



HOUSE OF LORDS

Science and Technology Select Committee

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2nd Report of Session 2019–21

# **Catapults: bridging the gap between research and industry**

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See Appendix 1.

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### *Committee staff*

The staff who worked on this inquiry were Dr Simon Cran-McGreehin (Clerk), Dr Amy Creese (Policy Analyst) and Cerise Burnett-Stuart (Committee Assistant).

### *Contact details*

All correspondence should be addressed to the Science and Technology Committee, Committee Office, House of Lords, London SW1A 0PW. Telephone 020 7219 5750. Email: [hlscience@parliament.uk](mailto:hlscience@parliament.uk)

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## CONTENTS

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	<i>Page</i>
<b>Summary</b>	<b>2</b>
<b>Chapter 1: Introduction</b>	<b>3</b>
Background	3
Our inquiry	4
Structure of this report	4
<b>Chapter 2: Overview of the Catapults</b>	<b>5</b>
Inception	5
Reviews	6
<b>Chapter 3: Barriers affecting Catapults' ability to deliver on their objectives</b>	<b>8</b>
Funding	8
Performance indicators and incentives	11
<b>Chapter 4: Wider issues affecting private investment</b>	<b>13</b>
Innovation system	13
Regional development	15
International competition	17
Government's innovation strategy	18
<b>Summary of conclusions and recommendations</b>	<b>20</b>
<b>Appendix 1: List of members and declarations of interests</b>	<b>23</b>
<b>Appendix 2: List of witnesses</b>	<b>25</b>

Evidence is published online at <https://committees.parliament.uk/work/804/the-contribution-of-innovation-catapults-to-delivering-the-rd-roadmap/> and available for inspection at the Parliamentary Archives (020 7219 3074).

Q in footnotes refers to a question in oral evidence.

## SUMMARY

The UK Government has strong ambitions for research and development, as set out in its 'R&D Roadmap'. This includes reaffirmation of a target that the UK should spend 2.4% of GDP on R&D by 2027. The Government has committed to increasing public sector R&D spending to £22 billion (about 0.8% of GDP) per year by 2024/25, but achieving the 2.4% target will require substantially greater private sector investment.

The Catapult Network is an integral part of the UK's innovation system, and the R&D roadmap envisages a key role for the Catapults in attracting increased private sector R&D investment. The Government also sees a role for the Catapults in the levelling up agenda. However, the Catapults face several barriers to achieving their objectives, which limit their potential contribution to delivering the ambitious R&D Roadmap.

The UK's research and innovation system has the necessary components to be successful, but it lacks the scale to deliver a large increase in commercial exploitation. The Government and Innovate UK need to consider how public sector resources and private investment can be made to match the ambitions of the R&D Roadmap.

Strategic decisions are needed to help the different parts of the innovation system—including Catapults—to interact more effectively. This includes strengthening links between universities and industry; ensuring key performance indicators more effectively incentivise Catapults and relevant academic disciplines; and providing long-term certainty for the Catapults.

Specific rules governing innovation funding should be reformed, to allow greater flexibility for Catapults and their partners. These rules currently act as barriers to collaboration between Catapults and universities, and often place too much risk on industry in transformative R&D projects.

To underpin all of these changes, the Government needs to develop a detailed strategic plan for delivering its R&D ambitions, which it should promote confidently in the UK and internationally. This plan should include clear criteria for how the Government will select technologies and sectors to receive further support.

The Government should make the best possible use of the Catapult Network, promoting it actively as the UK's national innovation asset to develop technologies in which the UK excels and to support sectors that can bring substantial economic benefits.

# Catapults: bridging the gap between research and industry

## CHAPTER 1: INTRODUCTION

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### Background

1. The UK's innovation 'Catapults' are independent, not-for profit technology and innovation centres. They are intended to foster collaboration between research organisations in the public and private sectors, in order to assist in turning innovative ideas into commercial products.<sup>1</sup> The first Catapults were established in 2011 by the Technology Strategy Board.<sup>2</sup> There are nine Catapults operating in various sectors.<sup>3</sup> They form the 'Catapult Network' and are overseen by Innovate UK.<sup>4</sup>
2. In its 2017 Industrial Strategy, the Government set a target that the UK should spend 2.4% of GDP on research and development (R&D) by 2027,<sup>5</sup> up from 1.7% in 2017. This current level is lower than the average for EU countries and the average for OECD countries, whereas the target is similar to some key comparators.<sup>6</sup> In the 2020 Budget, the Government committed to increasing public sector R&D spending to £22 billion (about 0.8% of GDP) per year by 2024/25.<sup>7</sup> Achieving the overall target will require significant private sector investment, some of which is expected to arise through the Catapults' activities.
3. In July 2020, the Government published its 'R&D Roadmap', which reiterated the spending target and sought to "Build on our innovation infrastructure, e.g. enhancing our Catapult and Accelerator Network". It stated the Government aimed to "enhance collaborations between business and R&D infrastructure" and "do more to facilitate access to these facilities

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- 1 For more information, see: The Catapult Network, 'Accelerating Business Growth, Stimulating Markets': <https://catapult.org.uk/about-us/why-the-catapult-network/> [accessed 22 January 2021].
  - 2 In August 2014, the Technology Strategy Board was renamed Innovate UK.
  - 3 The Catapults are named after the following nine sectors: Cell and Gene Therapy; Compound Semiconductor Applications; Connected Places; Digital; Energy Systems; High Value Manufacturing; Medicines Discovery; Offshore Renewable Energy; and Satellite Applications.
  - 4 Innovate UK is part of UK Research and Innovation, a non-departmental public body. Innovate UK works with companies and investors to de-risk, enable and support innovation and commercialisation. Innovate UK, 'About us': <https://www.gov.uk/government/organisations/innovate-uk/about> [accessed 21 January 2021]
  - 5 HM Government, 'Record boost to R&D and new transport fund to help build economy fit for the future', (20 November 2017): <https://www.gov.uk/government/news/record-boost-to-rd-and-new-transport-fund-to-help-build-economy-fit-for-the-future> [accessed 22 January 2021]. The current Government recommitted to this target: Conservative manifesto 2019, Conservative Party, 'Investing and Research and Development': <https://www.conservatives.com/our-commitments/investing-in-research-and-development> [accessed 22 January 2021]
  - 6 Royal Society, *Investing in R&D*, (2020): <https://royalsociety.org/-/media/policy/projects/investing-in-uk-r-and-d/2020/Investing-in-UK-RD.pdf> [accessed 27 January 2021] Figure 2 in this document gives examples of R&D investment levels in 2017 including: OECD average 2.37%, EU average 1.98%, USA 2.83%, Germany 3.13%, and South Korea 4.53%.
  - 7 HM Treasury, *Budget 2020*, HC 121 (Session 2019–21), section 1.61 Investing in innovation (12 March 2020): <https://www.gov.uk/government/publications/budget-2020-documents/budget-2020> [accessed 22 January 2021]

and capability, stimulating long-term private investment in our national assets and supporting new innovation tie-ups.”<sup>8</sup>

4. The Government envisages the Catapults supporting its ‘levelling-up agenda’ for regional development. The Department for Business, Energy and Industrial Strategy has been undertaking a review to “examine how the UK’s Catapult centres can strengthen research and development capacity in local areas, improving productivity and contributing to greater prosperity across the UK”. This review is due to report in early 2021.<sup>9</sup>

### Our inquiry

5. In November 2020 we launched a short inquiry to examine the contribution of the Catapults to delivering the UK’s R&D Roadmap, including their role in stimulating long-term private investment and supporting new innovation tie-ups.<sup>10</sup> This inquiry was not a review of the Catapults themselves.
6. We received written evidence from the Catapults and heard oral evidence in December 2020 and January 2021. We are grateful to those who gave evidence, and to the Catapult Network Development Office for its assistance.

### Structure of this report

7. Chapter 2 provides an overview of the Catapults, including examples of their achievements and key findings from past reviews into their performance. Chapter 3 considers barriers directly affecting the Catapults’ ability to deliver on their objectives. Chapter 4 discusses wider issues that affect private sector investment in research and development, and that indirectly affect the Catapults’ ability to deliver on their objectives.

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8 HM Government, *UK Research and Development Roadmap* (July 2020), p 25, 47–48: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/896799/UK\\_Research\\_and\\_Development\\_Roadmap.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/896799/UK_Research_and_Development_Roadmap.pdf) [accessed 22 January 2021]

9 Further supplementary written evidence from the Department for Business, Energy and Industrial Strategy ([CAT0012](#))

10 The scope of this inquiry is set out on our website: House of Lords Science and Technology Committee, ‘Committee launches inquiry into role of Catapults in delivering R&D Roadmap’: <https://committees.parliament.uk/work/804/the-contribution-of-innovation-catapults-to-delivering-the-rd-roadmap/news/136283/committee-launches-inquiry-into-role-of-catapults-in-delivering-rd-roadmap/> [accessed 21 January 2021].

## CHAPTER 2: OVERVIEW OF THE CATAPULTS

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### Inception

8. The Catapults were proposed in a 2010 review entitled *The Current and Future Role of Technology and Innovation Centres in the UK* by Dr Hermann Hauser, which was commissioned by the then Secretary of State for Business, Innovation and Skills (Lord Mandelson).<sup>11</sup> In the foreword to the review, Dr Hauser wrote that the UK “falls short on translating scientific leads into leading positions in new industries”, and this was “in part down to a critical gap between research findings and their subsequent development into commercial propositions that can attract venture capital investment or be licensed.” He noted that “Other countries benefit greatly from a translational infrastructure that bridges this gap”. The report cited various countries’ Technology and Innovation Centres that provided “support for, and exploitation of, a national or regional strength in one industry or technological field”. Of particular note were Germany’s ‘Fraunhofer Institutes’, which the review said have been “highly successful” with a “wider spread of investments in many technology or sectoral fields”.<sup>12</sup>
9. Dr Hauser’s 2010 review proposed that the UK develops an “equivalent capability” focused on “sustained and substantive support for an elite group of Technology and Innovation Centres ... that aim to exploit the most promising new technologies, where there is genuine UK potential to gain competitive advantage.”<sup>13</sup> In response to Dr Hauser’s recommendation, the then Government directed the Technology Strategy Board to establish the Catapults Network. The role of the Catapults was to: enhance business access to leading-edge technology and expertise; undertake collaborative applied research projects with business; undertake contract research for businesses; create a critical mass of activity between business and research institutions; and provide skills development at all levels.<sup>14</sup>
10. Funding was provided in autumn 2010 to establish the Catapults, and from 2011 to 2013 the first seven Catapults were established: High Value Manufacturing; Cell and Gene Therapy; Digital; Offshore Renewable Energy; Satellite Applications; Transport Systems; and Future Cities.<sup>15</sup> In 2015 and 2016, three more Catapults were added: Energy Systems; Medicines Discovery; and Compound Semiconductors.<sup>16</sup> In 2019, the Connected Places Catapult replaced the Transport Systems and Future Cities Catapults.<sup>17</sup>

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11 Dr Herman Hauser, *The Current and Future Role of Technology and Innovation Centres in the UK* (March 2010), p 1: <https://catapult.org.uk/wp-content/uploads/2020/12/Hauser-Report-of-Technology-and-Innovation-Centres-in-the-UK-2010.pdf> [accessed 18 January 2021]

12 *Ibid.*, p 9

13 *Ibid.*, p 1

14 Dr Herman Hauser, *Review of the Catapult network: Recommendations on the future shape, scope and ambition of the programme* (November 2014): <https://catapult.org.uk/wp-content/uploads/2020/12/Hauser-Review-of-the-Catapult-network-2014.pdf> [accessed 22 January 2021]

15 Technology Strategy Board, *Catapult update: Shaping the network of centres* (March 2012): <https://catapult.org.uk/wp-content/uploads/2020/12/Catapult-update-Shaping-the-network-of-centres-2012.pdf> [accessed 22 January 2021]

16 Also, in 2015 the ‘Precision Medicine Catapult’ was also announced, but it ceased to operate and some of its functions were transferred to the Medicines Discovery Catapult. See Innovate UK, ‘Additional responsibilities for Medicines Discovery Catapult’, (26 June 2017): <https://www.gov.uk/government/news/additional-responsibilities-for-medicines-discovery-catapult> [accessed 22 January 2021]

17 Connected Places Catapult, ‘Connected Places Catapult set to accelerate smarter living and travelling’ (1 April 2019): <https://cp.catapult.org.uk/2019/04/01/connected-places-catapult-set-to-accelerate-smarter-living-and-travelling/> [accessed 18 January 2021]

Separately to the Catapults programme, the Fraunhofer Centre for Applied Photonics was established in 2012 at the University of Strathclyde.<sup>18</sup>

11. Dr Ian Campbell, former Chief Executive of Innovate UK, described the three different categories of Catapult: Systems Catapults are “like consultancies and collate companies together to change procurement or regulation, as well as to drive innovation.” Asset-intensive Catapults “allow small, medium and large businesses to access assets that they otherwise would not be able to get hold of, in order to develop their products and services further.” Those in between have “a combination of assets, resources and capabilities to help drive innovative technologies into the market.”<sup>19</sup>

### Reviews

12. We were told that the Government has committed to reviewing the Catapults every five years, corresponding with their funding cycles.<sup>20</sup> Since the Catapults’ inception, there have been a number of other reviews, each making recommendations.
13. In 2014, the Department for Business Innovation and Skills commissioned Dr Hauser to review the then seven Catapults. In his report he noted “impressive outcomes” and was “very encouraged to see how rapidly we are closing the gap” with other countries’ innovation systems.<sup>21</sup> His recommendations for the future of the Network included: committing to investing in the existing Catapults over the long term; growing the Network of Catapults, at no more than 1–2 centres per year, with a view to having 30 Catapults by 2030; developing more effective strategies for engaging small and medium-sized enterprises (SMEs); and developing a stronger engagement model for working with universities.
14. In 2015, the Department for Business, Innovation and Skills commissioned a review by Dame Ann Dowling into business–university research collaborations, which discussed the Catapults.<sup>22</sup> It concluded that “Gradual growth in the number of Catapults would be beneficial”, but recommended that “any growth in Catapult numbers should only occur if additional funding is available and should not be at the expense of the support assigned to existing Catapults.” The review also recommended that “metrics used to evaluate Catapults’ performance should include indicators that capture the success of their engagement with universities”.

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18 The Fraunhofer Centre for Applied Photonics (CAP) is a “centre in the field of applied laser research and development”, which aims to perform “industry driven research to enable new or improved products and processes for industrial partners.” It was established in 2012 by Fraunhofer UK Research Ltd, a not-for-profit company and legally independent affiliate of the German Fraunhofer Gesellschaft. For more information, see Fraunhofer UK, ‘Fraunhofer CAP’: <https://www.cap.fraunhofer.co.uk/> [accessed 22 January 2021]. See also Fraunhofer UK, ‘Fraunhofer UK A brief Introduction’, <https://www.fraunhofer.co.uk/> [accessed 22 January 2021].

19 [Q 1](#) (Dr Ian Campbell)

20 [Q 15](#) (Alexandra Jones)

21 Dr Herman Hauser, *Review of the Catapult network: Recommendations on the future shape, scope and ambition of the programme* (November 2014), p 3: <https://catapult.org.uk/wp-content/uploads/2020/12/Hauser-Review-of-the-Catapult-network-2014.pdf> [accessed 22 January 2021]

22 Dame Ann Dowling, *The Dowling Review of Business–University Research Collaborations* (July 2015), p 5: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/440927/bis\\_15\\_352\\_The\\_dowling\\_review\\_of\\_business-university\\_research\\_collaborations\\_2.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/440927/bis_15_352_The_dowling_review_of_business-university_research_collaborations_2.pdf) [accessed 18 January 2021]

15. In 2017, the Department for Business, Energy and Industrial Strategy<sup>23</sup> commissioned Ernst & Young to review the Catapult Network to “assess the value it delivers for the UK”.<sup>24</sup> The review 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”, but “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”. It highlighted evidence that some Catapults—such as the High Value Manufacturing and Cell and Gene Therapy Catapults—have had a positive economic impact, but “it is unlikely that the impact of the network overall has been significant so far.” One problem identified by the report was that the Catapults’ key performance indicators (KPIs) “had limited effectiveness in guiding Catapults to achieve their business objectives and deliver maximum economic benefit for UK plc” and had “insufficient emphasis on outputs and outcomes”. In response, Innovate UK introduced a new set of KPIs for the Catapults, which are currently in use.
16. During 2020 and early 2021, the Department for Business, Energy and Industrial Strategy has been conducting a further review of the Catapults. This review—due to report in early 2021—has been exploring: “Catapults’ role in levelling up and scale up of businesses; opportunities to grow the network; benefits of working as a network; and data collection to support evaluation of the network”.<sup>25</sup>
17. Whilst our inquiry was not a review of the Catapults, we bore in mind the key recommendations from these reviews that were pertinent to the Catapults’ contribution to delivering the UK’s R&D Roadmap. A key theme in our inquiry was whether the UK’s innovation system is of sufficiently large scale to deliver the ambitions of the R&D Roadmap, for which two themes in particular from previous reviews were relevant. Firstly, there is the matter of sustained Government support for existing Catapults. Secondly, there is the matter of expanding the Network to include other sectors and technologies, and the criteria used to make those decisions.

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23 The Department for Business, Energy and Industrial Strategy (BEIS) was created in 2016, largely taking on the remits of the former Department for Business, Innovation and Skills (BIS) and the former Department of Energy and Climate Change (DECC).

24 EY, *Catapult Network Review* (17 November 2017): [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/662509/Catapult\\_Review\\_-\\_Publishable\\_Version\\_of\\_EY\\_Report\\_1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/662509/Catapult_Review_-_Publishable_Version_of_EY_Report_1.pdf) [accessed 22 January 2021] The EY review considered the original seven Catapults, but not the three that were established in 2015 and 2016.

25 Further supplementary written evidence from the Department for Business, Energy and Industrial Strategy ([CAT0012](#))

## CHAPTER 3: BARRIERS AFFECTING CATAPULTS' ABILITY TO DELIVER ON THEIR OBJECTIVES

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18. The Catapults operate amongst a range of public and private sector organisations and their ability to deliver on their objectives is determined in part by the decisions of these other organisations. Innovate UK establishes and oversees the Catapults, and decides on their funding and governance framework. Innovate UK is part of UK Research and Innovation (UKRI), which in turn is answerable to the Department for Business, Energy and Industrial Strategy, which sets policy for research and development in the UK. The Catapults are also affected by wider influences in the R&D system, which are discussed in Chapter 4.

### Funding

19. The innovation activities involving Catapults are intended to be funded using a 'thirds model': one third from a core grant from the Government (provided via Innovate UK); one third from industry partners; and one third from collaborative R&D funds bid for by consortia involving Catapults.<sup>26</sup> In 2019–20, total funding for these activities was £744 million: the Catapults received £236 million in core grants; they won £130 million in collaborative R&D funds, which leveraged £224 million from the private sector; and the Catapults attracted a further £154 million of private investment.<sup>27</sup> By comparison, in 2019 Germany's Fraunhofer Institutes had contract research revenues of €2.295 billion (around £2 billion): €746 million of base funding; €825 million from publicly funded projects; and €724 million from industry.<sup>28</sup>
20. There was a general consensus in evidence we received that the thirds model for funding is appropriate in theory, but that it is not necessarily achievable in all cases at present. Stuart Martin, CEO of the Satellite Applications Catapult, said that the thirds model "is a good way of ensuring that we have a strong range of activities close to the universities [and] low levels of technology development, through to what the businesses require".<sup>29</sup> Some of the Catapults have achieved this funding split<sup>30</sup> whereas others—particularly in their early years—are more reliant on their core grant. Philip New, CEO of the Energy Systems Catapult, said that "the principle of the blended approach is key", but "It does not pay to be too dogmatic" in meeting exactly the thirds model of funding. He observed: "How [the thirds funding model] plays out in detail will clearly depend on the context, maturity and business model of an individual Catapult."<sup>31</sup>
21. The collaborative R&D component of funding was raised as a concern by several witnesses. Catapults bid for collaborative R&D funds (from Innovate UK and other sources) as part of consortia involving one or more industry partners and sometimes public sector partners such as universities. There

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26 Q 2 (Dr Ian Campbell)

27 Catapult Network, *Creating the Future through Innovation*, (November 2020): <https://catapult.org.uk/wp-content/uploads/2020/12/Catapult-Network-Impact-Brochure-2020-FINAL.pdf> [accessed 27 January 2021]

28 Fraunhofer, 'Contract research: Revenue and budgeted expenditure 2015–2019': <https://www.fraunhofer.de/en/about-fraunhofer/profile-structure/facts-and-figures/finances/contract-research-revenue.html> [accessed 27 January 2021]

29 Q 36 (Stuart Martin)

30 For example, the High Value Manufacturing and the Medicine Discovery Catapults. Q 29 (Dick Elsy) and Q 41 (Professor Chris Molloy)

31 Q 36 (Philip New)

may be competition for these funds from businesses, universities and other research bodies. Dr Campbell commented on the limited availability of collaborative R&D funds: “Innovate UK only funds 15% of business-led applications it receives. If we got to 30% and had Catapults working alongside these companies, we could get to 2.4% [of GDP].”<sup>32</sup>

22. Innovate UK caps the amount of collaborative R&D funds that can be allocated to public sector partners in a consortium.<sup>33</sup> This cap is usually 30% of total eligible project costs, but Innovate UK explained to us that it has “increased the cap in a small number of competitions where there was evidence that earlier stage research would be beneficial, or where more intensive collaboration between business and academia was an explicit goal.”<sup>34</sup>
23. This capped funding must be shared between any public sector bodies in a consortium. This can limit a Catapult’s ability to engage in some projects, and more so when another Catapult, a Research and Technology Organisation<sup>35</sup> or a university would like to be involved. Dick Elsy, CEO of the High Value Manufacturing Catapult, told us that “We have had to turn a number of projects down because they are not commercially viable for us”.<sup>36</sup> The Compound Semiconductor Applications Catapult told us that the cap had prevented it from joining a funding application with a university and a company, and that the bid was then rejected because it lacked aspects that the Catapult would have provided.<sup>37</sup>
24. Industrial partners receive a proportion of the funds from successful bids for collaborative R&D grants. However, this does not cover the total project costs, and they have to provide some funding themselves (sometimes referred to as match funding or leveraged funding).<sup>38</sup> This model makes it hard for industry to engage in risky projects for ‘transformative’ innovation. The Satellite Applications Catapult told us: “The current trend to seek immediate match-funding to demonstrate leverage is counter-productive. It pushes all R&D towards ‘incremental’” (that is, improving existing products and services). It said Innovate UK’s role should be “encouraging R&D investment that wouldn’t otherwise happen ... focussing more on responsive and transformative R&D”, and “Government should fund more Transformative R&D at higher intensity, so that industrial R&D can focus on exploiting it.”<sup>39</sup>

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32 [Q 10](#) (Dr Ian Campbell)

33 See footnote to [Q 6](#) (Dr Ian Campbell)

34 *Ibid.*

35 Research and Technology Organisations (RTOs) aim to “assist in the support of local industry, often around specific industrial technologies or sectors”. They have developed in various European countries at both national and regional levels. For more information, see: EU Science Hub, ‘Research and Technology Organisations and Smart Specialisation’ (26 July 2019): <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/research-and-technology-organisations-and-smart-specialisation> [accessed 22 January 2021].

36 [Q 32](#) (Dick Elsy)

37 Written evidence from the Compound Semiconductor Applications Catapult ([CAT0003](#))

38 The proportion of a successful collaborative R&D bid that an industrial partner receives depends on factors including the size of the business. See for example, Innovate UK, ‘Innovate UK Smart Grants January 2021’ competition: <https://apply-for-innovation-funding.service.gov.uk/competition/810/overview#eligibility> [accessed 26 January 2021].

39 Written evidence from the Satellite Applications Catapult ([CAT0009](#)). They explained that there are three basic types of innovation. Incremental innovation is the improvement of existing products and service, which established businesses do well. Responsive innovation is exploiting changes in the environment or adopting new technologies, which start-ups focus on and where most public R&D funding is targeted. Transformative innovation is creating the change that enables disruption, which is often about turning technology into infrastructure.

25. We heard about the challenges of translational research—taking academic research and seeking to develop applications. Professor Chris Molloy, CEO of the Medicines Discovery Catapult, told us that the Life Sciences Industrial Strategy had proposed translational funds that “would be available when an asset reached a certain milestone”. He explained that this was more effective than the usual “iterative” approach to grants that can leave projects waiting for “some considerable while” between stages of development. He said that “the funding for translation must be available and delivered on an industrial scale with industrial-class decision-making.”<sup>40</sup>
26. Finally, Catapults are not permitted to apply for Research Councils’ funding—which is accessible to research bodies such as universities. This issue was raised by various Catapults in evidence. Dick Elsy said “We are part of the UKRI family, yet we are prohibited from bidding into research council grant funding. There is a strange asymmetry to the process.”<sup>41</sup>
27. The funding issues discussed above limit the level of investment in innovation. The amount of funding available is an important factor in determining the scale at which innovation can occur—although how the available funding is used is important, and outcomes are the key measure of success for the sector. As noted earlier, a key question for this inquiry was whether the UK’s innovation system is of sufficiently large scale to deliver the ambitions of the R&D Roadmap—including the 2.4% spending target. Professor Juergen Maier, former CEO of Siemens UK and Chairman of the Digital Catapult, told us that the UK does not currently have the scale that large multinational companies need for conducting innovation projects,<sup>42</sup> whereas some other countries have more capacity to support innovation.
28. **The funding available for innovation in the UK does not appear to be commensurate with the Government’s ambitions, as set out in the R&D Roadmap. Rules governing funding for innovation create barriers to collaboration between for Catapults and universities, and can deter industrial partners. First, the cap on collaborative R&D funding for public sector bodies inhibits collaboration between Catapults and universities. Leveraged funding requirements place too much risk on industry in transformative R&D projects. Finally, lack of access to Research Council funding puts Catapults at a disadvantage compared to universities.**
29. *We recommend that the Government, UK Research and Innovation, and Innovate UK set out a clear plan for how public sector resources and private investment can be made to match the scale of ambition in the R&D Roadmap.*
30. *We recommend that UK Research and Innovation allows Catapults to bid for Research Council funds where there are clear advantages in terms of both research and innovation.*
31. *We recommend that Innovate UK shows more flexibility in permitting public sector bodies to have a larger share of collaborative R&D funding, particularly when more than one such organisation is involved.*

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40 [Q 41](#) (Professor Chris Molloy)

41 [Q 32](#) (Dick Elsy)

42 [Q 44](#) (Professor Juergen Maier)

32. ***We recommend that Innovate UK and other funding bodies support transformative innovation more effectively, including by shifting the balance between public funding and industrial match funding, in order to reduce the risks to industry and encourage its participation in risky R&D projects. They should consider arrangements for more translational funding to increase the flow of projects from universities to Catapults and industry.***

### Performance indicators and incentives

33. Public sector organisations in the innovation system have a range of incentives, some of which do not lead to optimal behaviours. For example, we heard about problems with KPIs for public sector bodies. Professor Dame Ottoline Leyser, Chief Executive of UKRI, observed that “the whole notion of a KPI is in some ways problematic because it drives one to think about a unitary quantitative measure, which is quite often not able to capture what we are interested in capturing.”<sup>43</sup>
34. As noted in Chapter 2, the Catapults’ current KPIs were introduced following criticisms in the Ernst & Young review of 2017. We heard that not all these current KPIs are useful measures of the Catapults’ performance. The Connected Places Catapult told us that the Catapults’ current KPIs “incentivise quantity over quality when it comes to industry collaborations”.<sup>44</sup> Nicola Yates, CEO of the Connected Places Catapult, said that the KPIs do not measure longer-term effects such as how much investment SMEs attract after engagement with a Catapult, or wider activities such as assisting in the development of a ‘city deal’.<sup>45</sup>
35. Dr Campbell told us that the current KPIs were “trying to treat all Catapults the same” whereas “We need to get the KPIs correct for the industries and the sectors that they are trying to serve”. He said that Innovate UK would produce—hopefully by the end of April 2021—KPIs that are “dedicated to the needs of the Catapult and the outcomes and outputs that we are expecting from them”.<sup>46</sup>
36. There are some policy areas to which all Catapults are expected to make a contribution, for example the move to a net zero economy. Philip New said that Innovate UK “recognised that the net zero challenge is a significant and all-embracing challenge for the country, so it has incentivised and funded the Catapults to start to collaborate on better outcomes and make a stronger contribution to delivering net zero.”<sup>47</sup>
37. We heard that universities lack incentives to collaborate with Catapults—beyond just the 30% cap on the public sector share of collaborative R&D funds, discussed earlier. University researchers are assessed primarily through the Research Excellence Framework, which ran in 2014 and will run again in 2021.<sup>48</sup> UKRI is currently introducing the Knowledge Exchange

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43 [Q 10](#) (Professor Dame Ottoline Leyser)

44 Written evidence from the Connected Places Catapult ([CAT0002](#))

45 [Q 31](#) (Nicola Yates)

46 [Q 10](#) (Dr Ian Campbell)

47 [Q 35](#) (Philip New)

48 REF2021, ‘About the REF’: <https://www.ref.ac.uk/about> [accessed 19 January 2021]

Framework, which aims to improve the transfer of research findings for uses such as innovation.<sup>49</sup>

38. The Connected Places Catapult told us that the Knowledge Exchange Framework “should provide an additional incentive for Universities and other Higher Education Institutions to direct more of their resources to activities which generate economic impact as well as novel research.”<sup>50</sup> Dick Elsy explained: “Our Catapults have four key performance indicators, which look at the way we interface with universities. There are no reciprocal arrangements on the side of the Research Councils or universities. A set of symmetrical objectives would be quite powerful.”<sup>51</sup>
39. *We recommend that Innovate UK ensures that Catapults’ key performance indicators focus on delivery of effective collaborations and successful innovation and commercialisation, and reflect their contribution towards key policies such as the net zero economy and regional development.*
40. *We recommend that UKRI ensures that universities’ key performance indicators (under the Research Excellence Framework and the Knowledge Exchange Framework) provide stronger incentives for commercialisation of research findings in relevant disciplines.*

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49 UK Research and Innovation, ‘Knowledge exchange framework (KEF)’: <https://re.ukri.org/knowledge-exchange/knowledge-exchange-framework/> [accessed 19 January 2021]

50 Written evidence from the Connected Places Catapult (CAT0002)

51 Q 32 (Dick Elsy). The Dowling Review recommended that “metrics used to evaluate Catapults’ performance should include indicators that capture the success of their engagement with universities”. Dame Ann Dowling, *The Dowling Review of Business-University Research Collaborations* (July 2015), p 5: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/440927/bis\\_15\\_352\\_The\\_dowling\\_review\\_of\\_business-university\\_research\\_collaborations\\_2.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/440927/bis_15_352_The_dowling_review_of_business-university_research_collaborations_2.pdf) [accessed 27 January 2021]

## CHAPTER 4: WIDER ISSUES AFFECTING PRIVATE INVESTMENT

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41. Issues with the wider innovation system can affect the ability of private companies and universities to engage in innovation activities. These issues indirectly limit the Catapults' ability to deliver on their objectives, even if the specific points raised in Chapter 3 were to be addressed.

### Innovation system

42. The innovation system has undergone significant changes in recent years—for example the creation of UKRI to bring together the Research Councils and Innovate UK. As discussed in Chapter 3, some aspects of the new arrangements relating to funding and incentives cause issues that should be addressed. These may reflect an imbalance between competition and collaboration in the frameworks governing the interactions of public sector organisations—Catapults and universities in particular. Felicity Burch, Director of Innovation and Digital at the Confederation of British Industry, said: “There can be positives from competition, but it does not feel in this circumstance that having universities and Catapults bidding against each other is particularly effective.”<sup>52</sup>
43. The High Value Manufacturing Catapult relayed to us the key findings of a study with academics into how to deliver more effective collaboration. The proposals included systemic changes such as standardisation of rules and easier access to funds for joint working, and steps to build understanding and relationships through schemes such as ‘researchers in residence’.<sup>53</sup>
44. Similarly, we heard about the importance of Catapults working on innovation with SMEs and the challenges of raising awareness among SMEs about opportunities offered by Catapults—for example access to manufacturing facilities. Dick Elsy told us that “The Catapult model really works for SMEs, but it requires quite a lot of effort and bandwidth [from the Catapults]”, noting that “Although SMEs are half of our client base, they represent only about 10% of our income.” He said that the High Value Manufacturing Catapult has used “core funding ... to create that bandwidth, resources and capability to get to those SMEs.”<sup>54</sup>
45. It is also important that links are strengthened between academia and industry, to aid the exchange of knowledge and to enable researchers to work more easily at the interface between the two. Professor Leyser said:

“We need to be much more bold in investing in time for people to engage with much wider communities and to build those kinds of long-term relationships and to network. The Catapults provide a key role in that, along with shifting career incentives to promote much more mobile careers, where people move through the system in both directions. ... We need to get that multi-directionality much more hardwired into our system.”<sup>55</sup>

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52 [Q 49](#) (Felicity Burch)

53 Written evidence from the High Value Manufacturing Catapult ([CAT0006](#))

54 [Q 31](#) (Dick Elsy)

55 [Q 9](#) (Professor Dame Ottoline Leyser)

46. Strong links between researchers in academia and industry is seen as one of the strengths of the Fraunhofer Institutes, with senior academics working with industry at the Institutes. Evidence to a previous Parliamentary inquiry said: “Directors of Fraunhofer institutes commonly hold professorships at universities and run academic research groups in parallel to their Fraunhofer roles. The institutes offer PhD projects in the applied sciences. Several Fraunhofer Institutes have departments that are embedded into university departments.”<sup>56</sup> This model of staffing and training is used at the Fraunhofer Centre for Applied Photonics at the University of Strathclyde.<sup>57</sup>
47. Once changes have been made to facilitate better collaboration, we heard it is important that the innovation system—including the Catapults—is given long-term stability. For example, Professor Maier said that “the key thing ... is to recognise the Catapults as a key and strategic part of the UK’s research and innovation ecosystem.” He felt that the Catapults “are still seen as a secondclass citizen compared to the Research Councils.”<sup>58</sup>
48. As noted in Chapter 2, there have been several reviews of the Catapults. A degree of reviewing is necessary: Alexandra Jones, Director of Science, Research and Innovation at the Department for Business, Energy and Industrial Strategy, observed that reviews are “general good practice” and that “Every five years you need to look at how institutions are performing”.<sup>59</sup> There was agreement from most witnesses that there had been too many reviews. Felicity Burch said “The constant review of Catapult centres can make it quite difficult for them to keep going and to have the confidence to innovate and build their own business models.”<sup>60</sup> Professor Leyser wanted to “stop the endless reviewing and try to let the system that we have built deliver in a constructive way.”<sup>61</sup>
49. The Catapults are funded in five-year cycles, at the end of which they face potential funding changes—and could even cease to exist—limiting their ability to plan and gain traction. Felicity Burch described the CBI’s ambition that the Catapults should have the same standing and longevity as universities.<sup>62</sup> Dr Campbell told us that “We need to give [the Catapults] long-term stability”.<sup>63</sup> He said:

“Let us give them longterm funding, make them part of the system, commit to supporting them, galvanise the system around them, provide them with clarity of funding, get away from reviewing and support them to be successful, because if you are looking over your shoulder and

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56 Written evidence submitted by Professor L Gladden, University of Cambridge and Professor D Begg, Imperial College London to the House of Commons Science and Technology Committee, (Session 2010–11), ([TIC 31](#))

57 At the Fraunhofer Centre for Applied Photonics, some members of staff—including the Head of Centre—also hold positions at universities; and the website says that “Consistent with the Fraunhofer model, training of PhD and EngD students is a fundamental part of our mission.” For more information, see Fraunhofer CAP, ‘Organisation, our people’: <https://www.cap.fraunhofer.co.uk/en/AboutFraunhoferCAP/Organisation.html> [accessed 22 January 2021]. See also Fraunhofer CAP, ‘About Fraunhofer CAP’: <https://www.fraunhofer.co.uk/en/AboutFraunhoferCAP.html> [accessed 22 January 2021].

58 [Q 45](#) (Professor Juergen Maier)

59 [Q 15](#) (Alexandra Jones)

60 [Q 50](#) (Felicity Burch)

61 [Q 10](#) (Professor Dame Ottoline Leyser)

62 [Q 50](#) (Felicity Burch)

63 [Q 10](#) (Dr Ian Campbell)

worrying about what you are doing and when it will be reviewed, you will not be focusing on delivering value.”<sup>64</sup>

50. **The UK’s innovation system has the necessary components to be successful, but more strategic decisions are needed from the Government, UK Research and Innovation and Innovate UK—as set out in the recommendations below—in order to optimise the performance of the organisations and maximise innovation and commercialisation.**
51. *We recommend that UK Research and Innovation and Innovate UK address the imbalance between competition and collaboration in their frameworks such that Catapults and universities can work together more easily on innovation projects.*
52. *We recommend that UK Research and Innovation foster closer links between industry and universities and assist researchers to work at the interface between the two, including through supporting roles for academics at the Catapults.*
53. *We recommend that The Department for Business, Energy and Industrial Strategy uses its current review of the Catapults to give the Catapults assurance of long-term continuity—including longer-term certainty over funding and a commitment that reviews will be limited to once every five years, to match the five-year funding cycle.*

### Regional development

54. The potential for private sector investment in innovation is linked in part to policies for regional development, in which the Catapults can play a role. They have centres around the UK that provide local benefits<sup>65</sup>—although they operate more widely, with some projects in locations where they do not have centres. The Catapults were not intended explicitly for regional development but can contribute to the Government’s ‘levelling up’ agenda. Amanda Solloway MP, Minister for Science, Research and Innovation at the Department for Business, Energy and Industrial Strategy explained:

“Catapults are national assets established to have a national remit and capability. They do not have specific objectives to support levelling up. However, their national presence covers over 40 locations across the UK, and there are many examples of Catapults creating local clusters of innovation activity.”<sup>66</sup>

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64 [Q 10](#) (Dr Ian Campbell)

65 The Catapults have offices and facilities located around the UK: some of these locations were determined by geography or pre-existing industrial capacity. For example, centres of the Offshore Renewable Energy Catapult are at the coast, and the initial centres of the High Value Manufacturing Catapult are in industrial areas of the Midlands. Dr Campbell told us that both had been “regional development agency legacy enterprises”—[Q 1](#) (Dr Ian Campbell). Catapults have sought to develop their presence around the UK. See, for example, written evidence from the Satellite Applications Catapult ([CAT0009](#)). The Satellite Applications Catapult told us that it was one of the first Catapults to develop a regional programme, establishing centres of excellence in the South West, South Coast of England, and North East, North West and Scotland. It said that there is a need to increase the scale and impact of their regional presence, which it proposes to do by creating regional clusters.

66 Further supplementary written evidence from Department for Business, Energy and Industrial Strategy ([CAT0013](#))

55. Alexandra Jones told us that the Catapults will be considered “as we produce our R&D place strategy, which we committed to in the Roadmap.”<sup>67</sup>
56. Several Catapults noted that their activity is well suited to supporting the levelling up agenda, because there are opportunities across the country for investment.<sup>68</sup> Professor Leyser told us that the Catapults have a “role to play in the levelling up agenda but not uniformly”, and that it needs to be done in an “intelligent way”. She said that these decisions need to support the “agglomeration agenda”, that is: “working in partnership across local areas to deliver well thought through, nuanced and place-sensitive interventions to grow economies in particular places, taking into account all the things you need to drive that local growth”.<sup>69</sup> Dr Campbell agreed, telling us that levelling up is a “whole ecosystem challenge”, which will also require investment in skills and infrastructure, and building links with business and academia.<sup>70</sup>
57. Catapults face a barrier to involvement in UKRI’s ‘Strength in Places Fund’<sup>71</sup>—a flagship part of the levelling up agenda. In their response to the ongoing BEIS review into the Catapults, the Catapult Network explained: “As the funding is geographically ring-fenced, it prevents Catapults from investing in regions where they do not presently work”. This has the effect of “restricting [the] national reach” of the Catapults,<sup>72</sup> preventing them from participating where they could potentially add value.
58. Roger Marsh, Chair of Northern Powerhouse 11 and Chair of Leeds City Region Enterprise Partnership, said that the Catapults are one of several types of organisation that can contribute to regional development. He highlighted the need for “improving the decision-making and local influence” in order to “align the priorities with those areas”.<sup>73</sup> Felicity Burch highlighted the CBI’s proposal for ‘Catapult Quarters’.<sup>74</sup> These were described in the CBI’s report *Don’t Wait, Innovate* as being “located around anchor institutions like Catapults and Research Technology Organisations”. The report said that:
- “[Catapult Quarters] would build on local strengths to incentivise co-location and collaborative activity within designated geographic areas through a targeted benefits and support package, and in some cases regulatory flexibility. This place focussed intervention would serve to accelerate innovation activity around clusters of industrial strength”.<sup>75</sup>

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67 **Q 20** (Alexandra Jones). For information about the R&D Place Strategy and the R&D Place Advisory Group see: HM Government, ‘R&D Place Advisory Group’: <https://www.gov.uk/government/groups/rd-place-advisory-group> [accessed 19 January 2021].

68 For example, the Energy Systems Catapult told us in written evidence (**CAT0005**) that “Every part of the country will require investment so the shift to the Net Zero economy should be a key driver of the levelling-up agenda.” The Offshore Renewable Energy Catapult told us in written evidence (**CAT0008**) that it has “rolled out [its] regional growth strategy, seeing new offices in key coastal locations where often high value science and engineering based jobs are in short supply.”

69 **Q 7** (Professor Dame Ottoline Leyser)

70 **Q 7** (Dr Ian Campbell)

71 The Strength in Places Fund (SIPF) is run by UKRI. The fund invests in research and innovation projects that aim to drive economic growth in specific areas of the UK, building on existing research excellence and supply chains. UK Research and Innovation, ‘Strength in Places Fund’: <https://www.ukri.org/our-work/our-main-funds/strength-in-places-fund/> [accessed 21 January 2021]

72 Catapult Network, ‘Response to BEIS Review’ (19 February 2020): available upon request from the Catapult Network.

73 **Q 51** (Roger Marsh)

74 **Q 50** (Felicity Burch)

75 CBI, *Don’t Wait, Innovate* (2019), p 5: [https://www.cbi.org.uk/media/3844/12547\\_raising-regional-rd\\_online.pdf](https://www.cbi.org.uk/media/3844/12547_raising-regional-rd_online.pdf) [accessed 19 January 2021]

59. **The Catapult Network can contribute to the Government’s levelling-up agenda and the R&D place strategy—whilst focusing on its primary purpose of facilitating innovation in sectors with promise for the UK. Catapults are one of several bodies that can contribute to regional development, and better coordination is needed at local levels. The CBI’s ‘Catapult Quarter’ proposal has strong potential for delivering innovation and local development.**
60. *We recommend that the Department for Business, Energy and Industrial Strategy and UK Research and Innovation develop a more strategic approach across policies for innovation and regional development—such as broadening access to the Strength in Places Fund.*

### International competition

61. International factors affect the UK’s innovation ambitions. Multinational companies are important funders of R&D in the UK. Felicity Burch told us that 48% of the R&D performed by businesses in the UK was by non-UK owned businesses.<sup>76</sup> Professor Maier explained that multinational companies look for two things in a country when investing in R&D: quality and scale. On the quality of research, he said the UK “does pretty well ... through the Catapults and our research sector”. On scale, he said that “The UK scores pretty badly” because “We generally do not scale our activities well enough.” He gave the example of 5G development, for which the UK has ‘test beds’ but not at the large scale required by major companies.<sup>77</sup>
62. Felicity Burch told us that the Catapults can be attractive to inward investors, as they can help to address “two broad categories of problem, one around resource and one around risk” that these companies face.<sup>78</sup> She spoke of the need to “flaunt” the UK’s capabilities and strategy. She gave the examples of Estonia, which “has almost had a national rebrand around the importance of digitisation”, and of the German Chancellor presenting her country’s industrial strategy to another leader to show him “just how important her industrial strategy was and how much it framed the German approach to policy.”<sup>79</sup>
63. We heard comparisons between the UK’s Catapults and the German Fraunhofer Institutes, in terms of scope, scale and the depth of links with academia and industry. Matthew Durdy, CEO of the Cell and Gene Therapy Catapult, estimated that the Catapult Network “is probably less than a third of the scale of the Fraunhofer [Institutes]”.<sup>80</sup> Andrew Jamieson, CEO of the Offshore Renewable Energy Catapult and Chair of the Catapult Network, saw in the Fraunhofer Institutes “the equivalent of a Catapult with a much stronger academic base sitting below it.”<sup>81</sup> Alexandra Jones said that in Germany “Academics are much more focused on industry than we are in the UK” and “There is a lot more R&D funding available from industry”.<sup>82</sup>

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76 [Q 53](#) (Felicity Burch)

77 [Q 44](#) (Professor Juergen Maier)

78 [Q 50](#) (Felicity Burch)

79 [Q 51](#) (Felicity Burch)

80 [Q 43](#) (Matthew Durdy)

81 [Q 35](#) (Andrew Jamieson)

82 [Q 25](#) (Alexandra Jones)

64. **The UK has an important national asset in the Catapult Network, which should be promoted more widely. Further steps would be needed if the Catapults were to have an impact similar to that of their key international comparators. The Catapults would need to become a more established part of the R&D system, such that they attracted more involvement from academia and more investment from industry. Innovate UK would have to expand the Catapult Network more rapidly than it has to date.**
65. *We recommend that the Government prioritises scaling up the Catapult Network, without which it is unlikely that sufficient private sector investment will be committed and unlikely that the Government’s R&D spending target will be met.*

### Government’s innovation strategy

66. Underpinning many of the issues discussed in this chapter is the question of how the Government will deliver its R&D ambitions. The Government’s R&D Roadmap describes itself as “the start of a conversation”,<sup>83</sup> but we were told that the UK lacks a detailed plan for delivering its R&D ambitions. Professor Maier said that the Government needs to adopt “longtermism and [a] strategic approach”.<sup>84</sup>
67. We heard that the lack of a long-term Government plan is being accentuated by the recent sequence of one-year rolling spending rounds. Professor Maier said: “A real own goal has been having our spending review cut to just one year rather than the full three years ... competing Governments around the world, despite [the pandemic]—actually, I would say because of that—are giving these activities more longterm vision”.<sup>85</sup> Furthermore, we heard that industry’s investments in R&D are being affected by the pandemic, with about 28% planning to decrease their spending, compared with 16% planning to increase it.<sup>86</sup>
68. In developing a strategy, witnesses said that the UK needed to identify priority areas for R&D investment. Professor Maier advised that “we need to get better at defining the UK’s industrial strategy ... As a country, we need to decide which of these areas we are going to focus on and be world beating on.”<sup>87</sup> Felicity Burch agreed, saying that “the longterm strategic approach to R&D investment” should reflect “national characteristics and abilities, focusing on the industries or longterm markets where the country already has some potential advantage.”<sup>88</sup>
69. The Minister told us: “Innovate UK regularly assesses the Catapult landscape, as demonstrated by the establishment of the Medicines Discovery and Compound Semiconductor Catapults in 2015 and 2016 respectively.” She listed broad criteria—centred around UK strengths and economic potential—that had been used in these decisions and would be used in any decisions about further Catapults. She added that it would be necessary to

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83 HM Government, *UK Research and Development Roadmap* (July 2020), p 58: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/896799/UK\\_Research\\_and\\_Development\\_Roadmap.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/896799/UK_Research_and_Development_Roadmap.pdf) [accessed 22 January 2021]

84 [Q 46](#) (Professor Juergen Maier)

85 *Ibid.*

86 [Q 49](#) (Felicity Burch)

87 [Q 45](#) (Professor Juergen Maier)

88 [Q 51](#) (Felicity Burch)

consider “whether a Catapult is the right mechanism to support a certain sector or technology.”<sup>89</sup>

70. In terms of specific technologies that hold promise for the UK, each Catapult provided us with a list of developments in their areas.<sup>90</sup> It is not clear exactly how this type of information is used to inform policy decisions, or how sectors are identified for potential expansion of the Catapult Network. Alexandra Jones said that it was difficult to highlight particular options “because there are so many and the UK has many strengths”.<sup>91</sup> The Minister said: “It is very difficult to predict what will be happening in five, 10 or 15 years’ time, but I believe we need to be responsive.”<sup>92</sup>
71. **We were unconvinced by the Government’s approach to encouraging industry investment in R&D and expanding national assets such as the Catapults. The R&D Roadmap has insufficient detail about the Government’s objectives or its plans for achieving them. There does not appear to be a clear list of priority technologies for the UK, or a firm plan to expand the Catapult Network into sectors where the UK has strengths and the potential for economic gains. We recognise that in the wake of the pandemic there may be shifts in priorities for innovation and technology, including towards biotechnology and systems to support remote working. Nonetheless, the Government needs to have firm criteria for identifying key technologies and deciding on expansions of the Catapult Network, and these processes must be responsive to future challenges.**
72. *We ask that, in its response to this report, the Government provides a detailed strategic plan for delivering its R&D ambitions, including: milestones for increased private sector investment towards the overall spending target; a list of criteria to be used to select technologies and sectors for further support and an explanation of how these will be responsive to future challenges; and a list of technologies and sectors that are being considered for further support. We recommend that the Government makes the best possible use of the Catapult Network, promoting it as the UK’s national innovation asset, and using it as the default mechanism for exploiting promising technologies and sectors. We recommend that the Government promotes its R&D strategy confidently, in the UK and internationally.*

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89 Further supplementary written evidence from Department for Business, Energy and Industrial Strategy ([CAT0013](#))

90 Written evidence from the nine Catapults: Cell and Gene Therapy Catapult ([CAT0001](#)), Connected Places Catapult ([CAT0002](#)), Compound Semiconductor Applications Catapult ([CAT0003](#)), Digital Catapult ([CAT0004](#)), Energy Systems Catapult ([CAT0005](#)), High Value Manufacturing Catapult ([CAT0006](#)), Medicines Discovery Catapult ([CAT0007](#)), Offshore Renewable Energy Catapult ([CAT0008](#)), Satellite Applications Catapult ([CAT0009](#)).

91 [Q 17](#) (Alexandra Jones)

92 [Q 60](#) (Amanda Solloway MP)

## SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

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Below is a list of all of the Committee's conclusions and recommendations (recommendations appear in italics).

### Barriers affecting Catapults' ability to deliver on their objectives

1. The funding available for innovation in the UK does not appear to be commensurate with the Government's ambitions, as set out in the R&D Roadmap. Rules governing funding for innovation create barriers to collaboration between for Catapults and universities, and can deter industrial partners. First, the cap on collaborative R&D funding for public sector bodies inhibits collaboration between Catapults and universities. Leveraged funding requirements place too much risk on industry in transformative R&D projects. Finally, lack of access to Research Council funding puts Catapults at a disadvantage compared to universities. (Paragraph 28)
2. *We recommend that the Government, UK Research and Innovation, and Innovate UK set out a clear plan for how public sector resources and private investment can be made to match the scale of ambition in the R&D Roadmap.* (Paragraph 29)
3. *We recommend that UK Research and Innovation allows Catapults to bid for Research Council funds where there are clear advantages in terms of both research and innovation.* (Paragraph 30)
4. *We recommend that Innovate UK shows more flexibility in permitting public sector bodies to have a larger share of collaborative R&D funding, particularly when more than one such organisation is involved.* (Paragraph 31)
5. *We recommend that Innovate UK and other funding bodies support transformative innovation more effectively, including by shifting the balance between public funding and industrial match funding, in order to reduce the risks to industry and encourage its participation in risky R&D projects. They should consider arrangements for more translational funding to increase the flow of projects from universities to Catapults and industry.* (Paragraph 32)
6. *We recommend that Innovate UK ensures that Catapults' key performance indicators focus on delivery of effective collaborations and successful innovation and commercialisation, and reflect their contribution towards key policies such as the net zero economy and regional development.* (Paragraph 39)
7. *We recommend that UKRI ensures that universities' key performance indicators (under the Research Excellence Framework and the Knowledge Exchange Framework) provide stronger incentives for commercialisation of research findings in relevant disciplines.* (Paragraph 40)

### Wider issues affecting private investment

8. The UK's innovation system has the necessary components to be successful, but more strategic decisions are needed from the Government, UK Research and Innovation and Innovate UK—as set out in the recommendations below—in order to optimise the performance of the organisations and maximise innovation and commercialisation. (Paragraph 50)
9. *We recommend that UK Research and Innovation and Innovate UK address the imbalance between competition and collaboration in their frameworks such that*

*Catapults and universities can work together more easily on innovation projects.* (Paragraph 51)

10. *We recommend that UK Research and Innovation foster closer links between industry and universities and assist researchers to work at the interface between the two, including through supporting roles for academics at the Catapults.* (Paragraph 52)
11. *We recommend that The Department for Business, Energy and Industrial Strategy uses its current review of the Catapults to give the Catapults assurance of long-term continuity—including longer-term certainty over funding and a commitment that reviews will be limited to once every five years, to match the five-year funding cycle.* (Paragraph 53)
12. The Catapult Network can contribute to the Government’s levelling-up agenda and the R&D place strategy—whilst focusing on its primary purpose of facilitating innovation in sectors with promise for the UK. Catapults are one of several bodies that can contribute to regional development, and better coordination is needed at local levels. The CBI’s ‘Catapult Quarter’ proposal has strong potential for delivering innovation and local development. (Paragraph 59)
13. *We recommend that the Department for Business, Energy and Industrial Strategy and UK Research and Innovation develop a more strategic approach across policies for innovation and regional development—such as broadening access to the Strength in Places Fund.* (Paragraph 60)
14. The UK has an important national asset in the Catapult Network, which should be promoted more widely. Further steps would be needed if the Catapults were to have an impact similar to that of their key international comparators. The Catapults would need to become a more established part of the R&D system, such that they attracted more involvement from academia and more investment from industry. Innovate UK would have to expand the Catapult Network more rapidly than it has to date. (Paragraph 64)
15. *We recommend that the Government prioritises scaling up the Catapult Network, without which it is unlikely that sufficient private sector investment will be committed and unlikely that the Government’s R&D spending target will be met.* (Paragraph 65)
16. We were unconvinced by the Government’s approach to encouraging industry investment in R&D and expanding national assets such as the Catapults. The R&D Roadmap has insufficient detail about the Government’s objectives or its plans for achieving them. There does not appear to be a clear list of priority technologies for the UK, or a firm plan to expand the Catapult Network into sectors where the UK has strengths and the potential for economic gains. We recognise that in the wake of the pandemic there may be shifts in priorities for innovation and technology, including towards biotechnology and systems to support remote working. Nonetheless, the Government needs to have firm criteria for identifying key technologies and deciding on expansions of the Catapult Network, and these processes must be responsive to future challenges. (Paragraph 71)
17. *We ask that, in its response to this report, the Government provides a detailed strategic plan for delivering its R&D ambitions, including: milestones for increased private sector investment towards the overall spending target; a list of criteria to be used to select technologies and sectors for further support and an explanation of how*

*these will be responsive to future challenges; and a list of technologies and sectors that are being considered for further support. We recommend that the Government makes the best possible use of the Catapult Network, promoting it as the UK's national innovation asset, and using it as the default mechanism for exploiting promising technologies and sectors. We recommend that the Government promotes its R&D strategy confidently, in the UK and internationally. (Paragraph 72)*

## APPENDIX 1: LIST OF MEMBERS AND DECLARATIONS OF INTERESTS

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### Members

Baroness Blackwood of North Oxford  
 Lord Borwick  
 Lord Browne of Ladyton  
 Baroness Hilton of Eggardon  
 Lord Hollick  
 Lord Kakkar  
 Lord Mair  
 Baroness Manningham-Buller  
 Lord Patel (Chair)  
 Viscount Ridley  
 Baroness Rock  
 Baroness Sheehan  
 Baroness Walmsley  
 Baroness Young of Old Scone

### Declaration of Interest

Baroness Blackwood of North Oxford  
*Chair, Genomics England*  
*Trustee, the Alan Turing Institute*

Lord Borwick  
*Chairman of Penso Group Ltd, which undertakes automotive carbon fibre design and development work which may be part funded by Innovate UK or a Catapult*

Lord Browne of Ladyton  
*No relevant interests declared*

Baroness Hilton of Eggardon  
*No relevant interests declared*

Lord Hollick  
*Director, Honeywell International Inc*  
*Member, Advisory Board, Royal Society*

Lord Kakkar  
*Professor of Surgery, University College London*  
*Chairman, University College London Partners*  
*Member, Advisory Board, Royal Society*

Lord Mair  
*Fellow, Royal Academy of Engineering*  
*Fellow, Royal Society*  
*Emeritus Professor of Civil Engineering, Director of Research, University of Cambridge*  
*Head, Centre for Smart Infrastructure and Construction, Cambridge University*  
*Non-executive Director and Chair of Board, Epsimon Ltd (infrastructure monitoring)*  
*Partner and Consultant, Geotechnical Consulting Group LLP (consulting engineers)*  
*Chair, One CAM Limited (Cambridgeshire and Peterborough Combined Authority's company; special purpose vehicle for delivery of Cambridgeshire Autonomous Metro (CAM))*  
*Chair of the Department for Transport's Science Advisory Council*

Baroness Manningham-Buller

*Chair, Wellcome Trust*

*Member, Advisory Board, Royal Society*

*Advisory Board, British Museum*

Lord Patel

*Fellow, Academy of Medical Sciences*

*Member, Warwick Manufacturing Group (WMG) Advisory Board*

Viscount Ridley

*Member, Regulatory Horizons Council*

*Member, Department for Business, Energy and Industrial Strategy (BEIS)*

*Innovation Expert Group*

Baroness Rock

*Senior Adviser, Newton Europe*

Baroness Sheehan

*No relevant interests declared*

Baroness Walmsley

*No relevant interests declared*

Baroness Young of Old Scone

*Recent former Chancellor of Cranfield University (until July 2020)*

A full list of Members' interests can be found in the Register of Lords Interests: <http://www.parliament.uk/mps-lords-and-offices/standards-and-interests/register-of-lords-interests/>

## APPENDIX 2: LIST OF WITNESSES

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Evidence is published online at <https://committees.parliament.uk/work/804/the-contribution-of-innovation-catapults-to-delivering-the-rd-roadmap/> and available for inspection at the Parliamentary Archives (020 7219 3074).

Evidence received by the Committee is listed below in chronological order of oral evidence session and in alphabetical order. Those witnesses marked with \*\* gave both oral evidence and written evidence. Those marked with \* gave oral evidence and did not submit any written evidence. All other witnesses submitted written evidence only.

### Oral evidence in chronological order

- |    |  |                                 |
|----|--|---------------------------------|
| *  | Professor Dame Ottoline Leyser, Chief Executive, UK Research and Innovation (UKRI)   | <a href="#"><u>QQ 1–11</u></a>  |
| *  | Dr Ian Campbell, Former Executive Chair, Innovate UK   |                                 |
| ** | Alexandra Jones, Director of Science, Research and Innovation, Department for Business, Energy and Industrial Strategy (BEIS)  | <a href="#"><u>QQ 12–27</u></a> |
| ** | Dick Elsy CBE, CEO, High Value Manufacturing Catapult  | <a href="#"><u>QQ 28–32</u></a> |
| ** | Martin McHugh, Acting CEO and Chief Technology Officer, Compound Semiconductor Applications Catapult   |                                 |
| ** | Nicola Yates OBE, Chief Executive, Connected Places Catapult   |                                 |
| ** | Stuart Martin, CEO, Satellite Applications Catapult  | <a href="#"><u>QQ 33–37</u></a> |
| ** | Andrew Jamieson, CEO, Offshore Renewable Energy Catapult; and Chair of Catapult Network  |                                 |
| ** | Philip New, CEO, Energy Systems Catapult   |                                 |
| ** | Dr Jeremy Silver, CEO, Digital Catapult  | <a href="#"><u>QQ 38–43</u></a> |
| ** | Matthew Durdy, CEO, Cell and Gene Therapy Catapult   |                                 |
| ** | Professor Chris Molloy, CEO, Medicines Discovery Catapult  |                                 |
| *  | Professor Juergen Maier CBE, former CEO, Siemens UK; Chairman, Digital Catapult; Co-Chair, Made Smarter; Board Member, Greater Manchester LEP; and Board Member, Northern Powerhouse Partnership | <a href="#"><u>QQ 44–46</u></a> |
| *  | Felicity Burch, Director of Innovation and Digital, Confederation of British Industry (CBI)  | <a href="#"><u>QQ 47–54</u></a> |
| *  | Roger Marsh OBE DL, Chair, Northern Powerhouse 11 (NP11); and Chair, Leeds City Region Enterprise Partnership  |                                 |

- \*\* Amanda Solloway MP, Parliamentary Under Secretary of State (Minister for Science, Research and Innovation), Department for Business, Energy and Industrial Strategy (BEIS) [QQ 55–65](#)
- \* Louise Dunsby, Deputy Director for Innovation Policy, Department for Business, Energy and Industrial Strategy (BEIS)

### Alphabetical list of witnesses

- \*\* Cell and Gene Therapy Catapult ([QQ 38–43](#)) [CAT0001](#)
- \*\* Compound Semiconductor Applications Catapult ([QQ 28–32](#)) [CAT0003](#)
- \* Confederation of British Industry (CBI) ([QQ 47–54](#))
- \*\* Connected Places Catapult ([QQ 28–32](#)) [CAT0002](#)
- \*\* Department for Business, Energy and Industrial Strategy (BEIS) ([QQ 12–27](#)) ([QQ 55–65](#)) [CAT0010](#)  
[CAT0012](#)  
[CAT0013](#)
- \*\* Digital Catapult ([QQ 38–43](#)) [CAT0004](#)
- \*\* Energy Systems Catapult ([QQ 33–37](#)) [CAT0005](#)
- \*\* High Value Manufacturing Catapult ([QQ 28–32](#)) [CAT0006](#)
- \* Innovate UK ([QQ 1–11](#))
- \* Professor Juergen Maier CBE, former CEO, Siemens UK; Chairman, Digital Catapult; Co-Chair, Made Smarter; Board Member, Greater Manchester LEP; and Board Member, Northern Powerhouse Partnership ([QQ 44–46](#))
- \*\* Medicines Discovery Catapult ([QQ 38–43](#)) [CAT0007](#)
- \* Northern Powerhouse 11 (NP11) ([QQ 47–54](#))
- \*\* Offshore Renewable Energy Catapult ([QQ 33–37](#)) [CAT0008](#)  
[CAT0011](#)
- \*\* Satellite Applications Catapult ([QQ 33–37](#)) [CAT0009](#)
- \* UK Research and Innovation (UKRI) ([QQ 1–11](#))