The Catapult Network: Driving prosperity across the UK

Since inception in 2011, the Catapult Network has been responsible for directing over £2.5bn of private and public sector investment into cutting-edge industrial research, ensuring the UK gets full benefit of the new industries of the 21st century.

Catapults are in a unique position to deliver part of the Government's mission on building regional economies ("levelling up"), increasing productivity and making the Nation more robust and competitive. We have a proven track record in delivering regional growth and national prosperity through working with companies and universities to drive forward their applied research and development.

Since 2013, Catapults have collectively played a lead role in delivering over 2,000 academic collaborations, and supporting more than 5,000 organisations in over 12,000 projects.

Catapults have first-hand insight into strategic sectors that allows industry and government to address the key challenges shared by thousands of UK innovators. We actively apply emerging technologies and skills to enable existing businesses to succeed, attract and retain entrepreneurs, build high value supply chains, and extend the national skills base. We are also critical sources of national expertise and delivery, as proven in the recent pandemic, where multiple Catapults were intimately involved in the delivery of engineering, diagnostics and manufacturing solutions.

Our activities driving innovation are fully aligned with the recently announced Government strategies for R&D advancement, in levelling up regional disparities, net zero, developing talent, and others, and we are keen to maximise value by working more closely with national research and innovation ecosystems. As input to Spending Review, we prepared a list of 68 proposed interventions for development to address Economic Recovery, Levelling Up, Net Zero, Modernising Health and Social Care, Resilient Communications, Productivity, Food Sustainability and Skills, from which we highlight three major key areas:

Addressing the Gaps

1. **Net Zero**: Catapults are developing an ambitious strategy to ensure UK innovators capture the economic benefit of the transition to a Net Zero economy. This is realised through our unrivalled combined knowledge of multiple industry sectors and our whole systems approach. We will design and implement programmes across multiple industrial sectors in a range of supply and demand technologies, to address challenges in End-to-End Hydrogen, Decarbonisation in cities, town, places and industries, Nuclear, and Bioenergy, through national and international cooperation in this space.
2. **Levelling Up**: We can deliver the CBI's Catapult Quarters key recommendation for driving national innovation and Levelling Up by creating Catapult-centred industrial clusters of regional growth. This builds upon the strategic distribution of our Network, our extensive work with partners in the all regions and Devolved Administrations.
3. **Accelerated Academic Translation**: We accelerate the current pull through of research breakthroughs into industrial applications, returning higher value faster to further fund UK research. Working regionally and nationally with partners to de-risk their innovations and inventions, and strategically with national investors including British Business Bank to fund their development, we shall improve retention of UK entrepreneurial capability, improving the quality of early stage and start-ups, and enabling the scale up of existing UK companies.

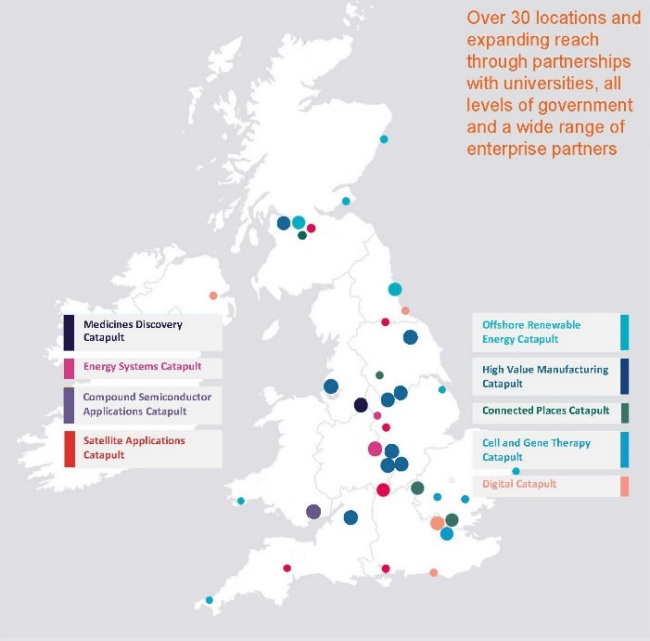
Many national and global challenges are being addressed through coordinated activity across the Catapult Network working with their sector communities and policy makers. These include; Hydrogen, 5G, New Treatments and Diagnostics. There remain gaps to be filled, such as in Robotics, Agritech, Health & Social Care, the Natural Environment and Nanotech, where technological innovation can create a step change. We are keen to collaborate with others in the UK research and innovation ecosystem, to bring the best possible value from these key challenges to meet the most urgent needs of the Nation.

The Catapult Network: Driving prosperity across the UK

Established by Innovate UK as independent not-for-profit organisations, Catapults are world-leading technology centres providing access to cutting-edge R&D infrastructure, expert technical specialists, and business support, helping accelerate the development, deployment and adoption of new technologies. By bridging the gap between research and industry, Catapults help tackle the biggest challenges that society and industries face today.

There are 9 Catapults, spanning over 30 sites across the UK covering a range of different sectors, technology challenges and systems:

- Cell and Gene Therapy Catapult
- Compound Semiconductor Applications Catapult
- Connected Places Catapult
- Digital Catapult
- Energy Systems Catapult
- High Value Manufacturing Catapult, a network of seven centres across 18 sites
- Medicines Discovery Catapult
- Offshore Renewable Energy Catapult
- Satellite Applications Catapult



Delivering Impact

The Catapult Network plays a vital role in supporting thousands of ambitious businesses to thrive in global markets and accelerate the growth of local, regional and national economies. Through our infrastructure and partnerships, we are fostering new knowledge, making industries more productive, stimulating demand and unlocking new markets. We play a critical role in roadmapping to identify the needs in innovation technology and mobilise the sectors and supply chains to produce the next set of advances.

Helping overcome barriers to innovation, we create attractive R&D environments that make the UK more prone to anchor inward investment. Our impact goes much further than improving the bottom line of individual businesses. We are delivering transformational improvements in the productivity and competitiveness of the firms we work with whilst addressing global challenges.

Building a better future for the UK industry

Building on a £1.2bn investment in sectors of strength and on the outcomes and impact that we are already delivering, the Catapult Network is ideally positioned to lead a unique systems thinking approach to address major global challenges. Through our collective vision and working with our communities, we propose **a number of programmes** that will deliver:

Recovery from COVID-19

Build critical capability to tackle health crises

Mobilising a large number of organisations across many sectors, the Catapult Network played a critical role to aid Government in the response to the COVID-19 crisis, delivering ventilators, drug repurposing, PPE, testing technologies and vaccine manufacturing solutions. We also continue to provide direct support and vital information to assess the impact of the pandemic on businesses. Building on Government's £750m support package for SMEs focusing on R&D, Catapults endeavour to support businesses in recovery and build partnerships across supply chains to rebuild the UK economy.

Net zero

Taking a whole systems approach, scaling up new technologies to enable the UK transition to Net Zero

A considerable collaborative effort is needed to meet the Government's target of Net Zero by 2050. Our combined capabilities across multiple sectors create a unique opportunity to enable a 'whole systems approach' to energy generation, management and distribution to help the UK achieve its clean growth ambitions. As well as driving development of innovative technologies, our work recognises a decarbonisation strategy that will depend on geography, building types, energy infrastructure, energy demand, resources and urban growth plans.

Modernising health and social care

Integrating innovative technologies in the deployment of health and social care, driving affordability, efficiency and resilience

Early diagnosis and intervention, advanced personalised therapies, and the integration of digital technologies are key enablers of cost-effective health and social care. The Catapult Network is already increasing the flow of innovative medicines, and can do more in diagnostics and digital therapeutics products. Catapults can also work strategically with the UK health, social care and regulatory systems to channel UK innovators into a supply chain of new approaches, technologies and models that can help manage costs and optimise outcomes.

Places

Recharge local economies, ensuring all UK regions benefit from, and are able to contribute to the latest technological advances

We work within the UK's regions to transform the prosperity of some of the most deprived communities in the country – attracting high value investment into economically lagging, deindustrialised areas, creating jobs, wealth and confidence. We want to use all of our assets, insights, scale, reach and relationships to provide heightened active leadership on the UK's greatest challenges in ways that create the high value employment opportunities, becoming the foundation of our most successful communities. We are fully behind the CBI Catapult Quarters, bringing together excellence through clustering in regions with the best potential and need for growth.

Secure, resilient communications

Develop and deploy the next generation resilient communications infrastructure

The combination of UK expertise in system level design, compound semiconductors, quantum cryptography, software development & cyber security and Catapults' wide range of capabilities, provides enormous potential to drive the UK towards the required advances to increase secure, resilient telecoms infrastructure in the future.

Productivity and efficiency

Transforming industries through digitisation

Connecting industries and the digital ecosystem is a key challenge. Through our facilities, demonstrators and R&D programmes, we are harnessing the UK opportunity to improve productivity through digitisation at both local and national level, helping our communities address the significant productivity gap and regional disparities. We can facilitate adoption and diffusion of advanced digital technologies, enabling the automation of tasks to drive productivity and efficiency across every sector, building on our smart manufacturing programmes.

Food sustainability

Helping boost food production nationally and globally

Maximising productivity whilst minimising or reversing environmental degradation, and reducing carbon footprint, are key factors to ensure commercial viability and sustainability of the food production sector. Working with industry and academia, and in particular the Agri-tech Centres, Catapults can bring their unique capability – in satellite technology, terrestrial systems, ubiquitous connectivity, IoT, automation, packaging, electrification, logistics, and advanced modelling – to change the state of play of food productivity in the UK and globally.

Skills and Talent

Develop an industry focused national skills programme growing the UK expertise

Economic growth arising from innovation will create the need for a new set of skills as technologies develop, and Catapults are well placed to understand what these needs are. HVM Catapult and CGT Catapult are already playing a strong role in shaping the workforce agenda (see Gatsby report) through their training centres with other Catapults following in their footsteps.

Our Key Highlights

Driving global competitiveness through innovative capability

- **Cell and Gene Therapy Catapult** is building the most favourable environment outside the US for adoption of cell and gene therapies, with 12% of global clinical trials for advanced therapy medicinal products (ATMP) now taking place in the UK.
- **Offshore Renewable Energy Catapult** is playing a leading international role operating the world's largest concentration of open-access offshore wind test and demonstration facilities, as well as one of the most advanced grid emulation systems in the world.

Responding to COVID-19 crisis

- Dick Elsy, the **HVM Catapult** CEO**,** led the Ventilator Challenge UK response, delivering over 13,000 ventilator units to UK hospitals, introducing unprecedented efficient procurement practices.
- **Medicines Discovery Catapult** mobilised and delivered the national Lighthouse testing laboratories programme across four new sites, processing over 3 million test samples in the first 100 days and form the bedrock of capacity for NHS Test & Trace.
- **Cell and Gene Therapy Catapult** (CGTC) and the **Centre for Process Innovation** (part of HVM Catapult) are working on scaling up manufacturing solutions for vaccines with Oxford University and Imperial College. CGTC will be running a £100m state-of-the-art centre to accelerate the mass production of a successful COVID-19 vaccine in the UK.

The future of communications

The recent government investment in OneWeb is a bold statement of confidence in this technology. The satellites are simple to build and flexible to operate, hence can be responsive to the changing demands of the market wherever that may be. Working with a wide range of stakeholders across various sectors, the **Satellite Applications Catapult** is looking to ensure the UK capitalises on this investment to enhance our 5G offering, and will look to lead on the design, development and delivery of a Mega- Constellation based Positioning, Navigation and Timing (PNT) service overlay to provide a new level of security and resilience to existing satellite navigation services.

Creating jobs and opportunities

The Fit4Nuclear and Nuclear Sharing in Growth programmes led by the **Nuclear Advanced Manufacturing Research Centre** (**NARMC**, part of HVM Catapult) are helping the sector prepare to reduce carbon emissions and already yielded £550m of new contracts, £50m of new private investment and securing **6,500 jobs**.

Driving advances to tackle Net Zero targets

Catapults are making a concerted effort to drive Net Zero with a number of programmes in design. A vital development by **Energy Systems Catapult** and **Connected Places Catapult** will create Net Zero Pathfinders to help cities, towns, and places in programmes to plan and implement solutions to drive large-scale decarbonisation through engagement, planning, systems architecture, coordination, physical testing and consumer insight and evaluation.

Levelling up through clusters of excellence

Compound Semiconductor Applications Catapult is joining forces in a Cardiff University-led consortium which has just won £43.7m to develop a Compound Semiconductor (CS) powerhouse in South Wales (Strength in Places Fund) and build a world-leading cluster of excellence in CS technologies, which is expected to attract economic investment and high quality jobs to the region. The cluster will translate university research into large-scale CS growth and device fabrication to develop enabling technologies, such as those needed for self-drive vehicles and 5G communications.

Promoting skills and talent

Digital Catapult and **National Composites Centre** (part of HVM Catapult) are looking to support the post COVID-19 recovery through the Digital Engineering Technology & Innovation (DETI), a research, innovation and skills initiative funded by the West of England Combined Authority, which is expected to deliver at least £62m of added value over five years. This partnership will bring together advanced engineering companies, digital technology pioneers and universities to develop and accelerate digital engineering across multiple sectors and to help UK businesses maintain engineering leadership.

Our Contribution to Economic Recovery

Our collective vision supports economic levelling and nurtures the talent that will address major national and global challenges and will achieve **Net Zero, create secure, resilient communications, drive productivity and efficiency, produce sustainable food systems, modernise healthcare**, and more. In a post-COVID-19 world, the Catapult Network can bring stakeholders together to create the engine at the heart of this recovery. We have prepared 68 proposed interventions that are aimed at developing vital sectors and markets for the national economy, delivering job creation and prosperity within the regions and throughout the nation. We would welcome a direct dialog with our stakeholders to discuss these and demonstrate the true value that the Catapults can bring to create an ambitious post-COVID-19 recovery and levelling up strategy; placing the UK at the centre of global technological innovation and talent creation.









ANNEX A – Catapult Network delivering Impact

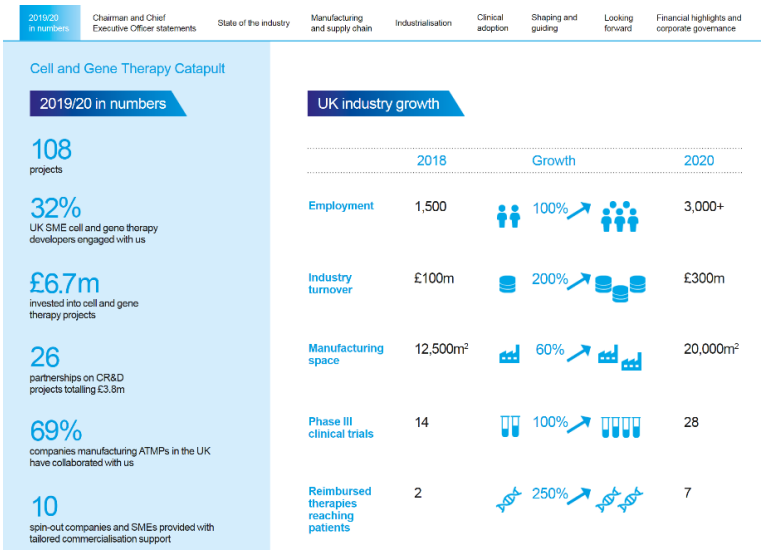
Since the creation of the first centres in 2011, Catapults have been evolving within their sectors at different stages of maturity. Some are already demonstrating evidence of impact through job creation, supply chain development, inward investment, while others are at earlier stages of delivery but already collecting evidence of the outcomes listed below:

- Facilitating collaborations and signposting new customers to new opportunities
- Testing and demonstration, through access to facilities and expertise
- Addressing barriers to innovation, helping businesses develop their ideas/projects
- Supporting firms in shifting technologies towards market, development of new and improved products, services and processes
- Providing an improved understanding and awareness of commercial opportunities
- Providing strategic leadership in R&D programmes
- Providing information on funding and investment increasing access to funding opportunities
- Delivering spill-over effects across sectors beyond the direct beneficiaries
- Improving investor confidence de-risking R&D projects and increasing private investment
- Improving skills, knowledge and access to data in general, and in some sectors, providing training and skills development
- Improving the understanding of the sector
- Building technical expertise and commercial skills within businesses
- Achievement of cost savings particularly in capital-intensive industries
- Creation of spinouts & business acquisition
- Stimulating demand for innovative technology
- Developing communities in technology areas

Some of the main highlights of Impact delivered by individual centres are given below.

Cell and Gene Therapy Catapult

The Cell and Gene Therapy Catapult has promoted major progress for the UK cell and gene therapy industry, with 12% of global advanced therapy medicinal product (ATMP) clinical trials taking place in the UK, with over 3,000 jobs created in the sector, and over 90 advanced therapy developers currently based in the UK. The manufacturing centre in Stevenage has doubled its capacity for collaboration providing additional infrastructure and expertise to anchor global cell and gene therapy manufacturing in the UK. Key highlights in the year include: 10 spin-out companies and small and medium enterprises (SMEs) provided with tailored support through commercial readiness advice clinics (through ERDF). The Advanced Therapy Treatment Centre (ATTC) network (ISCF funded) now has 6% of global ATMP clinical trials run through its centres, and the network works with 64 partners in industry, academia and healthcare providers. The number of Advanced Therapies Apprenticeship Community (ATAC) apprentices (ISCF funded) has more than doubled compared with 2019, helping to tackle the demand for skills in the industry. See more on CGTC Annual Review



Connected Places Catapult

Connected places are thriving local economies harnessing next-generation services and solutions to create the conditions for prosperity and productivity. Launched on 1st April 2019 from the merger of two previous centres, Connected Places Catapult works across government, industry and academia to connect the market, spark new

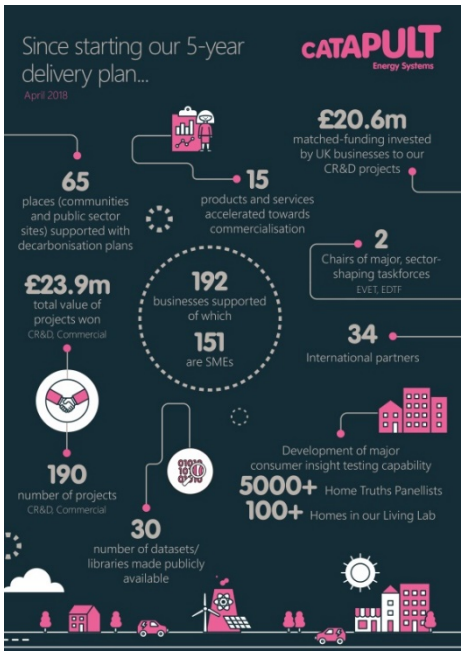
possibilities and accelerate commercialisation of these innovative technologies. To date, Connected Places Catapult has partnered with over 350 businesses to deliver more than 140 R&D projects. Over a third of these projects have advanced innovations through more than one Technology Readiness Level (TRL) including real world demonstration of drone operation, beyond visual line of sight and a 230-mile self-navigated drive in a variety of road conditions. Through its accelerator programme, Connected Places Catapult has supported innovative UK SMEs to raise £33.5 million in private equity, facilitated 23 commercial pilots and enabled over £3 million of commercial contracts to be secured. Through events and market engagement at its four regional hubs – London, Milton Keynes, Leeds and Glasgow – Connected Places Catapult has convened over 6,550 market actors, delivering new collaborations, partnerships and knowledge transfer.

Compound Semiconductor Applications Catapult

Since its inception in 2017, CSA Catapult has made impact in a range of different ways such as projects won, industrial collaborations, jobs created and safeguarded, academic partnerships and collaborations, international partners and 705 years of semiconductor experience across the team, which includes 23 PhDs. CSA Catapult is also key to enabling the transition from internal combustion engines, using petrol and diesel, to clean forms of energy to reduce the UK's emissions to Net Zero by 2050. Our Power Electronics projects will develop an electric powertrain solution using silicon carbide and establishing an end-to-end supply chain in the UK. Compound semiconductors are also integral to resilient communications and the Catapult is excellently placed in capability to harness the potential for UK companies to take an increasing share of the secure, resilient telecoms infrastructure of the future.

Digital Catapult

Digital Catapult continues to grow at pace. In the last year we have worked with over 570 small businesses, and forged more than 120 new industrial partnerships. The businesses that have engaged with Digital Catapult have raised more than £170m this year, and over £4bn in investment since we were established. As we continue to encourage, stimulate and support early adopters across the manufacturing and creative sectors, we increasingly find that a blend of technologies converging to form a new tech stack is having the greatest impact. With Verizon we are exploring 5G combined with augmented reality to create new opportunities in virtual retail, and various mixes of virtual reality, 5G and artificial intelligence to bring cultural experiences to new audiences at home from the 20 startups on our CreativeXR programme with Arts Council England. We launched the new Industrial Net Zero Innovation Centre with TWI in Cambridge to drive sustainable and environmentally responsible digital growth across multiple industrial sectors to reach the UK's net zero targets, and we expanded our industry leading AI Ethics Committee in response to demands from the startup ecosystem. Our regional centres continue to grow: the team in Belfast has launched 24 new industrial partnerships, and our centre in North East Tees Valley has worked with over 60 local companies. We are expanding our footprint in Bristol and the West Midlands delivering nationally important projects to boost local skills, employment and opportunities for businesses of all sizes to benefit from the adoption of advanced digital technologies.



Energy Systems Catapult

Since 2018, we have worked with over 2000 organisations; delivered more than 190 projects; and provided a higher-level of innovation support to 192 companies. We have leveraged nearly £21m of industrial matched funding in our CRD projects; and attracted £24m of project funding. Our **Innovating to Net Zero** programme has provided Government and business with their most comprehensive insights yet, underpinned by the **Energy System Modelling Environment (ESME)** – the UK's leading techno-economic whole system model. This work re-enforced our credibility as the nation's **Champion for Net Zero** and the importance of our role in

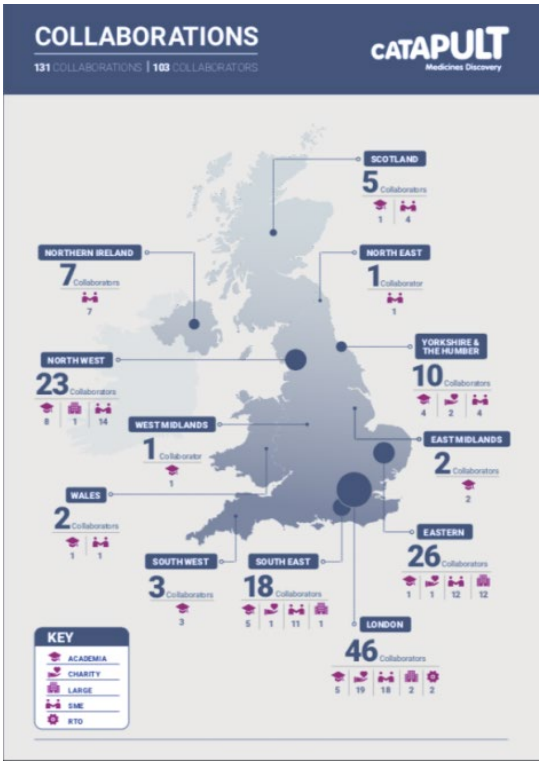
supporting the Catapult Network and Central Government departments and advisers to understand the system development, integration, engineering and policy support required to deliver Net Zero, e.g. our **Local Area Energy Planning** work, and **Systems Engineering for Net Zero** project. We also host the **Energy Research Partnership** (a group of key public and private energy sector policy, regulatory, industrial and academic stakeholders); and have chaired two of the most wide-ranging collaborative Taskforces between the UK energy sector, the public sector and two sectors vital to the future growth of the UK economy: transport and mobility (**EVET**) and Digital and Data (**EDTF**).

High Value Manufacturing Catapult

Responding to a call from the Prime Minister for UK manufacturers to step up production of vital medical equipment, the HVM Catapult has been at the forefront of efforts to equip the healthcare front line with some of the tools it needs to treat patients suffering from COVID-19 and save lives. This last year the Catapult Centres supported companies across 4,646 projects, 2,331 of which were with SME clients, to harness the power of innovation and strengthen their performance. This attracted £518m from industry R&D from small social enterprises to global giants employing thousands of people both directly and through their UK supply chains. The Catapults have made significant contributions to progress lightweight wings ready for net zero, cost-effective personalised healthcare, car batteries second life, next generation of bioimaging, reinforcements to save construction 54 million hours, and many other key areas that are critical for industry. The Catapult are also evolving their programmes to ensure the landmark commitment from the UK government to achieve net zero greenhouse gas emissions within thirty years is achieved. See the [HVM Annual Review]

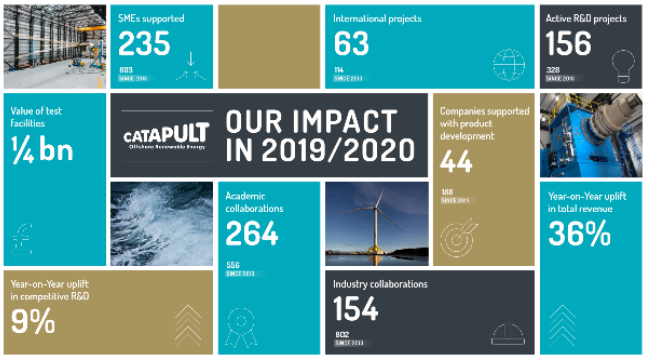
Medicines Discovery Catapult

Based in the North West and working across all regions of the UK, MDC industrialises and drives the adoption of new technologies and ways of working for the sector. MDC's interventions span bio-discovery and informatics technologies; creating new public-private networks of productive R&D; and providing access to high-value national assets, infrastructure and wisdom, which enable the sector to become more productive and attractive to private sector investment. MDC has rapidly established a national standing and is deeply engrained within its sector. MDC represents the biotech sector at ministerial level in Life Sciences expert and Brexit planning groups. It influences strategic planning for the delivery of the Life Sciences Industrial Strategy and provides expert insights with primary research that policymakers and officials use routinely. Since 2018, MDC has already:



- Created over 400 high skill jobs
- Deployed technology and long-term project support to enable a £300M SME licensing deal with multinational pharma
- Delivered the largest diagnostics laboratory project in UK history
- Enabled partners working with MDC to subsequently raise over £50M in new venture investment
- Provided high-vaue industrial training for students, graduates, technologists and post-doctoral researchers
- Launched three national-scale Drug Discovery Syndicates (Psychiatry, Cystic Fibrosis and Hearing Health)
- Created the first private sector UK contract research services and biosample supply networks
- Run 160 partnered projects with 86 partners across the UK
- Delivered internationally recognised recommendations for the industry use of healthcare data

Offshore Renewable Energy Catapult



Year on year, ORE Catapult continues to make significant progress in delivering its core mission of accelerating the creation and growth of UK companies and innovative technologies in the offshore renewable energy sector. Our research assets in Blyth, the largest in the world, are helping to bring the world's largest turbines to market at record breaking low costs, benefitting all electricity users. We drove innovation into the Offshore Wind Sector Deal in 2019, which established the industry-funded Offshore Wind Growth Partnership (OWGP), a £100m, ten-year UK business transformation programme delivered by ORE Catapult. Strong on levelling up and place agendas our facilities in Scotland, the North East, Humber, Wales and Cornwall bring extensive reach to SMEs, larger players, academia and public sector bodies to drive technologies forward in the UK in both wind power and emerging wave and tidal. More than 235 UK SMEs received support from ORE Catapult this year, through 65 collaborative R&D projects, 11 industry-led innovation challenges. In its first year, the new National Launch Academy, a national technology accelerator programme focusing on near to market solutions, has supported 17 businesses and has plans to expand further both nationally and regionally. We are at the forefront of floating wind power which will enable net zero targets to be met from going into deeper waters, further from shore and increasing synergies with other sea users, notably oil & gas thus maintaining and growing UK jobs whilst keeping electricity affordable despite huge changes in the way we generate electricity.

Satellite Applications Catapult

Over the last seven years, the Satellite Applications Catapult has played a major role in the establishment and development of a vibrant space and satellite applications start-up ecosystem. We now have an active and committed investor community and knowledgeable customers from government and across the private sector, all well versed in the economic opportunity that can be realised from space. In 2019-2020 the Catapult has continued its mission to transform the innovation landscape delivering benefits from the growing opportunities in space. The need for connectivity and for geospatial intelligence is being enhanced by the challenges of COVID-19. This was a landmark year for the Catapult and our In-Orbit Demonstration programme, as IOD-1 GEMS became our first satellite to be put into orbit.

This year we initiated important projects that will open new markets for UK businesses, from sustainable supply chains to 5G and Tailings Dam Monitoring. Our regional engagement through our network of Disruptive Innovation for Space Centres (DISC) continues to enable advanced manufacture for space, supporting new supply chains and future concepts. This year our first DISC facility in Harwell supported 22 customers and 10 Catapult projects. In June 2019, our Wescott 5G Step-Out Centre also became operational. Our international engagement has been growing, to support the developing export opportunities with the establishment of Sino-British Satellite Applications Centre (SBSAC) in Guangzhou.