



Science and  
Technology  
Facilities Council

# Strategic Delivery Plan

2022—2025



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Professor Mark Thomson (*Executive Chair, STFC*)

# Foreword

The Science and Technology Facilities Council is a world-leading research and innovation organisation, with a unique role within UKRI. We fund research in particle physics, nuclear physics, astronomy, space science and particle astrophysics. We also build and operate many of the UK's largest multi-disciplinary research facilities at our national research and innovation campuses, which are essential to delivering UKRI's collective ambitions.

Our fundamental research seeks to understand the Universe from the largest astronomical scales to the tiniest constituents of matter, and creates impact on a very tangible, human scale. Our funding has enabled the UK to play a leading role in some of the most fundamental discoveries of the last fifty years, including the Higgs Boson at CERN and gravitational waves. These profound and exciting discoveries have changed the way we understand the Universe with the potential to inspire the next generation to pursue careers in Science, Technology, Engineering and Mathematics subjects.

We are also one of the largest science delivery organisations in the UK with over 2500 staff in scientific, engineering, and technical roles. This depth of expertise is central to operating the UK's large-scale multi-disciplinary facilities. Our National Laboratories host a critical mass of expertise in key technologies including artificial intelligence (AI), supercomputing and quantum computing. We are committed to increasing our investment in early career technical staff through expanding our successful apprentice scheme with the aim of developing a pipeline of skills for the UK.

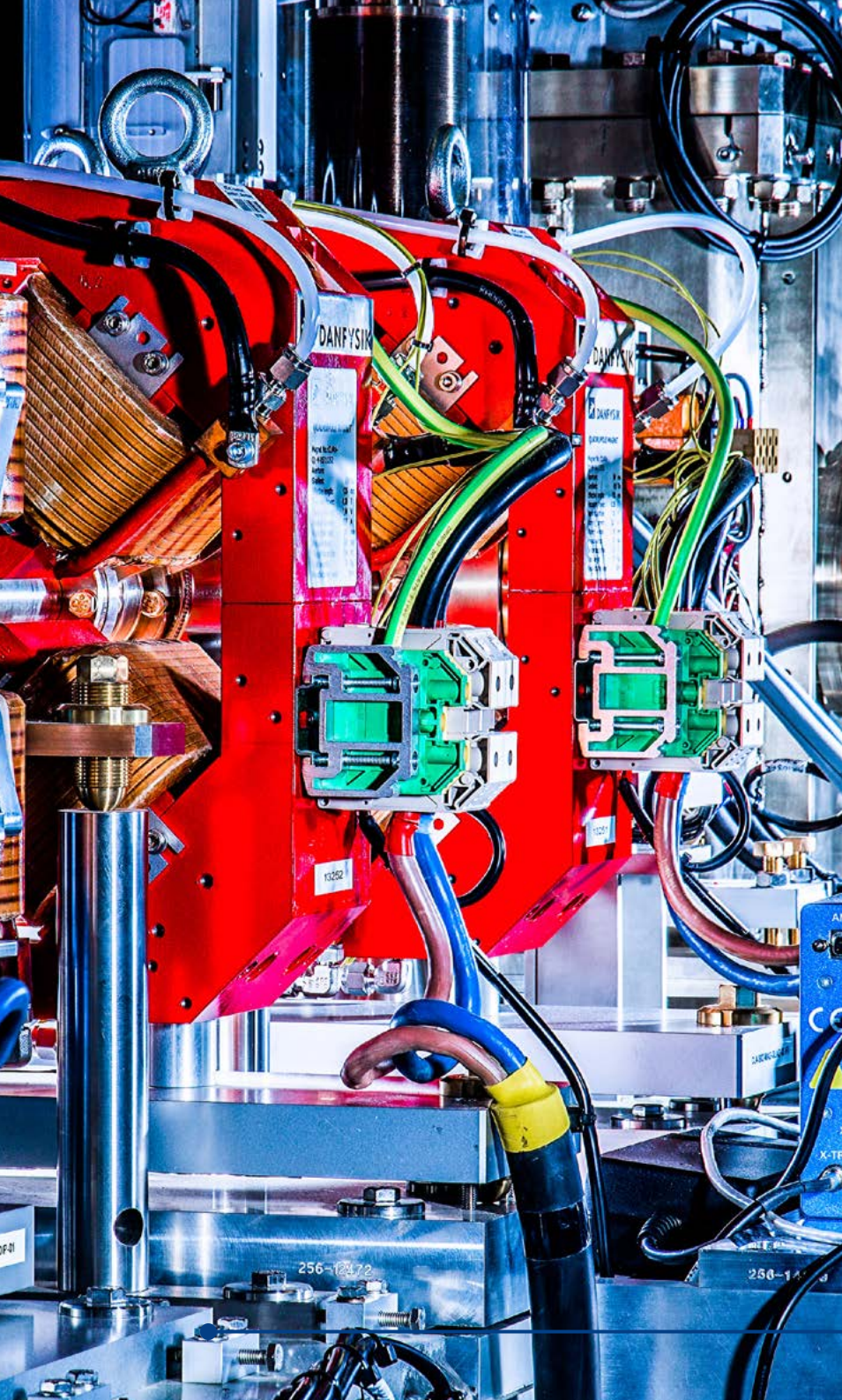
I greatly welcome the opportunities that arise from our [UKRI Strategy](#) and key Government strategy documents such as the [Integrated Review of Security, Defence, Development and Foreign Policy](#); the [Innovation Strategy](#), the [Levelling up White Paper](#) and the first [National Space Strategy](#). STFC is well placed to play an important role in delivering these strategies. For example: our grant-funded science programme utilises major research infrastructures around the globe and is almost entirely international, placing us in a key position to deliver science diplomacy elements of the Integrated Review; the large-scale national facilities we build and operate deliver internationally competitive multi-disciplinary capabilities to the science base across UKRI and for industry; the expertise and facilities within our National Laboratories provide key delivery capability for the National Space Strategy; and the ecosystems of clusters of small and medium-sized enterprises (SMEs) that we support at our major research and innovation campuses play a key role in the Innovation Strategy and levelling up.

This Strategic Delivery Plan presents our main goals for the next three years covering new initiatives in our fundamental science programme, new investments in facilities in our National Laboratories, and our ambitions to grow our links to business and industry at our Research and Innovation campuses. I believe this document presents an incredibly exciting plan reflecting the opportunities for STFC to contribute towards delivering our clear UKRI Strategy.

**Professor Mark Thomson**  
*Executive Chair, STFC*

September 2022

**Our fundamental research seeks to understand the Universe from the largest astronomical scales to the tiniest constituents of matter, and creates impact on a very tangible, human scale.**



# What we will achieve

The Science and Technology Facilities Council (STFC) mission is to discover the secrets of the Universe, to develop advanced technologies, and to innovate to solve real-world challenges. Our vision is for the UK to be a world-leader in fundamental science, with outstanding large-scale national facilities and research and innovation campuses that are internationally recognised as beacons of excellence. To deliver our vision we will:

- Provide **high-quality strategic leadership for UK frontier research** in particle physics, nuclear physics, astronomy, space science and particle astrophysics.
- Actively position our National Laboratories and large-scale facilities as **world-class centres of excellence in multi-disciplinary science, engineering and technology**.
- Provide effective leadership of the **UK participation in world-leading international facilities**, championing and promoting UK interests and maximising the scientific and industrial returns to the UK.

- Catalyse the development of **next generation technologies** and support the mechanisms to **exploit them**.
- Exploit our National Laboratories, Campuses and Science Programme as **an interlinked ecosystem for innovation in science and technology**, accelerating commercialisation and bringing competitive advantage for the UK as well as broader industrial, societal, and economic impact.
- Provide campus-wide leadership to ensure that **Harwell and Sci-Tech Daresbury are national beacons of excellence in science and technology** that maximise the benefits to our academic, industrial, and regional stakeholders.
- Deliver a world-class training programme to **develop the skills at all levels needed by UK research and industry** to maximise UK leadership in frontier research, leading edge science, technology, engineering and data science, and new disruptive technologies.
- Maximise the **impact of our inspirational scientific programme** to engage the public in science and technology and encourage the next generation to pursue careers in STEM subjects.

- Working **across disciplines** as part of UKRI and with external partners, using our expertise to **target national priorities and transformative technologies**, such as Net Zero, Space, Defence and Security, and application of quantum technologies.

Our vision and mission underpin the prosperity of the UK as a science superpower. As part of UKRI we will deliver core components of the Government's Innovation Strategy, National Space Strategy, Integrated Review, the National AI Strategy, and the UK Life Sciences Vision, as well as pushing the boundaries of digital technology, artificial intelligence (AI) and quantum technology.

We work with the other councils of UKRI to deliver the six objectives of the UKRI Strategy. STFC is unique in being both a funder and a science delivery organisation. Consequently, our high-level strategic aims often contribute to multiple strands of UKRI Strategy.

## Our purpose

To discover the secrets of the Universe, develop advanced technologies, and innovate to solve real-world challenges. Our vision is for the UK to be a world-leader in fundamental science, with outstanding large-scale national facilities and research and innovation campuses that are internationally recognised as beacons of excellence.

**Our principles for change – we will embed the principles of diversity, resilience, connectivity and engagement across all our work, to drive change and create the conditions for an outstanding research and innovation system**

**Our strategic objectives provide the framework for how we will achieve our vision and realise our principles, through world-class:**

People and careers	Places	Ideas	Innovation	Impacts
Training a pipeline of skilled engineers, technicians and scientists to meet the increasing demand of research and industry, and inspiring future generations to study and work in research and innovation.	Developing and deploying world-class national multidisciplinary facilities, leading the UK's participation in international infrastructures, and growing a thriving ecosystem for academic and industrial users and partners at the Harwell and Sci-Tech Daresbury Campuses.	Championing UK global leadership in research to understand the universe, its fundamental constituents, and their interactions and developing next-generation technologies.	Accelerating end-to-end innovation and stimulating business growth through access to our research, cutting-edge facilities and laboratories and network of experts, companies and private partners at our Campuses and Clusters.	Exploiting highly technical expertise to develop transformative technologies to target national priorities in space, quantum, net zero, computing, digital and security and create industrial, societal and economic impact.

Supported by **a world-class organisation**: operate a modern, sustainable, and effective organisation that supports the development, safety and well-being of diverse staff working across STFC's activities, from governance and administration to the building and running of large, complex machinery with biological, chemical, electrical and radiation hazards.



# Objective 1: World-class people and careers

STFC supports around 2000 early career scientists at universities (PhD students, postdoctoral researchers and fellows) working on some of the most profound questions in physics. Our researchers are partners in the most ambitious scientific endeavours ever undertaken, from the Large Hadron Collider (LHC) at CERN to the largest and most powerful ground-based and space-based telescopes that will view the Universe with unprecedented precision. The majority of our fundamental research programme is international in nature providing early career researchers with the opportunity to participate in large collaborations working with the world's most ambitious scientific research infrastructures and international teams.

We employ 2500 scientific and technical staff working on some of the most technologically advanced research infrastructure on the globe, including providing support for over 10,000 researchers per year from industry and the wider UKRI scientific community who access our national facilities. Our technical expertise and inspiring facilities provide a unique opportunity to train the next generation of engineers and technologists, directly addressing critical skills needs across a range of strategic areas identified in the Government's [R&D Roadmap](#), [Innovation Strategy](#) and [Integrated Review](#).



### 1.1 Delivering world-class training

We aim to **deliver a world-class training programme to develop the skills at all levels needed by UK research and industry to maximise UK leadership in frontier research, leading edge science, technology, engineering and data science, and new disruptive technologies.**

Through leveraging our investments in data-intensive science, analysis and instrumentation, we are in a unique position to address the national skills shortages in the key engineering and computing disciplines critical to new and emerging markets, such as Space, Quantum, Artificial Intelligence (AI) and Digital. We will work across UKRI to make the best use of our capability, spanning all levels from apprentices to PhD researchers, as we transition to greater collective working across our talent initiatives, ensuring that the specific needs of our doctoral students are met and links to industry through our Centres for Doctoral Training (CDTs) are strengthened. We will capitalise on the expertise in our National Laboratories to deliver a step-change in our technical and engineering skills pipeline, through the new STFC Skills Factory, building on our existing award-winning early career and apprentice schemes and informed through engagement with industrial partners.

We will:

- Increase our support for early-career university researchers working on our core scientific mission to discover the secrets of the Universe, by increasing funding for early career researchers through an uplift to the budget for consolidated grants.
- Initiate Phase-I of the STFC Skills Factory, investing £2.5 million to more than double the intake of apprentices working at our world-leading facilities by 2025, we aim to develop a pipeline of skilled engineers and technicians in strategically important sectors.
- Implement the Technician Commitment Delivery Plan, to highlight the importance of technicians internally and externally.
- Invest £2.5 million in CDTs in Data Intensive Science to support the next generation of researchers and innovators and offer mentorship and industrial placements.
- Run structured training programmes in AI for over 5000 individuals in Small and Medium Enterprises (SMEs) and industry, through the Hartree National Centre for Digital Innovation. This will provide training in the emerging technologies and tools in the rapidly evolving sector of high-performance computing-enabled AI, augmenting Turing 2.0 activities.

## Support for skills at all levels in research and industry

STFC's unique, inspirational facilities that support the UK's R&D community to deliver world-class research, provide the ideal training ground for technicians through to research fellows in STEM-related skills. STFC is an innovative and supportive employer, committed to continuously improving its approach and embedding a culture where the benefits of diversity are celebrated.

We have:

- Signed the Technician Commitment, to increase the recognition, support and development of the wide range of roles in the research and innovation ecosystem
- Developed a graduate scheme for engineering and computing disciplines, now recruiting over 75 graduates each year
- Built an award-winning apprenticeship scheme, recruiting more than 120 new apprentices over the last 4 years. In 2022 the scheme was awarded 'We Invest in Apprentices' gold accreditation from Investors in People.

We will scale-up this activity through investment in Phase-1 of the Skills Factory.

## 1.2 Engaging the next generation

We aim to **maximise the impact of our inspirational scientific programme to engage the public in science and technology and encourage the next generation to pursue careers in Science, Technology, Engineering and Mathematics (STEM) subjects**. As part of UKRI's People, Culture and Talent portfolio, we will help foster a world class R&I system by attracting, developing, and retaining people from all backgrounds to build on our existing strengths and to meet future challenges. STFC's frontier science discoveries, including images of distant galaxies, observing the gravitational waves from black holes colliding and new discoveries at CERN, all have the potential to capture people's imagination and inspire future generations to study and work in STEM subjects. We aim to inspire the nation to increasingly value and engage with scientific discovery through the captivating nature of our frontier science, engineering, and technology.

Our public engagement activities play a crucial role in supporting the UKRI Public Engagement Strategy to grow the UK's STEM talent pool, helping young people and their families to see STEM as exciting, relevant, and diverse. We aim to strengthen the take-up of STEM subjects in hard-to-reach groups to increase the diversity of the future UK science and engineering community and promote exciting science stories in the media.

### We will:

- Prioritise our Wonder initiative of public engagement activities that target young people and their families in relatively economically-disadvantaged areas, and from cultures that are traditionally under-represented in STEM subjects. We are aiming for at least 40% participation in our engagement programme from these groups.
  - Target schools in under-represented communities to increase the diversity of applications to STFC's apprenticeship and other training schemes.
  - Invest £4.2 million in public engagement, expanding our reach and impact by utilising our early-career staff, including apprentices and graduate intakes, to deliver over 1500 days of direct community-focused activities.
- Continue to fund and incentivise the academic communities we support to develop and participate in outreach and public engagement to maximise the wider value of the science that we fund.
  - Run a major open week at each of our research and innovation campuses, with the aim of showcasing our facilities and science to over 20,000 members of the public.

**We aim to maximise the impact of our inspirational scientific programme to engage the public in science and technology and encourage the next generation to pursue careers in Science, Technology, Engineering and Mathematics (STEM) subjects.**

## Case studies

### Wonder initiative

Beginning in 2018, Wonder is a long-term commitment to changing how STFC's public engagement activities run, with an emphasis on working with, rather than delivering to, communities. This initiative targets communities from the 40% most economically disadvantaged areas of the UK (as determined by national indices of multiple deprivation data), particularly young people aged 8-14, their families and carers. Research in the sector has shown that areas of greater economic deprivation have fewer access to science engagement opportunities and as a result, less young people are interested in careers in science and technology. Focusing our work in these areas, we hope to inspire and involve more young people with our science and technology.

Wonder acts across STFC's entire programme, including public engagement grant holders, national partnerships and the National Laboratories public engagement programme. Initial evaluation findings indicate the number of individuals from Wonder communities (as a proportion of the total audience) reached by STFC public engagement has increased since the initiative was started.



# Objective 2: World-class places

STFC's scientific mission is delivered through very large research infrastructures in the UK and around the globe. We operate National Laboratories in five regional sites across the UK: RAL at Harwell in Oxfordshire; Daresbury Laboratory at Sci-Tech Daresbury in the Liverpool City Region; the UK Astronomy Technology Centre in Edinburgh; Boulby Underground Laboratory in the North East of England; and Chilbolton Observatory in Hampshire. Our National Laboratories host key national capabilities, including UKRI's large-scale multi-disciplinary research infrastructure. Our research and innovation campuses, linked to our two largest National Laboratory sites, underpin many research areas and technologies highlighted in the Government's Innovation Strategy, providing internationally competitive sovereign research and innovation capability.

We also play a central role in developing international collaborative research infrastructures, securing access to leading-edge facilities for UK researchers and the best scientific return on investment from our international subscriptions. This generates industrial return for UK business, and exercises soft scientific diplomatic influence highlighted in the Government's Integrated Review. Our role in ensuring the UK's position in these world-leading research infrastructures is an essential component of the UK being a science superpower on the global stage.

### 2.1 International Research Infrastructures

We aim to **provide effective leadership of the UK participation in world-leading international facilities, championing and promoting UK interests and maximising the scientific and industrial returns to the UK.** The majority of our frontier research programmes rely on global co-operation and collaboration. Our research footprint spans

the globe including CERN in Europe, the Square Kilometre Array Observatory (SKAO) in Australia and South Africa, the world's large telescopes in Chile, and LBNF/Deep Underground Neutrino Experiment (DUNE) in the US. On behalf of UKRI, we fund the UK subscriptions to international multi-disciplinary facilities outside the UK: Institut Laue Langevin (ILL), European Spallation Source (ESS), European X-Ray Free-Electron Laser Facility (EuXFEL) and the European Synchrotron Radiation Facility (ESRF). From 2022 we also manage the funding for the European Molecular Biology Laboratory (EMBL).

Working closely with BEIS, we provide UK leadership in international policy governance of large international facilities. We provide strategic and technical leadership within the governance structures and develop long-term strategies for our international investments, with the aim of maximising scientific and diplomatic benefits and further increasing UK influence on the global scientific stage.

## Case studies

### STFC technology drives transformation in structural biology

In the last decade, building on design techniques developed for the Large Hadron Collider, engineers in STFC's technology department working with the MRC Laboratory of Molecular Biology in Cambridge delivered a breakthrough in cryo-electron microscopy (Cryo-EM) through producing high resolution cameras that survive the harsh microscope radiation environment.

This pioneering work greatly enhanced the performance of Cryo-EM systems and enabled their software to reconstruct the precise molecular structures of an ever-growing list of new biomolecules transforming structural biology and aiding drug development.

In partnership with EPSRC and the Rosalind Franklin Institute, STFC engineers are actively developing the next generation of camera optimised for lower energy electrons that are less damaging to the valuable biological samples. This will continue to expand the impact and capacity of the technique and will have huge benefits for both the basic understanding of life's chemistry and for the development of pharmaceuticals.

**We will:**

- Enhance UK scientific links globally, initially targeting new scientific collaborations with India, Japan and the US. Initially this will include funding the Hyper-Kamiokande Neutrino experiment in Japan and the US Simons Observatory, located in Chile.
- Deliver the UK technical contributions in major projects as part of our frontier research programmes, investing more than £40 million including the ATLAS and CMS upgrade at CERN and the PIP-II accelerator at FermiLab
- Invest £90 million over three years in the construction of the SKAO working with our co-hosts in Australia and South Africa and other international partners, to ensure that construction progresses according to plan, ensuring scientific success and optimising the economic and industrial return to the UK.
- Provide UK expertise and leadership within the governance structures of the international facilities we fund, including CERN and the ESS.
- Publish a new strategy for UK engagement with CERN, delivered in partnership with BEIS, focusing on maximising the benefits to the UK of our membership of CERN, and build close ministry-to-ministry and agency-to-agency partnerships with major European scientific nations and beyond.
- Develop and deliver a plan for increased investment in the EuXFEL in Germany to align with UK community needs and technological expertise within STFC and wider UKRI.

**2.2 Maintaining our National Facilities as Centres of Excellence**

**We aim to actively position our National Laboratories and large-scale facilities as world-class centres of excellence in multi-disciplinary science, engineering, and technology** across the whole of the UK. Through the ISIS Neutron and Muon Source, the Central Laser Facility and Diamond Light Source we provide unique national capabilities and expertise for academic and industrial researchers, addressing a diverse range of research from advanced materials and battery technologies to cutting-edge life sciences. Our facilities provide the tools that enable the UK's thriving research and innovation communities to address the most pressing industrial and societal challenges and support the Government's Innovation Strategy. We will strengthen the technical capabilities at Daresbury Laboratory in the North West of England and engage with international partners and local industry to bring a major internationally funded project to the North East, contributing to the delivery of the Government's levelling up ambitions.

**We will:**

- Deliver key multi-disciplinary projects using cross-UKRI funding, including from the Infrastructure Fund, to:
- Commence investment in the £500 million Diamond II upgrade programme (£81.5 million over the next three years) that will deliver a world-leading 4th generation synchrotron light source, providing up to 100 times the

brightness of the existing machine, future-proofing the UK's national synchrotron programme for the next 20 years.

- Commence investment in the £73.5 million ISIS Endeavour programme (with £3.4 million investment over the first three years) that, over the course of the decade, will deliver four new instruments and five upgraded instruments to provide new scientific capability and capacity to support advances in personalised medicine and bio-science, energy storage, clean growth and advanced materials.
- Commence construction of the £59.7 million 'Vulcan 2020' 20 PetaWatt laser (with £19.8 million investment over the first three years), a new high power world-class sovereign laser, providing unique capabilities in civil research and national security. We will also invest £17.2 million in the Hilux project (£8.6 million over the first three years) to upgrade the Ultra and Artemis laser facilities to 100kHz operation; enabling femto-second resolution imaging.
- Deliver new capabilities at the Rutherford Appleton Laboratory (RAL), including the National Quantum Computing Centre (NQCC) and the installation of the laser system in the new Extreme Photonics Applications Centre (with £35.8 million from the Strategic Priorities Fund).
- Complete the Compact Linear Accelerator for Research Applications (CLARA Phase 2) project and finalise it as a 250 MeV electron beam

scientific and industrial user facility. We will invest £4 million in the FEBE laser for CLARA providing a new facility to probe the interactions of high-energy electrons with light.

- Work with the Engineering and Physical Sciences Research Council (EPSRC), the University of Liverpool and Rosalind Franklin Institute, to invest £2.6 million from the UKRI Infrastructure Fund in the technical design and business case for the Relativistic Ultrafast Electron Diffraction and Imaging Centre. We will also invest £2 million over the next three years to develop the specification and costs for a pioneering, ion-based radiobiology research facility.
- Complete the design study for a greatly expanded underground science facility in the North East, with the potential to host a major international science infrastructure, such as a next generation dark matter experiment (with £2.8 million from the Infrastructure Fund).

### 2.3 Next Generation World-Class Capabilities

We will ensure the UK has a clear long-term plan for the next generation of large-scale national facilities that will provide the UK with a series of world leading capabilities through to 2050 and beyond. In parallel we will make progress towards transitioning to Net Zero in the development, running and maintenance of our world-leading facilities with the aim of transitioning to Net Zero operation of our facilities and laboratories by 2040.

## Driving innovation-led growth across the UK through clusters anchored to our Campuses

The Campuses lie at the heart of STFC's contribution to the Government's Innovation Strategy and contribute to the prosperity of the UK. Clusters are a strategic approach to stimulate innovation and productivity growth in sectors and key technologies across the Campuses including space, digital, health and life sciences, quantum and energy

Harwell Campus hosts 100 businesses in its Space cluster, 80 businesses in its Energy Tech cluster and 74 businesses in its Health Tech cluster.

Sci-Tech Daresbury hosts 44 businesses in its North West HealthTec cluster, 6 businesses in its Digital Tech cluster and 4 businesses in its recently launched (May 2022) North West Space cluster.

Over the next three years we will further enhance the impact of clusters on the economy and society by:

- Driving connectivity within and between different clusters across UK regions to facilitate information exchange and strengthen the competitiveness of emerging and strategic technologies.
- Operating dynamic schemes to stimulate new ideas from the diverse communities and sectors within and between our campuses to boost the development and adoption of disruptive technologies to improve productivity.
- Attracting and supporting a balanced cohort of innovative start-up, scale-up and mature businesses on our campuses and drive cluster growth.
- Building and incentivising strategic partnerships with public, private and academic stakeholders, and local and regional leadership, to ensure a joined-up approach to delivering a shared ambition for clusters.

**We will:**

- Invest £3.2 million to deliver the conceptual design and scientific case for the UK hosting a world-leading 2nd generation X-ray Free Electron Laser, either as a national capability or as a UK-hosted international project.
- Invest £5 million (with £3.9 million in the next three years) in the conceptual design for the ISIS-2 upgrade of the neutron spallation source infrastructure, with the aim of retaining the UK's sovereign world-leading capability into the 2040s and beyond.
- Finalise our roadmap for transitioning to Net Zero operation. All our new building projects will aim to reach BREEAM<sup>1</sup> Outstanding targeting carbon reduction.
- Explore and potentially invest in commercial options for large-scale provision of solar power from local solar farms to our sites.
- Develop invest-to-save opportunities for infrastructure on our science estate.

## 2.4 World-Class Research and Innovation Campuses

We aim to **provide campus-wide leadership to ensure that Harwell and Sci-Tech Daresbury are national beacons of excellence in science and technology that maximise the benefits to our academic, industrial, and regional stakeholders.**

These campuses are internationally leading locations for high-tech businesses to grow

and create high-value jobs, attracting inward investments and global talent to contribute to the UK's prosperity and the goal of becoming the world's most innovative economy. Our Campuses already support over 7900 high-tech jobs and host around 370 organisations from start-ups to Small and Medium sized Enterprises (SMEs), large-scale facilities and international corporates in a thriving ecosystem focused on clusters of excellence. We will continue to ensure the Sci-Tech Daresbury and Harwell Campuses are amongst the best places in the UK to start a high-tech business by delivering integrated business incubation and scale-up, facilities and access to finance for companies in emerging sectors and markets.

Through catalysing new, and growing existing, clusters of businesses and research organisations anchored around our facilities and technology hubs on our Campuses, we aim to develop an ecosystem of cross-sector collaboration and multi-disciplinary approaches to solve business challenges and accelerate innovation.

**We will:**

- Rapidly scale up the accommodation space for our innovation cluster at Daresbury, through our Joint Venture vehicle, Sci-Tech Daresbury, seeking private sector investment to deliver on the levelling up agenda and progressing towards the target of 10,000 jobs on campus. In addition, we will develop a business case for the digital accelerator at Sci-Tech Daresbury and explore different funding models with our private sector partners.

- Work with the Liverpool City Region Innovation Board and the Oxfordshire Local Enterprise Partnership Innovation group to maximise the regional impact of our Sci-Tech Daresbury and Harwell Campuses.
- Deliver a new Scale-Up Innovation facility and the UK Space Gateway, through private-sector investment.
- Leverage the Life Sciences Opportunity Zone stages to attract new opportunities for inward investment at Harwell and Sci-Tech Daresbury.
- Accelerate adoption of modern computing techniques in UK businesses of all sizes, by fully exploiting the Hartree Centre's position as a world-leading, industry-focused computing centre, bringing together high-performance computing, artificial intelligence (AI) solutions, academia, and industry partners.
- Develop a new Quantum Computing cluster of innovative businesses at Harwell, using the National Quantum Computing Centre (NQCC) as an anchor institute, focusing on technology development and the future UK supply chain for Quantum Computing.



Credit: SKAO

## Case studies

## Square Kilometre Array Observatory (SKAO) benefits UK industry

The SKAO is set to be the world's largest radio telescope. It will discover the evolution of the early Universe, exploring some of the earliest processes in fashioning galaxies such as our own Milky Way.

As one of the largest scientific endeavours in history, the SKAO brings together more than 500 engineers and 1,000 scientists in more than 20 countries.

The SKAO will bring economic benefits, through significant engagement with UK industry. Hosting the Headquarters at Jodrell Bank, near Manchester, will create a hub of excellence in North-West England, creating jobs and providing training opportunities.

To date, seven contracts have been awarded to UK organisations, worth €36.1 million, as part of the SKAO's obligation to seek an equitable return of 70% per each country's original contribution to the capital cost of construction.





## Objective 3: World-class ideas

STFC aims to provide high-quality strategic leadership for UK frontier research in particle physics, nuclear physics, astronomy, space science and particle astrophysics. We champion UK global leadership in research to understand the Universe, addressing some of the most profound questions in science from the largest astronomical scales down to its fundamental constituents. Our frontier research drives the development of ground-breaking technologies to deliver new capabilities. For example, developments in imaging sensors, AI and supercomputing and quantum technologies have the power to transform our economy through down-stream technology transfer. Similarly, the algorithms and methods generated by work at the forefront of theoretical physics have wider application.

## Case studies

We fund this research through both academia and the large and unique capabilities we host across our National Laboratory departments in the UK that cannot easily be delivered within university settings. These include RAL Particle Physics Department, RAL Space, UK ATC and STFC's Scientific Computing and Technology Departments. This critical mass of expertise, totalling 1067 staff, delivers technological and computational solutions across UKRI.

Our investments in major scientific projects are long-term, often spanning multiple decades and are delivered through managed strategic programmes, rather than short-term responsive funding. The international nature of our programme requires collaboration with funding agencies in other countries. It also requires balancing scientific exploitation, construction project funding and research and development to ensure long-term resilience.

### 3.1 Leveraging our international investments

We manage membership subscriptions to international organisations and the funding for our national programme that leverages the value from membership. We aim to effectively leverage our large investments in CERN, European Southern Observatory and the UK Space Agency (UKSA) investment in the European Space Agency (ESA) scientific programmes by providing the right level of investment in our frontier research.

## Global collaboration to push the frontier of knowledge in astronomy

The James Webb Space Telescope, launched in December 2021, is the largest, most powerful telescope ever sent into space. Successor to the Hubble Space Telescope, JWST can look further back in time than any other telescope, to just 400 million years after the Big Bang.

The first images from the telescope, released in July 2022, are the most detailed images ever captured of our universe.

The UK's main contribution to JWST is the Mid-Infrared Instrument (MIRI), one of four major scientific instruments on the observatory. Through the UK Space Agency and STFC, the UK has invested almost £20 million in the development phase of MIRI.

Of the first images from the telescope, most include images or spectra captured by MIRI, providing a new and unique view of the universe.

STFC's UK Astronomy Technical Centre led the European Consortium and overall design for MIRI. RAL Space was responsible for overall thermal engineering and instrument assembly, integration, testing and verification. Following launch, scientists, engineers, and astronomers

from UK ATC and RAL Space were actively involved in the complex commissioning process.

Use of the telescope by UK scientists will address key questions in astronomy and ensure UK scientists remain at the forefront of global space science research, 40 UK institutions and around 180 UK scientists have won telescope time in its first year of operation.

Credit: NASA-GSFC, Adriana M. Gutierrez (CI Lab)



**We will:**

- Continue to manage and fund our existing commitments in our frontier research programmes, providing funding of £226 million over three years, increasing on the approximately 390 full time equivalent researchers currently supported by our grants.
- Increase investment by £19 million over the next three years in our frontier research programmes through year-on-year increases to consolidated grant funding for science exploitation, increasing numbers of early-career researchers and better leveraging value from our annual £213 million subscription investment in international facilities.
- Formalise our partnership with the US-led Rubin Observatory in Chile, to include the development and operation in the UK of an advanced data handling and analysis centre focused on maximising impact from this new multi-purpose, transient-survey observatory.
- Deliver the UK share of the CERN LHC computing requirements in the most cost-effective manner, providing funding of up to £22 million to the Tier 1 “Grid for Particle Physics” and the SwiftHEP software optimisation programme.
- Initiate the first £1.1 million funding of a planned £49.4 million investment in the 10-year LHCb 2030+ project at CERN, which will explore intriguing hints for new physics seen in the current LHC data.

- Deliver the UK’s £9 million contribution to the Advanced Laser Interferometer Gravitational-Wave Observatory upgrade, a ground-based gravitational wave observatory in the US.
- Complete our Particle Physics Strategic Review and develop a ten-year plan to respond to its recommendations and to those identified in the [European Strategy for Particle Physics](#).

Credit: CERN

**Case studies****UK scientists work as part of International collaboration to challenge our understanding of the physical world**

In 2021, UK physicists from the LHCb (Large Hadron Collider beauty) experiment at CERN announced new results which suggest hints of a violation of the Standard Model of particle physics.

The Standard Model of particle physics predicts that beauty quarks should decay into muons or electrons in equal measure. This is known as lepton flavour universality. But the new result suggests that this may not be happening.

This tantalising hint at new and unexplained physics demonstrates the importance of the LHC in exploring nature at its most fundamental level. If a violation of lepton flavour universality were confirmed, it would require a new physical process, such as the existence of new fundamental particles or interactions.

It is now for the LHCb collaboration to further verify their results by collating and analysing more data, to see if the evidence for some new phenomena remains. Recent and future upgrades to the LHC mean faster data collection from a more powerful particle accelerator.

### 3.2 Strategic investment in our science areas

Through our investments we ensure that UK-funded researchers remain at the forefront of global pioneering discoveries. We continue to provide strategic leadership and identify the brightest ideas and highest-priority areas for investment in our frontier science and facilities, and will work across UKRI through a new interdisciplinary responsive mode.

#### We will:

- Provide national leadership in the scientific return to the UK from the JWST through UK ATC's central role in the calibration and operation of MIRI and engagement with the STFC Webb Fellows.
- Provide new funding for blue-skies research and development related to our scientific programmes, rising to £2.5 million per annum by 2024, with the aim of seeding genuinely new technological developments for down-stream commercialisation funding.
- Significantly enhance the science capability of the US-led Simons Observatory, exploring the microwave signature of the early Universe, using UKRI Infrastructure and STFC funds. This £12.6 million investment will allow UK scientists to be in the vanguard of discoveries from this major new infrastructure.
- Selecting and investing in a national collaboration to deliver a SKA Regional Centre in the UK focussed on advanced data handling and analysis tools in this global partnership radioastronomy infrastructure.
- Complete and deliver to the Very Large Telescope the new Multi-Object Optical and Near Infrared Spectrograph instrument, which is currently being constructed at the UK-ATC in Edinburgh.
- Complete new instrumentation for the Isaac Newton Group of telescopes, operated by STFC in the Canary Islands, including the commissioning in 2022 of the new WHT Enhanced Area Velocity Explorer instrument for the William Herschel Telescope.
- Invest £2.3 million (through the UKRI Infrastructure Fund) in the early-stage detector development for the Electron-Ion Collider at Brookhaven in the US.
- Invest £15 million, in partnership with EPSRC, to complete the first phase of the Quantum Technology for Fundamental Physics programme, explore opportunities for international collaboration, and plan for the next phase.
- Commence full-scale production of wire-sensing planes and data acquisition system for the £25 million UK contribution to the Deep Underground Neutrino Experiment (DUNE) in the US.
- Maintain our strategic partnership with the Institute of Particle Physics Phenomenology hosted by the University of Durham, where the institute grant has recently been renewed.

# Objective 4: World-class innovation

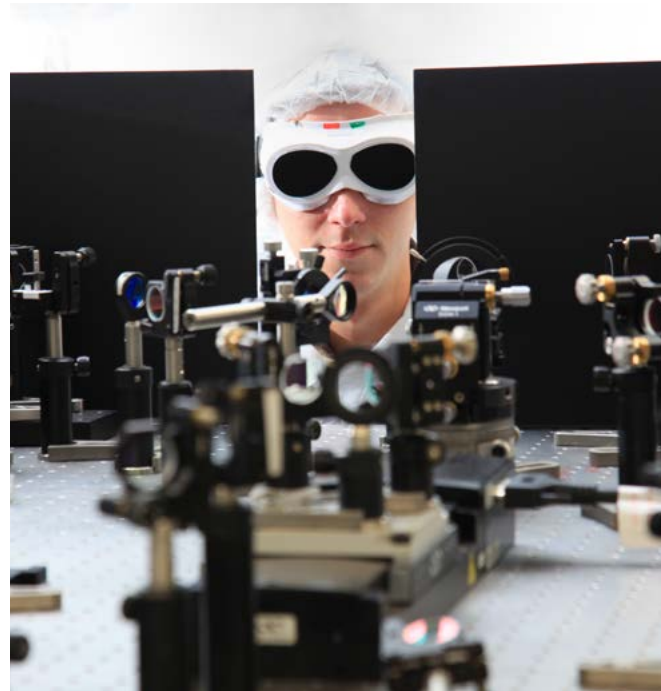
STFC's unique place in the UK landscape of end-to-end innovation contributes to achieving the Government's ambition for the UK to spend 2.4% of GDP on R&D<sup>2</sup> and delivering the UK Innovation Strategy. The academic community we support works on some of the most technologically challenging projects ever conceived. Our cutting-edge research and world-leading large-scale facilities require ground-breaking, innovative technology solutions. Within our facilities and National Laboratories, we provide access to world-leading facilities, deep technical expertise, shared laboratories, active business incubation and other business support to help businesses to thrive in an increasingly competitive national and global marketplace.

#### 4.1 Exploiting discoveries

**We aim to catalyse the development of next generation technologies and support the mechanisms to exploit them.** STFC's world-class technical and engineering capabilities in the technology-focussed departments at our National Laboratories sites, complements the capabilities in our partner universities, enabling us to deliver on the key technologies highlighted in the UK Innovation Strategy, while also capitalising on the UK's leadership in high-performance computing and artificial intelligence (AI). These two strands come together in the Hartree National Centre for Digital Innovation (HNCDI). HNCDI at Daresbury Laboratory is a new collaborative programme with IBM, which will enable Government and businesses to acquire the skills, knowledge and technical capability required to adopt digital technologies like supercomputing, data analytics, AI, and quantum computing. Building on these capabilities, we aim to develop, identify, and translate advanced and disruptive technologies from our fundamental research and National Laboratories, including AI, quantum technologies, space technology, advanced sensors, and high-performance computing.

##### We will:

- Simplify our academic-focussed commercialisation programmes into a single £2.5 million per annum scheme by 2024.
- Invest £6 million in a new novel detector systems initiative within our Technology Department, targeting applications for our science programme, the space sector, and multi-



disciplinary facilities, leveraging our extensive industrial links and networks to identify ways to exploit these detectors in wider markets.

- Invest £3 million in proof-of-concept funding for our own in-house programmes to stimulate IP from our National Laboratories to provide a pipeline of innovation for licensing to UK industry and to spin-out new ventures.
- Work with Innovate UK to maximise the impact of our initiatives and develop a more integrated pipeline of technology development, commercialisation and scale-up including further developing Analysis for Innovators and Bridging Innovators.

## Case studies

### Supporting spin-outs to capitalise on our inventive capacity

STFC's National Laboratories, research programmes, expertise, support initiatives and collaborative culture combine to create a permissive environment in which innovation flourishes, and this plays a key role in mobilising the UK's inventive capacity.

STFC protects and exploits the IP generated from its National Laboratories, supports new inventors, provides proof-of-concept funding, funds the exchange of knowledge from academia into industry, and transfers knowledge and technology to industry and commercial applications. Through UK universities, STFC funding has generated 39 spin-out companies (2007-2022). Research conducted in the National Laboratories has generated 22 spin-out companies (2002-2022), attracting £98 million of third-party investment and creating 294 highly skilled jobs.

The economic impact of 40 of the spin-out companies from STFC's National Laboratories and UK universities has been estimated over their lifecycles to 2020 at approximately £230 million Gross Value Added, representing a return on investment of £6.47 per £1 of STFC investment, or £4.90 per £1 invested if all public sector grants are taken into account.

- Fully exploit the £132 million investment in the HNCIDI including the establishment at least three regional SME hubs across the UK, delivery of at least 100 explorative technology demonstrator projects with UK companies and Government departments, and engagement of over 150 SMEs with focused support and skills development relating to the most appropriate emerging technologies and tools in AI enabled by high performance computing.

#### 4.2 Accelerating commercialisation

**We aim to exploit our National Laboratories, Campuses and Science Programme as an interlinked ecosystem for innovation in science and technology, accelerating commercialisation and bringing competitive advantage for the UK as well as broader industrial, societal, and economic impact.** Our Business Development team supports and coordinates the translation of STFC technology and research to a commercial application. Creating intellectual property (IP) is an important and integral part of our role and it is our duty to exploit IP for the economic benefit of the UK. We aim to maximise STFC's impact on economic growth in the UK through publicly recognised and effective commercialisation of cutting-edge technologies and the unique solutions arising from our research. We are committed to supporting end-to-end innovation and stimulating business growth through securing private sector investment to significantly scale-up our business incubation space at Sci-Tech Daresbury and Harwell.

#### We will:

- Work with Innovate UK and partners across the R&I system to bring additional financial contributions to support STFC's strategy on innovation through innovative funding schemes and the UK Innovation and Science Seed Fund (UKI2S)
- Provide support for commercialisation of research and technologies from STFC, leading to at least thirty new commercial licences and three new spinouts
- Support flexible funding to institutions through the Impact Accelerator Accounts (IAA) while working across UKRI to harmonise the scheme.
- Capture and assess the impacts of our funding for research commercialisation through the principles and indicators set in the UKRI Research Commercialisation Monitoring Framework.
- Develop a transformative approach to upskilling UK industry informed by our skills strategies for Sci-Tech Daresbury and Harwell Campuses.
- Work with Brookfield (our private sector Joint Venture partner at Harwell) to develop the business case for a new 'Incubation Accelerator at Harwell', with the aim of incubating 20 additional companies each year, contributing to achieving the campus jobs target.

#### 4.3 Providing industry access to our world-leading capabilities

We are committed to facilitating the exchange of knowledge between academia and industry and providing a clearly communicated offering to UK industry for accessing our skills and world-leading international and national facilities.

#### We will:

- Work with the Department for International Trade to systematically publicise tendering opportunities at international facilities to UK companies and support them through the process.
- Provide guidance and technical support to UK businesses to co-design and develop new technologies for world-leading facilities and fully leverage the economic benefits from international facility subscriptions.
- Leverage engagement with our innovation clusters to attract businesses at different stages of maturity to locate on our campuses and attract inward investment (see 'World-Class Places' for priorities for our clusters of excellence).





## Objective 5: World-class impacts

We work across disciplines as one UKRI and with our external partners, using our expertise to target national priorities and transformative technologies, such as Net Zero, Space, Defence and Security, and application of quantum technologies. Harnessing the scale and distinctiveness of our research, technologies, and facilities, we can make a vital contribution towards addressing emerging national and global challenges and collectively delivering UKRI's strategic themes, Government and National Science and Technology Council (NSTC) priorities.

As a large public-sector organisation, our staff provide a critical mass of expertise across a diverse spread of technical specialisms including advanced computing, novel quantum and silicon sensors, accelerator construction, laser and plasma physics, space technology and many more. This vital capacity both supports our science programme and national facilities and provides a significant resource to support wider Government priorities. Working with our partners, we play a leading role in delivering UKRI's strategic themes and Government strategies.

### 5.1 Space

STFC is a leading delivery partner in the implementation of the [National Space Strategy](#), working closely with partners across Government. Specifically, we invest in key capabilities to deliver critical scientific and technical expertise to the UK space sector.

#### We will:

- Work with UKSA to deliver a National Space Strategy implementation plan for astrophysics research, including exploiting fundamental research and technology development for future science and exploration missions, and international engagement.
- Work with UKSA, UK Space Command, commercial and academic partners to ensure that the sustainable utilisation of space is fully integrated into development strategies, including minimising impacts on fundamental science from commercial exploitation.

- Invest £4 million towards commissioning the new National Satellite Test Facility at Harwell, providing a key sovereign capability for the UK civil and military space sector.
- Invest £9.6 million to deliver the SWIMMR (Space Weather) programme and the UK's contributions to the SPEQTRE quantum key distribution Cubesat mission.

### 5.2 Building a Green Future

Our multidisciplinary facilities play a nationally significant role in developing green technologies by supporting a programme of targeted Net Zero research and delivering against the UKRI Building a Green Future strategic theme, the [UK's Net Zero Research & Innovation Framework](#) and the [British Energy Security Strategy](#).

#### We will:

- Leverage the capability of our National Laboratories to deliver a new Net Zero research and innovation demonstrator programme in conjunction with UK industry
- Complete the business case for a new centre of excellence in 'Sustainable Accelerators'.

### 5.3 Investing in transformative technologies

We collaborate closely across UKRI to facilitate the exploitation of transformative technologies across disciplines and industries and deliver against the Innovation Strategy's seven technology families.

## Case studies

### Demonstrating new technology to decarbonise the energy sector

The discovery of a new way to produce hydrogen from ammonia, at the ISIS Neutron and Muon Source in 2014, paved the way for the use of 'green' ammonia as a zero-carbon energy source.

Created from air and water using renewable energy, green ammonia can be used to produce hydrogen, a carbon-free fuel. By switching to renewable electricity to make ammonia, over 40 million tons of CO<sub>2</sub> could be saved each year in Europe alone, or more than 360 million tons worldwide.

The world's first green ammonia power demonstrator, built in 2018 with funding from Innovate UK, EPSRC and Siemens and operating at Harwell, illustrates how this technology could decarbonise heating, transport and industry.

In 2021 STFC, investors IP Group and aerospace manufacturer Reaction Engines established a joint venture, kick-started through the Harwell EnergyTec Cluster, to investigate ammonia as a fuel for the aviation and shipping industries in support of the UK's Net Zero agenda.

**We will:**

- Drive end user adoption and commercialisation of quantum computing in support of consultations on the [UK Quantum Strategy, Options & Scenario Analysis for Quantum Mission and Quantum Mission Delivery Plan](#).
- Develop and implement a fully resourced Quantum Readiness programme within the remit of NQCC full business case, scalable in the event of future additional funding.
- Invest £7.5 million in a new ‘AI for Science’ initiative within our Scientific Computing Department to embed AI in the operation of our multi-disciplinary facilities. We aim to collaborate with similar initiatives at the US Department of Energy’s national laboratories to maximise the impact.
- Work across UKRI to create a Digital Research Infrastructure that supports the wider UKRI programme and that is fully accessible to other Government and public sector organisations.
- Work with the Biotechnology and Biological Sciences Research Council (BBSRC), Medical Research Council (MRC) and others across UKRI to deliver an infrastructure proposal in advanced imaging, allowing the resolution of the molecular detail of biological samples.

**Case studies****Tackling global challenges: Fighting COVID-19**

Sustained investment from STFC in world-class research and innovation infrastructure positioned the UK’s scientific community to be able to mount a rapid response to the coronavirus pandemic and continue to play a key role in the world’s fight against COVID-19.

STFC’s Central Laser Facility (CLF) researchers used optical trapping to investigate the behaviour of COVID-19-causing virus SARS-CoV-2 in aerosol droplets and how this impacts virus transmission. CLF’s OCTOPUS Imaging Cluster utilised cryogenic microscopy to reveal structural information on the virus’s replication cycle.

Protein analysis capabilities at Diamond Light Source (DLS) were utilised to discover the

structure of a key component of SARS-CoV-2. Part of COVID Moonshot, DLS also generated detailed 3D views of how potential drugs interact with key proteins on SARS-CoV-2. The consortium rapidly identified potent antivirals, which are now undergoing a preclinical programme.

DLS is building on COVID Moonshot, through the AI-driven Structure-enabled Antiviral Platform (ASAP) to discover and develop globally accessible and affordable new antiviral drugs to combat COVID-19 and future pandemics.

STFC’s High Performance Computing capabilities continue to underpin this research, providing the digital infrastructure needed to rapidly model, analyse and interpret data.

**5.4 Building a Secure and Resilient World**

Our research and innovation supports the delivery of the Integrated Review as well as the UKRI Building a Secure and Resilient World strategic theme, developing new technology for real-time monitoring of potential threats and security risks and developing world-leading simulation capability in targeted areas.

**We will:**

- Collaborate with the Ministry of Defence to develop a new co-ordinated programme to support the UK’s key ‘Security and Resilience’ agenda across a range of areas including laser-based technologies, space, quantum technology and computational fluid dynamics.



## Delivering the National Space Strategy

STFC will be a leading partner for the delivery of the goals of the National Space Strategy. Through our world-leading space research and development base and our deep partnerships with the UKSA, ESA, NASA, Innovate UK, Department for International Trade, Ministry of Defence, BEIS, and industry, STFC will drive growth of the UK space sector and provide some of the highest impact opportunities and enablers to bring the Ten Point plan to life through:

- Leading the further development and growth of Harwell Space Cluster, the largest space cluster in the UK, home to RAL Space, ESA UK HQ and the Satellite Applications Catapult. The cluster includes 100 space related organisations, which collectively employ 1,400 people.
- Expanding the number of start-ups supported by the ESA Business Incubation Centre UK

across its sites on behalf of ESA and the UK Space Agency, further supporting a growing number of fledgling firms to transform ambitious space-tech ideas into commercial reality. Since its inception, more than 100 start-ups have been supported by the programme. These companies have raised over £99 million in investment and, in 2020 alone, incubatees filed 12 new patents.

- Completing and operating the National Satellite Test Facility, the UK's first purpose built, comprehensive set of large-scale space test facilities at a single location facilitating the testing of larger, more technologically advanced spacecraft and space payloads and removing the need for UK companies to use test facilities located abroad.
- Implement the NW Space Cluster Strategy, addressing the Government's ambitions of levelling up the space economy and growing world class space clusters. The NW Space cluster will capitalise on the rapid growth of the UK's space sector and the significant opportunity for regional growth, leveraging existing regional strengths in adjacent sectors such as advanced manufacturing, big data, telecoms and software.



## Objective 6: A world-class organisation

STFC is a large and complex council within UKRI, consisting of over 2500 scientific, technical and administrative staff. We operate over £2 billion of investment in major research infrastructure and are delivering an investment portfolio of over £1 billion in ongoing and new construction projects. We strive for operational excellence, ensuring that we use our collective resources across the entire research and innovation community to generate maximum scientific, economic, environmental, social and cultural impact. Our operational excellence covers all areas, including our role as research funder, and has a strong focus on science delivery at our research and innovation sites. This requires an effective, dynamic organisation that supports the development, safety, and wellbeing of a diverse mix of staff working across our scientific sites. We support activities from governance and administration to running complex instrumentation while managing our environmental impact. In the formative years of UKRI we have put in place strong and clear internal governance structures and have initiated a wide-ranging continuous improvement programme aligned with the broader UKRI change programme and the new operating model.

## 6.1 Valuing our people

Our most important asset is our people. Building on the [UKRI EDI strategy](#), we have developed our STFC people plan, an action plan aimed at addressing a variety of issues including skills shortages in the UK, particularly in engineering and computing specialisms, which, combined with an increasing public-private sector pay gap in these areas, presents challenges for recruitment and retention. This issue is the highest risk to our continued operation of existing facilities and new construction projects. The plan also describes how we aim to develop diverse talent and promote an open and inclusive culture that embeds EDI into all our processes (from funding calls and advisory board membership to career support and our talent attraction framework). We value and encourage the diversity that will enable us to deliver our exciting mission to produce extraordinary and world-leading scientific breakthroughs and contribute to the UK's ambitions to be a global science superpower.

### We will:

- Support staff with appropriate training to enable everyone to have the tools and knowledge to embed EDI in all they do, supported by clear actions with well-defined targets and metrics. We will also produce Equality Impact Assessments for funding calls and all major initiatives.
- Support our people by introducing a competency and behaviours framework and providing targeted management training and development in support of it, alongside establishing a 360 degree appraisal process to provide more effective feedback to managers and staff and drive improvement across the organisation.
- Introduce an anonymous reporting tool to enable a safe space for staff to raise issues and develop a reverse mentoring scheme to draw on the experiences of diverse colleagues across STFC.
- Work across UKRI and with BEIS on establishing the pay flexibility case for STEM staff in critical job families.

- Explore options for the structured use of special allowances to attract and retain STEM staff with specialised skills in engineering and technology

## 6.2 Improving the way we work

Working across UKRI, we will develop and implement a new operating model to make UKRI's operations simpler and better, to the benefit of our staff and our stakeholders. This will include maintaining a strategic pipeline of ambitious and transformative science, innovation, and infrastructure concepts ready to respond to funding opportunities across STFC and UKRI priority areas, whilst delivering our operational excellence goals. It will also include operating with transparent, robust, and clearly documented governance and management processes, and simplifying our sub-committee structure reporting into STFC Council to reduce bureaucracy and administrative load. We have embedded a culture of continuous improvement across the organisation that will enable us to deliver our ambitious Strategic Delivery Plan with more effective and efficient processes with the goal of delivering efficiency savings of £2 million per annum by the end of 2024-25.

**We will:**

- Embed a robust long-term (ten-year) financial planning process across STFC, contributing to UKRI being an effective and agile organisation, maximising return for the UK taxpayer
- Produce development plans for the STFC owned campuses; including a roadmap to enable the provision of adequate power, infrastructure, and services to meet future development requirements.
- Invest in the aging parts of our science estate to make it more modern, safe, and efficient, reduce energy consumption, and enhancing cyber-security in our digital infrastructure.

**6.3 Reducing our environmental impact**

As part of UKRI, we are committed to reducing our environmental impact. We aim to embed environmental sustainability in all STFC operations, estates strategy, research, supply chains and projects to enable us to meet our Net Zero objectives and UKRI's Environmental Sustainability Strategy, as part of our plan to transition to net zero operations by 2040.

**We will:**

- Identify and incorporate more environmentally sustainable alternatives and solutions for all aspects of STFC's work.
- Deliver a programme of power consumption reduction activities and develop an Energy Roadmap for the RAL site to assure continuity and sustainability of supply.
- Increase biodiversity on our campuses to make a positive contribution to the environment by developing a Biodiversity Action Plan.

# Our budget

Budget category <sup>i ii</sup>	2022-23 (£m)	2023-24 (£m)	2024-25 (£m)
<b>Core R&amp;I Budgets</b>	<b>531.21</b>	<b>544.02</b>	<b>575.40</b>
<b>Existing cross-UKRI Strategic Programmes</b>	<b>47.06</b>	<b>29.92</b>	<b>7.17</b>
Fund for International Collaboration	4.72	0.84	0.45
Strategic Priorities Fund	33.79	28.02	6.49
National Satellite Test Facility (ISCF)	7.47	0.00	0.00
Other cross-UKRI Strategic Programmes	1.08	1.06	0.23
<b>Infrastructure*</b>	<b>255.94</b>	<b>305.74</b>	<b>290.37</b>
Infrastructure Fund projects : STFC only	22.48	26.87	18.29
Infrastructure Fund projects managed by STFC on behalf of all of UKRI	9.10	33.51	80.57
World Class Labs	96.36	113.31	117.10
Capital for international subscriptions	49.50	47.70	47.50
Digital Research Infrastructure Programme – phase 1b pilot projects (2022-23 – 2023-24)	4.72	2.36	0.00
Carbon Zero Fund <sup>4</sup>	3.66	0.00	0.00
Existing infrastructure investments: European Spallation Source (ESS) – capital	27.83	26.89	7.61
Existing infrastructure investments: Square Kilometre Array (SKA) - capital	18.00	18.00	18.00
Existing infrastructure investments: Hartree National Centre for Digital Innovation (HNCDI) – capital	24.30	37.10	1.30
<b>R&amp;I Budgets – existing time-limited commitments</b>	<b>48.19</b>	<b>54.58</b>	<b>48.25</b>

## Notes

- i. The figures provided in this document are in line with the 2022-23 – 2024-25 budget allocations for UK Research and Innovation. These are broken down by our budgeting and reporting categories, and exclude funding for ODA, Financial Transactions, and BEIS Managed Programmes. Figures are indicative and may vary over the course of the three-year period due to budget adjustments made as a part of on-going financial management and planning processes to maximise the use of our total funding.
- ii. From 2022-23 UKRI talent investments are managed collectively across the Research Councils. The funding for collective talent activities outlined in this delivery plan are accounted for in the broader collective talent funding line included in our Corporate Plan.



COVID interventions	0.40	0.00	0.00
Hartree National Centre for Digital Innovation (HNCDI) - resource	21.11	25.96	22.92
Square Kilometre Array (SKA) - resource	12.00	12.00	12.00
European Spallation Source (ESS) - resource	14.69	16.63	13.33
<b>Grand Total</b>	<b>882.40</b>	<b>934.26</b>	<b>921.19</b>

\* Infrastructure projects are detailed separately below. Note that further infrastructure allocations to Councils may be made during the Spending Review period from the Infrastructure Fund, Digital Research Infrastructure Programme and Carbon Zero Fund Programme.

<b>Infrastructure Fund projects include:*</b>	<b>Total lifetime allocation (some in future SR periods)</b>
Infrastructure Fund: Wave 1 – Full project – Hyper-Kamiokande (Hyper K)	15.50
Infrastructure Fund: Wave 1 – Full project – Square Kilometre Array (SKA)	66.68
Infrastructure Fund: Wave 2 – Full project – Large Hadron Collider beauty (LHCb) 2030+ Subject to business case approval	49.44
Infrastructure Fund: Wave 2 – Full project – Simons Observatory SO:UK	18.30
Infrastructure Fund: Wave 1 – Preliminary Activities – Electron-Ion Collider (EIC)	2.97
Infrastructure Fund: Wave 1 – Preliminary Activities – Boulby Underground Laboratory – Dark Matter and Beyond Preliminary Activity	2.84
Infrastructure Fund: Wave 2 – Preliminary Activities – Ion Therapy Research Facility	2.00

\* Further allocations may be made during the Spending Review period. Excludes wave 1 preliminary activities where spend was in 21-22 only. Allocations include contingency, which may be returned if unused.

Infrastructure Fund projects managed by STFC on behalf of all of UKRI include:*	Total lifetime allocation (some in future SR periods)
Infrastructure Fund: Wave 1 – Full project – Diamond-II Subject to business case approval	296.60
Infrastructure Fund: Wave 1 – Full project – Endeavour Subject to business case approval	73.48
Infrastructure Fund: Wave 1 - Full project – Vuclan 2020 Subject to business case approval	59.71
Infrastructure Fund: Wave 2 – Full project – HiLUX	17.20
Infrastructure Fund: Wave 1 – Preliminary Activities – Diamond-II	5.30
Infrastructure Fund: Wave 1 – Preliminary Activities – ISIS-II Feasibility, Design Studies and R&D - 'Phase 1.2'	5.10
Infrastructure Fund: Wave 2 – Preliminary Activities – X-ray Free Electron Laser (XFEL) - Conceptual Design and Options analysis	3.20

\* Further allocations may be made during the Spending Review period. Excludes Wave 1 preliminary activities where spend was in 21-22 only. Allocations include contingency, which may be returned if unused.

# References

1. BREEAM (Building Research Establishment Environmental Assessment Method), first published by the Building Research Establishment (BRE) in 1990, is the world's longest established method of assessing, rating, and certifying the sustainability of buildings
2. Research and development (R&D) people and culture strategy, BEIS, July 2021: <https://www.gov.uk/government/publications/research-and-development-rd-people-and-culture-strategy>

# Image references

Image credits are STFC unless stated otherwise.

- Cover “Cosmic Cliffs” in the Carina Nebula.  
Credit: NASA, ESA, CSA, and STScI
- Page 17 An artist’s impression of the future SKA-Mid dishes in South Africa  
Credit: SKAO
- Page 18 The CMS detector at CERN.  
Credit: CERN
- Page 19 James Webb Space Telescope Artist Conception.  
Credit: NASA-GSFC, Adriana M. Gutierrez (CI Lab)
- Page 20 LHCb experiment cavern at LHC IP8  
Credit: CERN



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