

CREATING THE FUTURE THROUGH INNOVATION

RECOVERY AND RESILIENCE

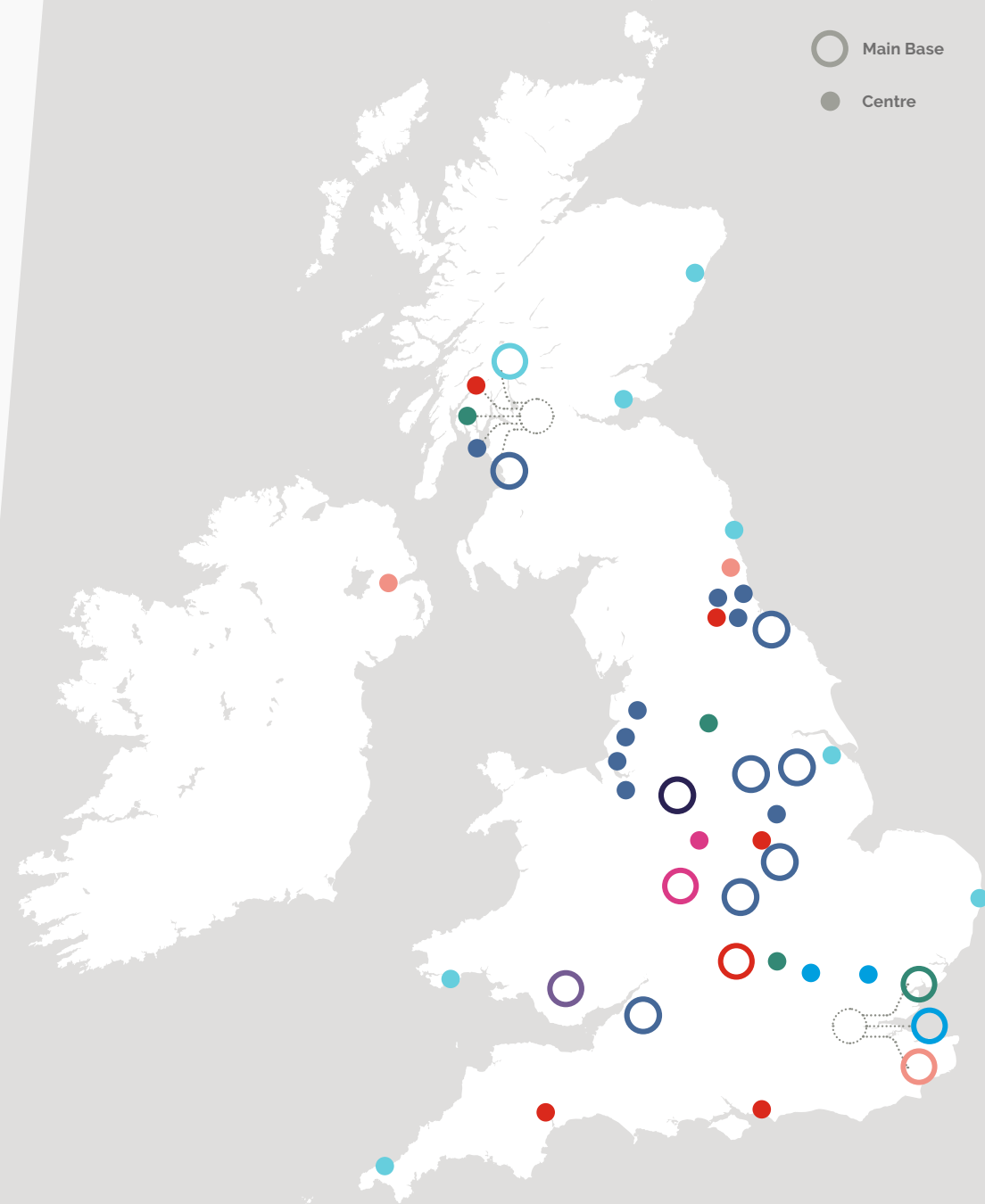
2019-20

WHAT IS A CATAPULT?

A Catapult is where research is accelerated, where new technologies are further developed, scaled up and realised

Catapults nurture small, medium and large business growth by equipping organisations with the right infrastructure, testing environments, demonstration tools and technologies to bring new products, processes and services to market, boosting productivity, developing the workforce and providing a catalyst for technological change. Established by Innovate UK, Catapults are key enablers of innovation, accelerating disruptive, transformative and market-creating activity to deliver societal, economic and environmental impact. Catapults take an integrated approach to sectors and markets, supporting local and national communities by fostering collaboration between industry, government, research organisations, academia and many others. They help motivate new policies and shape new standards and regulations. When Catapults and their communities work together, they cultivate a continuous innovation cycle, creating a journey from concept to reality.

Find out more



Cell and Gene Therapy

Connected Places

Compound Semiconductor Applications

Digital

Energy Systems

High Value Manufacturing

Medicines Discovery

Offshore Renewable Energy

Satellite Applications

2013-20 OUR IMPACT

8,332

SMEs
SUPPORTED



14,750

INDUSTRY
COLLABORATIONS



5,108

ACADEMIC
COLLABORATIONS



1,218

INTERNATIONAL
PROJECTS

4,712

EMPLOYEES
IN 2020



>£1.3BN

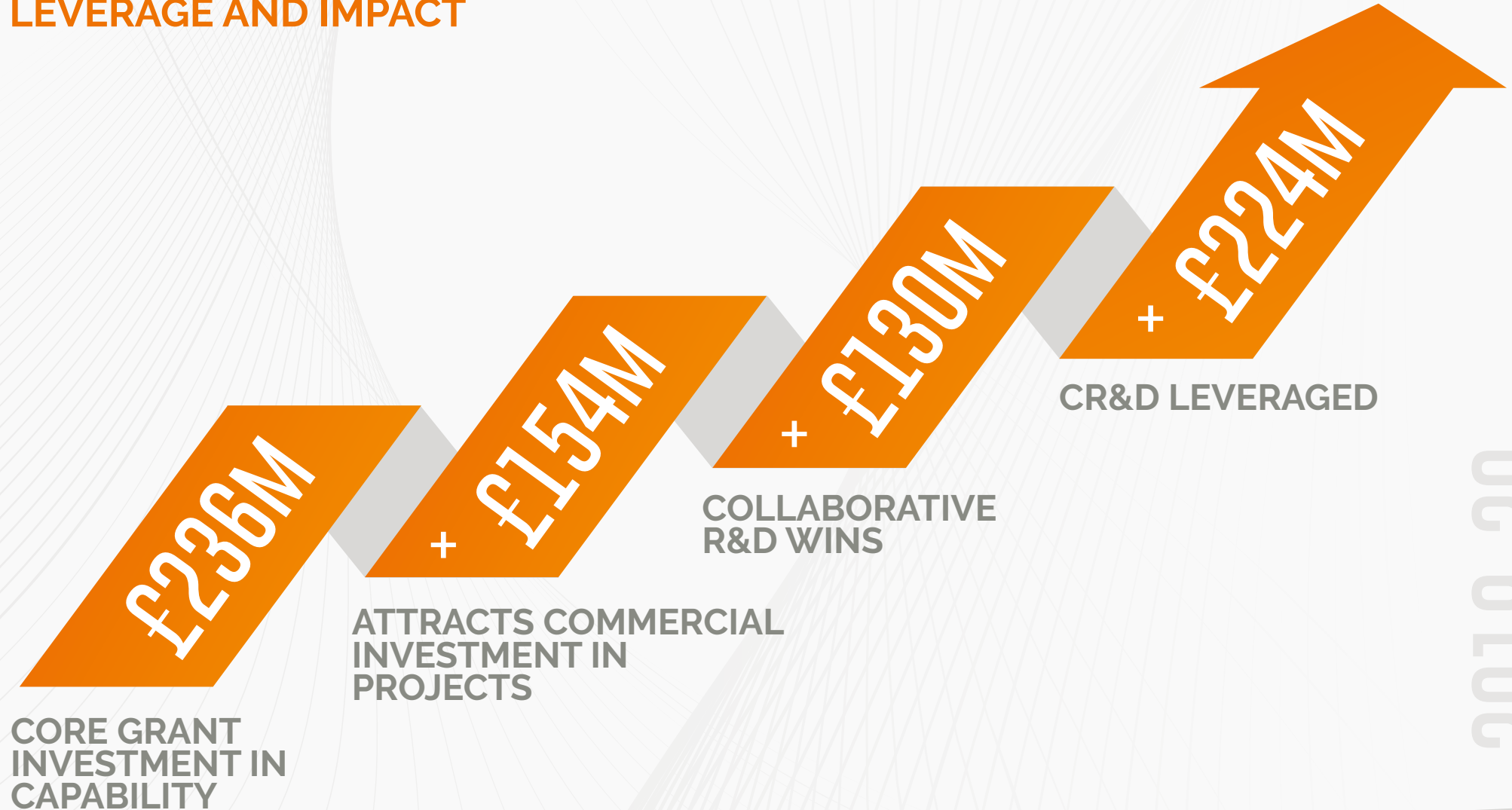
R&D FACILITIES
UNDER MANAGEMENT



R&D INVESTMENT

LEVERAGE AND IMPACT

TOTAL
£744M



2019-20

FOREWORD



A handwritten signature in black ink, appearing to read 'A Jamieson'.

Andrew Jamieson
CEO Offshore Renewable Energy Catapult
and Chair of Catapult Network

Catapults are a vital part of the UK research and innovation infrastructure actively supporting thousands of businesses to become more competitive through innovation and enabling faster adoption of emerging technologies to create new markets. Working collectively with the research and industry communities, the Catapult Network is uniquely positioned to lead a systems thinking approach to address major national and global challenges across multiple sectors and areas of technology. Our achievements over the past seven years reflect this.

In what has been an extraordinarily challenging year, the Catapult Network's coordinated effort to support businesses and the NHS in response to the COVID-19 pandemic is a standout example of our ability to mobilise organisations in times of crisis. The cornerstone of 'building back better' is innovation, in which the Catapults play an integral role. We exist to help businesses transform great ideas into valuable products and services, enabling them to thrive in global markets. Our activities that drive this innovation are fully aligned with the Government's R&D Roadmap, to advance economic levelling, nurture the workforce talent, enable Net Zero, modernise healthcare, create resilient communications, increase adoption of new technologies, drive productivity, food security, and much more.

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We exist to help businesses transform great ideas into valuable products and services, enabling them to thrive in global markets



Catapults are a national asset and work with businesses across all UK regions. We have a proven track record of delivering regional growth and national prosperity. Since 2013, Catapults have collectively played a lead role in delivering major R&D programmes involving over 14,000 collaborations with industry, 5,000 partnerships with academia, and supported more than 8,000 SMEs, leading to the creation of jobs, supply chain and sector development, new sources of revenue and investment.

As a Network, we are well established in our industry sectors, and future activity will see even greater cross-Catapult engagement and many more opportunities to collaborate with other partners in the UK's outstanding innovation ecosystem.

Throughout this report you'll discover how our world-leading facilities and expertise are helping businesses that would otherwise lack the R&D resources, to scale up their ambitions and unlock new markets. More than this though, we are a huge resource of industry knowledge and innovative thinkers. Through our collective vision we continuously work to create ambitious approaches to stimulate business growth, fostering reach that will place the UK at the centre of global technological innovation and talent creation, ensuring everyone benefits.



#Ai Leyser

Professor Dame Ottoline Leyser
UK Research and Innovation CEO



The UK has an incredible asset for the acceleration of innovation in the form of the Catapult Network

Throughout the world, 2020 will be remembered for the COVID-19 pandemic. As well as the immediate health emergency, it has had, and will continue to have profound societal and economic impacts. The crisis has taught us many things, highlighting our strengths and weaknesses as a nation. Throughout, we have seen the extraordinary power and creativity of the UK's research and innovation communities.

In this document you can read how the UK's Catapult Network has stepped up through its work on projects such as the ventilator challenge or on testing. This is a testament to their convening power, and their ability to rally businesses together and develop collaborative solutions at pace.

Their work clearly demonstrates us how crucial research and innovation are, not only for addressing the immediate issues thrown up by

the pandemic, but for the recovery and continued economic prosperity of the UK.

Beyond COVID, the Catapult Network's deep industry sector knowledge and trust amongst their business networks are vital enablers in the delivery of the Government's R&D roadmap. The Network can play a central role in accelerating and capturing the value of UK innovation to build a greener, healthier and better-connected world.

This presents commercial opportunities for UK businesses, large and small, with which the Catapults are well-placed to help. By providing both social and physical infrastructure, the Network can help test new ideas, share knowhow and support entry into new markets.

In these challenging times, the UK has an incredible asset for the acceleration of innovation in the form of the Catapult Network. By working together across academia and industry and as part of the UK Research and Innovation community, I am confident the Catapult Network will continue to rise to the challenge.

COVID-19

BRIDGING ACROSS SECTORS TO SURGE THE LATEST TECHNOLOGIES



2020 has been an unprecedented challenging year as a result of the COVID-19 pandemic; determining a path for rapid and substantial change in our societies. The innovation landscape has exhibited a global resilience demonstrating our ability to help businesses develop, even in times of uncertainty.

Collectively, Catapults have demonstrated their transformative innovative power to do something remarkable, leading an innovative charge to solve a critical problem for the nation. The Catapult Network joined national efforts to tackle the impact of the COVID-19 pandemic and by inspiring collaboration

between businesses, their supply chains, academia, charities, local authorities, service providers and end-users – it is stimulating the right conditions for recovery and change.

Catapults mobilised organisations to aid Government, NHS and health providers through the crisis, by delivering ventilators, drug repurposing, PPE, testing laboratories, digital solutions for remote applications, safe social distancing, and much more. All Catapults have continued to provide critical support to their extensive network of UK companies, keeping their needs front of mind, guiding them to access Government's support interventions and maintaining communications with their investor communities.

Critically, COVID-19 has forced the acceleration of the use of digital technologies in all areas of business and society. Across the whole Catapult Network, there is extensive activity taking place to advance the status of digital technologies, to develop secure remote connectivity and to help businesses embed these technologies in their environments more seamlessly. Digital Catapult for instance, has put its technology expertise to use, testing a number of new to market social distancing tools to assist in getting the UK back to work.

This Internet of Things benchmarking exercise helped to guide purchasing decisions by providing a neutral evaluation of these critical products, which if successful, will help create new industry standards.



DELIVERING VITAL MEDICAL EQUIPMENT, SAVING LIVES

Following a call with the Prime Minister, Dick Elsy, CEO of the High Value Manufacturing Catapult convened an industrial consortium from across the aerospace, automotive, motorsport and medical sectors to produce vital ventilator devices and support the NHS in its fight against COVID-19. Against a backdrop of life-or-death urgency, the VentilatorChallengeUK consortium – made up of over 5000 volunteers – established seven new large-scale manufacturing facilities in weeks at sites including the HVM Catapult's own Advanced Manufacturing Research Centre Cymru in Broughton. The consortium worked with great determination and energy to scale-up the production of the Penlon ESO 2 Emergency Ventilator, based on current technology from Penlon and an existing device from Smiths Group, the Smiths paraPACTM plus.

This coalition of the very best of this country's people and capability showcased the strength of the manufacturing industry in the UK. The consortium produced 13,437 ventilators in only twelve weeks, more than doubling the number available to the NHS and building a resilient stock should ventilators be required in the UK in the future. The High Value Manufacturing Catapult's seven Centres have also been active in donating over 100,000 items of PPE kit and manufacturing key items, such as face visors and shields for aerosol-generating procedures, using 3D-printing and batch cutting techniques for increased production efficiency.

It has been an amazing and humbling experience for Penlon to be a part of such a nationally important project. There is nothing more purposeful for a UK medical device company than contributing to saving thousands of lives.

Guru Krishnamoorthy
CEO Penlon

MOBILISING NATIONAL HIGH SCALE COVID-19 TESTING

As part of Government's effort to launch a national testing response to support the UK's fight against coronavirus via the establishment of a network of high-scale testing laboratories, the Medicines Discovery Catapult took the lead in coordinating the creation of the UK's Lighthouse Labs network and the delivery of a testing lab based at Alderley Park in Cheshire.

The Lighthouse Labs are an unprecedented effort building partnership with NHS, Public Health England as well as many other private and public organisations, and the biggest diagnostic lab project ever established in British history. Medicines Discovery Catapult's own Lighthouse Laboratory was created from scratch, repurposing an empty building at Alderley Park. Over 30,000 tests per day are performed on this site alone, completing 4 million samples in October 2020 since its opening, making it a critical component of community testing for the UK.



Alderley Park is showcasing the finest diagnostic science available to achieve the mass throughput, fast-process COVID analysis, helping to save lives and protect the NHS. We are enormously grateful for the hard work of the team.

Lord Bethell
Minister for Innovation at DHSC



BUILDING LONG-TERM NATIONAL RESILIENCE

COVID-19 LOOKING AHEAD...

Catapults are also avidly working on medicines and vaccine manufacturing solutions for COVID-19. Working alongside the UK Government taskforce, the Cell and Gene Therapy Catapult has been providing resources and technical expertise to support the development of the adenovirus vaccine candidate, originally developed at Oxford University's Jenner Institute. The Cell and Gene Therapy Catapult is also working with industry to develop the £100m state-of-the-art facility in Braintree to accelerate mass production to address the national COVID-19 response, and will also ensure that the UK has the best skills and expertise in cell and gene therapy and vaccine manufacturing through the development of an advanced therapies skills training network comprising online and national Centres.

CPI, part of the High Value Manufacturing Catapult, has also been playing a key role in supporting national efforts in the COVID-19

vaccine development. CPI is focusing on the development, scale-up and manufacture of the self-amplifying RNA (saRNA) vaccine candidate under development at Imperial College London. CPI's endeavour will create a significant legacy capability in the UK for RNA vaccines scale-up and manufacture, including Lipid Nanoparticles technology (LNPs), a key drug delivery mechanism for the class of RNA vaccines.

There are so many more excellent exemplars of response to the COVID pandemic across the Network. Working with their business communities and partnering with others in the innovation ecosystem, whilst acting as trusted and technology neutral organisations, Catapults will continue to create strong and resilient solutions to respond to the virus and boost the UK economy.

NET ZERO

DEPLOYING TECHNOLOGIES AND SYSTEMS TOWARDS DECARBONISATION

Progress towards Net Zero targets will require transformation across many areas, through advances in technologies, new approaches to accelerate their deployment, introduction of new service and business models, enhanced market and consumer focus, and importantly, new policy and regulations to encourage transformation.

Catapults are at the heart of the technological, market and policy developments that will drive the innovations of the Government's 10-point plan for the UK's transition to Net Zero. 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.



LARGE SCALE REAL-WORLD TESTING FOR HOME ENERGY INNOVATION

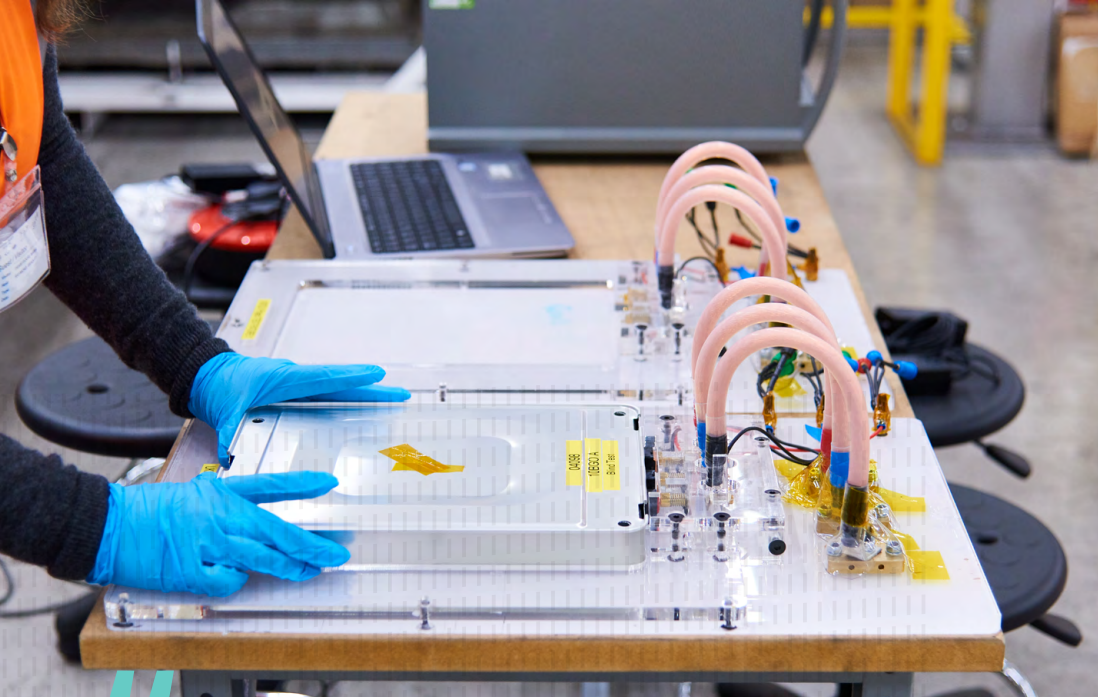
With around 40% of greenhouse emissions coming from UK homes, the Energy System Catapult has developed a 'Living Lab' – a real-world test environment of 100 digitally connected homes – to enable innovative businesses to rapidly design, market-test and launch their smart energy innovations in real conditions. The Living Lab also provides a national capability to test and demonstrate new market arrangement, policies and regulations with real consumers. AirEx Technologies was the first company to trial a product in the Living Lab. They tested a smart ventilation control – an intelligent air brick – with sensors measuring temperature, humidity and air quality, adapting to control humidity and heat loss, offering customers warmer homes, lower energy bills, and improved air quality.

The Catapult supplied technical expertise and consumer feedback data from Living Lab residents, helping AirEx refine their innovation, product offering, consumer attractiveness, acceptance and take up. This was essential in helping AirEx attract further investment, regulatory acceptance and recognition, increasing their turnover fivefold and doubling their employees in two years. The energy industry regulator, Ofgem, selected AirEx as one of only five new technologies approved to take part in the £640m ECO 3 Scheme programme where large providers invest in new solutions to deliver energy efficiency and heating. AirEx see a significant market for their innovation, with up to 40 million homes across Europe that could benefit.



Living Lab enabled us to gain quicker, better and easier access to consumers.

Agnes Czako
Co-Founder and Managing Director, Airex Technologies



THE FUTURE OF BATTERIES IN DRIVING DECARBONISATION

In the quest for decarbonisation, the Energy Innovation Centre (EIC) at WMG, part of the High Value Manufacturing Catapult, is driving key advances in battery development for energy storage spanning across a number of sectors. Their work has already allowed industrial partners such as Nissan Energy, AMETEK and Element Energy explore options for grading second-life electric vehicle (EV) batteries for reuse or recycling. The group's aim is for 90% reuse of Nissan battery packs currently assembled in EVs in Europe by 2021, with plans to recycle the remaining 10%.

Working closely with the automotive industry, regional and local authorities, the EIC has also played an instrumental role in developing the case for the £274m ISCF Faraday Battery Challenge to ensure the UK leads the world in the design, development and manufacture of electric vehicle (EV) batteries for the automotive sector. They led the initial establishment of the £80m UK Battery Industrialisation Centre, a national facility for scaling up battery manufacturing, which will make large scale EV manufacturing a reality in the UK. This is expected to attract much inward investment, create thousands of jobs and will be a true transformation towards Net Zero, with benefits available for all forms of transport.

UKBIC will deliver a critical capability for the UK to take battery technologies which have been proven in the laboratory, and understand how they can be manufactured at the volumes and quality needed to satisfy the future demands of the transport and energy sectors. As an open national facility, the largest of its kind in Europe, it will serve the needs of large-scale battery companies and new entrants alike.

Professor David Greenwood
CEO of the High Value Manufacturing Catapult's Centre at WMG

ADVANCING TECHNOLOGY INNOVATION FOR GREEN ENERGY

With the UK Government's recent ambitions to power British homes with wind power, the role of large scale testing facilities to provide real-world demonstration opportunities for new offshore wind products and services is becoming a top priority. To help with this challenge, the Offshore Renewable Energy Catapult provides the world's most advanced, open-access facilities for testing and demonstrating offshore wind turbine technologies, including the Levenmouth Demonstration Turbine (LDT) in Fife hosting some of the industry's most exciting new technologies.

Since 2016, the LDT has attracted over 100 SMEs for technology development, testing or demonstration, leveraging over £16m in additional funding. The Turbine also attracts world-leading collaborative research projects, such as the £4.3m Horizon 2020 Total Control and the €4m Demowind-funded Offshore Demonstration Blade. Livingston-based Cyberhawk, an autonomous inspection provider, which in 2018 performed commercial tests on the turbine, identified an industry baseline for quality. The Catapult has also funded a STEM ambassador at Levenmouth Academy, delivering extensive programmes throughout the school in areas such as robotics, drones and programming to spark local children's interest in offshore renewable energy as a future career.



Access to ORE Catapult's Levenmouth Demonstration Turbine has given our technology and services the crucial edge, providing the track record we needed to win contracts in the industry.

Euan Baird
Cyberhawk





END-TO-END HYDROGEN

Catapults are collectively supporting the development and integration of hydrogen as part of decarbonised global energy systems. Leveraging its cutting-edge R&D infrastructure and expertise and transferring knowledge and experience from different sectors, Catapults can help accelerate the development, integration, and commercialisation journey of both blue and green hydrogen. As neutral convenors of communities of interest, Catapults can help UK industry in the development and commercialisation of technologies needed for production, distribution and end use of hydrogen including applications in industry, manufacturing, transport, aviation, shipping, heating and more. Given the fragmented and complex landscape for hydrogen, and the need for a highly coordinated approach to innovation and demonstration, the Catapult Network is well placed to take a leading role in the creation of this important new energy vector.





CREATING CAPABILITY AND TALENT ACROSS KEY INDUSTRIAL SECTORS

NET ZERO LOOKING AHEAD...

With all eyes on the Government's effort to create incentives for this essential clean energy transformation, industries, innovators and researchers have a critical part to play. By fast-tracking the delivery of solutions to improve decarbonisation in energy generation through renewables and the deployment of low carbon alternatives, such as hydrogen and electrification, the UK is taking the lead in the Net Zero race. In particular, the UK is making concerted efforts to create the right environment that will enable widespread vehicle electrification, tackling emissions in the transport sector, which alongside power and conversion, account for nearly half of greenhouse gas emissions.

Collectively, 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 combined knowledge of multiple industry sectors and our integrated, 'whole systems approach'. Catapults 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, towns, places and industries, Nuclear, and Bioenergy, through national and international cooperation in this space.



ACCELERATING BUSINESS GROWTH

LAYING THE FOUNDATIONS FOR STARTUPS AND SMEs TO THRIVE IN CHALLENGING TIMES

Businesses have been under much pressure to plan for an uncertain future in the wake of so much transformation. The pandemic has added to this pressure even further.

An essential route that businesses are taking to build resilience and plan for the long-term is to focus on innovation as a strategy to remain competitive. This is where the Catapult Network, together with Government, business and communities in the innovation ecosystem, play a vital part.

Catapults actively apply emerging technologies, capabilities and specialist knowledge in multiple sectors to help pioneering businesses succeed in the introduction of new and improved processes, products and services, generating new revenue streams.

Fostering the current pull through of research breakthroughs into industrial applications, the Catapults return higher value faster. They also look to improve retention of UK entrepreneurial capability, improving the quality of early stage concepts and supporting startups, and enabling the scale up of established UK companies. The Catapults'

hands-on expertise and extensive knowledge of emerging markets and R&D programmes increase the level of maturity of innovations, activating trust in the investor communities and reducing barriers to entry for fledgling businesses engaged on their programmes.

Catapults are also actively promoting supply chain growth and resilience through special programmes that help businesses develop the necessary competences, skills, capability and experience needed to become more competitive and to secure contracts, such as in nuclear industry and offshore renewable energy.

TRANSFORMATION IN UK SATELLITE BASED SERVICES

Satellites help us to better understand our world and our surroundings. The data satellites collect have applications in agriculture, health and wellbeing, weather monitoring, and importantly, in digital communications. Exploring the opportunities for space data is helping UK businesses to realise the potential of satellite technology. One of the Satellite Applications Catapult's flagship innovation programmes is the In-Orbit Demonstration Programme (IOD) which involves the development and launch of six cubesats in space. Cubesats are a miniaturised satellite used for a multitude of applications, from space research and exploratory missions to earth observation and communications.

AAC Clyde Space – a world-leading supplier of cubesats – was part of an early IOD consortium which developed a new miniature satellite (UKube-1) allowing the company to pivot from a subsystem component manufacturer to a cubesat manufacturer. AAC Clyde Space subsequently became a mission delivery supplier for the IOD programme in 2017. They are now responsible for the delivery of 5 of the IOD spacecraft. A typical end-to-end (design-build-launch-operate) mission example is the launch from the International Space Station of a satellite providing a new miniaturised weather observing and forecasting technology into space. The support of the Catapult over the last few years has directly aided the growth of AAC Clyde Space, and Glasgow now produces more satellites than any other European city.



Without the Satellite Applications Catapult, I am certain that the UK would not be in as strong a position for commercial space sector growth as it is today.

Craig Clark
MBE, CSO AAC Clyde Space





SMEs increase the rate of innovation in cities, transport, and places. When teamed with larger corporates, they spark and accelerate much needed growth. At Connected Places Catapult, we provide 'innovation as a service' and our dedicated SME programme supports small businesses and enables them to get to their next growth level through our intensive accelerators, connections to pioneering practice and access to physical test beds and cutting-edge research.

Prof Greg Clark
Chair, Connected Places Catapult

CREATING INTEGRATED RESILIENT ECOSYSTEMS

Supporting small businesses in their growth is critical for the UK economy. More than 400 SMEs and startups have benefited from participation in the Connected Places Catapult's SME Development Programme since April 2019, of which 20 startups have raised a total of £25m in investment. The Catapult has also launched the HS2 Accelerator with 10 companies selected to take part in collaboration with Innovation Birmingham focusing on productivity, the environment and the circular economy. As well as harnessing the Catapult's technical knowledge, market expertise and regulatory experience, the SME Development Programme provides intensive business support preparing start-ups to be 'investor ready', helping regenerate local communities and retaining local talent. A recent example is Arrival Ltd – a London based technology SME that develops unique technology solutions to assemble vehicles in locally placed micro factories. Arrival worked with the Catapult to meet sustainability targets through the use of existing motorway infrastructure together with autonomous vehicles and new transport hubs, to provide more frequent services across the country. The company has continued to grow and in January 2020, Arrival successfully received €100m from Hyundai and Kia to jointly accelerate the adoption of commercial electric vehicles globally, supporting Arrival's ambition to deploy 1,000 micro factories by 2026.

ACCELERATING BUSINESS GROWTH LOOKING AHEAD...

Catapults have first-hand insight into strategic sectors that allows industry and government to address challenges shared by thousands of UK innovators. Through their intimate knowledge of industry sectors, Catapults help businesses grow their existing markets, simultaneously unlocking new ones.

The Catapult Network is collectively securing the future of high growth SMEs through their contribution to major key national initiatives. For instance, working with others in the research and innovation ecosystem, Catapults have helped build many of the cases for the Industrial Strategy Challenge Fund (ISCF), including the Faraday Battery Challenge, Future Flight, Driving the Electric Revolution,

Prospering from the Energy Revolution, Made Smarter, Transforming Construction, and also delivering many R&D and training programmes within these. These initiatives will deliver the next generation of technological advances to create the growing markets of tomorrow across multiple sectors including automotive, aerospace, energy, infrastructure, construction, emergency services and so forth.

As newly established Catapults and their centres continue to mature, the Catapult Network will play an increasingly larger role in re-gearing the UK economy, ensuring that the benefits of small companies prospering flow into their supply chains and every community.



INCREASING GLOBAL COMPETITIVENESS



LEVELLING UP

CHANNELLING IMPACT INTO LOCAL ECONOMIES THROUGH INNOVATION

Government aims to address inequality and 'level up' underperforming parts of the UK through a programme of infrastructure development, and by further investing in education, skills, science and R&D.

Catapults, as key national assets accelerating commercialisation of research and connecting the innovation landscape, are helping all of the UK's regions attract high value investment into economically lagging, deindustrialised areas, creating jobs, wealth and investor confidence.

The Catapult Network works closely with Local Enterprise Partnerships (LEPs), Knowledge Transfer Network (KTN), local authorities and Devolved Administrations establishing relationships with local research and business communities to design and deliver essential R&D programmes and to create clusters of excellence. By promoting better alignment of the local agendas in respective sectors and economic plans, Catapults are playing a major role in helping regenerate underdeveloped areas through innovation.



REGENERATING LOCAL COMMUNITIES

Rotherham is home to the High Value Manufacturing Catapult's Advanced Manufacturing Research Centre (AMRC) and Nuclear AMRC which have attracted over £218m of inward investment from global companies including Boeing, Rolls-Royce and McLaren. This has spurred regeneration of the area of deprivation that once surrounded the Orgreave Coking Works, transforming it into a prosperous, positive innovation hub with up to 3,500 new jobs. The Centre's work has attracted strong inward investment from Boeing which established its global digital flagship for connected factory and supply chains - its only European manufacturing facility - on the AMRC's doorstep; and enticed UKAEA to build a £22m nuclear fusion research facility next door. It has not only transformed an area but also whole communities - where the Battle of Orgreave played out in 1984 now stands the AMRC Training Centre with its proud record of training more than 1,500 apprentices and putting £20m into the homes of some of the region's most disadvantaged families.



If I were 16 and given a hundred choices for careers, I would choose here every time. You cannot ask for a better environment for tomorrow's engineers.

Professor Hamid Mughal
Former Director of Global Manufacturing, Rolls-Royce



Through collaboration with the Catapult we and our members are growing the UK's strength and capability in automotive electronics. A great example of this working relationship is the APC12 £20m funded ESCAPE SiC project of which the Catapult is a core and central partner.

Paul Jarvie
Director, AESIN (operated by TechWorks)

A COMPOUND SEMICONDUCTOR POWER HOUSE IN SOUTH WALES

A transformation is taking place in Wales to create the world's first compound semiconductor cluster with an associated talent pipeline producing highly skilled, well-paid jobs and bringing progress and prosperity into the region. This £43m programme funded through the UKRI Strength in Places Fund is led by Cardiff University with key regional industrial partners and the Compound Semiconductor Applications Catapult.

The 'CS Connected' cluster integrates research excellence with the regional supply chains in advanced semiconductor manufacturing to develop a competitive advantage in critical sectors, such as optical communications, 5G, autonomous and electric vehicles, aerospace, robotics and medical devices. Wales is becoming the home for key developments that will create a complete UK supply chain for the production of electric power train components and industrial scale-up programmes that are expected to transform the UK's automotive industry.

The Compound Semiconductor Catapult is taking a key role in driving these advances, in collaboration with industrial and academic partners in a number of programmes: £20m ESCAPE for McLaren Applied, £30m FUTURE-BEV with BMW & McLaren Applied, and one of four 'ISCF Driving the Electric Revolution' industrialisation centres. It is anticipated that these will deliver considerable impact over 3-5 years, adding over 230 jobs and attracting over £130m of additional investment into the region.



MAKING THE NEXT GENERATION OF IMMERSIVE CONTENT A REALITY

Digital Catapult has established and contributed to state-of-the-art Immersive Labs in Northern Ireland, Brighton, Gateshead and Greater Manchester, bringing physical digital facilities that would not otherwise exist, with a focus on driving local innovation. In partnership with immersive media company Hammerhead Interactive and Microsoft Mixed Reality Capture Studio, Digital Catapult launched Dimension, a state-of-the-art volumetric and 3D capture studio for the next generation of immersive content. Dimension harnesses six years of Microsoft research and are one of only three such studios globally.

Digital Catapult formed the three way partnership, identifying Gateshead's Hammerhead Interactive as a company capable of taking this technology to market. Since the launch of Dimension, over 100 new high value jobs have been created in production companies, retailers and broadcasters to exploit the technology. In Gateshead, recognising the importance to the local economy of companies like Hammerhead, the City Council invested £8m in the creation of a brand new purpose built performance capture studio and adjacent office refurbishment. Proto, the first digital production facility of its kind in Europe, opened in early 2018. In 2019, Hammerhead signed an agreement with Nikon to create two mobile volumetric capture studios based on the strength of Dimension's performance.



We are thrilled to partner with Digital Catapult and Hammerhead to create Dimension Studio, which is the first studio to license our Mixed Reality Capture Technology and take it to a global scale.

Steve Sullivan
General Manager, Microsoft Mixed Reality Capture Studios



GENERATING REVENUE, JOBS, EXPORT AND INWARD INVESTMENT OPPORTUNITIES

LEVELLING UP LOOKING AHEAD...

As the UK propels economic growth arising from innovation, it also ignites the requirement for a new set of specialised workforce skills in these areas. In sectors where Catapults operate, they are ideally positioned to understand what these needs are. The Catapult Network is already shaping the workforce agenda in key sectors through informing requirements, identifying gaps, and where essential, taking the lead on establishing training centres, with hundreds of apprentices being trained each year.

Bringing the power of digital and data to promote faster growth of regional sectors and encourage inclusivity everywhere is one key opportunity Catapults are also working towards. Connecting industries and the digital ecosystem remains a challenge. Catapults facilitate adoption and diffusion of advanced digital technologies, such as machine learning, Artificial Intelligence, 5G, future networks, enabling the automation of tasks to drive higher productivity and efficiency across every sector. Through the

establishment of testbed and demonstration facilities, Catapults are harnessing the UK opportunity to improve productivity at both local and national level, helping communities address regional disparities. Catapults are also driving the UK towards key advances in critical areas such as to create secure, resilient telecoms infrastructure and to assure the future of sustainability, such as in food production, agriculture and the environment.

Catapults are continuously developing regional strategies through the establishment of centres, facilities or offices in many regions across the UK to better enable local access to the customer base, especially to reach out to startups and SMEs, and to access different specialisms and technical competencies in those regions. Building upon the strategic distribution of our Network, this journey will continue to evolve, creating further opportunities for more Catapult-centred industrial clusters of regional growth.

MODERNISING HEALTH

HEALTH AND WELLBEING ENERGISED BY BREAKTHROUGH TECHNOLOGIES

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 will do more in diagnostics and digital therapeutics products. Catapults 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.





ENABLING THE DEVELOPMENT OF POTENTIALLY LIFE-SAVING THERAPIES

Maintaining highly viable cells from the starting material to final therapeutic product is a major challenge. Between initial collection, manufacturing, and re-infusion into the patient, freezing of cells may be required, adding specific logistic and cell thawing needs. Cell thawing is critical to preserve cells viability and functionality, especially if manual processes are applied, introducing risks of process variations and contamination, possibly jeopardizing therapy efficiency. Particularly at the final step, therapy re-infusion, thawing is crucial to ensure maximum benefit for the patient.

The Cell and Gene Therapy Catapult identified the need for a cell thawing solution and worked with Asymptote (now part of Cytiva, formerly GE Healthcare) to develop a point-of-care benchtop device for the controlled thawing of cell therapies. Asymptote were able to commercialise this product, and the GE Healthcare acquisition in 2017 enabled further advancing product development and reaching a larger market.

Research and developments have continued and expanded into addressing the challenges of cryo-shipping. Working together with the Advanced Therapies Treatment Centres network coordinated by the Cell and Gene Therapy Catapult, the team has developed the first liquid nitrogen-free cryogenic shipment system, specifically designed for cell therapies, successfully launched in May 2020.

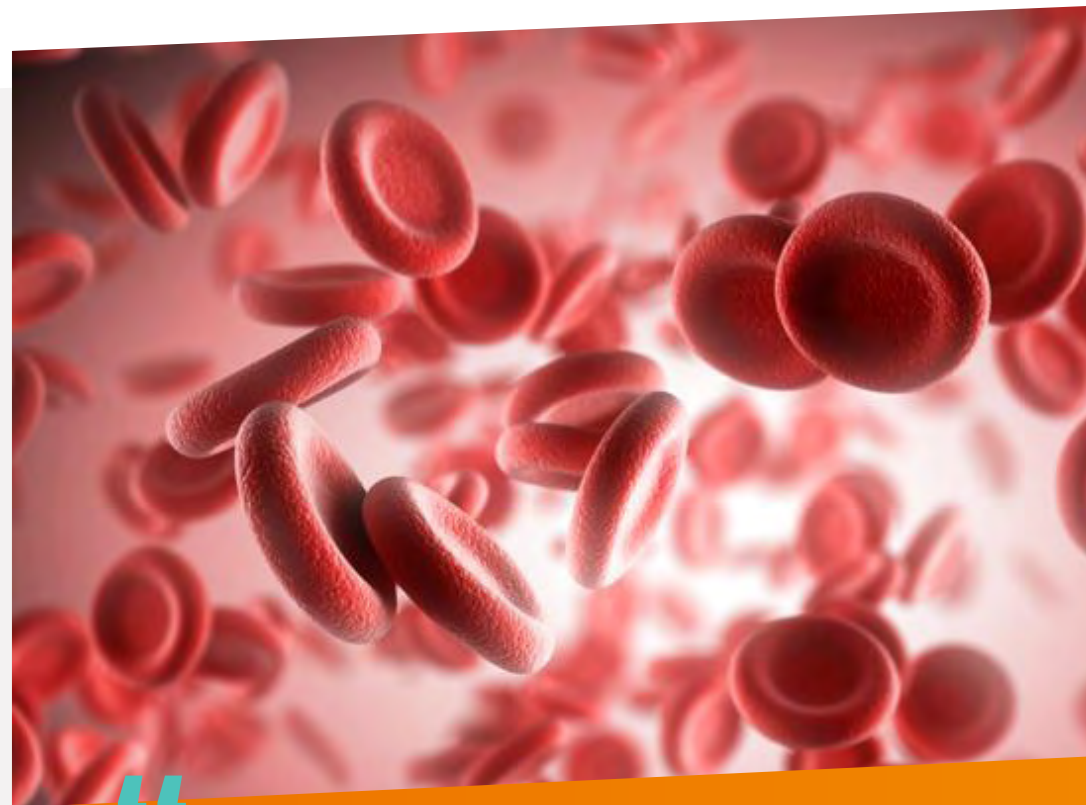
Asymptote Ltd has found the access to the NHS and ATMP developers through the ATTC network invaluable. Being part of this collaborative network has dramatically accelerated the development of Asymptote's technologies.

John Morris
Chief Executive Officer, Asymptote, part of Cytiva

NEW THERAPIES TO TREAT THROMBOSIS DISEASES

LUNAC Therapeutics, a UK based drug discovery company, along with the Medicines Discovery Catapult and the University of Leeds, are working on the development of an innovative first-in-class anticoagulant treatment drug with minimal bleeding risk.

Anticoagulation therapy is used in a range of conditions such as prevention of stroke in patients with atrial fibrillation or venous thromboembolism post-surgery. The project aims to develop medicines to prevent the formation of a blood clot inside a blood vessel (thrombosis), overcoming common undesirable brain or gut bleeding events of current medicines which in some instances, may be fatal. New anticoagulant treatments have the potential to save in excess of £2.7 billion per year, in Europe alone.



New anticoagulant treatments are desperately needed. LUNAC's research has shown that targeting activated Factor XII has the potential to offer a new treatment option for patients, and we are therefore delighted to have secured Biomedical Catalyst funding to help drive this exciting project forward.

Professor Helen Philippou
Scientific Founder of LUNAC Therapeutics



DRIVING AFFORDABILITY, EFFICIENCY AND RESILIENCE

MODERNISING HEALTH LOOKING AHEAD...

Building on UK research and innovation capability, collectively Catapults are now looking at health innovation strategies that take a fully integrated and personalised healthcare systems perspective. This considers new preventative approaches to healthcare and health models, promoting the integration of data to support advanced and point of need diagnostics, identifying new pathways to treat and manage chronic diseases and maturing new medicines and advanced therapies that reach patients more quickly.

Working in partnership with healthcare providers, Catapults are creating local and regional ecosystems which will transform the national landscape through specialist expertise, facilities and training that accelerate the transition of advanced therapies, medicines, and adoption of a number of advanced technologies in health applications.

The role of Artificial Intelligence in providing improved responses in the analysis and assessment, across the full cycle from diagnosis to monitoring through to drug discovery, manufacturing and device development will also play an important role in medical breakthroughs.



CREATING THE FUTURE THROUGH INNOVATION

The Catapult Network was created as a national asset to provide ambitious businesses with access to world-leading facilities and expertise, to test and scale-up new developments and technologies, to accelerate innovation, and access new markets. This impact report highlights examples of the economic benefit Catapults have had on UK innovative business growth.



The UK must create the best possible environment for research, development and innovation

The UK must create the best possible environment for research, development and innovation, nurturing the sectors and technologies that will transform the UK and aid economic recovery.

Key to this is stimulating collaboration between businesses, their supply chains, researchers, and end-users to accelerate the commercialisation and adoption of technological innovation. It is also important that the Catapults assist in the skilling of people, ensuring that businesses can employ the talent and R&D capability needed to enhance productivity and growth.

Each of the Catapults operate in a sector where the UK has a particular strength or where the ingredients exist to grow a multi-billion-pound industry. In the future, greater cross-Catapult working, developing linkages across the network, will ensure that no matter where they are based, businesses can access the facilities, skills and talent they need from across the ecosystems to grow.

In the future as innovation continues to evolve, more businesses will benefit from the Catapult's combined knowledge of multiple industry sectors, their unique convening power and cross-sector collaboration in bringing thought-leaders together with businesses to drive their sectors forward, making the UK's innovation ecosystem stronger.



A stylized, handwritten signature in black ink, appearing to read 'Ian Campbell'.

Dr Ian Campbell
Innovate UK Interim Executive Chair

Get in touch



catapult.org.uk |  @catapult_uk

