics and Political Science, London School of Hygiene and Tropical Medicine, School of Oriental and African Studies University of London.	The Bloomsbury SET: Connecting Capability to Combat the Threat from Infectious Disease and Antimicrobial Resistance **Bloomsbury SET**	£4,960,000
University of Sheffield	Universities of Oxford and Cambridge and Newcastle University	Promoting the Internet of Things via Collaborations between HEIs & Industry **Pitch-In**	£4,917,863
University of the West of England	Bath Spa University; Falmouth University; University of Plymouth	South West Creative Technology Network **SWCTN**	£4,585,416
University of York	University of Hull; Teesside University	THYME Project (Teesside, Hull and York - Mobilising Bioeconomy Knowledge Exchange) **THYME**	£5,000,000

The CCF scheme is being delivered in the context of the government's Industrial Strategy which has an ambitious aim to increase investment in R&D across the UK to 2.4% of GDP (from 1.7% in 2016). This requires concerted effort by both Government and businesses to make the UK the most innovative country in the world. The CCF scheme has been devised in the light of this ambition.

HEIs are seen as a key contributor to the success of this goal. For this to be achieved, the processes of knowledge exchange and commercialisation from UK HEIs must contribute to these increased levels of innovation. The basic processes of intellectual property (IP) commercialisation from HEIs worldwide typically follow a similar pattern, shown in the diagram below:

Figure 1: Components of HEI IP commercialisation



This linear scheme, however, hides a range of activities and subtleties in knowledge exchange practices, including more fundamental research collaborations with industry. It also assumes that innovative ideas occur in isolation. The CCF scheme is specifically designed to circumvent some of these assumptions, and to identify the additional value that may be possible through collaboration; within HEIs, between HEIs, and between HEIs and industry. It aims to overcome traditional individual research rivalries between universities and explore what synergies can be achieved when HEIs work together and pool their resources.

2.1 AIMS OF THIS EVALUATION

At the halfway point in the CCF programme, Research England has commissioned an interim review of the CCF programme as a whole. The primary aim of this evaluation is to provide evidence about the potential impact of a programme such as CCF, including its complementarity to other funding streams such as HEIF, with a view to informing decisions about future funding and continuation of a programme of this sort. It is also intended to provide insights to improve current and future programme management. The review 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. The evaluation focuses particularly on the value of a programme that supports collaborative knowledge exchange and commercialisation practice.

The main themes addressed in the evaluation are:

- Potential key impacts
- Best practice and lessons learnt
- Added value
- Future programme design

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:
    - original project bid documents, grant letters identifying key success measures for each project, key performance indicators (KPIs) agreed for each project
    - 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
- Interviews with Research England programme management staff
- Interviews with other relevant stakeholders

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.

The anticipated deliverables have also been briefly matched against the Industrial Strategy, to understand how they might support the foundations and the specific sectors addressed.

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:

- How your project is contributing to the overall CCF aims (pooling of KE expertise for enhanced industry engagement; building cross-university KE responses to external challenges; sharing best practice)
- Best practices emerging from the CCF scheme
- Lessons learned
- Unexpected benefits
- Progress towards your individual project aims

It is important to note that the evidence collection has been anecdotal, not systematic and exhaustive. Although we have attempted to group responses into categories and quantify the number of projects that have reported a particular output, outcome or challenge, the data collection process was not prompted, and so there may well be other CCF projects in the same categories which did not mention a specific outcome in their responses, and so were not captured. This interim review may be used to identify specific areas of potential impact and measures of outputs and outcomes which could be used for a later more comprehensive and systematic evaluation of the achievements of the CCF programme.

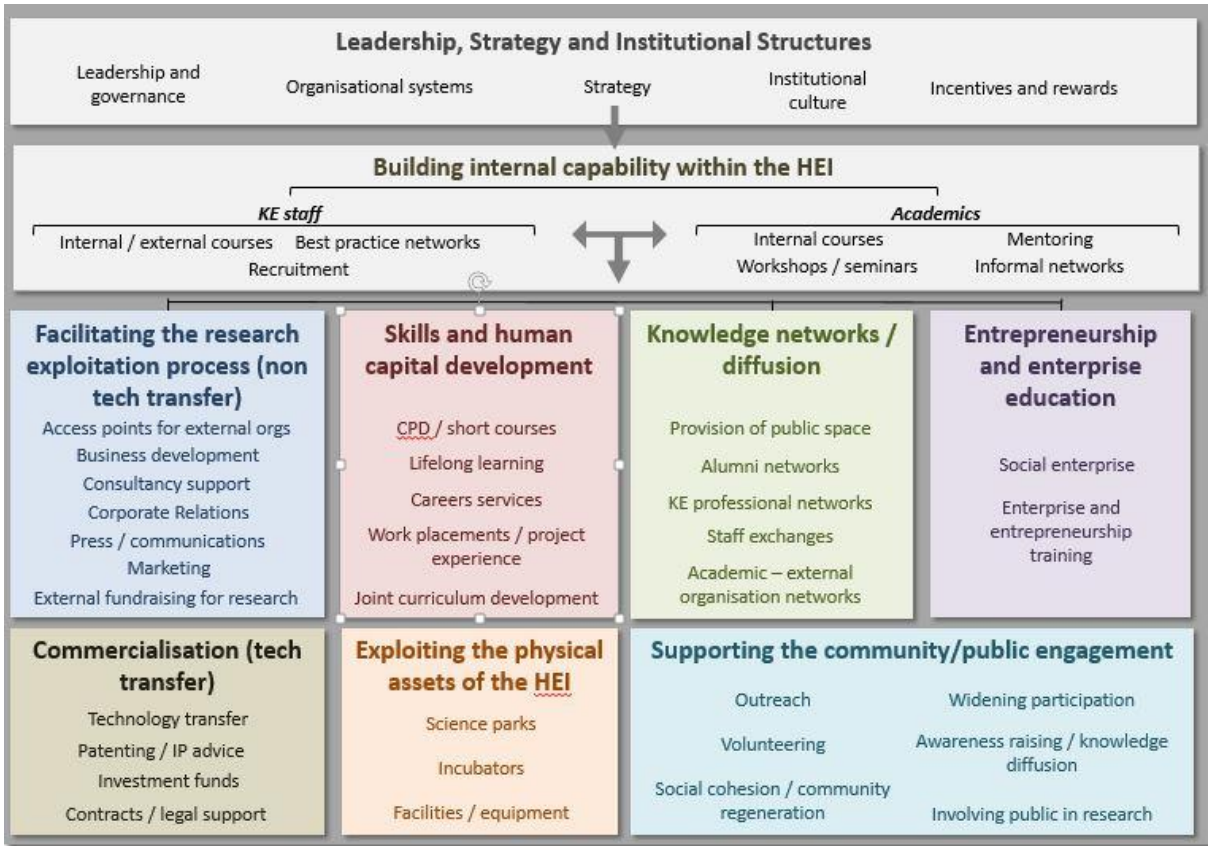
The figures reported in this study relate to the state of play in the projects as was reported at the time of the interviews (August - September 2019). Further progress has since been made by these projects, and the KPIs and success measures would now be higher if reported as at the publication date of this report.

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

3 OVERVIEW OF THE CCF PROJECTS

The CCF programme aims to demonstrate the benefits that can be achieved by undertaking KE activities at scale and in collaboration. Research England has a broad viewpoint of the activities that can make up successful KE for HEIs, as summarised in the diagram below:

Figure 2: Categories of Knowledge Exchange



(Source: HEFCE / Tomas Coates Ulrichsen, 2017)

The projects selected for the CCF are focused on increasing commercialisation, but are not focused solely on traditional areas for technology transfer (Science, Technology, Engineering and Maths). Projects within the CCF programme also include those which have as their central remit design, creative technologies, and social sciences.

The projects that make up the CCF programme involve a total of 54 HEIS, and include more than 120 individual businesses and investors as formal partners, as well as wider business and investor networks. These will be supplemented during the delivery of the projects with additional industry partners that become involved with collaborative projects and with commercialisation of the innovative ideas arising from the scheme.

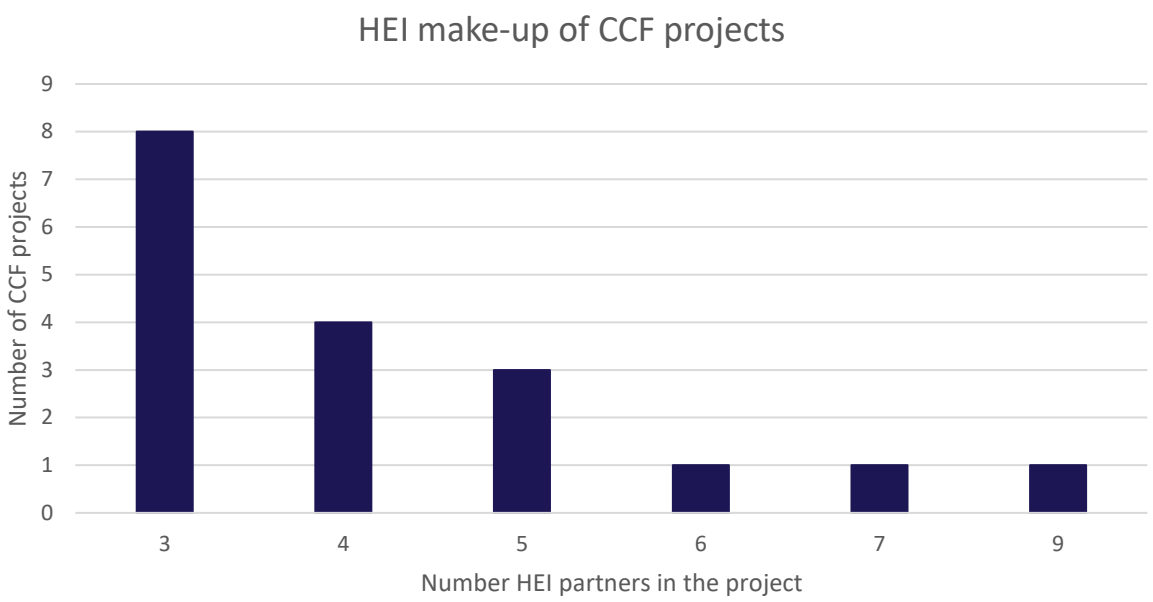
Twelve of the CCF projects have a regional focus, which span the whole of the UK. More than 12 different Local Enterprise Partnerships (LEPs) will specifically benefit. HEI partners also include three HEIs from the devolved authorities, although these are not able to directly receive funding from the scheme. The map below shows the locations of the lead HEIs (blue circles) and their partners (red dots).

Figure 3: Geographical distribution of CCF programme participating institutions

Blue circles show lead institutions, named in blue; red dots show other partner institutions

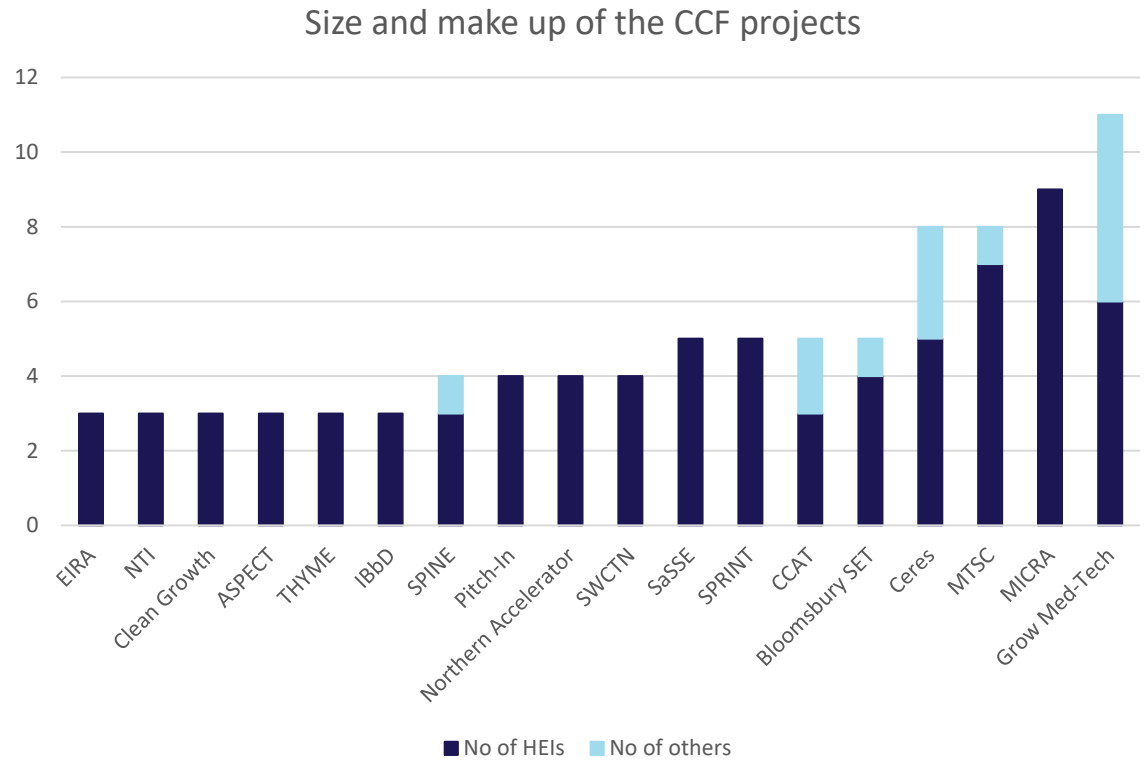
The majority of the projects include 3-5 HEI partners, as shown in the graph below:

Figure 4: Number of HEI partners in the CCF projects



Each of the projects may also include other (non-HEI) partners, and when these are included, the make-up of the separate projects is as shown in the figure below:

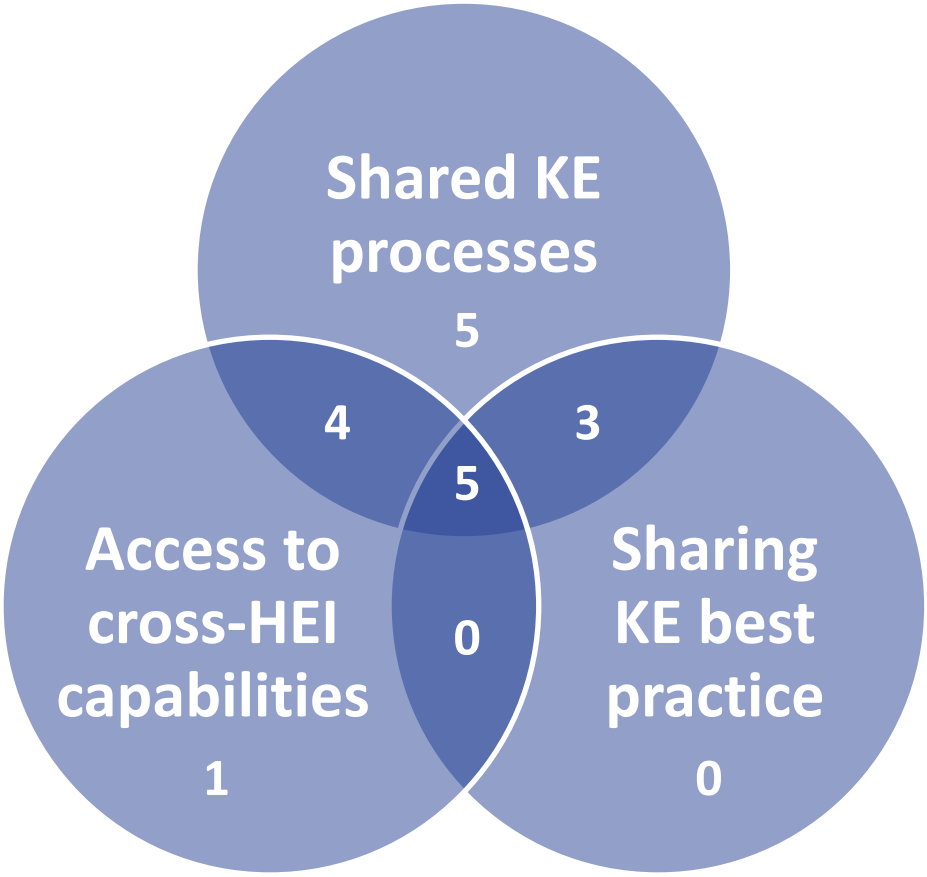
Figure 5: Make-up of the CCF projects



The projects will attract at total of over £322 million of additional investment from universities, businesses, investors and other partners over their life-span. With five Catapults and some Research Councils involved, the projects also build on partnership working across many of the organisations that make up UK Research and Innovation (UKRI).

All of the projects address each of the three main objectives of the CCF programme to a lesser or greater degree. However, some projects have a more pronounced focus on certain of these objectives. The spread of the different key objectives amongst the projects is as follows:

Figure 6: Number of projects addressing each objective of the CCF



The projects can also be divided according to their primary KE mechanisms. The majority of the projects have a heavier focus on developing university ideas and technology and linking these with external industry partners and commercialisation routes. The remaining projects focus on pulling in industry involvement with the HEI innovation system and stimulating engagement. These two aims are not mutually exclusive, and most of the projects contain an element of both approaches.

Three of the projects are sector-agnostic, and focus instead on any promising technology which arises in their partner HEIs. Most of the projects, however, have a sector focus. For some this is very specific, whilst others span one or more broad sectors, which are often aligned with priority sectors of focus within the Industrial Strategy, as shown in the table below:

CCF Project	Key sector(s)
Advanced Therapies	Cell and gene therapies
ASPECT	Social sciences Research
Bloomsbury SET	Infectious Disease & Anti-Microbial Resistance (AMR)
Ceres	Agritech
Clean Growth UK	Green Technologies
EIRA	Digital Creative, Biotechnology, and Artificial Intelligence
Grow MedTech	Medical Tech
IBbD	Design and New Product Development
MICRA	-
MTSC	Medical Tech
Northern Accelerator	-
NTI	-
Pitch-In	Internet of Things
Scale-Up Programme	Digital Innovation; Health & Wellbeing; Environmental, Sustainability, Marine & Maritime; Advanced Engineering & Manufacturing
SPINE	Age-related illnesses
SPRINT	Space
SWCTN	Creative
THYME	Bio based

The 18 projects, and their primary focus areas are:

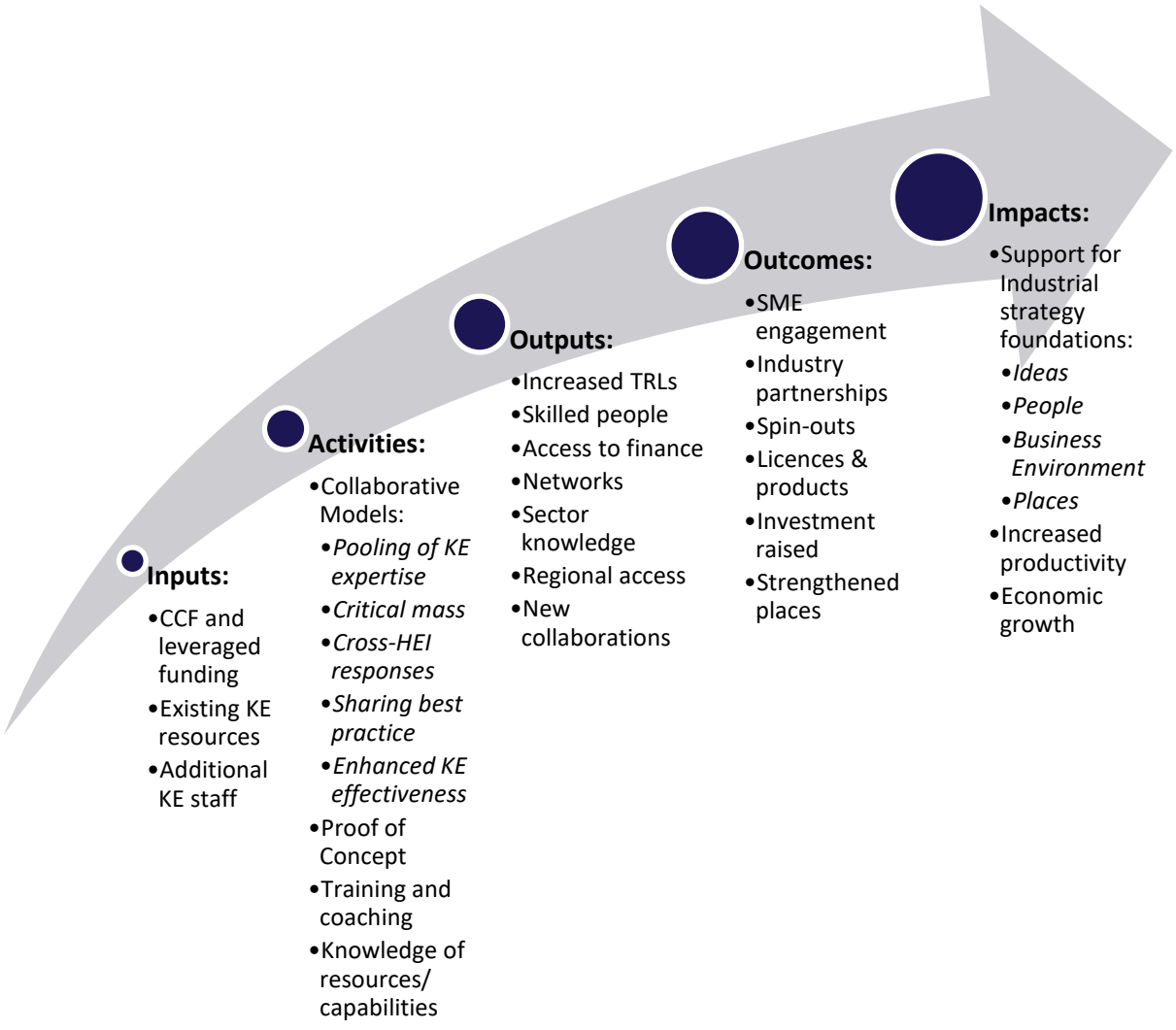
Project	Phase	Website	Region
Advanced Therapies	Phase 2	https://www.medcityhq.com/medcity-programmes/the-advanced-therapies-network/	London
Utilising complementary expertise and strengths to provide a comprehensive set of activities to catalyse knowledge exchange between the HEIs, SMEs and industry, building on the structure of a successful MedCity programme, to position London, and the UK, as a global leader in the sector of advanced therapies			
ASPECT	Phase 2	https://www.aspect.ac.uk/	National
To develop, implement and scale up a globally leading social sciences commercialisation ecosystem, based on an innovative new approach successfully piloted with Zinc, an LSE spin-out			
Bloomsbury SET	Phase 2	https://bloomsburyset.org.uk/	London
Pursuit of innovative scientific / technical solutions (tools, vaccines, mathematical models) to counter infectious diseases and increasing resistance to antimicrobials, and hence help safeguard human and animal health. Investigation of socio-economic barriers and enablers to the timely adoption of these technical solutions in the real world.			
Ceres	Phase 2	https://www.ceresagritech.org/	East
To create a new cluster supporting growth, productivity and innovation across the agri-food supply chain in the East of England			
Clean Growth UK	Phase 2	https://www.clean-growth.uk/	National
To create a National Clean business-innovation network linking thousands of members with a clean, green or low carbon focus to the knowledge and facilities of three applied research universities. It aims to drive innovation and market take up of technologies, products and services which provide solutions to the climate and environmental crisis. SMEs can tap into support to innovate, commercialise and secure investment whilst academics and students are provided with strong, enduring links to a wide pool of cleantech companies			
EIRA	Phase 1	https://www.eira.ac.uk/	East
To extend the established Eastern ARC Research Consortium to support businesses and key technology sectors of priority in the East of England, working with a network of regional higher education providers			
IBbD	Phase 2	https://www.ibbdesign.co.uk/	National
To address SMEs' needs for responsive and holistic support for design innovation to enable the successful development and commercialisation of new products			

Project	Phase	Website	Region
Grow MedTech	Phase 2	https://growmed.tech/	North
Focusing on technology convergence and the de-risking of technologies in a patient-focussed and commercially-driven innovation system, it will enhance productivity and economic growth in the UK medical technology sector, while addressing the evolving health needs of the population			
MICRA	Phase 2	https://micragateway.org/	Midlands
To establish the UK's largest, formal technology transfer office collaboration, across the eight Midlands Innovation alliance universities, providing a shared knowledge exchange network and 'gateway' to the MI alliance's collective intellectual property (IP) resources			
MTSC	Phase 2	http://medtechsuperconnector.com/	London
Bringing together talented early career researchers (ECRs), academic discoveries and pooled know-how from 8 academic institutions with 3 bioscience incubators, industry expertise, NHS patients and enabling partners (investors, service providers, designers etc.) to determine the most effective methods for translation of Medtech discoveries into clinical practice and consumer use			
Northern Accelerator	Phase 2	https://www.northernaccelerator.org/	North East
To deliver a step change in commercialising research to deliver economic impact in support of the North East priority technology/industrial sectors. This integrated approach aims to provide the commercial pipeline to feed into, and de-risk, the establishment of a legacy NE Universities Investment Fund.			
NTI	Phase 1	No dedicated website	North
To support the growth of a significantly enhanced, shared intellectual property pipeline; set up a unique regionally focussed finance vehicle, seeking to raise £350 million in private finance to support university commercialisation; and strengthen the entrepreneurial eco-system of the North of England			
Pitch-In	Phase 2	http://pitch-in.ac.uk/	National
To extract and demonstrate benefit from IoT technologies via wide-scale collaboration between academic institutions and the public and private sectors. It will investigate barriers to collaborative IoT exploitation, trial solutions, capture KE good practice learning outcomes, and disseminate guidance regionally, nationally and globally			
Scale-Up Programme	Phase 1	https://www.setsquared.co.uk/programme/scale-up-programme/	South
Aiming to tackle the challenge of scaling up small to medium-sized enterprises to innovate and grow, focused on key technology sectors and enabling partnerships across the South of England			
SPINE	Phase 1	https://www.kespine.org.uk/	National
An open innovation approach drawing on partnerships across universities, NHS and business to advance clinical research and medical innovation focused on improving health in old age			
SPRINT	Phase 2	https://www.sprint.ac.uk/	National
A space sector focused SME high growth programme, engaging businesses in support of the UK Space Sector Growth Strategy			
SWCTN	Phase 2	https://swctn.org.uk/	South West
To develop a new, networked model of KE for creative technologies innovation through a series of interdisciplinary R&D programmes that grow the capabilities and connections between the participating HEIs and industry partners			
THYME	Phase 2	https://thyme.biovale.org/	North East
To deliver projects focused upon 3 areas: transforming bio-based waste into new products; converting industrial sites by re-purposing them for bio-based manufacturing; growing the productivity of the region's bioeconomy as a whole by bringing together research and commercialisation capabilities in the Yorkshire, Humber and Tees Valley region.			

4 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 proposed a logic model, 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 7: 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.

The logic model, and the analysis in this report, both focus on the stated external economic benefits arising from the CCF programme, and to a lesser extent to how this may feed back into economic benefits to the HEIs themselves. There will also be other more intangible benefits that arise within the HEIs; some of these are discussed in later sections on changes to KE practice and added value from the project. Another expected intangible benefit would be increased scientific knowledge, and

an improvement in the quality of the research within the project partners. This is a likely outcome of the collaborations both between HEIs and between HEIs and industry that the programme will promote. Significant impacts on wider society, for example in improvements to environmental sustainability, to health and welfare, or to quality of life may also stem from the outputs of these projects, but these have not been examined in depth in this report.

Figure 8: Categories of potential outcomes and impact from the CCF programme

In our analysis of the key outcomes and impacts of the CCF programme, we have focused on the first five of these themes, which align with the stated overall aims of the initiative. 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 each theme include:

Training & skills

Key Performance Indicator	Total anticipated by Year 3	Progress to date (partial data)
Number of people trained	-	2,062

Commercial readiness

Key Performance Indicator	Total anticipated by Year 3	Progress to date (partial data)
New products/services	50	1,184 projects in development

Spin-outs

Key Performance Indicator	Total anticipated by Year 3	Progress to date (partial data)
Number of spin-outs created	124	28

Industry engagement

Key Performance Indicator	Total anticipated by Year 3	Progress to date (partial data)
Number of businesses engaged	462	116
Number of businesses networked	4,449	1,568

Investment

Key Performance Indicator	Total anticipated by Year 3	Progress to date (partial data)
Project leverage	£93,155,000	£37,100,034
Access to Finance funding	£435,000,000	£58,805,470

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 2018 for all the projects, supplemented with additional unofficial KPI information provided by 7 out of the 18 projects and updating on progress to the end of July 2019. The official KPI reporting from all projects to the end of July 2019 will not be collated until early in 2020.

All the individual CCF projects believe that they will deliver more of their objectives in the second half of the project, which means that the delivery of outputs and outcomes will be back-end loaded. They all believe they will hit their goals on budget (though perhaps not all on time).

A further aim of the CCF programme was to support the government's Industrial Strategy. This outlines the five foundations which support their vision for a transformed economy:

- **Ideas:** the world's most innovative economy
- **People:** good jobs and greater earning power for all
- **Infrastructure:** a major upgrade to the UK's infrastructure
- **Business Environment:** the best place to start and grow a business
- **Places:** prosperous communities across the UK

Positive effects on all of these foundations are expected to arise from the CCF programme. The alignment of each of these foundations to the key outcomes from the project is outlined further in the following sections.

The sector specialisms of the different CCF projects were discussed in section 3. Several of these sectors are also ones which have been highlighted by the Industrial Strategy and in its subsequent grand challenges and sector deals. By enhancing innovation and economic outputs in these sectors, the CCF programme will also be contributing to these government priorities.

Grand Challenges	Relevant CCF project(s)
Artificial Intelligence and data	Scale-Up Programme, EIRA, Pitch-In
Ageing society	SPINE, Scale-Up Programme, Pitch-In
Clean growth	Clean Growth, Scale-Up Programme, Pitch-In
Future of mobility	Scale-Up Programme

Sector Deals	Relevant CCF project(s)
Aerospace	SPRINT Scale-Up Programme
Artificial Intelligence	Scale-Up Programme, EIRA, Pitch-In, SPRINT
Automotive	Scale-Up Programme, SPRINT
Construction	SPRINT
Creative industries	SWCTN, EIRA
Life sciences	SPINE, Scale-Up Programme, EIRA, THYME, Advanced Therapies, MTSC, Bloomsbury SET, Ceres
Nuclear	SPRINT
Offshore wind	Clean Growth, SPRINT
Rail	SPRINT
Tourism	

5 KEY OUTPUTS AND OUTCOMES TO DATE

This interim review has examined the outputs and outcomes that are emerging from the each of the individual projects, and how these are contributing to the impact of the CCF programme as a whole. 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.

At this point in the programme, the quantitative evidence in not sufficiently mature to be able to calculate the potential long-term value of the CCF scheme. Evidence has been compiled from the year 1 KPIs reported to RE, selected updated KPI information received from some of the CCF projects, the interviews and supporting documentation from each of the projects, and information on the project websites. This has been used to identify case studies, and illustrative examples of emerging outcomes, and to comment on the likely scale of future outcomes and impacts and the timescales in which these may be achieved. These examples show the range of activities and achievements to date, and are not intended to be a comprehensive account of all that has been achieved.

The amount of information available on the different projects is uneven, because only some have provided updated KPI information to the end of July 2019, 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 accelerate in the second half of the programme, as activities scale up and the support delivered in the first half of the 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.

The additionality of the scheme is also difficult to assess at this point. How will the whole KE sector grow as a result of the CCF programme? There are demonstrable benefits to individual KE projects and benefits from collaborative learning, but is difficult to say which of these would not have been possible if the CCF were not in place. From the interviews, the participants clearly believe that there are many positive effects that just would not have been funded by other funding streams. HEIF funding, in particular, is allocated to an individual HEI based on their individual KE achievements. There is therefore little incentive for HEIs to use this funding to support collaborative activities. Future evaluation of the CCF programme could compare the outputs of the CCF HEIs with counter-factual examples from the HEIs which were not part of the CCF projects. It would be important to ensure that these are well matched against the participants in terms of underlying size, research capabilities, funding levels, teaching/research mix, location etc. The timeframe for comparison is also interesting because, as will be discussed below, many of the expected outcomes from the programme will extend beyond the timeframe of the individual projects.

5.1 TRAINING & SKILLS

This theme directly contributes towards the Industrial Strategy foundation *People: good jobs and greater earning power for all*. Our research found evidence of positive outputs relating to enhanced skillsets in three sectors:

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

Amongst the KE profession, there are multiple informal opportunities for learning arising from the interactions within the CCF projects, and these are explored further in section 6.1. PraxisAuril (https://www.praxisauril.org.uk/) is a membership organisation which supports knowledge exchange professionals through the provision of training, advocacy and networking. PraxisAuril has supported the CCF programme by providing the platform for a private online Special Interest Group for CCF participants to enable them to connect to facilitate sharing of ideas and best practice. This platform is active, with about 40 interactions over the last four months, involving 18 different organisations.

Most of the CCF projects include some formal teaching mechanisms to increase the commercial skills of the academics and students in the partner HEIs. These take many different forms, including online training materials, bootcamps, workshops, accelerator programmes, and internships. The table below gives some examples of positive outputs in academic training to date

Project	Output / Outcome
THYME	3 project workshops run where 40 early career researchers received training on how to start their own business. Another Entrepreneurship Training course for academics from THYME universities is scheduled for Oct 19
ASPECT	4 training and development events held for academic social science researchers
EIRA	Students and recent graduates from the last 3 years can be offered an Innovation Internship with businesses based in the region Forming a cohort of early career researchers from partner HEIs who are being trained in commercialisation and business engagement skills. This has already led to some cross-institution collaborations for grant applications. Delivered training to KE and professional services staff from across the network to develop expertise in grant funding, business engagement and teamworking.
Grow MedTech	Use the application forms for their funding streams as a learning tool to guide the academic applicants through the commercial development pathway
MICRA	Courses delivered on Board awareness, IP for healthcare academics, licensing masterclasses, raising finance,
MTSC	Adding commercialisation elements from the CCF project to the student curriculum
Northern Accelerator	Ideas Impact Hub helps academics to identify whether they have a commercially promising idea and to understand and engage with the route to commercialisation. Also adapting the ACTION for Impact programme delivered by Newcastle University Enterprise team for early career researchers, and bespoke provision tailored to the needs of established academic founders, delivered by external innovation experts Viadynamics. 42 academics have been involved in the Ideas Impact Hub training to date

Some of the CCF projects are focused less on encouraging academics to develop their ideas commercially, and more on bringing industry in to work more closely with the HEIs. In this group, the

target customers are often SMEs that may not be familiar with working with universities. These CCFs include training and coaching opportunities which are aimed at the businesses themselves, to give them the skills they need to work effectively with HEIs and to develop their own businesses. Some examples are shown in the table below.

Project	Output / Outcome
Clean Growth	Offering a Commercialisation and Investment Readiness programme to provide SME businesses and new innovators with tailored business support through 1-2-1 coaching, workshops and masterclasses and Profitnet a peer-to-peer growth programme Offering links to graduate internship and student placements to enhance the skills base of the SME businesses
SPRINT & Scale-Up Programme	Providing coaching for SMEs on how to access investment, their own funding schemes as well as funding from Innovate UK and others
Pitch-In	Surveying regional businesses and organisations to determine collaboration possibilities including identification of IoT skills and training priorities. Plans to develop targeted materials to suit different groups, e.g. with a business model and business case development focus for management, and an IoT data analytics focus for technical staff. Speculatively, the project is investigating how under-represented demographics can be tapped and retrained to fill skills gaps.
IBbD	The SMEs engaged with the project have increased their awareness of how to use new product design processes in their businesses, increasing their ability to use external design houses effectively. The CCF has also been able to pass on their knowledge of State Aid rules to these companies.

The return on investment from upskilling these different parts of the commercialisation chain is difficult to measure, but it is clear that by the end of the three year programme, the number of people that will have received useful training and increased their KE skills will be in the thousands or even tens of thousands. These will be the people that are then enabled to deliver the outcomes and impacts described in the following sections.

5.2 ENHANCED COMMERCIAL READINESS

Research within HEIs is often described as “blue-sky” or curiosity driven. The ideas which arise from this research may therefore be promising, but not yet proven or developed to the extent that would allow them to be directly deployed by industry, consumers or society. All the CCF projects have activity strands which aim to bridge this gap and to translate academic ideas and increase their commercial readiness. These activities align with the Industrial Strategy foundation of *Ideas: the world’s most innovative economy*, and may also contribute to *Infrastructure: a major upgrade to the UK’s infrastructure*, by developing more advanced technology solutions for deployment.

Many of the CCF projects provide funding to individual academic- or business-led projects through a Proof of Concept (PoC) fund. These may have different names, but all are aimed at reducing the uncertainty around the commercial value or importance to society of the technology. Ultimately, the eventual aim is to produce successful products or services which are available in the marketplace, and/or to spin-out successful companies (see next section). The length of these projects varies between schemes, but is typically six months to a year, and in many cases will represent the first step towards commercial feasibility, rather than a direct route to a commercially available product. If a spin-out is not formed around the technology, then an industry partner will be needed to bring the

products or services to market, and it takes time to identify a suitable partner and come to an agreed deal. Ultimately, these licensed products will return a revenue stream in the form of milestones, development fees and royalty payments to the HEI, demonstrating the return on investment from these PoC funds. Further in-house development within the company is often needed after licence and transfer of the technology, which can be quick (for example in the case of new software development), or may take many years (for example for healthcare products which must undergo rigorous safety and efficacy testing).

The number of commercial products or services that will be launched following support from the CCF programme within the three-year timescale is therefore likely to be quite small. It is likely that there will be some examples before March 2021, and all the CCFs are looking for suitable case studies that they can point to which demonstrate the successes of their work. Further examples are expected to follow after this point, as the technologies mature and continue down the commercialisation pathway.

Within the programme lifetime, however, we certainly do expect to see many examples of individual technology projects that have been successfully progressed further down the pathway to commercial readiness. This can be measured in a number of ways, depending on the type of technology. Engineering projects may have reached a higher Technology Readiness Level (TRL), design projects could move from a mock-up to a manufacturing prototype, or healthcare projects could begin testing in man or start clinical trials.

BABY BSL

One of the prototyping projects supported by SWCTN is Baby BSL, which uses augmented reality storytelling to motivate parents and carers to use British Sign Language to interact and communicate with deaf (and hearing) children who have not learned to speak.

A test edition of the Baby BSL buggy book "Where is the Bird?" has been created for 3,000 users across the South West. The book launched in October 2019 and is available for purchase through the Baby BSL website.

At this halfway point in the CCF programme, most of these individual PoC supported projects are still underway, but many have been started and many more are planned over the next year. Some are also leveraging other funding sources to supplement their PoC pots; for example, Pitch-In has submitted 12 collaborative funding applications to funders including UKRI and Innovate UK. The CCF projects which are working with established businesses may expect to be able to demonstrate tangible outcomes in the form of new or improved products, services and processes more quickly than those which are developing academic ideas.

Project	Output / Outcome
SWCTN	The first set of 8 prototypes have been developed and are being tested in the real world, including a project to add audio capability to a lighting installation, and another to allow simultaneous editing of a virtual reality system by multiple users in real time. In addition, several of the project's Fellows have gone on to secure funding for their businesses from outside of SWCTN to bring them closer to market.
Pitch-In	45 projects are underway, aiming to remove barriers to the adoption of IoT technologies and developing the Universities' position within the IoT ecosystem.

Project	Output / Outcome
Grow MedTech	21 projects have received Proof of Market funding, 10 have received Proof of Feasibility funding, and 8 projects at TRL5 and above are being supported with Proof of Concept funding. These funds are being used to de-risk medical technologies; around 80% include direct clinical engagement, and about half already involve a development partner.
Advanced Therapies	12 HEI-HEI collaborative projects have received Confidence in Collaboration awards of £100k each, with a second round of applications being assessed in Sept 2019.
THYME	PoC projects of £30-50k each have been awarded to 7 projects that address one of THYME's Grand Challenges and involve at least two HEIs and one industrial partner
Bloomsbury SET	11 grants have been made to projects involving at least two of the four HEI partners. Grants can be for up to 2 years and a maximum cost of £300,000.

5.3 BENEFITS TO SPIN-OUTS

Another potential effect of the CCF programme is the establishment of new, high-growth companies as spin-outs from the HEIs in the projects. This supports the Industrial Strategy foundation of *Business Environment: the best place to start and grow a business*. Some technologies are better developed through a standalone company than through licensing to an existing company. This may be because the technology is radical or disruptive or a platform technology, which needs further innovation to understand where the best applications may be within the current market. Spin-outs tend to be more suited to higher risk, higher reward technologies, which may be ignored by the established industry players. In this case, the return to the HEIs will be through an eventual exit from their initial stake in the company. The benefit to the UK includes new products and services, as well as more high growth companies, employing staff and returning value to the country through taxes and economic growth.

MTSC VENTURE ACCELERATOR

Ugur Tanriverdi joined the MTSC Venture Accelerator as part of the first cohort in 2018. This gave him mentoring and funding to continue the process of validation and testing the commercial viability of his PhD research at Imperial College London. His start-up, Unhindr, is developing a soft robotic liner for leg prosthetics which uses AI to adapt to changes in the shape of the stump throughout the day.

Unhindr has recently received a €612k award from the European Institute of Innovation and Technology to support further technical development of the product, and was named Company of the Month for April 2019 by MedCity.

Six of the CCF projects are specifically focused on building a pipeline of new viable spin-out companies from their partner HEIs, and several of the others are developing the commercial potential of projects where the ultimate route to market (spin-out vs licence) has not yet been determined and may eventually lead to new company formation. A new spin-out is likely to take several years (typically 10-15+ years) before it reaches an exit point where value in the form of equity returns may be realised by the original HEI and CCF project. Within the timescale of the CCF projects, however, it is feasible for a number of new spin-outs to be formed with support from the scheme. As these spin-outs scale and grow, the successful companies will attract additional investment from venture capital (VC) funds and other sources, to leverage the input from the CCF projects. This is discussed further in section 5.5.

Project	Output / Outcome
Northern Accelerator	A Pre-Incorporation Fund is available to develop high quality research projects to the point where they are ready to spin-out. 14 spin-outs have been formed to date. Together, this fund and the Executives into Business programme (see below) have increased the rate of spin-out formation from the partner HEIs more than three-fold.
Northern Accelerator	Nearly 60 entrepreneurs have joined the Executives into Business programme, and are able to take advisory and executive positions within new spin-outs to help them with their commercial development. This programme is also supported by ERDF funding. 12 executives have been placed to date.
MTSC	The Venture Accelerator programme has provided 10 participants with existing medical technology with funding, training, mentorship and access to industry partners to help fast-track the translation of their research. Five of these have established new companies, and two more are employing staff. A new cohort of 11 proto-companies has just completed the programme from summer to autumn 2019.

Project	Output / Outcome
Scale-Up Programme	The new CCF project is focusing on supporting the growth of SMEs, including several companies which have previously spun-out of the partner HEIs.
MTSC	The first ever spin-out from the Royal College of Music is being supported by the project.

5.4 ENHANCED INDUSTRY ENGAGEMENT

Industry is increasing turning to the university sector in its search for innovation and new ideas. Engagement between industry and HEIs can be fostered in many ways, including networking, employment or secondment of students and researchers, and joint collaborative research projects. These interactions contribute to the Industrial Strategy foundations *Business Environment: the best place to start and grow a business,* and *Ideas: the world's most innovative economy.*

RAYMETRICS – LIDAR FOR AIR POLLUTION

Supported by a SPRINT partnership, LIDAR manufacturer Raymetrics is developing a new application of their laser-based detection instruments in the monitoring of atmospheric pollution with the University of Leicester.

The project brings together Raymetrics' commercial LIDAR systems with Leicester's expertise in space technology and air pollution science. The outputs of this project will enable Raymetrics to expand into new air pollution applications and streamline the capabilities of atmospheric monitoring.

The table below identifies some of the outputs and outcomes that are arising from the CCF project activities to increase engagement between the HEIs and industry. Many of these activities are aimed specifically at SMEs, which traditionally find it harder to interact with the HEI sector. Three CCFs reported that they have seen increased "ownership" of the engagement process from the SMEs that they work with by offering standardised sources of funding support and ways of interacting. The predominant aim is to increase the uptake of technology and ideas generated within the universities, and make these available for commercial exploitation. Some projects, including SPRINT and the Scale-Up Programme, have found that their interactions have enabled their larger industry partners to link up with SMEs that are being supported by CCF projects to develop their technology up to the point where the larger company would be interested. This benefits all the participants – the HEI, SME and large company all gain from these relationships.

A number of CCFs are also building networks in specific industry sectors which not only increase HEI-industry interactions, but also promote relationships and collaborations within industry. Member directories and networking events increase these interactions. Within the CCF projects, five CCFs reported that they were sharing industry contacts, or using a joint customer relationship management (CRM) database, and that this had resulted in new interactions between their existing industrial partners and other HEIs in the partnership.

The projects are also making efforts to make it easier for industry to find and engage with the skills and facilities that they need. Five projects have created joint databases of their capabilities, and have spread knowledge of these amongst the partners. This can provide a single "front door" for industry to approach the partners, as well as making it easier to identify cross-university expertise

that can be combined to solve a particular problem. Joint industry days have been held by at least 6 CCFs, enabling industry to connect with researchers from multiple HEIs at a single event.

Some examples of ways in which the CCF projects are contributing to increased skills and knowledge within industry are described in section 5.15.1.

These interactions can have a direct effect on industry innovation, growth, productivity and efficiency, and lead to new products and services. It is difficult to link these impacts directly to the CCF project interventions, as they will also be supported by the existing capabilities within the company. It will be difficult to quantify all the effects that the CCF programme will have influenced, but there have already been a significant number of joint projects and many more will be instigated before the programme is complete. It is expected that many of these relationships will continue beyond the end of the programme, delivering further outcomes and impacts later on.

The immediate return on investment from the CCF funding will be easier to measure in this category, as many of the schemes that are being used require leveraged funding from the industry partner, through cash and/or in-kind effort. Longer-term returns may also come from licensing revenues to the HEIs, and from improved economic performance of the company partners.

Project	Output / Outcome
SPINE	Awards ranging from £30,000 to £300,000 per project to fund KE activities that enable people working across the ageing innovation space to exchange knowledge across industries and/or different academic fields, duration 9-12 months dependent on level of funding committed.
NTI	Held a joint event with a large pharma company to introduce them to technologies in the pipeline at Manchester, Sheffield, Leeds and Liverpool.
SPRINT	Provides UK SMEs an opportunity to access up to £100k of innovation support through collaborative projects with academic teams from the top UK space universities helping them accelerate the development of their space-enabled products and services. To date 25 projects with a combined value of over £1.5M have been enabled through SPRINT, including significant matched funded contribution from industrial project partners. SPRINT also supports interactions between SMEs, universities and larger industry partners within the sector through its innovation voucher scheme, contributing to growth of the innovation ecosystem for the UK space sector.
Advanced Therapies	7 Collaborate to Innovate awards of around £100k each have been made to HEI-SME collaborations with the objective of promoting new interactions between SMEs that are innovating and bringing products closer to market with academics with complementary expertise.
IBbD	15 collaborative company projects are being developed, bringing new product development (NPD) capabilities to these SMEs and developing new commercial products. The businesses contribute around half the project costs with in-kind support, and will repay their grant support once the product is generating significant revenues for the business.
Scale-Up Programme	Have 98 new SME members with 39 SME projects with HEIs.
Bloomsbury SET	Three Innovation Fellowships have been awarded to allow an academic to work on a 2-year project with industry and/or partners to drive outputs. Industry involvement has been integral to the Programme, through expert review of grant proposals, support for proof-of-principle studies and participation in the Advisory Council.

5.5 INVESTMENT

The final theme that will demonstrate the effects of the CCF programme is that of investment. This covers both the investment raised by the CCF projects into funding pots to support future spin-outs, and direct investment into the commercial opportunities developed by CCF activities. The leveraged funding that the CCF projects have raised to support their projects, for example from other grant and industry funding sources have already been described in section 4.

Six of the CCF projects include a specific aim around improving Access to Finance. Some are trying to raise a legacy VC fund that will continue to invest in its pipeline of spin-out projects. This requires the CCF project to be able to demonstrate that they have sufficient deal flow and scale to justify a dedicated fund, whilst maintaining their unique identity that will attract investors.

For example, Northern Accelerator have established the investment protocol for an investment Seed Fund, with plans to have made 5 seed fund investments by July 2020. They are also developing a Venture Capital fund to support their pre- and post-incorporation support structures beyond the end of the CCF project.

British Business Bank (BBB) are working closely to advise these CCF projects about the commercial viability of their plans, which has informed their development. Initial discussions with potential investors are progressing, and one CCF project has recently selected a fund manager for their proposed fund. The timescales needed to close these funds are likely to be longer than the three-year CCF timeline, and this has been confirmed in our interview with BBB. Partly, this is due to the time needed to secure funding commitments, and partly this is because it will take time for the opportunities in the pipeline that have been supported by the CCF projects to develop far enough that they represent an attractive investment proposition.

As the spin-outs that are supported by the CCF projects develop, they will also receive direct investment from VC and corporate investors, providing additional return on investment from the CCF funds. Again, most of this return is likely to arise after the end of the three-year programme.

Project	Output / Outcome
Several CCFs	Working on the development of a legacy VC fund to invest in the spin-out pipeline that they are incubating
SWCTN	In the early stages of working to create an Investor network within the South West with an understanding of the potential of Creative Technology Businesses and an appetite to invest in sustainable South West businesses. Planning is underway for a dedicated investment session at the Automation Showcase in June. Also exploring the use of crowd funding to support the next stage of development of the prototype projects for those businesses who do not currently fit the traditional investment model.
CleanGrowth	Provide an Investment Readiness service linking SMEs and investors
MTSC	First cohort of opportunities in the Accelerator programme have raised a total of £100k in VC funding to date

6 BEST PRACTICE AND LESSONS LEARNT

The third aim of the CCF programme is to incentivise sharing of expertise in KE and commercialisation and dissemination of good practice across the HE sector. Through the interviews, we have examined how the projects have identified and spread best practice amongst themselves, and how this is now beginning to be disseminated more widely within the sector. The projects have also faced challenges, and different approaches to addressing these challenges have also been identified and shared. This will lead to up-skilling in KE practice across the sector, as well as providing more consistency of approach for those wishing to engage with the HEIs. To make a lasting change, this must be embedded into everyday practice, and the projects are now beginning to plan for how to achieve this, and to sustain the activities of their project beyond March 2021.

6.1 ENHANCED KE PRACTICES

The governance of the projects has brought together individuals from the different HEI members for regular interactions. This was cited most often (by 9 CCFs) as the key mechanism through which barriers are broken down and knowledge is shared. Face-to-face, person-to-person interactions, leading to organic changes seem to be most effective and valued by the group. This is most obvious at an operational level, where the KE staff who are delivering the project activities typically meet in person at least fortnightly, with other formal and informal interactions between these meetings. Collaboration tools are also being used by several groups to streamline joint working across multiple sites, for example using Trello boards, Slack channels, and shared databases. However, there is also interaction at different managerial levels of the HEI through Steering Groups and project evaluation committees, and this mutual understanding at all levels is seen as very beneficial by the projects.

It is clear that all the projects are benefitting from learning about and understanding how their peers carry out KE at the moment, exposing them to new ideas and opportunities. A number of the CCFs commented that they had recruited a mix of people from both within the KE sector and outside it. This range of backgrounds is also increasing the input of new ideas and approaches, although it has also been a steep learning curve for external hires who not only have to get up to speed with the project delivery, but also navigate the complexity of University life in a very short time frame. Although it might be expected that the larger, more research active universities will be "teaching" the partners with fewer internal KE resources in their project, in fact 13 of the projects stressed that the learning is in all directions. For example, the HEIs receiving lower levels of research funding are often much more active within the industrial landscape or involved with SME engagement in their local communities. This upskilling is at both an individual and an institutional level. Many of the projects are now harmonising selected procedures to take the best from each of their members' approaches. This is not confined to within the CCF project themselves, for example Imperial is now integrating its CCF approaches into its own Student Lab accelerator scheme. Some examples of the learning opportunities and changes in KE practice that have been stimulated by the CCF scheme are shown in the table below.

All the projects reported examples of learning spreading within the partners of their particular project. Other links are also starting to form between projects, for example SPINE have held an event on KE for healthy ageing, which included sessions run by the Advanced Therapies and Grow

MedTech CCFs, and there are plans for reciprocal events with other projects. At least 10 other more formal interactions between two or three CCFs were reported, along with many other informal conversations and interactions. These inter-CCF exchanges have been assisted by the joint CCF events organised by Research England. These have been very well received by the participants and offer a "safe space" where the projects can discuss their challenges in an open and constructive manner. More events of this nature would be welcomed, and it would also be valuable to open some of these up to the wider KE community. The first more widely attended event was held at the 2019 PraxisAuril conference in Harrogate, which attracted 430 attendees from across the KE sector. The CCFs jointly organised a parallel session at this conference, which was well attended with positive feedback.

STATE AID

State Aid legislation is in place to prevent State resources from unfairly favouring a business in a way which could distort market competition within the EU. As the CCF projects are state-funded, there is a potential that State Aid regulations could be relevant, particularly if a project is working with SMEs. This is a challenging area of law, where there are often conflicting opinions on what is permissible, and how to navigate the rules.

The CCF projects have individually and collectively developed approaches and guidance to ensure that they can work appropriately within this legislation, and this learning was shared at a joint meeting of the CCF projects, organised by Research England.

Several of the CCFs, including MTSC, Grow MedTech, ASPECT and Pitch-In have developed best practice guides and materials which are freely available on their websites. These cover a wide range of topics, such as how to develop a business case for introduction of IoT technologies, industry engagement tools, how to assess early stage technology opportunities and what makes a successful Accelerator programme. These resources will grow and mature as the projects develop, providing a rich source of reference materials, and efforts should be made to ensure that these resources are maintained after the close of the CCF scheme. For example, there may be a role for PraxisAuril in providing a repository for this material.

Another common area for mutual learning has come from the mechanisms used to identify which opportunities to support – whether this is project selection for small-scale proof of concept funding or a more formal investment panel. NTI and Ceres have found that bringing external advisors into this process not only increases the commercial insights, but is also very valuable for the participants. Real-world experience brings credibility and validity and removes any perception of institutional bias in the decision-making process. SWCTN are using the members of the public to prioritise the consumer-facing prototype concepts generated by their Fellows. Grow MedTech involve patient representatives in their opportunity assessment processes. Being involved in a process where you are competing with members of other HEIs for funding support has also resulted in all the participants "upping their game" and making sure that the proposals that reach the decision-making process are as well developed as possible. Internal proof of concept funding is being used to pump-prime projects so that they are at the right stage for the CCF funding. The partners are also learning from seeing the investment pitches from other HEIs, and incorporating the best elements to strengthen their proposals. This is driving up standards across the board.

Project	Output / Outcome
Several CCFs	Introduction of common IP and commercialisation processes, including shared legal templates in some cases

Project	Output / Outcome
IBbD	Standard procedures and support mechanisms needed to run a design consultancy service within an academic organisation have been proposed by DMU, honed by the partners, and adopted throughout the CCF
MICRA	Introduced the e-Lucid express technology licensing platform for all the high volume, low value licences across the partners, freeing up significant internal administration time; joint development of case study portfolios and dissemination through In-Part.
MTSC	Conducted a best practice study looking at existing processes within the partners and from international examples, visiting more than 7 accelerator programmes to develop their own accelerator plan. The findings have been compiled into a report for further dissemination including on the website.
Bloomsbury SET	Considering whether the CCF project approach could lead to establishment of a single Technology Transfer Office (TTO) for the group, offering a single front-door to industry and acting as a funding channel
MICRA	Procurement of shared patent attorney services
THYME	Placements for academics/KE staff from one partner into another to share best practice, drive collaboration, share contacts and improve 6 placements have been started to date

6.2 CHALLENGES FACED

Interestingly, the challenges that were most commonly reported by the CCF projects do not relate to the complexities and difficulties of the KE approaches they are trying to deliver, but instead to the practicalities of running the programme. Some suggestions on improvements to these aspects are discussed further in section 8.

The most common issue (reported by 13 CCFs) was caused by delays to the start of the project because of difficulties in recruitment. This stemmed from a range of interconnected issues, including the short lead-in time between project award and project start date, the difficulties of finding suitably qualified candidates (particularly for the key project manager role), and competition for staff not just between the 18 projects starting at the same time but also with existing TTO roles and other similar projects. There is still a shortage of good quality, well trained KE practitioners within the sector[1], as well as established career pathways. One positive side effect of the CCF scheme should be to train and develop further skilled people to fill these roles. As the projects are fixed length, some also are concerned that the best staff will start to look for alternative positions and move on during the final year of the project, which could result in a loss of momentum.

For some projects, the delay in recruitment was extended because they were unable to start the recruitment process until the collaboration agreement between the HEI partners to govern the conduct of the project had been agreed and signed. Ten projects reported that this process had been more difficult and taken much longer than they had anticipated. For some this has extended to delays with getting agreement to the project website. Hopefully, the experience gained by these

[1] https://www.praxisauril.org.uk/sites/praxisunico.org.uk/files/The%20State%20of%20the%20KEC%20profession%202017.pdf

projects in how to structure governance and collaboration between the HEIs will be valuable for other collaborative projects, and will smooth future interactions.

Two projects (IBbD and Pitch-In) also experienced difficulties in finding suitable candidates to deliver the translational projects that they are supporting. These programs require specific skills in design and IoT technology respectively, that are not common amongst the academics in the member HEIs, and can be difficult to recruit for short-term projects that may only last for 6 months. Pitch-In found that they could not staff their 'mini-projects' entirely with current employees and so needed to recruit. To make these posts attractive they developed coherent sets of mini-projects and recruited staff capable of working on such sets. They are now more generally encouraging projects larger than originally anticipated.

Other challenges that relate more directly to the KE activities and aims of the projects surround the availability of PoC funding. This funding has proved very popular, indicating that there is still a shortage of sources for this type of support. Five projects have been well over-subscribed for their PoC funds, and some have re-profiled their spending to be able to put more resources into this pot. Only one project reported that it had some initial difficulties in finding applicants for its PoC scheme, but is now seeing higher demand.

For some projects which are driven by demand from external industry, rather than by push from internal academic proposals, it is proving quite challenging to identify enough partners who wish to engage with the project within the 3-year timeframe. This can be particularly difficult where the target audience is SMEs who have not previously worked with the HEI sector. Four projects reported this problem, and are trying different approaches to extend their reach (see case study in the sidebar).

Finding and supporting good quality mentors for the commercialisation projects was another concern common to at least 2 projects. In order to ensure that everyone is aligned, it is recommended that clear terms of reference are drawn up for mentors, and that these are given appropriate support particularly in the early stages of their engagement.

Twelve projects were concerned about the length of time that it will take for the support that the CCF projects are providing now to manifest as successful outcomes and impacts that can be used to garner further support and funding for the CCF projects. Although some outputs will be delivered during the project period, other more valuable outcomes and impacts are expected to take much

SME ENGAGEMENT

Although the Scale-Up Programme was based on the already successful SetSquared Partnership, their CCF project has switched the focus from forming HEI spin-outs and start-ups to helping early stage companies of all types to scale and grow. Engaging with a new cohort of SMEs, many of which have never worked with an HEI before, proved challenging, so the team switched their approach.

Instead of trying to identify SMEs that might benefit from university expertise, they now use an approach centred around funding calls. For example, they identify upcoming Innovate UK schemes that will support a specific sector, and identify companies within that sector. They can then approach these companies with an offering that brings both the promise of help with obtaining funding and a link to the HEI expertise that they need to access that money. This approach is proving much more successful in recruiting new SMEs into their project.

longer to become apparent. This was of particular concern to the projects which are seeking to raise investment or industry funding to take their projects forward.

Linked to this point, and looking forward to the next phase of the projects, the most common response was that their biggest ongoing challenge was how to achieve sustainability; this is examined further in the following section.

6.3 SUSTAINABILITY

At the halfway point for the CCF programme, all the projects are beginning to think seriously about how to sustain their projects beyond the three-year CCF funding period. All of the projects are seeing significant value from their activities, and wish to continue after March 2021, perhaps evolving the support provided in the light of experience to date. The original vision for the programme was for individual projects to become self-sustaining after three years, and the outline approaches to achieve this proposed in the original bids are now being developed in more detail.

It is becoming clear that this ambition is the biggest challenge faced by the projects going forward. It was always recognised that this would be a testing timeline, and this has been exacerbated by the delays in getting the projects fully up-to-speed which were described in the previous section. Any commitment to funding from alternative sources requires evidence of tangible benefits from the project. This report shows that this evidence is beginning to emerge, but recognises that the majority of the valuable impacts will take longer to demonstrate. Similarly, for those projects which require the commercialisation activities that they are funding now to become revenue-generating (or in the case of spin-outs to reach an exit point) before they can return money to the project will face an even longer wait. It is likely that most, if not all, projects will face a funding gap unless they can find additional grant or internal funding to take them further.

Nevertheless, certain aspects of the individual projects have already become embedded into university processes and will remain in place after March 2021. Some of this is dependent on personal relationships, and may be lost if these individuals leave the HEIs at the end of the projects. Other aspects, such as best practice materials, training courses, use of harmonised contracts and processes, some physical assets, websites, and access gateways will continue to provide value beyond the end of the scheme.

Several CCF projects commented that the most difficult money to replace from alternative sources is the funding used for Proof of Concept schemes to demonstrate that an idea has commercial merit and

I-TEAMS AND BOOTCAMPS

EIRA highlighted some KE schemes which are now used within all their HEI members and will continue, even if the CCF project is not funded further.

i-Teams is an international programme that is now used by all the HEIs, bringing fresh thinking and new ideas to organisations whilst giving students real world consultancy experience. Under the scheme, a business mentors a team of interdisciplinary students to develop a product solution for issues affecting their organisation.

Training for HE students from EIRA institutions has also been aligned, by offering places across the whole network to take part in an Innovation bootcamp. This develops entrepreneurial thinking and skills in areas such as idea generation, market research and pitching. The partners value the additionality found by running these courses across the HEIs, and plan to continue to provide them jointly instead of separately in the future.

feasibility. This type of funding is very unlikely ever to be provided by industry or investment, and will always need to be pump-primed from public sources. BBB also recognises the need for pre-VC funding development support for projects, but as yet there are few alternative solutions that allow an HEI discretion over which projects to support without anticipation of any direct financial return.

A range of different approaches to achieving sustainability are being explored by the different projects. These include:

- **Find internal HEI funding** for (some of) the support activities and extra staffing levels provided by the projects. This is likely to be very difficult for those organisations with no HEIF allocations, and could lead to other useful activities being dropped if internal funding is moved across.
- **Use of alternative funding streams** to support similar activities, eg ERDF, EU, Strength in Places, etc. Some projects are already bidding into such schemes.
- **Leveraging other funding sources** is likely to be easier than finding external support for an entire project. This requires some level of pump-priming either from within the HEIs or from another source.
- **A network membership model**, with companies paying to access the benefits offered by the CCF and network. Direct charge-for-service models are seen as unlikely to be successful.
- **Success fees** that return money to the CCF from successful results in whatever form may be more palatable as the risks are shared.
- **Direct industry support**. This is a longer-term option, as it requires the scheme to have demonstrated outcomes and impacts that industry views as valuable before they will consider engaging.
- **Returns from the commercialisation projects** which are supported being ploughed back into ongoing maintenance of the scheme. Various mechanisms are being used or considered by the schemes, including taking equity in spin-outs, providing convertible loans to projects which can either be repaid or converted into equity later, and providing support to SMEs as a loan, rather than a grant that is repaid once the intervention has delivered a certain threshold of income within the company. These are all long-term returns
- **Investment fund**. A number of the CCFs have an ambition to set up a VC-fund to invest in early stage spin-outs arising from their consortium. This is recognised as a long-term ambition as such funds typically take several years to come together, even where an existing pipeline of investment opportunities can be demonstrated.

It is likely that if there is no further CCF funding forthcoming, then many of the current projects will have to scale back on their current activities. Even at this stage, however, it seems very likely that a subset of these activities will be continued, and some projects may be successful in finding alternative support mechanisms for the whole project (or an evolution of the same). Longer-term, there is an increasing chance that alternative funding mechanisms will be able to take over some or all of the CCF grant funding for individual projects.

When we asked the CCF projects which aspects of their funding profile they would prioritise if forced to choose through reduced funding, we received varied answers. The most common were:

- **People:** without hands on the ground, there is no spare capacity to make these activities happen. Without dedicated PoC funding, progress will be slower, but is still possible using other translational funding streams.
- **Project manager**: the coordination role was seen as extremely important for many to drive and coordinate collaborative activities and monitor progress.
- **Communications**: valuable outcomes are worth less if no-one is aware of their successes.
- **PoC funding**: As discussed above, many see this as the most difficult pot of money to replace.

7 ADDED VALUE

At this stage of the programme, the individual projects have not yet been able to mature sufficiently to allow for any quantitative attempt to assess the additionality of the CCF programme. We have used anecdotal evidence to identify unexpected outputs and outcomes that would not have been possible without the CCF funding. As the key aim of the programme is to encourage collaboration within and between the projects, we have looked at other benefits that have come from this increased collaborative way of working. We have also looked at potential contributions to KE policy and to strengthen local entrepreneurial ecosystems.

7.1 INCREASED UNIVERSITY COLLABORATION

The primary aim of the CCF programme is to enable collaborative delivery of KE between different HEIs. This inevitably results in organic learning and exchange of KE best practice amongst the members of each consortium, as described in section 6.1. Some of the projects include specific activities to promote this exchange, such as the THYME placement scheme which provides support for academics and KE staff from one THYME partner to spend time working with staff from another. The scale of the programme means that at least 54 different HEIs are directly benefitting from this increased KE collaboration. We have also found that the CCF projects using similar approaches or addressing common problems have joined together into informal groupings to share insights and solutions to their problems. NTI, MICRA and Northern Accelerator, for example, are working closely together on various aspects of raising a legacy investment fund.

Several interviewees commented that they found these projects to be much more truly collaborative than other projects they have come across in the HEI sector. Maybe this is because they are driven by KE professionals, whose jobs involve creating connections, rather than academics, who are used to working under the pressures of inter-HEI rivalry and achievements of the Research Excellence Framework (REF).

This KE collaboration has stimulated other bids for collaborative working. At least 13 new bids are in development of submitted which are built at least in part on the relationships formed within the CCFs, and some of these have already been successful. This includes a bid in development for a project worth an 8-figure sum, which would have a transformative effect on a priority industry sector. This finding that collaboration stimulates further collaboration is not surprising, given the importance of inter-personal relationships in establishing effective working processes. It also bears out the observation that some CCFs found it easier to develop bids and define working practices as these were built on existing relationships in other areas. Seven of the CCFs had at least partial consortia who had worked together before they applied to the CCF programme.

Most of the CCF projects have both KE and academic participation in their day-to-day running and/or governance procedures. By bringing these groups together to work as part of the same team, they are seeing that KE forms a continuum with academic endeavour, rather than being a “bolted-on” service. Bloomsbury SET has recognised the value that this brings, and is working to bring more academics into the running of the project. Two other projects also reported that the business school at one of the partners is now getting involved, adding another dimension to these collaborations.

A common output reported from the CCF projects is the formation of academic-academic collaborations. This includes new relationships within an individual university, for example Ceres has a project which brings together experts in chemistry and food, who had not previously collaborated.

JOINT POST-DOCTORAL TRAINING

Three members of Ceres joined together to successfully bid to EPSRC to establish the world's first Centre for Doctoral Training (CDT) for agri-food robotics.

Located at the University of Lincoln, with collaborators from Cambridge and UEA, the Centre will provide training for 50+ students, and bring together the largest ever group of Robotics and Autonomous Systems (RAS) specialists for the global food and farming sectors. It also brings in industry input from key players in both agriculture and robotics.

More common, however, is the initiation of joint projects involving two or more of the partner HEIs. Some of the CCFs require that any projects bidding for their PoC funds should include representatives from at least two HEIs, and some also require an industry partner. Others have found that these relationships have developed naturally, and that they are receiving predominately collaborative project proposals. Ten CCFs described academic-academic collaborations that were being stimulated by their project. These relationships can be expected to drive up research quality, but no attempt has been made in this report to measure or quantify this outcome.

The delivery of a successful CCF project is dependent not only on academic and KE staff, but also on the involvement of other central services, including finance, procurement, legal, contracts, and communications. In some cases, this has introduced some tensions as the CCF has led to an unanticipated increase in the workload of these departments. A number of projects, however, have embraced these challenges and are introducing more streamlined ways of working, for example to allow one partner to sign a Non-Disclosure Agreement (NDA) on behalf of the whole consortium. There are also collaborative efforts to align legal contracting and IP arrangements, and combined procurement processes. For the projects with a focus on SME engagement, concerted efforts have been made to enable internal university systems to be made more responsive, flexible and streamlined, so reducing the barriers for these companies to engage. In some CCFs, the central services are also collaborating to ensure that they are working together to address the issues raised by CCF activities.

Project	Output / Outcome
Grow MedTech	Leverage the Translate Secondment scheme, funded by the university partners in the consortium, to provide opportunities for research collaborators in the Leeds and Sheffield City Regions to progress technologies. Two-way exchanges are supported between academia, industry, healthcare settings, innovation enablers and charities.
SWCTN	Built a cohort of 70+ engaged academics who are building new production relationships, creating a community of people with shared goals
ASPECT	Partner Zinc is running "missions" which engage the different HEIs, along with problem-owners, industry and other stakeholders to address important social challenges – for example, the current mission is "To add 5 more high-quality years to later life".
Cross-CCFs	EIRA worked with a company using their Innovation Voucher scheme, and introduced them to another CCF where they are now carrying out a joint research project. SPRINT and IBbD are both working with the same solar panel company, with IBbD providing NPD support, and SPRINT giving technical expertise.

7.2 BENEFITS TO KE POLICY

The CCF projects reported a number of ways in which the CCF project is adding value to their KE strategy and policy. In particular, the high profile of the projects is drawing attention to the importance of KE, both inside the university system, and in those which interact with it.

Eight of the CCFs have found that the project has significantly boosted the profile of KE within their institutions. The size of the awards at around £5m is such that it becomes important within the overall university finances, particularly for the lead universities which have additional accountability. We found that attention is being given to the projects at Governing Council, Vice Chancellor (VC) and Pro-Vice Chancellor (PVC) level, allowing those involved in the projects to build up personal relationships at this level, not only within their own university, but also in the partner organisations. This is also increasing high level interactions between the partner universities, which leads to other opportunities as described above. The mechanisms for governance, coordination and consensus decision-making at this level can then be re-used in other collaborative situations. With higher direct involvement at the PVC/VC level, the challenges and risks associated with KE should become better understood, as well as the benefits being more widely recognised.

The scale that is achieved by combining the approaches of universities that alone may not be traditionally seen as "research power-houses" has also allowed them to attract external interest more easily. This extends to allowing easier ways for government, industry and others to interact with and understand the HEI sector. This was reported as very helpful by the BBB, for example, who can use the lead contacts at each of the six CCFs with an interest in Access to Finance to interact with a much wider group of the member HEIs. Examples were also given of being able to use the combined HEIs to attract funders to present their interest, or industry to explore research interests, or government departments to consult.

The programme as a whole makes a very interesting collection of the breadth and challenges of KE. The group of 18 projects is a manageable number to be explained to external policy makers and interested parties, and provides a good cross-section of the huge variety of activities, approaches and successes of KE in the HEI sector. The CCF projects have also provided a good opportunity for the TT functions to use their entrepreneurship and innovation to design and deliver some interesting and ambitious projects. As such, the CCF programme can be seen as a successful showcase for HEI KE activity. Greater understanding can only lead to better aligned policy decisions.

7.3 BENEFITS TO LOCAL ECOSYSTEMS

One of the five foundations outlined in the Industrial Strategy is *Places: prosperous communities across the UK*. This recognises that there are currently significant disparities in regional productivity, with a large slice of innovation activity focused on the "Golden Triangle" that links Oxford, Cambridge and London. About half of the CCF projects have a regional focus that is outside the Golden Triangle, and report that they have to work harder to gain attention from both industry and investors. Even those close to this nexus find that they can be overlooked, for example both EIRA and Ceres have ambitions to divert attention away from the Cambridge area. Because the CCF scheme is focused on English HEIs through Research England, it is more difficult for HEIs in the devolved authorities to participate in the scheme. These HEIs are able to join a CCF project, but

cannot be directly funded, which has resulted in the vast majority of the activities stimulated by the scheme benefitting the English regions rather than the whole United Kingdom.

The regional CCFs tend to focus on their regional ecosystem as a natural arena for their commercialisation activities, rather than using them specifically to encourage local economic growth or to engage investment in research by local large companies. Four regional CCFs reported that proximity to their partners made the activities and relationships easier to manage, and conversely three national CCFs said that the geographical distances puts an additional level of complexity onto their projects.

INTERACTIONS WITH GROWTH HUBS

EIRA and IBbD have both built deeper relationships with their local Growth Hubs, and found the experience offers benefits to both sides.

The Growth Hubs benefit from knowledge of another source of help, collaboration and funding for the SMEs that they work with, and the CCFs gain referrals of SMEs that wish to work with the partners. Both sides have a better understanding of the complementary funding opportunities available in their area, and additional support mechanisms.

The relationships that have been developed in the CCFs are now leading to new bids with a regional focus. Strength in places bids were reported to be in development by three CCFs, and three others have already been successful in supporting bids for regional angel investment accelerators with InnovateUK.

Project	Output / Outcome
Pitch-In	Joined up some activities from Sheffield to Barnsley, which has a proactive approach to the introduction of IT innovation.
Advanced Therapies	Revived networking meetings, which are attracting good attendance from around 450 local members
Northern Accelerator	Building a close strategic relationship with their local LEP, which recognises the relatively high contribution to R&D that is provided by the universities in their region
Thyme, Ceres, and Advanced Therapies	Leveraging existing regional infrastructure, by working running joint activities with the BioVale network, AgriTech East, and MedCity and the Cell Therapy Catapult respectively
Scale-Up Programme	Expanded their regional footprint, by adding the University of Cardiff to their partnership
Grow MedTech	New Leeds City Region Memorandum of Understanding around developing the medtech expertise in the city has been signed involving Grow MedTech alongside other relevant healthcare players

7.4 OVERALL VALUE

In our interviews, the responses to the scheme were universally **very** positive. There was a high level of enthusiasm about the projects and a firmly held belief in the benefits that they are already delivering. The comments below give a flavour of the sentiments we heard:

- The project is transformational.
- It has allowed us to try things that we just couldn't justify with our own funds because existing schemes don't allow this.

- It's a fantastic programme – there are real synergies from working together.
- Proving to be extremely valuable and successful.
- Has had a real transformation on approaches.
- CCF has given significant extra capacity over HEIF-funding for some partners.
- A game-changer.
- I am thrilled about the programme.
- I am convinced the approach is right – it is a hugely positive, valuable opportunity.
- Fantastic opportunity, and a part of bigger changes in university technology transfer approaches.
- Very exciting, nationally unique scheme. I believe it has legs.
- Interesting challenges, interesting sector; I can see the benefits to what we are actually trying to do.
- Hand-on-heart, I can say that we wouldn't be doing what we are doing without the CCF funding.
- Fun, fulfilling, challenging and useful.
- I like it, I think it is wide-ranging, and I've never seen anything specifically like it. I think it is working.
- Very enjoyable.
- Game-changing for our region.
- I can't praise the significance higher from a strategic KE perspective.
- Everyone involved is really enthusiastic about the possibilities, and it is a fantastic opportunity to achieve something at scale.
- I'm a super-enthusiastic fan.
- There is nothing else in this space which does what CCF is doing, and what it is doing is really useful.
- It is pulling together interesting projects in interesting areas of strategic importance.

8 FUTURE PROGRAMME DEVELOPMENT

During the interviews, we received feedback on the design of the overall CCF programme, and in particular some challenges that arose as a result of the way in which the scheme was introduced and administered. It was widely recognised that many of these features were unavoidable, given the conditions attached to the funding from Treasury. However, the following sections offer some suggestions for improvements for consideration in any future evolution or repeat of the scheme.

8.1 PROGRAMME DESIGN

As reported above, all those interviewed were very positive about the overall aims and objectives of the CCF programme, and believe that it has funded very valuable projects.

The biggest concern with the current programme is that the length of projects is not sufficient to be able to demonstrate concrete outcomes, particularly for more ambitious schemes. The type of impact that will convince funders, industry or investors to contribute further cash to support CCF activity may take 10-15 years to demonstrate, particularly for spin-outs. Although some felt that a 3-year timespan focuses the mind and introduces a strong incentive for action, the practicalities described in section 6 mean that most of the projects will actually only be fully functional for about 2-2.5 years. A 3-5 year project span would seem to be more reasonable for many of the projects to be able to deliver solid outputs and stretch KPIs. Even within this longer timespan, it is likely to be challenging for the CCF projects to become fully self-sustaining, particularly for those focused on Access to Finance and raising an investment fund; this was also borne out in our conversation with the British Business Bank.

The optimum size of each consortium will vary, depending on activities it is trying to achieve. The projects with only 3 partners have generally shown themselves to be more agile and quicker to get up and running than those which have to reach consensus amongst multiple partners. Nevertheless, they are all still reporting good collaboration, learning, outputs and outcomes from their projects. A maximum consortium size should not be mandated, but it may be sensible to consider the scale of operations and activities when judging whether any new projects are likely to succeed.

The scale of the individual projects (up to £5million per project) was felt to be about right, as it is sufficient to achieve significant impacts, and also large enough to get the attention of senior management within the HEIs. The overall scale of the programme (£85million in total) is also seen as a good balance between enabling enough projects for a good proportion of the HEIs in England to be able to participate and benefit, but small enough to allow the programme to be understood as a whole with 18 different projects showcasing the diversity of KE activities.

Most importantly, all the participants and external stakeholders stressed that the CCF programme was additive to (and not a substitute for) the existing regular HEIF funding that is received by many of the participating HEIs. HEIF funding is an essential mechanism to provide the fundamental services and facilities that enable the organisations to manage their individual KE activities. Without this underpinning capability, they would not be in a position to benefit from the additional activities and collaborations that CCF has funded.

8.2 APPLICATION PROCESS

The CCF application process split the awards into two rounds – the first for projects that were relatively well developed at the time the programme was announced and able to proceed directly to a full bid, and a two-stage process for other projects with an Expression of Interest (EoI), followed by the full bid. The second stage projects received feedback on their EoIs, and could attend events to assist with partnering. Some projects from the first round commented that their process felt rushed, with too much time spent on the politics of assembling the consortium and not enough on developing the bid. The feedback on the EoIs was welcomed by the second stage projects, and most applicants felt that the level of effort needed to prepare the bids was commensurate with the potential rewards from success. In any future rounds, it would be preferable for all applicants to use the two-step process to allow them more time to develop their proposition and plans. More active help with consortium building could also be useful.

The first phase projects do however seem to have benefitted from having a longer lead-in period before the project start date; this will be discussed further in section 8.3 below.

To manage demand, a limit was placed on participation: each HEI could only submit one bid as lead institution, and participate in one other bid as a non-lead partner. Whilst the participants understood the reasoning behind these limits, many pointed out that this had unwanted consequences, including:

- Too much time spend on political manoeuvring and making decisions on which bids to support, rather than on project planning
- Confusion as bids were prioritised then later dropped
- Some good projects eventually not submitted as they could not get enough partners to commit
- Some projects missing out on credible partners who would have added to their activities
- Some partners missing out on good projects because they had more than two good bid opportunities
- A likely bias towards “safer” and less innovative projects, as HEIs were not willing to take a risk with their single chance at participation as a non-lead partner

These effects were seen as being out of line with the overall aim of the programme to encourage collaboration between HEIs. Some have subsequently tried and in some cases succeeded in adding additional partners to their project, but this has not been straightforward, and runs the risk of creating a two-tier project with some partners better able to benefit than others.

8.3 ADMINISTRATION

Project monitoring by RE has been generally supportive and light touch, which is seen as very welcome by the projects, with eight projects specifically mentioning how good they have found RE to work with. A number of projects also commented favourably on the support that they had received from RE when they faced specific problems, and with making useful introductions.

For a 3-year project, annual formal reporting points on KPIs may not give sufficient granularity to identify projects which are not performing as expected in time for adjustments to be made. This is particularly pertinent given the timings of these reporting points. The first KPIs only covered the first

4 months, and were reported after 10 months; the second KPIs cover months 5-17, and will be reported after 22 months. The projects will therefore be nearly two years into their three-year span before RE receives the first substantial reporting on project activity, rather than start-up. However, there seems to be sufficient informal monitoring in the interim for this not to pose a significant problem.

In our analysis of the potential outputs and outcomes from the CCF programme, we have found it difficult to combine KPIs from individual projects into comparable groupings. Each project has set its KPIs in isolation with RE, which is appropriate given the diverse nature of the projects and their different aims and approaches. However, there are some themes around groups of projects, for example those which are seeking to engage with SMEs or those which are preparing a pipeline of spinouts ready for investment. For these groups of projects, it could have been more effective if some of their KPIs were aligned with consistent definitions of what should (and should not) be counted to allow them to be aggregated and compared more easily. One KPI which spans all the participants is that of leveraged funding brought in, and clearer guidelines about how to measure and report this leverage could also be helpful. It may be helpful to add some categories of data for the projects to report against, even if formal targets are not set. Examples could be: number of spin-outs formed, amount of co-investment raised by spin-outs, number of new products/services introduced, number of people receiving training, number of companies engaged in projects, number of companies engaged in networking, etc. This type of quantitative data would allow the key outputs and outcomes to be measured more easily.

Thirteen of the projects reported that they would have benefitted from a longer lead-in period to the start of the project. In hindsight, several projects did not allow enough time for recruitment and getting their governance procedures agreed. This was exacerbated for the second phase projects which were only formally announced as the projects began, and were not communicated to the participants very long before that. A six-month delay between project award letter and project start date would allow the projects to "hit the ground running" and focus their limited project time on delivery rather than start-up. It is appreciated that these constraints were unavoidable in this case due to the conditions attached to the funding scheme. If it is possible in any future rounds, we would recommend that RE is allowed more time to plan and run the process, and more attention is paid to advising participants and scrutinising bids to ensure that enough time is allowed for recruitment and contracting. Six projects stressed the importance of hiring a good project manager/director early in the process, and seven mentioned that it was also vital to include communications support for the project.

8.4 FUTURE ROUNDS

We found strong support across the board for a continuation of the CCF programme. This has already been partly discussed in section 6.3 on sustainability. All the current projects would be keen to re-apply as they can see the benefits that are arising from the scheme. The external stakeholders interviewed also supported continuation of the scheme. Although out of scope for Research England, there would also be benefits from easier mechanisms for HEIs in the devolved authorities to participate fully in the scheme, perhaps by the provision of similar dedicated funding through Higher Education Funding Council for Wales (HEFCW), Scottish Funding Council (SFC) and Department for the Economy (DfE, Northern Ireland).

Additional value from further funding and support for the CCF programme could come via a number of routes:

- Some of the projects would benefit from longer timescales to achieve their planned outcomes and impacts, but do not require additional funding to do so. If this is a possibility, then early notification of the CCF projects would allow them to plan better for the most effective spending profile for optimal delivery.
- Some of the projects may need more money to deliver on original goals, especially those addressing Access to Finance and seeking to raise dedicated investment funds.
- Some projects would like to continue and expand their activities over future years to deliver more of their expected outcomes.
- Other projects would like to evolve and develop their activities. Some potential examples that were mentioned included:
    - SPINE could adapt their scheme to other health problems, such as antibiotic resistance, mental health, or rare diseases
    - EIRA could identify new research themes where their partners have expertise
    - IBbD could expand their support into commercialisation and investment support for the new products developed
    - Grow MedTech could consider how to address the next funding gap for medtech product development – that of demonstrating clinical evidence of benefit
    - Advanced Therapies could expand their geographic coverage to other centres of excellence, including Manchester and Sheffield
- There are also likely to be other good collaborative KE ideas that were not submitted or not well enough developed to be funded by the current CCF scheme. New schemes would allow more alternative approaches to be tested, and the cohort of involved HEIs to be expanded.

The evidence collected to date and outlined in this report suggests that there are already positive benefits coming from the scheme with more expected to come. The projects are contributing well to all aspects of the overall objectives of the programme. The underlying problems that the scheme is seeking to address are not going to disappear, and the need to develop innovative ways to address these problems will remain. Continued support for future rounds of the scheme would allow (at least some of) the projects that have started to be refined and optimised and deliver additional impact. We recommend that the successful projects are not starved of support, but instead enabled to continue with approaches that are working now that they have overcome the initial difficulties of starting up. Further value could also be gained by extending the scheme to some other HEIs that are not yet participants, through funding new schemes and/or through supporting some of the existing schemes to expand their membership.

APPENDIX 1: ACRONYMS AND ABBREVIATIONS USED IN THE REPORT

Acronym	Description
AMR	Anti-microbial resistance
BBB	British Business Bank
CCF	Connecting Capabilities Fund
CRM	Customer Relationship Management
EoI	Expression of Interest
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
KE	Knowledge Exchange
KPI	Key Performance Indicator
LEP	Local Enterprise Partnership
NPD	New Product Development
PoC	Proof of Concept
PVC	Pro-Vice Chancellor
RE	Research England
REF	Research Excellence Framework
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
MTCS	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
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

CCF Project Lead interviews:

Project	Interviewees
Advanced Therapies	Prof Simon Howell – Project Lead and grant holder
ASPECT	Julia Black – Lead PI, and head of commercialisation, entrepreneurship, student entrepreneurship
Bloomsbury SET	Ray Kent, Director of Research Administration (RVC) and CCF Lead
Ceres	Iain Thomas – responsible for communication between the project and the lead University Louise Sutherland– Director of Ceres project
Clean Growth	Zoe Osmond, Director Clean Growth UK
EIRA	Vanessa Cuthill – Director of Research & Enterprise Office, Sponsor of project at Essex Rob Singh – Deputy Director Enterprise – involved with bid and Steering Group Kirstie Cochrane – Operational lead
Grow MedTech	Jo Dixon-Hardy – Project Lead
IBbD	Guy Bingham – Prof of Design at DMU and project lead Emily Hancock– Project manager
MICRA	Simon Jones – Lead Project Manager
MTCS	Simon Hepworth, Consortium lead Imperial 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 – UMI3 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
Scale-Up Programme	Simon Bond, SET Squared Innovation Director and CCF Lead
SPINE	Beverly Vaughan – Programme Director
SPRINT	Martin Barstow, SPRINT PI and Director of the Leicester Institute of Space & Earth Observation
SWCTN	Nicole Foster, Creative Economy Research Fellow, UWE Jonathan Dovey, Professor of Screen Media on Dept of Creative Industries, Director REACT (Research & Enterprise for Arts and Creative Technologies)
THYME	Penny Cunningham, THYME Operations Director Joe Ross, Director of the Biorenewables Development Centre (BDC)

External interviews:

Organisation	Interviewees
British Business Bank	Alice Hu Wagner & Nick Shuttleworth
PraxisAuril	Maxine Ficarra and Tamsin Mann (by email)
Research England	Alice Frost
UKRI	Freddie Jones