

UK SBS PS17086 Catapult Network Review

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United Kingdom

Catapult Network Review

17 November 2017

In accordance with your instructions, we have performed the work set out in our contract for professional services dated 24 May 2017 (the "Contract") in relation to the Catapult Network Review (the "Project").

Purpose of our report and restrictions on its use

This report was prepared on the specific instructions of Department for Business, Energy and Industrial Strategy (BEIS) solely for the purpose of the Project and should not be used or relied upon for any other purpose.

We accept no responsibility or liability to any person other than to BEIS and accordingly if such other persons choose to rely upon any of the contents of this report they do so at their own risk. A disclaimer page is included at the start of the report to provide further information to other persons in this respect.

Disclosure of our report

This report and its contents may not be quoted, referred to or shown to any other parties except as provided in the Contract or as otherwise agreed between us.

Notwithstanding the terms of the Contract, we have separately agreed with you the basis upon which you may, at your election, make the report publicly available through the world wide web.

Yours sincerely,

A handwritten signature in black ink that reads 'Rob Moody'.

Rob Moody

Partner | UK&I TAS Chief Innovation Officer
Ernst & Young LLP



Foreword

Innovation is critical to the long-term success of any national economy and the UK has a globally renowned reputation for being a leader in this field. However, to be successful and remain successful, innovation requires relentless pursuit through many forms.

One of these forms is having the ability to bridge the gap between R&D and industry, ensuring that there is a '*translational infrastructure*' that allows our most innovative ideas to be commercialised and drive benefit to the UK economy.

The Catapult network seeks to bridge this gap, working closely with academia, the research industry and the public and private sectors. The Catapults are distinct from other forms of innovation in that they are intended to address specific market failures and enable risks to be taken that would not ordinarily be undertaken by the commercial market. Therefore, Catapults can potentially lead to innovation that benefits the wider economy and that would not otherwise have been delivered.

In our report, we have reviewed the Catapults' performance to date, noting both the successes and areas where improvements are required to put them on a trajectory that maximises the benefits of innovation to the UK economy.

It is inherently challenging for any organisation to measure the return on innovation spend and, as is the case with the Catapults, within a period of five years. It is important, therefore, to strike a balance between providing sufficient structure, process and governance to provide assurance that publicly-funded innovation is delivering value

for money for UK plc, whilst not providing so much control that innovation is constrained and Catapults feel unable to take measured, calculated and properly understood risk.

During our review of the Catapults, we have had the opportunity to visit their physical locations, and engage with chairs, CEOs and their leadership teams, sector experts, customers and collaborators. We find it reassuring to see high levels of enthusiasm and commitment to ensure the success of Catapults, which has also been exemplified through numerous case studies. We also take note of how the Catapult programme has inspired international initiatives, such as the French 'Boosters'.

Our recommendations focus on areas around overall governance, strategy and future plans, how performance should be managed, the funding considerations and the need to deliver and measure economic impact through addressing market failures. This is underpinned by recommendations we make for a high-level operating model that Catapults should adopt going forward.

A '*translational infrastructure*' is a critical component of the UK's innovation portfolio and should not be treated or viewed in isolation. If the Catapults are to effectively fulfil this role then we consider the recommendations made in our report to be vital to strengthening their performance.

Ernst & Young LLP

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Executive summary

Executive summary

Introduction

BEIS has appointed EY to conduct a review of individual Catapults, and the network as a whole, to assess the value it delivers for the UK. Our review has focused on answering the following questions:

- ▶ **How has the Catapult network performed to date? What are the areas of success and which areas could be improved?**
- ▶ **What lessons can be learned from the last five years and what could be done to make all Catapults more effective in the future?**
- ▶ **What is the optimal operating model for the Catapults to deliver better innovation outcomes? What are the appropriate governance and financial management activities that can support this?**
- ▶ **To what extent can other Government funded innovation organisations be ‘integrated’ into the Catapult network?**

We have considered the questions above through our analysis of the six work streams below



Executive summary

Methodology overview

Approach summary

Historic performance review

- ▶ Quantitative KPI assessment
- ▶ Qualitative assessment
- ▶ Economic impact assessment review



Future plans analysis

- ▶ Catapult future plans analysis
- ▶ Governance analysis

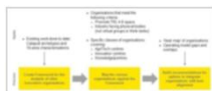


Operating model

- ▶ Operating model
- ▶ Financial management
- ▶ KPIs



Integration of other innovation organisations



Catapult stakeholders

EY has worked closely with BEIS to ensure that all relevant stakeholder contacts have been included. We have engaged in **c.75 meetings with c.250 stakeholders:**

- ▶ **Catapults and IUK:** Catapult CEOs and their leadership teams, chairs, IUK leadership, IUK and former Catapult employees
- ▶ **Innovation SMEs:** Fraunhofer, TNO, Nesta, CRC boards, National Research Council Canada
- ▶ **Government departments and agencies:** Agri-Tech, DCMS, UK Space Agency, MoJ, DfT, DoIT, Scottish Government, Welsh Government, DCLG, BEIS, Northern Ireland Government
- ▶ **EY sector leads and other senior client facing staff**
- ▶ **Customers:** EY contacts, through CRC process and via access to source data from the SQW and Frontier Economics work

Documents and data

Working with BEIS, IUK and the Catapults, **we have analysed 2,000+ survey data points and c.275 documents** covering key aspects of IUK's and the Catapults' performance:

- ▶ HMG approval documentation for the creation of the Catapults
- ▶ Economic impact assessment documentation from SWQ and Frontier Economics
- ▶ Current and future Catapult delivery plans
- ▶ Q4/annual reviews of each Catapult for each year
- ▶ Financial indicators and management accounts from each Catapult

Executive summary

Introduction to Catapults

The Government has established a network of technology centres ('Catapults') to commercialise new and emerging technologies in areas where there are large global market opportunities and a critical mass of UK capability. The Catapults were created in response to a report published in 2010 by entrepreneur and technologist, Dr Herman Hauser, and were intended mainly to address a perceived failure of the market to bridge the gap between research and commercialisation in an effective manner. They were expected to provide access to infrastructure, expertise and capabilities that are generally not available in the market and bring together business, academia, research and Government to transform innovative ideas into new products and services to generate economic growth in the UK.

The Catapults were set up as independent research and technology organisations, established and overseen by Innovate UK ('IUK'), though structured to operate as private sector organisations at arm's-length from IUK. This was configured to ensure that the Catapults respond to the needs of UK businesses and address the challenges and opportunities facing the sectors in which they operate.

A private sector classification was designed to enable the Catapults to, inter alia:

- ▶ Maintain a neutral status across industry
- ▶ Act in an agile, responsive and flexible way, driven by a commercial mind-set
- ▶ Attract talented leadership and highly qualified expert staff to support industry
- ▶ Be trusted with IP and commercially sensitive information
- ▶ Avoid the constraints and administrative costs faced by public organisations

The private sector classification creates potential trade-offs and tensions, especially around governance and IUK's ability to direct the Catapults:

- ▶ IUK is unable to take up formal representation on Catapult boards and is restricted to having only an observer type role.
- ▶ IUK is unable to be prescriptive about Catapult board appointments.
- ▶ There are private and public sector culture clashes, e.g., when Catapults are asked to deliver for Government, report on performance or comply with government accounting rules.

Executive summary

Introduction to Catapults (continued)

The Catapults receive funding from Government ('core' funding) through IUK to develop and maintain their internal capability and infrastructure. They have been traditionally funded with £50mn per new Catapult across five years, with a 'flat' funding profile of £10mn per annum. After five years, the Catapult must apply for its grant to be renewed subject to approval of a business plan for the subsequent five years. We are now at this renewal stage with seven Catapults, following completion of their first five years of operation:

Longer established Catapults	Date operational
High Value Manufacturing (HVMC) (seven centres)	October 2011
Cell and Gene Therapy (CGTC)	October 2012
Satellite Applications (SAC)	December 2012
Offshore Renewable Energy (OREC)	March 2013
Digital (DC)	June 2013
Future Cities (FCC)	June 2013
Transport Systems (TSC)	August 2013

There are a further three Catapults (Energy Systems, Medicine Discovery and Compound Semiconductor Applications) that have either been set up recently or announced. Precision Medicine is no longer operational.

Executive summary

Introduction to Catapults (continued)

Delivering a transformational programme, such as the implementation of Catapults, is hugely complex given the size of the investment, the number of stakeholders involved and the scale of the change required.

The Catapults were tasked with delivering a paradigm shift in how the UK identified, nurtured and delivered market-worthy ideas. While this was not an entirely new concept, with 'translational infrastructure' having been rolled out elsewhere (e.g., the Fraunhofer Institutes in Germany and TNO in the Netherlands), the way the Catapults were set up, funded and positioned in the innovation eco-system was unique. As a result, when IUK was given the responsibility for implementation, there was no well travelled path, with a detailed and reliable blueprint to guide it through the process.

The challenges for IUK in implementing the new Catapult concept were further increased by changes in their funding, leading to a reduction in their resourcing and also a decrease to the collaborative research and development pool which is a material component of the Catapults' funding model. In addition, a changing government policy landscape, and difficulties in hiring appropriately experienced senior personnel in some niche sectors, undoubtedly had impacts on the effective delivery of this complex programme.

Yet, in this challenging context, notable achievements have been made, with Catapults demonstrating a contribution to innovation outcomes and validation of the Catapult model:

- ▶ Each of the longer-established Catapults has been successful in setting up and establishing themselves in their sectors, forming relationships with academia, SMEs, Government and industry, and generating commercial and CR&D funding streams.
- ▶ Large facilities and cutting edge technology have been successfully developed and deployed into the innovation network (e.g., the CGTC Stevenage facility) for exploitation within the Catapult sectors.
- ▶ The Catapult international brand and reputation has grown, with other countries now seeking to duplicate the Catapult model within their own geographies.

Executive summary

Summary of findings

Based on our analysis, we have concluded that **the concept of Catapults is sound and, when effectively implemented, Catapults have the potential to drive innovation and economic benefit to the UK.** Indeed, our work has suggested that similar programmes in other countries have successfully managed to support innovation as evidenced by their commercialisation of new products and services, longevity of existence and continued financial support from respective governments.

We have seen some examples in all Catapults of positive progress. For some, this has been positive progress over a reasonably long time period and we have seen evidence of some Catapults driving forward the innovation agenda in their field, with evidence of positive economic contribution to the UK economy. It is our view that, when the Catapult concept works, it works well and can deliver innovation outcomes and positive economic contribution to the UK. However, for some Catapults this positive progress is much more recent following very recent changes to executive teams, in particular for TSC, FCC and DC.

Therefore, it is our view that, for the Catapults we have reviewed, and considering everything we have seen for those Catapults since inception, implementation of the Catapult concept has been inconsistent and could have had a significantly greater impact in delivering innovation, economic benefits and value for money that would have been more consistent with the benefits envisaged when the concept was initiated. This is because, with a few notable exceptions:

- ▶ There has been no single, commonly agreed and consistently communicated purpose statement for Catapults that has been applied across the network and reflected from strategy through delivery plans to performance measurement and evaluation.
- ▶ IUK governance has not been sufficiently robust, particularly around financial and performance management, with limited evidence of timely intervention where Catapults' performance targets and wider objectives have not been met (other than in very recent examples).
- ▶ There is limited evidence that Catapults have had effective performance management in place.
- ▶ Catapults have not achieved their funding model expectations as per their envisioned operating models and they remain overwhelmingly reliant on public funding.

Executive summary

Summary of findings (continued)

- ▶ Whilst it is not possible to quantify the economic impact robustly with the data available, there is some evidence that individual Catapults may have had a positive economic impact. This is especially the case for HVMC and CGTC, where they have historically centred delivery plans to drive economic benefit to the UK. This, combined with the case studies that were presented to us by HVMC and CGTC, gives us a higher degree of confidence that these two Catapults are likely to have generated a positive impact relative to the other Catapults.
- ▶ However, in broader terms, with the Catapult network's overall lack of a clearly articulated set of objectives, or a framework for measuring impact, and the current level of operational performance, it is unlikely that the impact of the network overall has been significant so far. Hence our view, taking in to account everything we have seen, is that, to date, the Catapult network is unlikely to have provided the benefits and value for money envisaged at the outset.
- ▶ There is limited evidence of extensive collaboration between Catapults and limited synergies achieved through being part of the Catapult network, which, if addressed, could help make the Catapult brand more effective in the UK.

Executive summary

Summary of recommendations

It is our opinion that continued core funding for the Catapult network should be subject to placing more robust governance around the network to provide assurance to HMG that the network is delivering according to expectations, driving real economic benefit for UK plc and ultimately delivering value for money for the tax payer.

Specifically, the provision of core funding should be conditional on:

- ▶ All Catapults defining their clarity of purpose, which is critical for them to be successful
- ▶ Building upon this purpose, with all Catapults providing robust, focused business plans supported by measurable milestone plans that will lead to **economic benefits for the UK economy through addressing clearly articulated market failures**
 - For TSC, DC and FCC, a detailed plan of activities and interim milestones for the next 12 months needs to be set out and agreed with IUK (or the appropriate HMG governing body) to provide confidence that the Catapult is genuinely on track to achieve its longer-term objectives
 - If the Catapult and IUK are unable to specify and agree an acceptable plan within a bound period (e.g., 12 weeks), then any further funding should be halted
 - If, after the 12 month period (or indeed earlier if there are significant concerns), the Catapult fails to meet its plan and associated interim milestones, consideration should be given to halt further funding
 - As part of this special planning, consideration should be given to contingency of the Catapult should core funding halt, e.g., legal and insolvency ramifications, potential costs, Catapult branding considerations
- ▶ Significantly improving both IUK and BEIS governance, and financial and performance management arrangements of Catapults, so there can be ongoing monitoring and transparent evaluation to ensure value for money to the tax payer
- ▶ Embedding the BEIS and IUK jointly developed evaluation framework and economic logic model in all Catapults, overseen by BEIS, making it the core pillar of performance management across the Catapult network to realise and maximise the economic impact to the UK economy
- ▶ Continuing with the development of CSAC and MDC, subject to the implementation of recommendations in this report
- ▶ Putting on hold the launch of new Catapults or incorporation of other organisations in the Catapult network until significant progress has been made in addressing the issues raised by this report and implementing the recommendations we set out

Given that funding for all Catapults needs to be renewed by April 2018, we also recommend that BEIS makes a decision on the future of the Catapult network as soon as possible and by the end of 2017 at the latest, to provide clarity for Catapults, their teams and IUK on the way forward.

Executive summary

Summary of recommendations (continued)

If, **once the recommendations in this report are implemented**, there is a decision to establish new Catapults, we would recommend that the following points are considered before any formal arrangements are made to proceed with launching a new Catapult:

- ▶ Does the proposed Catapult meet the **core criteria** to be considered as a Catapult:
 - Is this a multi billion £ industry that is important to the UK?
 - Is there a definable cluster of activity in the UK?
 - Is there **demand** showing market intervention needed to remove barriers to commercialisation of innovative products and services, which can be addressed by a Catapult?

- ▶ Could the proposed Catapult operate on a set of **viable core objectives**:
 - Would it have the ability to provide infrastructure, skills and expertise to act as a platform for innovation pursuits in specific sector or technology domains within its industry where there is a **market failure**?
 - Could it work alongside the R&D capability in the UK, accessing CR&D funding, to develop innovative solutions addressing key sector or technology domain challenges?
 - Could it work with industry to commercialise innovation in a way that drives long-term **benefit to the UK economy**?

- ▶ Is there a credible ecosystem and resources to support an **optimal operating model** for the proposed Catapult?
 - Is there an interest and willingness to participate from key stakeholders within academia, industry, Government and other Catapults?
 - Is there a selection of credible candidates who would be motivated to lead, and plausibly be employed by, the proposed Catapult?
 - Is there confidence in sustained sponsorship and governance from HMG for the proposed Catapult?

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Key findings

Key findings

1 Strategy and future plans

- ▶ Whilst there are common themes in how key stakeholders (BEIS, IUK, Catapult leadership, customers, etc.) describe the core purpose of Catapults, there is no single, commonly agreed and consistently communicated purpose statement for Catapults that is applied across the network and reflected from strategy through delivery plans to performance measurement.
- ▶ In our view, with a few exceptions, Catapults' strategies and future plans do not provide sufficient evidence that their selected priorities and pursuits focus on addressing key market failures in their sector or technology domains. Nor do they describe how their plans are expected to maximise returns to the UK economy, e.g., there is limited analysis of market failure, strategic options analysis, cost-benefit analysis or economic logic.
- ▶ Whilst the strategies and future plans of the Catapults generally include high-level roadmaps, they are not supported by detailed execution plans (e.g., considering investment or FTE resources) that include measurable milestones against which interim progress can be objectively assessed.
- ▶ The future plans of FCC, DC, OREC and MDC are not targeting to achieve the long-term 1/3 core funding, 1/3 commercial funding, 1/3 CR&D funding split target (i.e. the '1/3, 1/3, 1/3' funding target).

2 Governance

- ▶ Until recently, there have been limited interventions from the governance process where Catapults have underperformed. Performance reviews and interventions have recently stepped up considerably, e.g., DC's delivery plan has been rejected (and DC has subsequently redrafted another version), the Catapults went through an independent review process ('CRC' process) and economic consultants were brought in to assess the economic impact of Catapults. In our opinion, these interventions could have been more timely.
- ▶ There has been a lack of consistency in the performance data reported, lack of transparency in the flow of funds, some lack of clarity on the use of funds and non-timely availability of this data. For example, our work identified material differences in IUK and Catapult data for the quantum of core funding provided or received (these have now been reconciled by IUK). We were surprised this analysis had not previously been undertaken as a core part of the regular review of Catapult performance.
- ▶ In our opinion, these points are indicative of IUK's sub-optimal financial management to monitor and analyse whether Catapult funding has been well spent, in a way that seeks to maximise returns to the UK economy.
- ▶ Whilst we recognise the budgetary challenges IUK has faced, the shift from dedicated Catapult leadership to four sector directors has not helped improve the governance around Catapults.
- ▶ Catapults that had a chairperson with relevant business and industry experience (e.g., experience of setting up businesses) performed relatively more strongly than those that did not.
- ▶ The innovation policy landscape is currently undergoing considerable change with the creation of UKRI, which will bring together Research Councils, IUK and Research England, and will therefore have the ability to influence key Catapult governance decisions.

Key findings

3 Performance management

- ▶ The KPIs that have been used to monitor performance of the Catapult network have had limited effectiveness in guiding Catapults to achieve their business objectives and deliver maximum economic benefit for UK plc.
- ▶ In our opinion, there have been too many KPIs and those KPIs have been too focused on inputs, with insufficient emphasis on outputs and outcomes. This has been recognised by BEIS and IUK, who are working on developing a new KPI reporting framework.
- ▶ Consequently, Catapults have not used KPIs provided by IUK to systematically focus on the real outputs of their activities for UK plc, nor have they used KPIs to drive business performance.
 - There is no evidence of analysis linking input KPIs to output KPIs, e.g., capex, staffing and engagement KPIs measure activity and do not necessarily convert to achievement of funding targets.
 - There is evidence that Catapults do not view the IUK KPIs as necessary to understand the performance of the business and that some IUK imposed KPIs are not used for internal reporting purposes, such as number of patents created.
- ▶ There is evidence from some Catapults of continual year-on-year reduction of performance targets as agreed performance targets are not achieved.
- ▶ Catapults are involved in the delivery of wider government policies, receiving c.25% of funding from 'Public Other' sources (HVMC representing the bulk of this). These projects have been generally aligned with the Catapults' scope and objectives and did not distract Catapults from making progress against their delivery plans.

4 Funding

- ▶ In our view, balancing commercial, CR&D and core grant funding is appropriate in enabling the Catapults' long-term purpose. It is a good model to balance the interests of the different stakeholders a Catapult should be serving. However, this funding model needs some flexibility to reflect other factors, such as a Catapult's maturity, sector or technology trends, or changes in availability of other funding pools (e.g., CR&D programmes aligned to the Catapults' objectives).
- ▶ From FY14 to FY17, Catapults received total funding of c.£1,250mn, including c.£745mn (60%) from the public sector ('Core Grant' and 'Public Other'). The majority of the funding from the public sector (68%) was provided to HVMC and CGTC which, in our view, performed relatively well.
- ▶ Only HVMC met the 1/3 public ('Core Grant' only), 1/3 collaborative R&D and 1/3 commercial funding expectations; all other Catapults were heavily reliant on public funding.
- ▶ Five Catapults (FCC, TSC, DC, OREC and CGTC) missed their GFA CR&D targets by a total of £25.0mn. Although the targets for these Catapults have been revised down by 53% to c.£18.4mn, they have still missed the CR&D funding target by £4.7mn (26%).
- ▶ HVMC and SAC in particular have been proactive in identifying new sources of CR&D funding (i.e., outside IUK) and HVMC have been instrumental in developing new CR&D funding pools e.g., the Faraday Challenge.
- ▶ In our opinion, availability of CR&D funding in areas linked to the focus of Catapults will be critical to allowing Catapults to meet the CR&D funding targets and deliver the thirds funding model. There is a key link between Catapults and CR&D programmes which need to be considered together, as does the success of Catapults in an open competition process for this funding.
- ▶ FCC, TSC and DC missed their cumulative FY14–FY17 commercial funding GFA targets by a total of £15.3mn (66%). Although the targets for these three Catapults have been revised down by 34%, they have still missed the revised commercial funding target by £7.4mn (48%).

Key findings

5 Economic impact

- ▶ The UK Catapult network was established to “transform the UK capability for innovation” and “help drive future economic growth”.
- ▶ In assessing the success of the network in achieving this, it should be noted that impacts associated with innovation and R&D often take many years to materialise as technology takes time to diffuse through the economy.
- ▶ Furthermore, measuring the economic impact of innovation centres is technically challenging, due to the difficulty in estimating the additionality (i.e., how have the activities of the Catapults specifically led to a measurable and attributable impact?) and creating a credible counterfactual (i.e., what would have happened anyway in the absence of the Catapult?). We note that similar organisations internationally encounter similar challenges in estimating economic additionality.
- ▶ Two independent consultancies (SQW and Frontier Economics) have been appointed to analyse the economic impact of the Catapults. Based on our analysis of their reports we believe that their approach, in principle, has been reasonable. Furthermore, we have developed an alternate approach to ascertain the economic impact through case studies. We have found that, for both approaches, given the challenges with data quality, availability, and the relatively short time that Catapults have been in existence, the analysis is not robust enough to be fully conclusive.
- ▶ However, our case study approach did highlight specific examples which evidence the positive economic impact of a number of Catapults, as well as some examples of qualitative anecdotal evidence on the wider benefits that the Catapults bring to their customers – although we note that this evidence is subject to selection and confirmation bias.
- ▶ Therefore, while there is some evidence that the Catapults have generated additional economic impact, our view is that given the lack of a clearly articulated set of objectives and a framework for measuring impact, together with the performance of the Catapult network since inception, it is more likely than not that, to date, this additional economic impact has not been significant.
- ▶ A comprehensive evaluation framework has now been developed by BEIS and IUK. If implemented correctly, this is expected to improve delivery and help demonstrate value for money.

6 Catapult operating model

- ▶ From our observations, there are certain characteristics we have identified which will increase the likelihood of a Catapult having a strong chance of long-term success:
 - A focused strategy and delivery plan that articulates clearly how the activities of a Catapult addresses a particular market failure/failures and, logically, how those activities are ultimately expected to drive economic benefits to UK plc.
 - Having set out a focused strategy and delivery plan, maintaining alignment, and executing against, the criteria and core objectives of the Catapult.
 - A limited number of KPIs, with economic impact KPIs at the heart of the performance management regime, and full alignment of KPIs with the overall strategy and plans for Catapults.
 - Strong collaboration with academia, industry, Government and other Catapults.
 - Strong internal leadership.
 - Strong external governance with agreed interim milestones in place such that progress towards the longer-term aspirations can be assessed and timely intervention made where concerns are identified.
- ▶ Whilst, in principle, some organisations could be integrated into the Catapult network, the over-arching precondition required prior to further analysis is that the existing Catapult network and governance needs to be addressed first.
- ▶ The Agri-Tech Centres fulfil the criteria and objectives of a Catapult and our initial view is that they could be integrated into the Catapult network, subject to the Catapult network addressing the issues raised by this report and further detailed diligence around organisational integration.
- ▶ We have performed a high-level strategic analysis of other publicly funded organisations that show strategic alignment with Catapults and could potentially also be integrated with a fully functioning, well operated Catapult network, subject to further detailed diligence around organisational integration. These have included, inter alia:
 - Turing Institute
 - National Graphene Institute
 - Graphene Engineering Innovation Centre
 - National Physical Laboratory
 - Advanced Propulsion Centre
 - SPECIFIC IKC

3

Key recommendations

Key recommendations

We have identified 38 recommendations designed to improve Catapult performance and maximise value for money

	Number of recommendations	Timescale (months) ¹			Primary ownership			Area		
		3–6	6–12	12+	Catapult	IUK	BEIS	People	Process	Strategy
1 Strategy and future plans	3	1	2	0	2	1	0	0	2	1
2 Governance	12	4	2	6	0	8	4	4	5	3
3 Performance management	6	2	2	2	4	2	0	1	3	2
4 Funding	8	3	0	5	5	3	0	1	2	5
5 Economic Impact	4	3	0	1	2	2	0	1	2	1
6 Catapult operating model	5	0	0	5	1	3	1	0	2	3
Total	38	13	6	19	14	19	5	7	16	15

¹Timescales are indicative of the recommended time to complete implementation of recommendation from submission of this report.

Key recommendations

Strategy and future plans

1 Strategy and future plans

Area	Recommendation	Primary owner	Timescale (months) ¹	Indicative complexity ²
Process	1. Catapults' strategy and future plans need to be more specific, granular and include measurable targets, metrics and action plans with clear change management documentation.	Catapult	3–6	Medium
	2. Catapults need to establish a structured strategy development process that is underpinned by rigorous and detailed market research, particularly around market failure, economic evaluation and strategic options and cost-benefit analysis supporting Catapults' objectives. This will provide a clearly defined and focused scope of priorities, activities and targeted customers, partners and sectors, thereby maximising value from Catapults and IUK's investment.	Catapult	6–12	Medium
Strategy	<p>3. All Catapults should have the same clearly stated, documented and consistently communicated purpose and objective statement. This is to ensure long-term strategic focus, minimise the impact of short-term policy changes and communicate a consistent proposition to customers. This statement needs to be developed jointly by BEIS, IUK and Catapult Leadership with inputs from customers, partners and industry, and be effectively implemented in Catapults' strategies, delivery plans and communications with stakeholders and supported by appropriate KPIs. Delivering economic impact for UK plc should be at the very heart of this.</p> <p>Based on our analysis, the purpose and objective statement of Catapults should focus on:</p> <ul style="list-style-type: none"> ▶ Providing infrastructure, skills and expertise to act as a platform for innovation pursuits in specific sector or technology domains where there is a market failure ▶ Working alongside the R&D capability in the UK to develop innovative solutions addressing key sector or technology domain challenges ▶ Working with industry to commercialise innovation in a way that drives long-term benefit to the UK economy <p>The above objectives should help Catapults avoid activities and projects that do not deliver value to the UK economy and address market failure in their sector.</p>	IUK	6–12	High

¹Timescales are indicative of the recommended time to complete implementation of recommendation from submission of this report.

²Indicative complexity – difficulty of implementation as determined by external stakeholder involvement, impact on organisational structure, crossing boundaries within the organisation, cost to implement, staffing requirements and other resource requirements.

Key recommendations

Governance

2 Governance

Area	Recommendation	Primary owner	Timescale (months) ¹	Indicative complexity ²
People	4. IUK needs to strengthen its financial management capabilities to have a transparent, accurate and reliable view of how funds have been allocated and used (e.g., provide additional training and recruit appropriately skilled resource).	IUK	3–6	Medium
	5. IUK should have a centralised, dedicated Catapult management function. This management function should have a holistic view of the Catapult network performance, as well as enable coordination between Catapults and be responsible mainly for: <ul style="list-style-type: none"> ▶ Regularly analysing relative performance of Catapults ▶ Developing and continuously improving management information reporting, e.g., developing dashboards with drill-down capabilities or automating processes ▶ Analysing individual Catapult activities, identifying areas of overlap and opportunities for aggregation and sharing of resources ▶ Creating 'one version of the truth' for performance reports for the Catapult network ▶ Introducing controls and checks across reporting processes to minimise risk of errors 	IUK	6–12	High
	6. IUK should proactively influence and engage in improving the Catapult leadership by: <ul style="list-style-type: none"> ▶ Appointing a Catapult chairperson, who has demonstrable experience in establishing new businesses, to provide greater confidence, particularly in the start-up phase and subsequent performance during the operational phase ▶ Ensuring there is at least one externally recruited NED to support the Chair and CEO prior to substantial funding being released ▶ Ensuring CEOs are not hired on an interim basis, but on a permanent contract in order to have commitment from both sides to ensure the success of the Catapult ▶ Ensuring the composition of the Catapult Board is reflective of the maturity and strategy of the Catapult 	IUK	12+	Medium

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²Indicative complexity – difficulty of implementation as determined by external stakeholder involvement, impact on organisational structure, crossing boundaries within the organisation, cost to implement, staffing requirements and other resource requirements.

Key recommendations

Governance (continued)

2 Governance (continued)

Area	Recommendation	Primary owner	Timescale (months) ¹	Indicative complexity ²
People	7. Programmes of the scale, size and complexity of the Catapult programme require senior BEIS and IUK official support and involvement. We recommend direct ministerial oversight of the Catapults and active ministerial involvement in the governance process.	BEIS	3–6	Medium
Process	8. The Catapults should receive greater input and support from IUK to assist them during the start-up process, i.e.,: <ul style="list-style-type: none"> ▶ All Catapults should be issued with outline start-up business plans clarifying the purpose of Catapults and the subsequent delivery plans should be aligned with these. ▶ Options should be assessed as to whether incubating a new Catapult within a UK public body (such as a university) prior to private sector launch would maximise chances of success whilst managing VFM. ▶ Creation of five-year delivery plans should be done within defined timescales, and any prolonging of delivery plan development should prompt an IUK review of whether the Catapult scope is still necessary or intervention is required. ▶ A remediation or contingency plan process should be in place should a Catapult fail to meet its funding milestones or other agreed interim milestones. ▶ The delivery team appointed in the start-up phase should be clear that core funding will be subject to acceptance of a credible delivery plan, and therefore, market-related activities and longer-term financial commitments should be managed accordingly. ▶ Clear milestones should be set by IUK for the first six months of the Catapult in terms of the progress of delivering an acceptable five-year plan vs. a funding schedule under the interim GFA. 	IUK	12+	Medium

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Key recommendations

Governance (continued)

2 Governance (continued)

Area	Recommendation	Primary owner	Timescale (months) ¹	Indicative complexity ²
Process	9. IUK should develop a consistent and documented process to gather, store and analyse financial, operational, and economic data from the Catapults, using standardised templates and definitions.	IUK	6–12	Low
	10. IUK should develop a structured, transparent remediation process for instances where Catapults do not meet their KPIs, and develop contingency plans to halt funding for underperforming Catapults.	IUK	3–6	Medium
	11. Processes and rules should be put in place to minimise the impact of changes in governmental and departmental short-term objectives and policies, particularly in the start-up phase, e.g.,: <ul style="list-style-type: none"> ▶ Developing, documenting and communicating a clear purpose statement for the Catapult network ▶ Developing transparent, evidence-based, quantifiable and well-documented screening criteria for Catapult selection ▶ Introducing a structured and documented change control process (e.g., when KPIs are being amended) 	BEIS	12+	High
	12. IUK should ensure Catapults establish a structured strategy development process that is underpinned by rigorous and detailed market research, particularly around market failure, economic evaluation, strategic options and cost-benefit analysis supporting the Catapults' objectives.	IUK	12+	Low
Strategy	13. IUK should launch any future Catapults with a clearly and narrowly defined area of focus (based on rigorous, detailed market and financial analysis), identifying innovation 'gaps' and value to the UK economy from addressing the market failure, and having a clear sense how a Catapult can bridge these gaps.	IUK	12+	Medium
	14. Key strategic decisions regarding the Catapults should consider the ongoing changes to the innovation policy landscape, specifically the creation of UKRI.	BEIS	3–6	Low
	15. Given the creation of UKRI, there is an opportunity to review, restructure and rationalise (and continue to do so on an ongoing basis) the whole innovation portfolio to ensure alignment, minimise duplication of effort and costs, and ensure effective allocation of funds to maximise economic returns and innovation outcomes to the UK.	BEIS	12+	High

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Key recommendations

Performance management

3 Performance management

Area	Recommendation	Primary owner	Timescale (months) ¹	Indicative complexity ²	
People	16. Catapults should embed KPI-based performance management at the heart of the organisation: <ul style="list-style-type: none"> ▶ Clearly and transparently communicating strategy and related KPIs, with a clear focus on output KPIs, in particular, economic impact for UK plc, and obtaining employee 'buy in' ▶ Aligning personnel objectives and scorecards with Catapult objectives ▶ Assigning clear accountability for KPIs ▶ Holding timely and effective review and appraisal meetings ▶ Creating appropriate incentives and rewards 	Catapult	12+	High	
	Process	17. Catapult leadership need to monitor performance on a regular (weekly) basis and take timely actions to bring the business performance on track as soon as there is a deviation from planned targets.	Catapult	3–6	Low
		18. Catapults should continuously analyse data, e.g., identifying leading indicators, modelling (e.g., analysing whether the number of SME engagements transforms to funding outputs) and relationship between KPIs and outcomes, to better determine how business performance can be improved, measured and more accurately forecast.	Catapult	3–6	Medium
		19. Specific deadlines should be agreed with each Catapult in relation to the five-year plan. Failure to meet these deadlines should be formally escalated to the IUK Board and BEIS.	IUK	6–12	Low

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Key recommendations

Performance management (continued)

3 Performance management (continued)

Area	Recommendation	Primary owner	Timescale (months) ¹	Indicative complexity ²
Strategy	<p>20. Catapults should reduce, simplify and prioritise their KPIs. KPIs should be aligned with Catapults' core objective and purpose and, wherever possible, be output based:</p> <ul style="list-style-type: none"> ▶ Providing infrastructure, skills and expertise to act as a platform for innovation pursuits in specific sector or technology domains where there is a clear and accepted market failure ▶ Working alongside the R&D capability in the UK to develop innovative solutions addressing key sector or technology domain challenges ▶ Working with industry to commercialise innovation in a way that drives long-term benefit to the UK economy <p>Given the above, we would expect the following to be reflected as appropriate KPIs for each of the Catapults as a means to managing their businesses to meet objectives:</p> <ul style="list-style-type: none"> ▶ Economic impact indicators aligned to the logic model (e.g., GVA impact, employment impact) ▶ Innovation outcome indicators (e.g., the investment rounds for SMEs that the Catapult has collaborated with, businesses created or spinouts) ▶ CR&D revenue from the Catapults' sector or technology domains ▶ Commercial revenue from the Catapults' sector or technology domains <p>Catapults should be given the discretion to include additional performance metrics to help them meet their objectives. The main purpose of the KPIs should not be reporting to IUK or BEIS for governance purposes. IUK or BEIS governance mechanisms should be focused on whether the Catapults achieve their objectives, for example through quarterly or annual performance reviews, rather than on KPIs.</p>	Catapult	6–12	Medium
	<p>21. Conduct a feasibility assessment to determine whether there are opportunities to drive synergies between Catapults or combine certain Catapults, e.g., systems based Catapults, which could help make them more effective through sharing of best practice, resources, IP and market-facing branding.</p>	IUK	12+	Medium

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Key recommendations

Funding

4 Funding

Area	Recommendation	Primary owner	Timescale (months) ¹	Indicative complexity ²
People	22. Catapults should improve their business development capabilities, e.g., provide additional training, recruit appropriately skilled resource to improve access to commercial funding and CR&D.	Catapult	3–6	Medium
Process	23. Business development processes for accessing commercial and CR&D funding should be strengthened through proactive data collection and analysis (e.g., win/loss reviews) and regular feedback and guidance from the Catapult Board.	Catapult	3–6	Medium
	24. Catapults should continue to strive for the 1/3, 1/3, 1/3 funding target, as in principle it strikes a good balance between the core purpose of a Catapult and the different stakeholder groups. However, these targets should be phased in over time in line with the maturity of the Catapult, with some flexibility in early years immediately post start-up, and relatively less flexibility in later years when a Catapult is more established.	Catapult	12+	High
Strategy	25. Catapult targets should be set to aim to achieve the 1/3, 1/3, 1/3 target within five years from inception, however the split of funding should be determined on a case-by-case basis supported by evidence relating to: <ul style="list-style-type: none"> ▶ The maturity of the Catapult: in its formative years, Catapult effort is likely to be expended on activities such as building organisational capability, brand relationships, etc., therefore the target split of funding should be phased. ▶ Sector or technology trends: some sectors and technologies are likely to experience impacts from the wider economy which may pose opportunities and challenges around the availability of funds – in particular commercial funding. The changes in market conditions should be reflected in planning. ▶ Total available CR&D funds: total CR&D availability (through IUK and globally) is likely to fluctuate annually and should be considered as part of establishing viable CR&D targets for Catapults. 	IUK	12+	Low
	26. IUK should provide Catapults with longer-term funding guarantees (where there are justified activities to conduct core duties), subject to performance, to give the Catapults more certainty and allow them to make longer-term commitments and investments.	IUK	12+	High
	27. Catapults should develop strategies to win CR&D funding beyond IUK, particularly as availability of this funding from IUK is expected to decrease in the near term.	Catapult	3–6	Medium

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Key recommendations

Funding (continued)

4 Funding (continued)

Area	Recommendation	Primary owner	Timescale (months) ¹	Indicative complexity ²
Strategy	<p>28. IUK needs to be clear on the availability of CR&D funds so Catapults can plan their activities accordingly and remain broadly aligned to a 1/3, 1/3, 1/3 funding model. Assuming overall core funding continues at the FY17 level of c.£150mn per annum for the foreseeable future, IUK should have provision to ensure that Catapults can plausibly access c.£150mn per annum of CR&D funding, and that each individual Catapult can potentially access CR&D funding to meet its 1/3, 1/3, 1/3 target.</p> <p>If IUK is backfilling CR&D shortfalls through diverting core funding, any reductions in core funding should not result in a situation where Catapults are unable to carry out their core tasks and meet their core objectives.</p>	IUK	12+	High
Strategy	<p>29. Catapults should calculate their requirements for core funding based on their detailed delivery plans – i.e., a ‘bottom-up’ approach to understanding how much core funding is necessary for delivering what is in their plans. This would allow the Catapults to be more reactive towards reductions in core funding – e.g., the potential to reduce core activities to better align to a 1/3, 1/3, 1/3 model where CR&D is reduced, through, e.g., the reduction of spend on non-essential activities.</p>	Catapult	12+	High

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Key recommendations

Economic impact

5 Economic impact

Area	Recommendation	Primary owner	Timescale (months) ¹	Indicative complexity ²
People	<p>30. Catapults should strengthen their economic analysis and evaluation capabilities through recruiting a dedicated resource with strong economic skills to:</p> <ul style="list-style-type: none"> ▶ Support the implementation of the BEIS economic evaluation framework and logic model ▶ Help shape and inform Catapult strategy and delivery plans with sound economic thinking ▶ Support identification and quantification of market failures and advise on areas where Catapults should focus their activities to maximise value to the UK economy ▶ Analyse initiatives and projects and advise whether they are likely to deliver economic value for UK plc ▶ Analyse input and output performance metrics and advise where Catapult efforts need to focus to drive economic value for UK plc ▶ Champion and embed economic value and analysis at the very heart of decision making for all Catapults 	Catapult	3–6	Medium
Process	<p>31. Catapults should apply the BEIS/IUK evaluation framework and logic model approach through a systematic and robust process to capture, measure, analyse and report economic impact. This will require:</p> <ul style="list-style-type: none"> ▶ The collection of high quality primary data to assess the impact of the Catapult's activities and the evolution of the Catapult sectors ▶ Leveraging secondary data to assess changes in outcomes on a comparable basis ▶ Making a robust assessment of the baseline and the development of a well-argued counterfactual 	Catapult	3–6	Medium
	<p>32. IUK should monitor and sponsor the implementation of the BEIS/IUK economic evaluation framework based on an agreed, detailed, milestone-based plan to ensure effective Catapult adoption. IUK needs to engage BEIS economists to review the implementation of the framework at each Catapult to ensure it is sufficiently robust. The data requirements and gathering approach should also be agreed with BEIS economists and be a pragmatic approach that does not overburden the Catapults.</p>	IUK	3–6	Low
Strategy	<p>33. Once a robust economic evaluation process is in place, there should be a decision point agreed whereby if the economic returns do not justify the core funding, then a Catapult is reviewed. Given that the current logic models are just being implemented, we would expect a more robust economic evaluation being possible in circa one year's time.</p>	IUK	12+	Medium

Key recommendations

Catapult operating model

6 Catapult operating model

Area	Recommendation	Primary owner	Timescale (months) ¹	Indicative complexity ²
Process	34. The Catapults should develop a process and approach to move towards the operating model changes recommended in this report.	Catapult	12+	High
	35. IUK should monitor the progress of Catapults based on an agreed, detailed, milestone-based plan as they implement the recommended changes to their operating model but use the recommended operating model in all new Catapults from inception.	IUK	12+	Medium
Strategy	36. Other publicly funded organisations should not be integrated into the Catapult network until BEIS is satisfied that significant progress has been made implementing the recommendations provided in this report.	BEIS	12+	Low
	37. While the Agri-Tech Centres strategically align to Catapults, an integration should not be considered until the Catapult Network has implemented the recommendations provided in this report, at which time a more detailed assessment and further diligence is required to determine benefits associated with any potential integration.	IUK	12+	Medium
	38. Once the Catapult Network has implemented the recommendations provided in this report and Catapults are operating effectively and clearly delivering economic benefits for UK plc, we recommend that the potential for integrating other publicly funded organisations that strategically align to Catapults be assessed on a detailed case-by-case basis. At this stage, more detailed diligence should be performed to determine the benefits and ideal integration structure.	IUK	12+	Medium

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