

# World-class innovation

## Delivering economic impact: harnessing the innovative capacity of our research facilities and campuses to create new business opportunities

Our long-term strategic goal is to accelerate the commercialisation of novel ideas and technology arising from our science, thereby supporting the government's commitment to raise investment in R&D to 2.4% of GDP by 2027.

Technological breakthroughs, and culture of innovation, drive novel products for industry, new ventures and clusters of high-growth businesses with huge potential benefits. We play a key role in mobilising the UK's inventive capacity. By delivering world-leading facilities for the purposes of industrial and academic research, translating discoveries into practical applications and exploitable outcomes and developing our research and innovation campuses, we help create high-value jobs and high-tech businesses.

In order to exploit the multi-faceted nature of our science, we have developed approaches and support mechanisms to drive innovation actively from the very early stages, fostering novel ideas and spinning out new ventures. Our translational activities combine challenge-led approaches to stimulate the application of our science to address grand challenges, technology-push initiatives to explore the opportunities for our innovative discoveries, and activities to promote innovation within our national laboratories and wider university community.

- **Research and innovation campuses**
- **Supporting small- and medium-sized enterprises**
- **Commercialisation of intellectual property from STFC's national laboratories**
- **Commercialisation from STFC's university programmes**
- **Transferring knowledge and technology to industry**
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### Research and innovation campuses

STFC works to realise the innovative capacity of its science and research facilities to support the growth of the UK economy. This is exemplified by our national research and innovation campuses at Daresbury in Cheshire and Harwell in Oxfordshire, where industry, academia, commercial and public organisations are co-located with cutting-edge facilities to provide a vibrant research and development-intensive ecosystem. Since their inception more than ten years ago, these campuses have been remarkably successful, enabling innovation and the growth of skills, as well as the development of high-tech businesses and high-value jobs, with more than 7,000 people currently employed across both campuses.

They are home to a variety of research-intensive organisations, from disruptive start-ups to blue-chip companies, co-located with world-leading research infrastructure, and continue to attract public and private investment and deliver economic growth for their respective regions.

### Harwell Campus

With an estimated GVA of over £1 billion<sup>i</sup>, Harwell is a world-leading science, research, technology and business campus; it provides job creation and economic growth that benefits the whole country<sup>ii</sup>. A partnership between STFC, the UK Atomic Energy Authority, Harwell Oxford Partners and U + I, and Brookfield Asset Management, the campus hosts 225 commercial, public and academic organisations, which together employ around 6,000 people working at the forefront of UK innovation and discovery.

Harwell is also home to £2 billion worth of scientific infrastructure, and provides a combination of start-ups, SMEs and large corporations, offering a critical mass of world-class expertise across sectors including space, life sciences and energy, and supercomputing, AI and big data.

### Science facilities based at Harwell

Three large-scale, national research facilities are based on campus at STFC's Rutherford Appleton Laboratory: the **Central Laser Facility (CLF)**, the **Diamond Light Source synchrotron (DLS)**, and the **ISIS Neutron and Muon Source**. They are an integral part of Harwell, providing invaluable support to the campus community and far beyond, enabling scientists and industry to advance their interdisciplinary and multidisciplinary research and innovation.

Alongside these facilities, work continues on the construction of the £103 million **Rosalind Franklin Institute (RFI)**, which will be dedicated to bringing about transformative changes in life science through interdisciplinary R&D.

Elsewhere on campus, the **National Satellite Test Facility** (left) is due to become operational in 2022; while the new **Faraday Institution**, a virtual research organisation devoted to science related to batteries, already has its HQ at Harwell.



Another research facility, the UK's first **Vaccines Manufacturing Innovation Centre (VMIC)**<sup>iii</sup> (right), will open at Harwell in 2021, ahead of the originally scheduled date of 2022. Founded by the University of Oxford, Imperial College and the London School of Hygiene and Tropical Medicine, with support from industrial partners, the new centre will provide facilities and expertise to underpin the rapid acceleration of vaccine research, and establish the UK's first advanced capabilities for the manufacture of vaccines. The centre is supported by government investment of £67 million awarded via the Industrial Strategy Challenge Fund in August 2019, with additional funding provided by commercial and other partners, including Janssen Vaccines & Prevention BV, Merck Sharp and Dohme and Wellcome. Expertise and training in state-of-the-art manufacturing equipment will be provided by GE Healthcare<sup>iv</sup>.



The campus is also due to be enhanced by the opening of the **Extreme Photonics Application Centre (EPAC)** in 2024. The new centre, which will receive £81 million in government support, will house super-bright lasers to produce state-of-the-art 3D X-rays in just 40 seconds. This will help speed up the development of new medical treatments, bring down the cost of manufacturing and identify design improvements<sup>v</sup>.

A £180 million, state-of-the-art, science and digitisation centre for the **Natural History Museum** will be another new addition to Harwell. Announced in the government's 2020 budget, the new facility will be a world-leading sustainable base for natural sciences research and international collaboration, establishing a world-class research centre that will strengthen the UK's position in tackling global challenges including climate change, resource scarcity, biodiversity loss, and emerging diseases<sup>vi</sup>.

### Harwell Campus clusters

There are three major clusters on campus together comprising more than 160 organisations, of which nearly one-third are active across more than one cluster, thereby providing avenues for technology translation across disciplines<sup>vii</sup>.

The **HealthTec Cluster** at Harwell is a thriving ecosystem of innovative companies across a broad spectrum of emerging pharmaceutical/biotech, medtech, diagnostic, digital health and related areas, comprising more than 1,000 people across 56 organisations, many utilising the capabilities of large facilities such as the DLS or the CLF for drug discovery and the development of biocompatible materials<sup>viii</sup>. Public Health England's Centre for Radiation, Chemical and Environmental Hazards and the

MRC's Harwell Institute are also on campus; they will soon be joined by the RFI, with its focus on developing and delivering tools that enable breakthrough research in academic and industrial communities<sup>x</sup>. The cluster will also be strengthened with the arrival on campus in the latter half of 2020 of the Nucleic Acid Therapy Accelerator, a new national research initiative with a mission to accelerate the development of nucleic acid therapeutics<sup>x</sup>.

Space is an intrinsically multi-disciplinary sector, and interdisciplinary collaboration between the clusters at Harwell is driving growth, with spill-over benefits that extend into many parts of the economy. The **Harwell Space Cluster** is the gateway to the UK space sector, with 105 Space organisations employing more than 1,100 people as at the end of 2019, a year-on-year increase of 16 per cent<sup>xi</sup>. By 2030, the cluster aims to include 200 organisations collectively employing 5,000 people, according to the cluster's ten-year strategy<sup>xii</sup>. Organisations currently within the cluster include STFC's long-established RAL Space, the Satellite Applications Catapult, the European Space Agency's European Centre for Satellite Applications & Telecoms, and a thriving European Space Agency (ESA) business incubator. This core of organisations attracts start-ups and large corporates alike, including Airbus Defence & Space, Lockheed Martin and Thales Alenia Space<sup>xiii</sup>.

The **EnergyTec Cluster** has grown by 17 per cent since its launch in May 2018, and now includes 35 industry, academic and public organisations working on the campus, collectively employing ~900 people. A further 26 companies, which started off in Harwell's Space or HealthTec Clusters, now also focus on the energy sector as a major market for their innovative technologies. With a focus on energy storage, battery technologies and carbon neutral alternatives to fossil fuels, the technologies emerging from these 60+ organisations will influence every aspect of life across work, travel and recreation, improving the environment and developing sustainable alternatives for the future<sup>xiv</sup>. The campus is also setting up a **Technical Living Laboratory**, the purpose of which is to support energy innovators in developing next-generation energy solutions as part of efforts to mitigate climate change<sup>xv</sup>.

### **MIRICO start-up achieves rapid growth at Harwell**

MIRICO is a rapidly-growing start-up which exemplifies the way in which the world-leading technology and cross-industry collaboration offered by Harwell, combined with early-stage innovation and business support, can help a business to flourish. MIRICO designs, develops and manufactures cutting-edge gas-sensing solutions that were originally created for the purposes of exploring Mars. Established in 2015 as a spin-out from STFC's RAL Space, MIRICO was able to develop its technology with the support of the Rainbow Seed Fund (now UKI2S – UK Innovation and Science Seed Fund) and the private capital investor, Longwall Ventures EFC, which provided funding of £1 million in 2016. Additional external funding, provided in 2018, has included £3.5 million from the Foresight Williams Technology EIS Fund, Longwall Ventures, STFC Innovation Ltd and UKI2S to enable MIRICO to transition from product engineering to manufacturing their own technology<sup>xvi</sup>.

MIRICO now applies its laser-sensing technology to the high-precision chemical analysis of gases across a wide range of applications. These include diagnosing medical conditions through testing human breath, verifying the origin and authenticity of goods in the food and wine industry and identifying sources of carbon dioxide in the environment to aid in monitoring climate change. MIRICO's technology can be used by non-experts in hospitals, industrial factories, and outdoors – significantly improving upon ease of use compared to existing laboratory-scale equipment. The company has also benefited from the cross-industry collaboration offered by Harwell, via the campus's EnergyTec cluster in particular.

According to Mohammed Belal, Founder and Business Development Director: "Harwell Campus' combination of state-of-the-art research facilities and access to organisations that we can collaborate with makes it the ideal environment to develop a product and grow a company. At Harwell, our technology has gone from the STFC lab to deployments within major organisations, which couldn't have been achieved anywhere near as quickly without the ability to share resources, knowledge and even contacts with other companies operating in this unique environment<sup>xvii</sup>."

## Sci-Tech Daresbury

Sci-Tech Daresbury is a joint venture between STFC, Halton Borough Council, and the property development and management company, Langtree. A dynamic and economically transformative campus, built with a heritage of excellence in HPC (high performance computing), and particularly in particle acceleration, Sci-Tech offers a thriving, collaborative innovation community, integrating world-class science and technology with ambitious and fast-growing businesses.

Around 150 companies are based at Sci-Tech; together with STFC they employ more than 1,400 people<sup>xviii</sup>. They range from start-ups to global players such as IBM, Atos and Hitachi. The company base is technology-focused, with a particular focus on advanced engineering and materials, digital/ICT, biomedical and healthcare, with a HealthTec cluster at Sci-Tech comprising 35 organisations and nearly 350 employees<sup>xix</sup>.

Since their formation, tenant companies at Sci-Tech have raised £119,170,000 in funding, created 121 new products/services, and achieved sales valued at £130.6 million. More than 200 collaborations have taken place between campus companies.



## Science and innovation assets hosted at Daresbury

- STFC's **Daresbury Laboratory**, recognised internationally for world-leading scientific excellence in a diverse variety of fields, from nuclear physics to supercomputing
- STFC's **Hartree® Centre**, which works with partners including IBM to support UK industry in the effective adoption of advanced digital technologies, such as HPC, artificial intelligence, simulation and big data analytics
- The **Virtual Engineering Centre**, led by the University of Liverpool, a leading centre for the integration and exploitation of innovative digital engineering solutions to industry, such as advanced modelling and simulation and immersive visualisation
- The **Accelerator Science and Technology Centre (ASTeC)**, a centre of excellence for the study of the production, acceleration and delivery of charged particle beams
- The **Cockcroft Institute**, another national centre of excellence in particle accelerator science
- **SuperSTEM**, one of the world's most powerful scanning transmission electron microscope facilities, led by a consortium of five UK universities, with more than 80 active user groups from across the globe.

## Advanced Oncotherapy

Since establishing testing and assembly operations at Sci-Tech Daresbury, Advanced Oncotherapy has been working with leading experts in particle accelerator science at the Accelerator Science and Technology Centre (ASTeC), and the Cockcroft Institute to develop the next generation of proton beam machines for the treatment of cancer. Verification and validation of the world's first linear proton beam accelerator system started in late 2019, and the company expects that the first patients will be treated at Daresbury before the end of 2020, after which the system will be moved to London to start commercial operations. Advanced Oncotherapy's new Linac for Image Guided Hadron Therapy (LIGHT) system was developed by a CERN spin-out company; the new system is designed to reduce the cost and optimise the performance of proton therapy, and is set to be a significant advancement in cancer therapy. While at Sci-Tech, the company has been growing its business links thanks to the growing innovation ecosystem on site and the development of sector-specific cluster networks<sup>xx</sup>.

## **Hartree® Centre helps to transform competitiveness of its industrial users**

The Hartree® Centre, based at Sci-Tech Daresbury, is a supercomputing centre that exists to help transform the competitiveness of UK industry by accelerating the adoption of HPC, big data and cognitive technologies, thus helping to keep the UK at the forefront of industrial innovation. It has grown quickly and delivered an exciting array of projects thanks to government investment, its own expertise, and strong industrial partnerships with organisations such as IBM. The centre provides specialist skills and state-of-the-art facilities, and enhances the capabilities of its industrial users, delivering a quality and breadth of service that goes beyond anything the market will provide.

An independent baseline study published in October 2018 reported a net impact GVA of £27.5 million in commercial benefits to users during the centre's early phases<sup>xxi</sup>. This was in addition to a £7.1 million net impact from the operational expenditure of the centre in the first two phases of the centre.

### **Using big data to streamline early-stage drug development**

The Hartree® Centre is working as part of the ADDoPT ((Advanced Digital Design of Pharmaceutical Therapeutics) project, an academic-industrial knowledge-base collaboration with the UK pharmaceutical industry to accelerate advanced digital-design techniques, thereby streamlining drug development. Understanding and predicting the solubility of drug compounds early in the development cycle can help the pharmaceutical industry to refine candidate selection, offering a way for molecular variants to be ranked against each other without the need for expensive experimentation, and giving greater control and accuracy, thus speeding up drug design.

The energy with which molecules are bound together within a crystal provides a strong indication of key drug properties, taken together with broader datasets and atomistic modelling. Working with the ADDoPT team, using atomistic modelling, big data and machine learning, Hartree has created a practical model with which to analyse a database of 60,000 known crystal structures to ascertain the way in which molecules orient themselves with respect to one another within a crystal. Pfizer has already developed the model in order to apply it to 1,500 drug structures<sup>xxii</sup>.

## **Supporting small- and medium-sized enterprises**

### **Business incubation**

Since 2010, companies supported by STFC have raised £120+ million in funding. The programme of support includes STFC's business incubation programmes. Delivered with the European Space Agency (ESA) and CERN, these programmes provide tailored support to meet the needs of start-up enterprises that have their roots in STFC's research base, applying technology in sectors such as biomedicine, energy and security. By supporting the growth of businesses, STFC is making an impact on UK productivity in key sectors of the economy.

### **The ESA BIC UK**

The ESA Business Incubation Centre (BIC) UK is part-funded by STFC in partnership with the ESA, and forms part of European network of 20 ESA BICs. Start-ups, SMEs and early-stage businesses can base themselves at Edinburgh, Daresbury or Harwell. ESA BIC tenant companies are able to benefit from a strong programme of support including: access to funding opportunities; expert science and engineering advice and assistance; a world-renowned business address; on-going support from business advisers; and access to STFC's extensive network of universities, partner organisations and other businesses, including unique access to international programmes and partnerships. Since its inception in 2011, the ESA BIC UK has provided this broad range of support to more than 75 start-ups that use space technology in their businesses, in sectors that include agriculture, digital technology, energy and healthcare. Collectively, the companies have raised nearly £50 million in equity investment, and created numerous high-value, knowledge-intensive jobs.

### **Adaptix uses stargazing technology to detect cancer**

One of the ESA BIC's early graduate companies, Adaptix Ltd, was awarded £1 million in 2019 as part of a joint initiative by the UK Space Agency, the European Space Agency and NHS England. The funding is designed to enable Adaptix to develop a portable 3D medical X-ray machine that will give clinicians a more comprehensive view of tumours than traditional 2D X-rays. Miniaturised, portable and connected through satellites, the Adaptix 3D X-ray machine will also allow patients to be scanned in doctors' surgeries, enabling earlier diagnosis and reducing the need for trips to hospital for in-demand X-ray and CT scanners. Adaptix started its life as a start-up at the ESA BIC in November 2011, where it began to develop its technology. "Working with ESA BIC at the world-renowned Rutherford Appleton Laboratory in Oxfordshire's Harwell Campus has given us access to fantastic facilities and leading minds. ESA's focus on commercialising space-heritage technology to create tangible benefits for the EU population and the UK economy has helped us to create 33 high-value UK jobs in R&D and, increasingly, in manufacturing. Our vision is to create a business that will transform radiology through the export of high-science-content high-value products to achieve revenues of more than \$100m. X-ray is the primary diagnostic in healthcare, and one day we hope that Adaptix technology will touch the life of everyone that you know," said Adaptix CEO Mark Evans<sup>xxiii</sup>.

### **The CERN BIC**

The STFC CERN BIC is a collaboration between STFC and CERN. The BIC supports small businesses that are using high-energy physics technology to develop and commercialise new and innovative products and services. Start-ups benefit from unprecedented access to the expertise and capabilities of both STFC and CERN, alongside funding, business support and technical assistance.

### **D-Beam accelerates business with CERN technology**

D-Beam, a spin-out from the Cockcroft Institute for accelerator technology at Sci-Tech Daresbury, was formed in 2017 and joined the CERN BIC the same year. Its first commercial device was a sensor capable of detecting the tiniest particle in a kilometre-long particle accelerator. The company now offers world-leading expertise in particle-beam diagnostics, developed through strong research collaboration between its own staff and experts at CERN. D-Beam also has access to specific elements of CERN intellectual property through its membership of the CERN BIC<sup>xxiv</sup>. According to Professor Carsten Welsch, co-founder of D-Beam and Head of Physics at the University of Liverpool, a partner of the Cockcroft Institute, said: "Having unique access to specific parts of CERN intellectual property will help us translate our cutting-edge research into commercially available tools. This will improve our understanding and control of particle beams, which are so important in proton beam cancer therapy as well as for large international research facilities, such as the LHC and the European Spallation Source."

### **Commercialisation of intellectual property from STFC's national laboratories**

STFC has a strong track record as regards creating new companies and exploiting the technology that derives from our science for the economic benefit of the UK. We are responsible for protecting and exploiting the portfolio of intellectual property generated from its national laboratories. This includes supporting new inventors, enabling spin-out companies, transferring knowledge and technology to industry, and providing proof-of-concept funding, including the recently launched cross-cluster proof-of-concept fund, which provides funding amounting in total to £250,000, with up to £30k per project being awarded to support and accelerate innovative multidisciplinary collaborations across the three Harwell clusters, HealthTec, Space and EnergyTec<sup>xxv</sup>.

## Commercialisation from STFC's national laboratories between 2002 and end-March 2020:

- 20 spin-out companies created
- £84 million raised in third-party investment
- 249 Jobs created
- 50 royalty-bearing licences delivered
- The national laboratories' portfolio at the end of the 2018-19 FY comprised: 236 total patents; 175 granted; 61 pending; and 70 families.

### Spin-out companies

Since 2002, STFC has been responsible for the creation of 20 spin-out companies based on research and development within its national laboratories, and has spun-out a new company every year on average. STFC spin-outs often go on to attract a substantial amount of external investment enabling laboratory-based techniques and know-how to deliver industrial innovation. These new spin-out companies also channel money into research, benefit local economic development and create new jobs. Companies spun out from STFC continue to demonstrate their economic impact, leveraging investment, providing highly skilled jobs and exporting their products and services around the world<sup>xxvi</sup>.

### Quantum Detectors

A spin-out from STFC and the Diamond Light Source in 2007, Quantum Detectors has benefited from working closely with Diamond to develop state-of-the-art detector technology, with co-location at Harwell vital to the success of this collaboration. The company delivers its technology to laboratories and facilities around the world, including to these synchrotrons: the National Synchrotron Light Source, the Cornell High Energy Synchrotron Source and the Stanford Synchrotron Radiation Lightsource in the USA, SPring-8 in Japan, and Soleil in France. In addition to Diamond, the company also collaborates with other large-scale facilities such as the European Synchrotron Radiation Facility in France, and with academic institutes such as the University of Glasgow<sup>xxvii</sup>.

### Commercialisation from STFC's university programmes

STFC engages with its community to maximise the economic and societal benefits that derive from our science base. Using commercialisation and exploitation activities, and working with key partners, STFC funds innovation projects and supports the development of skills to maximise its investment. As well as responsive- and-user-led awards, STFC offers empowering support and an "Innovations Club", which runs a structured programme of workshops, events and newsletters to share information, opportunities and know-how to its community. Through our innovation schemes, we have funded eight applications at seven different institutions in FY 2018-19, awarding £2.38 million in total. Six project-partner companies have contributed a total of £703,000.

### Transferring knowledge and technology to industry

STFC works to transfer technology to industry, providing companies with innovative know-how and product opportunities. Our licensees work across a range of industry sectors, export their goods across the world, and carry out R&D to bring innovative products and services to the market.

### Thruvision technology keeps passengers safe on Los Angeles Metro

Following the sale of its video business for £27.5 million in October 2017, Thruvision (previously Digital Barriers) has focused on scanning solutions which utilise passive-terahertzscanning technology developed at RAL Space. In September 2018, the Los Angeles County Metropolitan Transportation Authority confirmed that it will adopt the body-scanning technology that Thruvision produces to screen more than 2,000 commuters as they enter and leave the stations. The technology uses sensitive cameras that can pick up a person's body heat through their clothing and detect hidden items without revealing any anatomical detail<sup>xviii</sup>. Head of Innovation at STFC Dr Liz Kirby commented: "We are thrilled that Thruvision has reached this next stage in its commercialisation of this technology that will provide an extra layer of protection for commuters. This is a fantastic example of how world-leading technology can be commercialised to provide a direct benefit, both to the UK economy and society as a whole."

### The UK Innovation and Science Fund (UKI2S) records return on investment of 7:1

Known previously as the Rainbow Seed Fund (RSF), the UKI2S is a £27 million 'ultra-patient' capital fund that invests in early-stage, technology-based companies. STFC is a lead partner in this fund – along with the Biotechnology and Biological Sciences Research Council, the Natural Environment Research Council and the Defence Science and Technology Laboratory – which is managed by private-sector fund manager Midven Ltd. According to a report by consultants SQW Ltd<sup>xxix</sup>, published in early 2020, the fund has invested £11.5 million and leveraged £500 million since its inception on 2002-03. Equity funding has been provided to 57 start-up companies; 38 'pathfinder' investments of up to £25,000 each have also been made available to fund exploratory work on commercial viability, of which 13 have graduated into full investments. The SQW report attributed the following direct impacts to UKI2S during the period 2002-2019:

- GVA (as measured by the value of employment over time) of £82.3 million
- Return on investment of 7:1
- R&D expenditure of £67 million, representing a significant contribution towards the government target of raising R&D expenditure to 2.4% of GDP by 2027
- Combined maximum employment by firms: 296 people
- Exports valued at £55.8 million

The SQW report also notes that UKI2S supported investments in areas of importance for society including health and healthcare, security and defence, and energy, the environment and sustainability. UKI2S has contributed towards the development and sharing of new knowledge as a result of enduring collaborative activity on the part of the companies that the fund has supported. Those companies have also developed skills in innovation and in the commercialisation of research, again to the benefit of society.

### Working with industry

We work with industry and others to harness business opportunities with the aim of delivering economic impact from the research and capabilities that we fund. In addition to the development of thematic clusters in Health, Space and Energy, this support can take the form of investment in collaborative research as well as research training with partners.



### **Teledyne e2v forms a strategic partnership with STFC**

In September 2018, Teledyne e2v, a leading supplier of technologies and components for industry, formed a strategic partnership with STFC that will advance the next generation of particle accelerator technologies and bring exciting new opportunities for UK industry. Under the agreement, Teledyne e2v has gained access to STFC's Compact Linac accelerator and radiation enclosure at Daresbury Laboratory, and STFC has secured specialist technical support for the Compact Linac from Teledyne e2v, thereby providing a reliable and supported system for use by other academic and industrial collaborators<sup>xxx</sup>. "Working with STFC enables us to access world-class facilities and expertise, creating a fantastic platform for joint innovation. As a result, Teledyne e2v will accelerate the development of new products and solutions for its key partners and customers." (Dr Ewan Livingstone, President of RF Power Commercial at Teledyne e2v)

### **Bridging for Innovators**

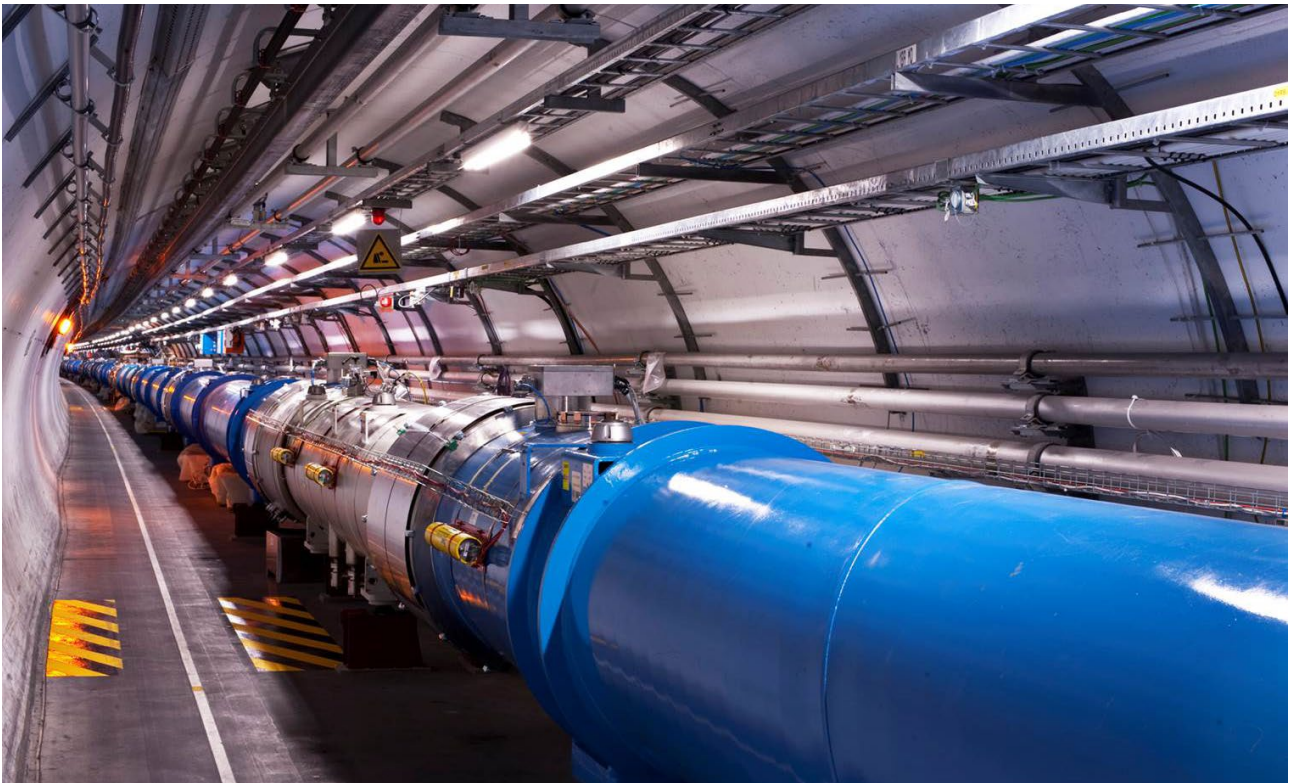
Bridging for Innovators (B4I) offers businesses unique access to a suite of high-tech scientific facilities and knowledge to fast-track solutions to industrial challenges. From start-ups to large corporates, B4I helps companies to overcome product, manufacturing or process performance issues by leveraging more than £2 billion in government investment in world-leading science facilities. Working closely with STFC research and innovation experts, companies can develop projects that address specific innovation challenges to accelerate business productivity. By taking part in B4I, companies gain access to the following: in-kind funding for projects aiming to solve product, manufacturing or process issues; STFC's world-leading science facilities; and extensive support from scientific and technical experts with proven track-records of solving complex industrial challenges.

### **Cobham Plc develops communications systems for challenging environments**

After developing a new communications system that provides improved voice and data connectivity in aircraft cabins, Cobham Plc needed to test its product before going to market. In order to do this, the company required specialist facilities which would enable it to warrant the new system against the natural neutron radiation environment experienced at altitude. The company did not have the capability to do this in-house but, via the B4I scheme, it was given access to STFC's ISIS Neutron and Muon Source, and awarded 48 hours of beam time on the ChiPlr instrument – one of only three facilities in the world accepted as providing a good match to the aerospace radiation environment. In addition, the company received advice and support from experienced scientists, engineers and innovation experts, and was able formally to assess its new communications system to ensure that it adhered to safety standards. One software issue was highlighted and resolved in the final system. The assistance received ensured that the product the company launched was of the required standard. This enabled Cobham Plc to take its product to market more quickly and cost-effectively than was previously possible<sup>xxxi</sup>.

### **Winning contracts from overseas**

STFC helps UK companies to access contract opportunities at the international facilities that we help support. Opportunities exist in a wide range of sectors, from electronics to medical engineering to computing.



### **UK reaps significant rewards from CERN membership**

According to a new evaluation study of the social, economic and diplomatic benefits derived from the most recent decade of the UK's membership of CERN, UK businesses have won hundreds of high-value contracts and UK scientists continue to play major roles in the breakthroughs achieved at the world's largest, most prestigious science experiment. The benefits achieved as a result of the UK's subscription to CERN (which is managed by STFC) go well beyond the opportunity to participate in world-leading science. From standard maintenance contracts to precision components for facility upgrades, UK companies compete and win contracts that drive technical developments and manufacturing capabilities. In the last ten years, 500 UK companies have done business with CERN, winning contracts valued at £183.3 million; working with CERN has also opened up new markets estimated to be worth £1 billion.

### **Wessington Cryogenics**

For more than 30 years, Wessington Cryogenics has been winning contracts at CERN, and since 1997 the company has been awarded over 770kCHF in contracts. Of this, 580kCHF is from the core CERN budget and 198kCHF is from visiting research teams and collaborations. The company has supplied liquid helium and a variety of components to the facility and now receives a steady influx of small orders each year. It was able to benefit from membership of several DIT/STFC trade missions to CERN; it has also gained contracts from universities and institutes involved in CERN experiments: for example, supplying items for the ARIADNE Detector via the University of Liverpool<sup>xxxii</sup>.

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