

UK Manufacturing Forum

Bridging the Academic-Industrial Gap: Recommendations for UK Collaboration and Funding

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Introduction

As identified in the 2010 Hauser Report¹, a successful economy requires an effective pipeline from academia to industry in order to feel the true benefit of world-class research. Particularly in high growth areas like advanced manufacturing, this is key for a country to succeed in a globally competitive and constantly evolving industry.

The Catapult Network was established between 2011 and 2013 to help bridge this gap in the UK. A decade later, however, some barriers to successful collaboration between universities and industry remain.

Formal reviews into the Catapult Network help to bring the barriers to enduring UK success into focus. For example, the 2014 Hauser Review² identified that “Catapults should develop a stronger, more coherent engagement model for working with Universities”. The 2017 Ernst & Young Catapult Network Review, noted that Catapults need: “Strong collaboration with academia” for long term success³. Also, from these reports, it’s clear that the Catapult Network needs both further integration into the UK’s broader research community and a supportive overall landscape in order to achieve this.

Two recent publications, from the Department for Business, Energy and Industrial Strategy (BEIS)⁵ and the House of Lords’ Science and Technology Committee⁴, demonstrate an increased awareness of this gap. Within government, funding bodies and the larger research and innovation community, there is growing agreement that bridging the knowledge exchange gap is an important step to more effective national translation of the UK’s world-leading research output. This sentiment is echoed in the updated ambition within UKRI for “A continuum of funding for end-to-end translation and commercialisation from research to market”.

The UK Manufacturing Forum (UKMF or the Forum hereafter) is a thriving community of academics, researchers, engineers and industry representatives with a driving purpose to create a real-world impact through collaboration. Including people from the innovation community across the country, the UKMF mission is to identify practical actions which will help to maximise the impact of investment in the UK's research and innovation ecosystem.

As a significant actor in the space, the High Value Manufacturing Catapult was commissioned to produce this report in December 2019, following a workshop on this topic and subsequent conversations with UK Research and Innovation (UKRI) and Innovate UK commercialisation leads.

This report is based on workshops and consultations with key stakeholders and the wider community between 2019 and 2021. Our initial findings have already influenced the direction of policy in this area, as reflected in the 2021 BEIS review of the Catapult Network⁵. Whilst there are already signs of some changes in response to the recommendations, there is an ongoing imperative to do better and more, to truly seize the opportunities granted by the UK's world-leading research.



Summary

The Forum collected and incorporated a wide variety of insights and ideas from communities across the UK, to identify the barriers, opportunities and consequences to strengthening the collaboration between Catapults and academia. The collated information includes views from government (in particular, BEIS), funding bodies (including Innovate UK, UKRI and the Engineering and Physical Sciences Research Council, EPSRC), the HVM Catapult and other research and technology organisations (RTOs), and leading academics in engineering and manufacturing-related disciplines.

Drawing on workshops and interactive sessions⁶, the resulting material is crystallised into key observations, focused initially on current collaboration mechanisms. There is strong consensus in the Forum and wider communities that funding mechanisms, as currently operated, are a major barrier to fostering the depth and breadth of collaboration that both academia and the Catapult Network believe is vital to building a truly effective UK innovation pipeline. In particular, three clear insights emerged:

1. IUK funding rules (% overall funding and % research participation) :-
 - a) are a barrier to joint Catapult/academic collaborative engagement with business; and
 - b) act as a disincentive to collaboration between universities and Catapults/RTOs
2. There is absence of funding mechanisms to support the first-stage translation of academic research, with the aid of Catapults, on its journey to commercial markets
3. There are diminishing opportunities for larger-scale, medium to long timescale joint Catapult/academic collaborative demonstration projects of the size and importance of the current Industrial Strategy Challenge Fund (ISCF) and Strength in Places Fund (SiPF) programmes

Further analysis of the current state of affairs resulted in a set of five specific recommendations to address these barriers, which have been agreed by the Forum.

1. Simplify and standardise rules for all Innovate UK projects
2. Provide funding for accelerating the translation of research in joint projects between universities and Catapults
3. Invest in people to build “bridges” between Catapults and Universities
4. Allow Research Council-funded academic projects to include Catapults and other RTOs as collaborators
5. Create opportunities for larger scale collaborative research and development (CR&D) projects, covering a broad range of technologies and without geographical limit

In addition, specific recommendations are provided on adaptations to several existing funding mechanisms, namely Impact Acceleration Accounts, Prosperity Partnerships, the RCUK Researchers in Residences, and Catalysts.



The current landscape and barriers to collaboration

Early UKMF workshops addressed the question “What are the barriers to more effective Catapult/RTO and Academic collaboration?”. The responses from the community broadly correspond to issues of collaboration culture and communications, or to those of collaboration mechanisms and frameworks. Within each of these themes, several focus areas emerged:

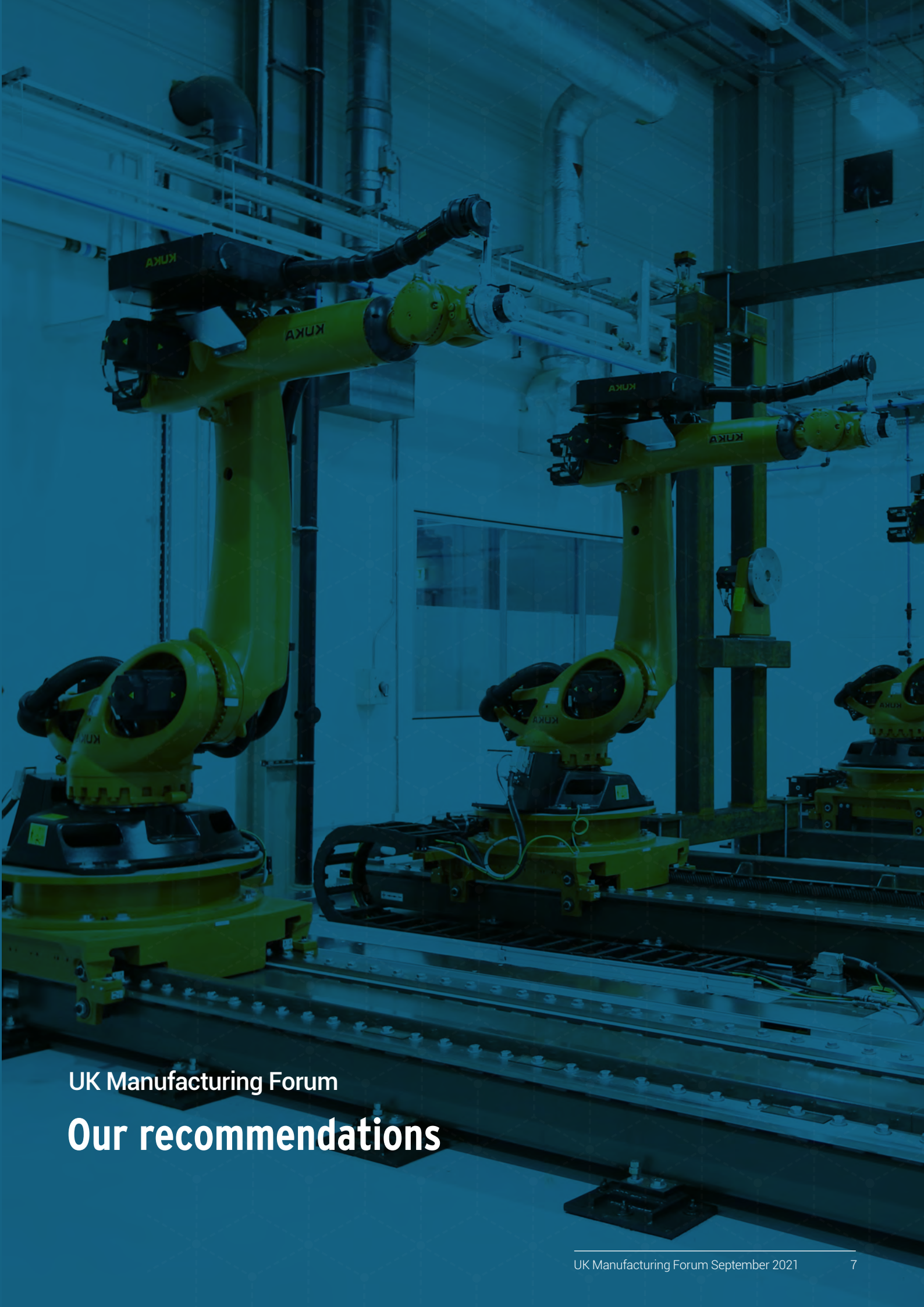
Culture & Communications	Mechanisms & Frameworks
<ul style="list-style-type: none">• Communicating & Understanding There is often a lack of understanding in both universities and RTOs of what is required to achieve successful translation. Some of this lack of understanding is due to poor communication.• Competition versus Collaboration There is often a culture of competition between universities and RTOs because of the limited availability of funding to support translation.• Timescales Different timescales and 'clock periods' across industry, RTOs and universities present coordination and prioritisation challenges.• Culture There are significant differences in the cultures of universities and RTOs. These differences often lead to different views and behaviours.• Human Resources There is a lack of people with the skills and expertise to a) facilitate successful translation and b) help raise awareness of what is required for successful translation.	<ul style="list-style-type: none">• Legal & Contractual Given the different priorities and cultures it can be difficult to agree upon the terms of NDAs and Collaboration Agreements.• Intellectual Property (IP) There is often conflict of interest between universities, RTOs and companies on the ownership and exploitation of IP.• Process Framework There does not appear to be a widely accepted framework or process that can be used to help achieve successful translation through collaboration.• Funding There is very limited funding available to support translation through collaboration between universities and RTOs.• Key Performance Indicators (KPIs) The current university and RTO KPIs differ and neither encourage collaboration to achieve more successful translation.

A vision for a better system

Based on this background information, we identified a key vision for the UK translation landscape:

“The UK must establish trusting relationships between academic institutions, research and technology organisation and the Catapult Network based on mutual understanding and benefits, enabling these organisations to work together on commonly agreed causes and facilitated by access to funding mechanisms crafted to respect and leverage the contributions of all participants.”

To achieve this vision, the Forum recommends action in five specific areas.



UK Manufacturing Forum

Our recommendations

Simplify and standardise rules for all Innovate UK projects

Standard Innovate UK rules currently limit research organisation (i.e. academic, RTO) participation in projects to 30% by value.

This is not, however, applied universally across all competitions, and some (but not all) competitions also limit overall project funding rate to 50%; other competitions have no constraints in participation or funding rates. It is important to note that the 30% and 50% limits were not introduced in response to (pre-Brexit) EU state aid requirements.

These rules have predictable consequences for consortium membership. For example:

- » In competitions with an overall 50% funding limit businesses are 'penalised' by sub-50% funding when a consortium contains academics/RTOs; this can result in very low (20% is not atypical) industrial funding rates which are a known disincentive to participation by businesses of all sizes.
- » In competitions with a 30% cap on research organisation participation it is often the case that academics and catapults feel forced to compete for a larger/total share of the 30% allocation.

In competitions without these limits/caps, there is good incentive for industrial participation (business grants of 50-70% typical depending on organisation size), better scope for interdisciplinary activity, more opportunity for translation to industry, and promotion of true collaboration where universities and catapults are not in competition.

Removing the overall 50% funding requirement would require a consortium to present its own mechanism of State Aid compliance, rather than having a model imposed. We recognise that this may result in significant work and was the subject of later workshop discussion - a practical balance needs to be achieved, perhaps introducing guidance, advice and structure whilst retaining flexibility.

Proposed changes:

- » Modify standard Innovate UK rules, removing limits to overall project funding rate and research org participation share – as per Strength in Places
- » Allow limits to be added in competitions where specifically needed
- » Adopt the most appropriate funding ratios to encourage translation in more cases than is done currently

Opportunity 01

Innovate UK funded projects better leverage commercial resources, resulting in greater collaboration in end-to-end R&D ecosystem and greater UK economic benefit

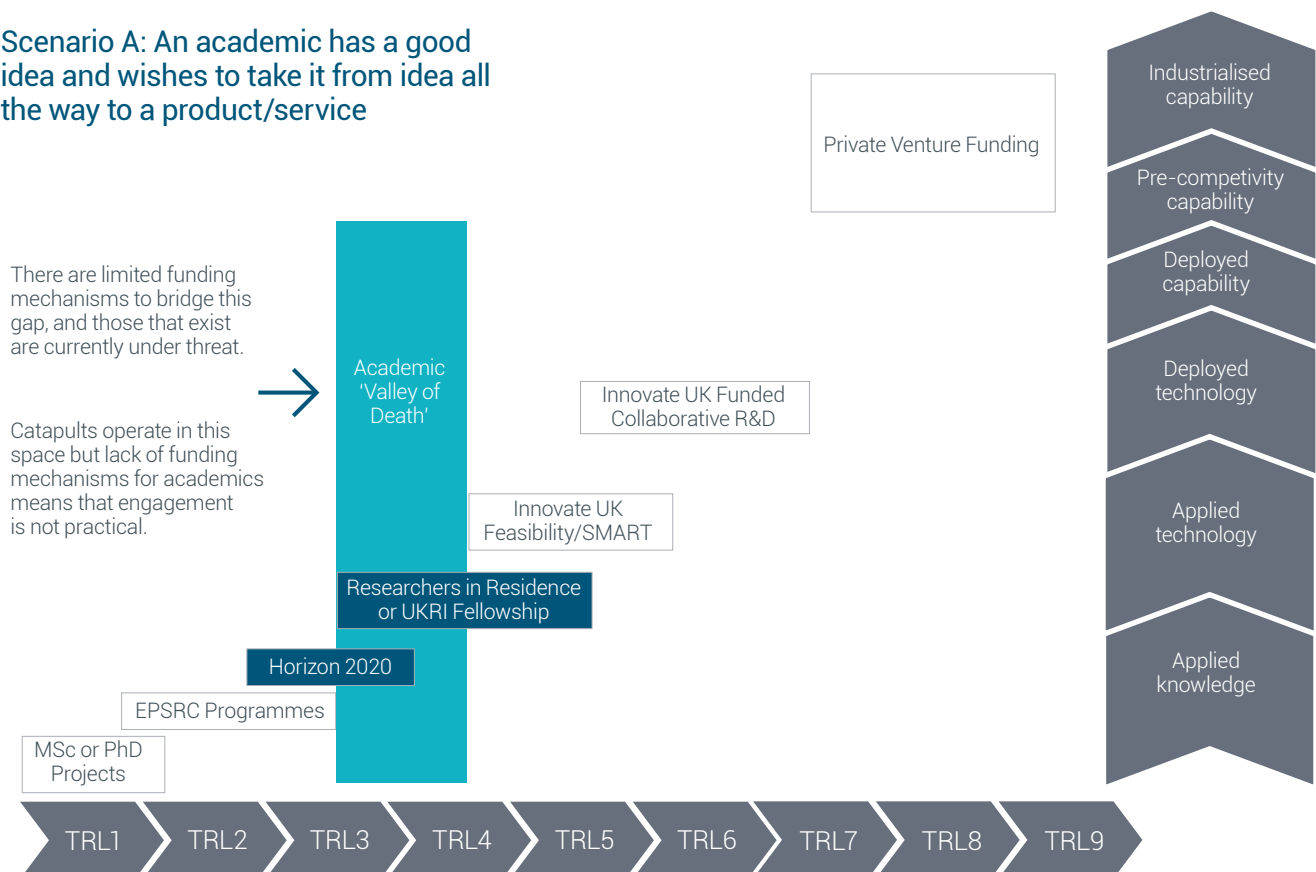
Provide funding for accelerating the translation of research in joint projects between universities and Catapults

Both universities and Catapults bring different skill sets to the commercialisation pipeline, with the former specialising in early-stage discovery and the latter specialising in innovation and industrial scale-up.

These profiles are naturally complementary, but there are limited funding mechanisms to nurture cross-community research translation. Improved access to funding mechanisms that enable the translation of early-stage discovery to the market via the innovation and scale-up capability of Catapults would greatly increase the speed and scale of UK commercial opportunities. It would also encourage follow-on work between universities and Catapults, nurturing partnerships and enabling more effective technology commercialisation in the longer term.

Funding Routes

Scenario A: An academic has a good idea and wishes to take it from idea all the way to a product/service



There are limited funding mechanisms to bridge this gap, and those that exist are currently under threat.

Catapults operate in this space but lack of funding mechanisms for academics means that engagement is not practical.

The proposed new funding access for universities and Catapults to work in partnership would also fill a gap in the current ecosystem. This gap is in the translation of existing proof of concept research into products, processes or materials that are ready for industrial scale-up. Our proposal would accelerate the movement and increase the success rate of early-stage discoveries from universities reaching the market by:

- » Direct, bi-lateral collaboration between Catapults/RTOs and academics
- » Exploiting the innovation and scale-up capabilities of the Catapults
- » Providing joint access to both Catapult and university facilities and equipment
- » Facilitation of indirect industry engagement
- » Targeting industrial exploitation either for sector(s) or for specific organisations
- » Seeding the development of larger CR&D proposals through Innovate UK

The proposed funding mechanisms would enable a series of partnerships that could quickly and effectively develop and de-risk the best of the UK's research for economic benefit. This could further increase the value of intellectual property before sale to industry and allow more risky research - where industry engagement is difficult - to have a better chance of commercialisation.

We note that Impact Acceleration Accounts are intended to bridge the gap between academic research output and commercial impact. In practice, however, the funding amounts are relatively small and mechanisms for Catapult collaboration are not clear. As such, there is a limited impact that these can have at present in the successful transition of research to the market.

Opportunity 02

Partnerships between universities and Catapults would be encouraged at a greater scale, quality and number, increasing the impact of UK research by de-risking opportunities for industrial investment and thereby delivering national commercial benefit

Invest in people to build “bridges” between Catapults and Universities

We propose several people-based bridge-building approaches to maximise the use of the UK's research and innovation resources:

- » Enhancing knowledge exchange, understanding and culture building through a funded exchange of staff between universities, Catapults and private business
- » Build capacity in research translation and capture best practice by appointing permanent translation professionals (Translation Managers) to support development and execution of translation projects in both universities and Catapults
- » Increase new appointments of Researchers in Residence (RiR) in Catapults, broadening the scope to include early career researchers and even entire new groups

Welcome progress has been made on the last point since the study was completed and, subject to BEIS budgetary approval, UKRI (via EPSRC) intends to commit £2.25m in the 2022/2023 financial year to encourage the development of new collaborations and increase knowledge exchange and co-creation of activities between UK academia and the Catapults. This funding initiative will build upon previous Researchers in Residence (RiR) activities which have been delivering strongly since 2014.

Opportunity 03

Enhancing knowledge exchange and understanding between universities and Catapults, with the addition of Translation Managers to support project development and execution, would streamline the translation process, bringing more of the UK's research to market

Allow Research Council-funded academic projects to include Catapults and other RTOs as collaborators

The current arrangement has an indirect penalty to collaboration between a university and a Catapult or RTO.

According to the current terms, an academic seeking collaboration with a Catapult or RTO can only do so through a sub-contracting arrangement – whereby the project lead contracts out a portion of the scope to the Catapult or RTO. The funding mechanisms currently in place ensure that 20% of the costs in such a situation remain the liability of the university in question – a clear disincentive for collaboration.

We are strongly committed to the principle that the leadership of these projects (ie the Principle Investigator) remains with the academic institutions, whose expertise makes them best placed to lead. However, we recommend that UKRI's eligibility rules are changed to enable Catapults (particularly those not affiliated with universities) and other RTOs to be full partners in these projects to reflect a meaningful contribution.

The proposed changes would facilitate and increase Catapult partnerships, across a wider range of programmes, thereby helping academics to increase the potential impact of their work.

This applies to Impact Acceleration Accounts, Prosperity Partnerships and standard Research Council grant awards.

Opportunity 04

Improving the impact of Research Council-funded projects by allowing RTOs to become full partners, leveraging the RTO's expertise, under the leadership of the academic institution directly claiming their costs, as appropriate

Create opportunities for larger scale collaborative research and development (CR&D) projects, covering a broad range of technologies and without geographical limit

The number of opportunities for large scale projects with multiple partners is decreasing. Although the UK remains eligible to participate in Horizon Europe, the UK's departure from the European Union has had a negative impact on these opportunities.

The remaining large UK schemes are often tied to particular products, markets or geographies. As such, many valuable projects are excluded because the development would fall outside of specific regional locations, or where the outputs unlock a wide range of markets but, as a consequence, the overall impact potential is less visible.

This funding is resulting in a severe restriction on early scale-up of ideas. It is the large-scale pilot and demonstration projects that enable a particularly effective route for innovation across whole supply chains, enabling multiple partners to collaborate and universities, and Catapults to work together. With the pressing challenge of Net Zero, a continued limitation of fundable projects by geography and narrowly defined target markets will mean that the UK will fail to capitalise on opportunities, many of which have a crucial impact on the economy.

We propose that larger CR&D schemes at the TRL 4/5 boundary are made available in future funding rounds – without limiting project delivery by geography, and by including ideas from broader technology bases with wider target markets.

Opportunity 05

Improving the scalability of Research Council-funded projects by providing funding for larger collaborative research and development, covering innovation in broader technology areas and without geographical limit, to bring the benefits gained to whole supply chains

Adaptations to Existing Schemes

In order to implement the recommendations in this report, we realise that the funding landscape must change in two ways:

After analysing several existing schemes in the current funding landscape, we have made some suggestions below that would increase the potential for collaboration and impact.

1. by providing some additional mechanisms for those gaps where no such mechanism exists, and
2. by improving the mechanisms that currently exist to provide greater impact.

After analysing several existing schemes in the current funding landscape, we have identified some additional changes, below, that would increase the potential for collaboration and impact.

Impact Acceleration Accounts (IAAs): Increase scale and include Catapult eligibility

IAAs do not currently encourage collaboration between academic institutes and Catapults due to the modest levels of available funding, the complexity of the procurement processes and the lack of consistency of how IAAs are operated across different Research Councils. We propose that the scheme could be amended as follows:

- » Increase scale of awards to institutions and encourage larger awards to projects in order to cross the threshold required to achieve meaningful impact.
- » Encourage partnership with other parts of the research and innovation ecosystem within any single bid, both before submission and after award.
- » Enable direct participation of Catapults and RTOs in bids as full partners (see also Recommendation 4).
- » Increase the value of intellectual property by stage-gating larger awards.
- » Consider the funding allocated to future leadership capability in a more holistic manner.
- » Consider future leadership capability as an investment in 'future impact' by developing "Industry leaders of the Future", each with a planned career path to industry.

Prosperity Partnerships: Catapult eligibility

Catapults are not eligible for direct funding despite this scheme's translation ambitions; any sub-contracting is disincentivised by the 80% FEC funding model (see recommendation 4). Uptake has also usually been restricted to large businesses rather than with small and medium-sized enterprises (SME's, which make up a majority of the UK's manufacturing sector). We therefore propose that the scheme could be amended as follows:

- » Encourage translational bodies (such as Catapults) to participate directly in the scheme, promoting:
 - » More effective use of the UK ecosystem to support companies to “discover” (with university) and “innovate” (with Catapults), accelerating the launch of new products and services
 - » More opportunities for SMEs to engage in large innovation programmes
 - » Improved links (and hence 'pull') to industrial technology roadmaps for the whole ecosystem, helping to better exploit Catapult industry networks
- » Set up meaningful stage-gates for larger awards, with consideration for all three parts of technology development – research, feasibility and piloting/ demonstration – in applications, potentially with different partners at different stages

Researcher in Residence (RinR): Increase numbers and extend eligibility

Both the Catapult Network and the EPSRC recognise the successes that have been achieved in the RinR scheme, which has been running since 2014. However, within the manufacturing innovation domain, it has been oversubscribed for some time. We therefore propose that the scheme is expanded, making more posts available and to a wider community. To do so, we propose:

- » Allocating funding for further tranches of Researchers in Residence
- » Extending eligibility to include partnerships between an early career researcher supported by an established academic (or vice versa)

As noted in Recommendation 3, welcome progress has already been made by EPSRC, supported by the Catapult Network, in this regard.

Conclusion & Recommendations

The commercial impact of UK academic discovery could be greatly enhanced through a more co-ordinated use of existing capabilities – in research, translation and commercialisation. This can be achieved by more effectively incentivising stakeholders to work collaboratively across different stages of a technology life-cycle, from early-stage discovery to late-stage scale-up. This report has presented five recommendations to increase the coherence of the ecosystem, as well as several scheme-specific improvements that build on existing mechanisms.

The five Recommendations are:

1. Simplify and standardise rules for all Innovate UK projects
2. Provide funding for accelerating the translation of research in joint projects between universities and Catapults
3. Invest in people to build “bridges” between Catapults and Universities
4. Allow Research Council-funded academic projects to include Catapults and other RTOs as collaborators
5. Create opportunities for larger scale collaborative research and development (CR&D) projects, covering a broad range of technologies and without geographical limit

The adoption of these recommendations by Government and funding bodies would be a significant step towards their stated ambitions, maximising the impact of investment in the UK's research and innovation ecosystem. We are ready to help the UK create “a continuum of funding for end to end translation and commercialisation from research to market”, grasping the true benefits of our world-class research and innovation institutions.

References

- ¹ Hauser (2010) The Current and Future Role of Technology and Innovation Centres in the UK
- ² Hauser (2014) Review of the Catapult network: Recommendations on the future shape, scope and ambition of the programme
- ³ Ernst & Young LLP (2017) Catapult Network Review
- ⁴ House of Lords, Science and Technology Select Committee (2021) Catapults: bridging the gap between research and industry, 2nd Report of Session 2019-21
- ⁵ Department for Business, Energy & Industrial Strategy (2021) Catapult Network Review – How the UK's Catapults can strengthen research and development capacity (April 2021)
- ⁶ This study draws on insights gained through the following:
 - UKMF workshop summer 2019 – round tables
 - UKMF academic engagement event winter 2019 – detailed workshop survey of participants including 77 academics, 72 Catapult/RTO representatives, and 15 others.
 - HVM Catapult experience of academic engagement (multiple centres)
 - Industrial experience of academic engagement (large and small organisations)
 - UKMF Recommendations workshop in spring 2021 - invitees from academia helped to validate, refine and develop the material.

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The findings from this funding landscape study were given the full endorsement of all Catapult Network CEOs in early 2021.

About the UK Manufacturing Forum

The UK Manufacturing Forum (UKMF) was created in 2018 by the HVM Catapult in partnership with the University of Cambridge's Institute for Manufacturing (IfM). It builds on the legacy of Sir Mike Gregory who had created the annual 'UK Manufacturing Professor's Symposium' event in the 1990's to bring together academics specialising in manufacturing-related research with Government policy makers, and to raise awareness and increase collaboration in the field. The HVM Catapult and IfM have continued with that ethos by organising and hosting UKMF events to build a thriving community of academics, researchers, engineers and industry representatives with a driving purpose to create a real-world impact through collaboration. Including people from the innovation community across the country, the UKMF mission is to identify practical actions which will help to maximise the impact of investment in the UK's research and innovation ecosystem.