

Academic Research | United Kingdom

Driving research excellence

Northumbria University

Northumbria teamed up with Lenovo and Logicalis to deliver a world-class high-performance computing (HPC) facility. The new Higgs cluster will support research that shapes knowledge and scientific practice around the world.



1

Customer background

Who is Northumbria University?



Northumbria University is a research-intensive university that unlocks potential for all, changing lives regionally, nationally, and internationally. Named Modern University of the Year 2025 by The Times and The Sunday Times, it is based in Newcastle upon Tyne, with an additional campus in London.

Originating as Rutherford College in 1877, Northumbria is ranked in the UK's top 25 universities for research power. Two thirds of Northumbria's undergraduate students come from the North East and enter employment in the region when they graduate, demonstrating the university's significant contribution to social mobility and levelling up in the North East of England.





Across its undergraduate and postgraduate programmes, Northumbria attracts students from 137 countries and collaborates globally with higher education institutions.

2 The challenge

Northumbria has a proud heritage of changing lives through education and research, tackling the global challenges of our age to transform society.

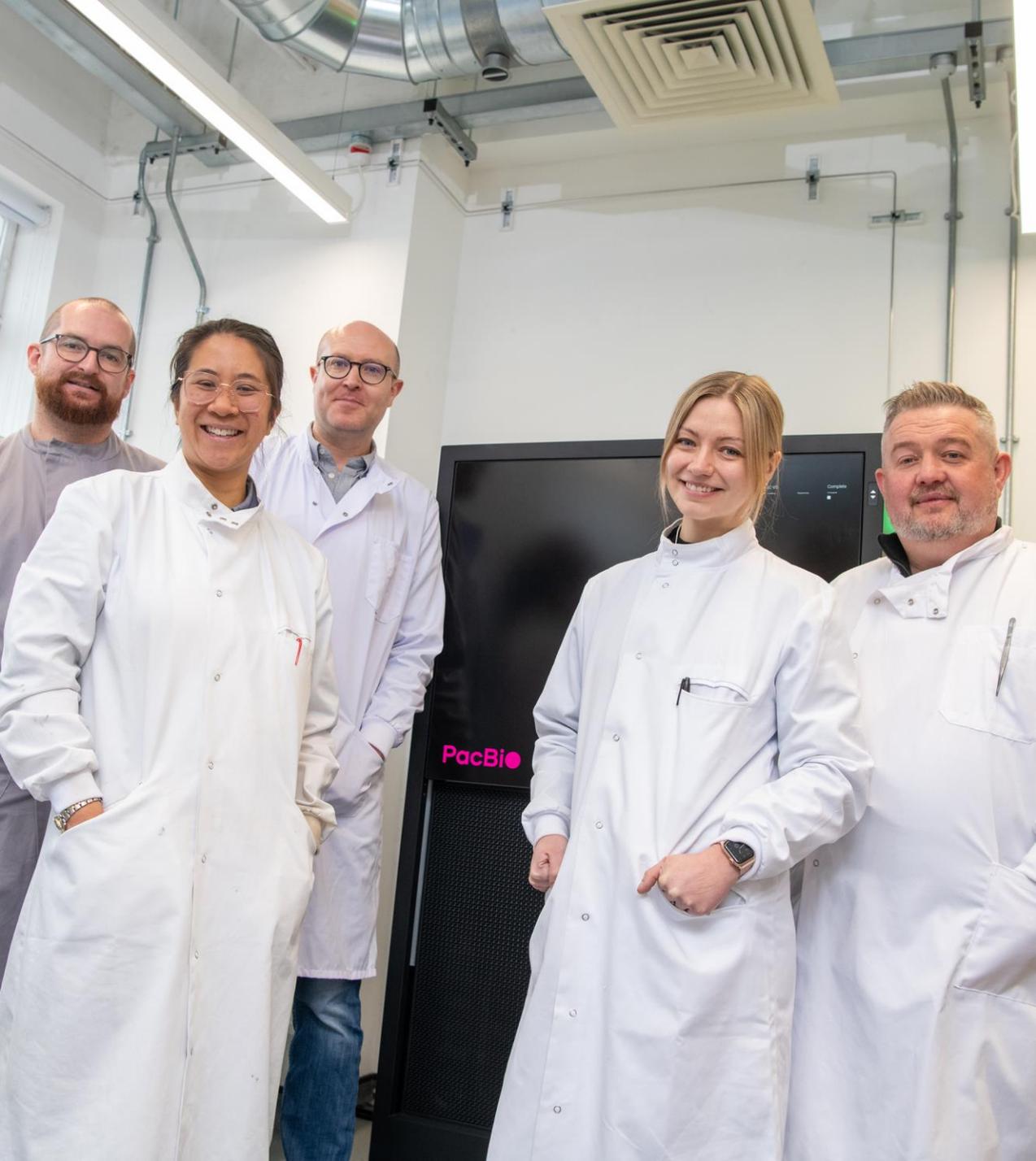
Several areas of research at the University are truly outstanding, with a global reputation for academic excellence. These research 'Peaks of Excellence' include [Microbiome Exploration](#), [Solar and Space Physics](#), [Ice on Earth](#), and [Microbial Biotechnology](#). To advance knowledge and break new ground, researchers working across these Peaks of Excellence require access to HPC resources.

“ All our leading research requires computation and in my own area of research, I had pushed our existing HPC infrastructure to the absolute limit—particularly during the pandemic when Northumbria University was generating far more genome sequencing data than many nation states in the world.”

Dr Matthew Bashton

Assistant Professor in Computational Biology and Genomics, Northumbria University





During the pandemic, scientists at Northumbria joined a research consortium backed by the UK government to map how COVID-19 spreads and evolves using whole-genome sequencing. The group of experts also consisted of the National Health Service, Public Health Agencies, Wellcome Sanger Institute, and numerous other academic institutions.

2 The challenge

A team led by Darren Smith, Professor of Bacteriophage Biology at Northumbria, deployed [NU-OMICS](#), the University's DNA sequencing research facility, to assist in the national effort to combat the disease. As part of the Covid-19 Genomics UK consortium (COG-UK) they informed on both hospital and public health outbreaks to support regional infection control teams whilst also supporting national studies as a North East England Hub for SARS-CoV-2 genome sequencing. On completion, NU-OMICS continued to support the UK Health Security Agency (UKHSA) as a SARS-CoV-2 resilience site using their experience to provide data to the Office for National Statistics (ONS). Their supporting data allowed deeper analysis that was later published in the prestigious academic journal, [Nature](#).

2 The challenge

Dr Matthew Bashton, Assistant Professor in Computational Biology and Genomics at Northumbria who supported the project, recalls: “During the height of the Omicron wave, we were processing 5,000 samples a week working within a 72-hour turnaround. It was during this period that I hit the limit of the Crick cluster. Sometimes the file system would desync and the information wouldn’t get through to analysis, so we’d have to relaunch jobs, further delaying the process. The Higgs cluster can align 42 high depth runs of the human genome in four hours, so we can now process four times the number of samples in half the time.”

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“State-of-the-art research requires state-of-the-art computation. We made the decision to replace our existing departmental clusters with a new university facility. The Higgs cluster is Northumbria’s first university-level HPC system and reflects our continued growth as a research-intensive university.”

Dr Matthew Bashton

Assistant Professor in Computational Biology and Genomics, Northumbria University

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“The Higgs cluster will include cutting-edge Lenovo HPC hardware, powered by 4th Gen AMD EPYC™ processors, to deal with advanced workloads at high speeds, such as the complex calculations, simulations, and modelling carried out by research teams at Northumbria. This partnership with Lenovo and Logicalis signals an exciting time in our journey as a research-intensive university.”

Dr Simon Corbett

Chief Information Officer, Northumbria University

3 The solution

Powerful infrastructure

Northumbria partnered with Logicalis to build a next-generation HPC system, named Higgs, based on Lenovo ThinkSystem server and storage technology, powered by AMD EPYC™ 9004 Series processors. Logicalis was responsible for the design, development, and installation of the cluster as well as ongoing maintenance.

The Higgs cluster is named after visionary Nobel laureate Professor Peter Higgs, who was born in Newcastle, and whose revolutionary work on the Higgs boson particle changed our understanding of what helps bind the universe together.

Hardware

Lenovo ThinkSystem SR645 V3 powered by AMD EPYC™ 9654 processors
Lenovo ThinkSystem SR675 V3 powered by AMD EPYC™ 9124 processors
Lenovo ThinkSystem SR650 V2
Lenovo ThinkSystem SR650 V3
Lenovo ThinkSystem SR630 V2
Lenovo ThinkSystem 42U Onyx Heavy Duty Rack Cabinet
Lenovo ThinkSystem DE6000H Hybrid Flash Array
Lenovo Distributed Storage Solution for IBM Storage Scale (DSS G210)
Lenovo Storage D3284 External High Density Drive Expansion Enclosure
NVIDIA H100 GPU

Software

IBM Storage Scale
Logicalis Ubiquity
Slurm Workload Manager
Ubuntu Linux

A photograph of a server rack with a hexagonal mesh cover. The Lenovo logo is visible on the right side of the rack. The background is a light purple gradient.

Lenovo

“Given the significance of his contribution to the way we understand the world, we have sought permissions from the family of the late Professor Peter Higgs to name the new cluster after the visionary Nobel laureate, whose name and links to the region live on through his transformative work.”

Professor Louise Bracken

Pro Vice-Chancellor (Research and Knowledge Exchange), Northumbria University

3 The solution

Ongoing investment

The Higgs cluster is predominately based on Lenovo ThinkSystem SR645 and SR675 servers, powered by AMD EPYC™ 9004 Series processors. It comprises general-purpose HPC nodes, high-memory HPC nodes with additional RAM per core, a GPU node to support AI workloads, and a parallel file system based on Lenovo ThinkSystem DE6000H Hybrid Flash Arrays with IBM Spectrum Scale with a total storage capacity of 905 TB.

Built to handle large scientific and engineering datasets, the AMD EPYC processors deliver high compute performance and efficiency. The compute and storage connect with high-speed Mellanox network switches, and the cluster runs Ubuntu Linux, with Logicalis Ubiquity for cluster management and Slurm Workload Manager for job scheduling.

Northumbria plans to regularly expand the Higgs cluster throughout a five-year project period to ensure that it meets the evolving needs of the University's growing research community.



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“There’s been brilliant collaboration between IT, procurement, and academic staff at Northumbria, who have worked closely with Lenovo and Logicalis to co-design the specification of the cluster so that it gives us everything we need to meet current demand, while ensuring it is capable of growing with us over the coming years to meet future requirements.”

Dr Simon Corbett

Chief Information Officer, Northumbria University

4 The results

The Higgs cluster marks the beginning of a new chapter for Northumbria, giving researchers across the University access to cutting-edge HPC resources that will help to advance their work.

For Professor Darren Smith and NU-OMICS, which is an out-facing DNA-sequencing service supporting regional, national and international studies, Higgs and its architecture will improve data generation, analysis and productivity. The cluster complements and allows for the development of this state-of-the-art facility, helping to drive further research breakthroughs. This includes the continuation of [work to investigate the influence of breast milk viruses—or phages—on bacterial communities in the gut of pre-term and newborn babies](#), supported by a Biotechnology and Biological Sciences Research Council (BBSRC) grant of £1.2 million.



First university-level HPC facility



Huge boost in capacity and performance



Significant investment in research excellence



“The Higgs cluster will give us the bandwidth and computational power to fully utilise the DNA sequencing instrumentation that we have in the NU-OMICS lab and get results faster. Our DNA sequencers have very high levels of output and in the past, it took longer to analyse the data than it did to sequence it. Having access to the larger, more powerful Higgs cluster will greatly accelerate this sort of work.”

Dr Matthew Bashton

Assistant Professor in Computational Biology and Genomics, Northumbria University

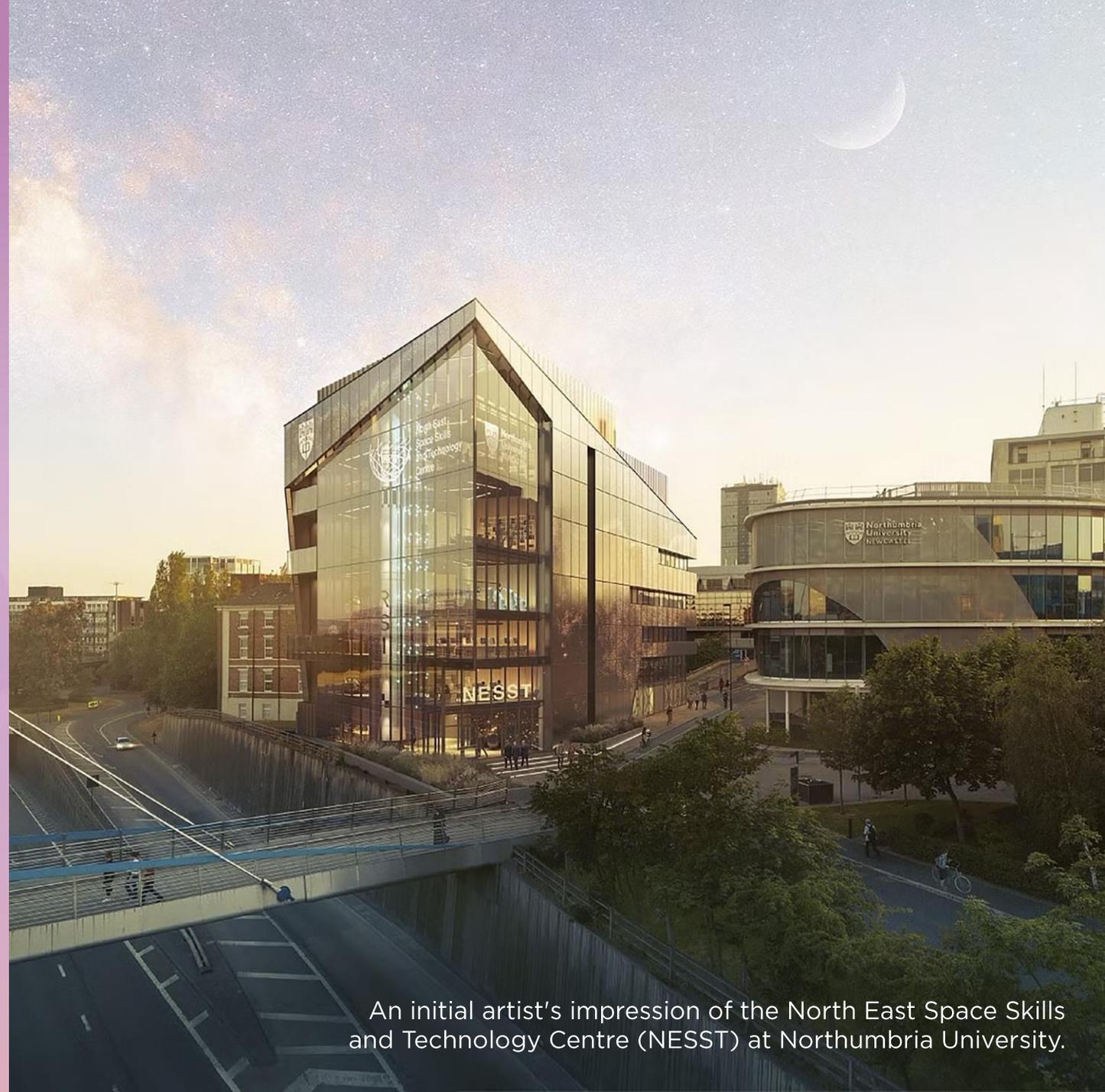
4 The results

Out-of-this-world research

The Higgs cluster will be available to researchers across the University, with many of the [Peaks of Excellence](#) research areas expected to benefit.

One of these is the Solar and Space Physics research group, which has been [awarded £1.29 million from the UK government's Science and Technology Facilities Council \(STFC\) to fund four research projects](#), each exploring a different element of the Sun's activity. Headed by Professor James McLaughlin, the group's research contributes to advances in predicting space weather, and how best to develop, enhance, and protect the satellite fleets that we rely on in our daily lives on Earth. The group includes a number of researchers who have been awarded prestigious fellowships to pursue their work, including computational astrophysicist and [Royal Society University Research Fellow](#), Dr Luca Franci, and [STFC Ernest Rutherford Fellow](#), Dr Steph Yardley.

Northumbria is also developing the North East Space Skills and Technology Centre (NESST), a £50 million facility that will support world-leading space experts and unite industry with academia to transform the UK space economy.



An initial artist's impression of the North East Space Skills and Technology Centre (NESST) at Northumbria University.

4 The results

Down-to-earth discoveries

The Future of Ice on Earth group focuses on research into ice sheets and glaciers on a global scale. A team from Northumbria are working to [interpret satellite data and build ice and ocean models to predict the impact of climate change on the fastest changing areas of Antarctica.](#) What happens in Antarctica has global repercussions. Northumbria researchers, led by Professor Hilmar Gudmundsson, are working to understand key tipping points, and how future sea level rises could impact coastal communities around the world. This includes a collaboration with the Niels Bohr Institute in Denmark and Danish Meteorological Institute on the £1.4 million Prediction of Climate Change and Effect of Mitigating Solutions (PRECISE) project, funded by Novo Nordisk.

4 The results

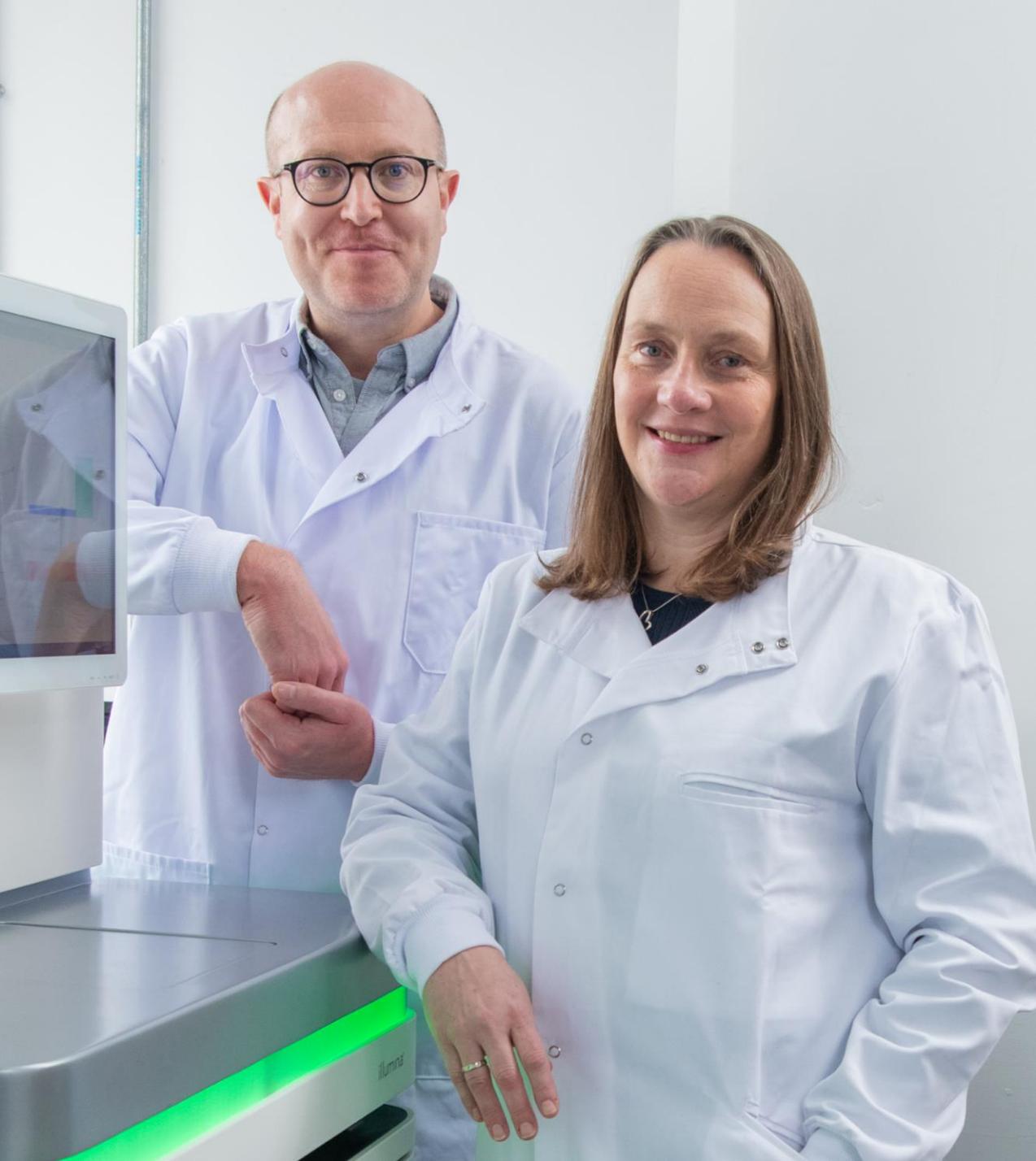
Northumbria's Microbial Biotechnology research group, meanwhile, [is developing tools to create living buildings for a more sustainable future](#). Co-led by Professors Gary Black and Meng Zhang, the group investigates the use of enzymes and synthetic microorganisms to manufacture consumable products and energy, while using microbial biotechnologies and engineered biomaterials to advance healthcare and sustainability solutions. This includes Professor Zhang's £3.4 million Horizon Europe grant, which focuses on using engineered living materials to treat macular degeneration, and a BBSRC-funded project aimed at producing self-dye vegan leather through microbial fermentation.

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“This is a major investment which will continue the sustained growth in our research capabilities at Northumbria and demonstrates our commitment to building capacity to support the world-leading research that goes on here. This really will be a revolutionary project for many of our researchers, particularly those working with large datasets which need to be processed at high speeds.”

Professor Louise Bracken

Pro Vice-Chancellor (Research and Knowledge Exchange), Northumbria University



“I’m really pleased we’re working with Lenovo and Logicalis to bring the latest HPC technology to our campuses.”

Professor Louise Bracken

Pro Vice-Chancellor (Research and Knowledge Exchange), Northumbria University

Why Lenovo, Logicalis, and AMD?

For Northumbria, Lenovo and Logicalis represented a safe pair of hands. The two companies have a proven track record of delivering HPC clusters for UK universities, and Northumbria was impressed by the combination of robust Lenovo ThinkSystem hardware and powerful AMD EPYC™ processors, as well as innovative Ubiquity software and expert support from Logicalis.

The Ubiquity environment utilises containers and container orchestration to reduce deployment time and enable mobility of research. “Thanks to Ubiquity, we will be able to containerise applications and models developed locally on the Higgs cluster and run them on other HPC systems without any adjustment,” says Dr Matthew Bashton. “This will enable researchers to run their work on other clusters, for instance if they have the opportunity to scale up to national-level resources such as ARCHER2—the UK’s national supercomputing service.”



“Logicalis is incredibly proud to partner with Northumbria University and Lenovo in delivering HPC technologies to fuel their cutting-edge research. Our team of dedicated HPC experts will be working closely with the University over the next five years, ready to scale the Higgs cluster’s compute performance and capacity as needed to process ever larger datasets at high speed.”

Neil Eke

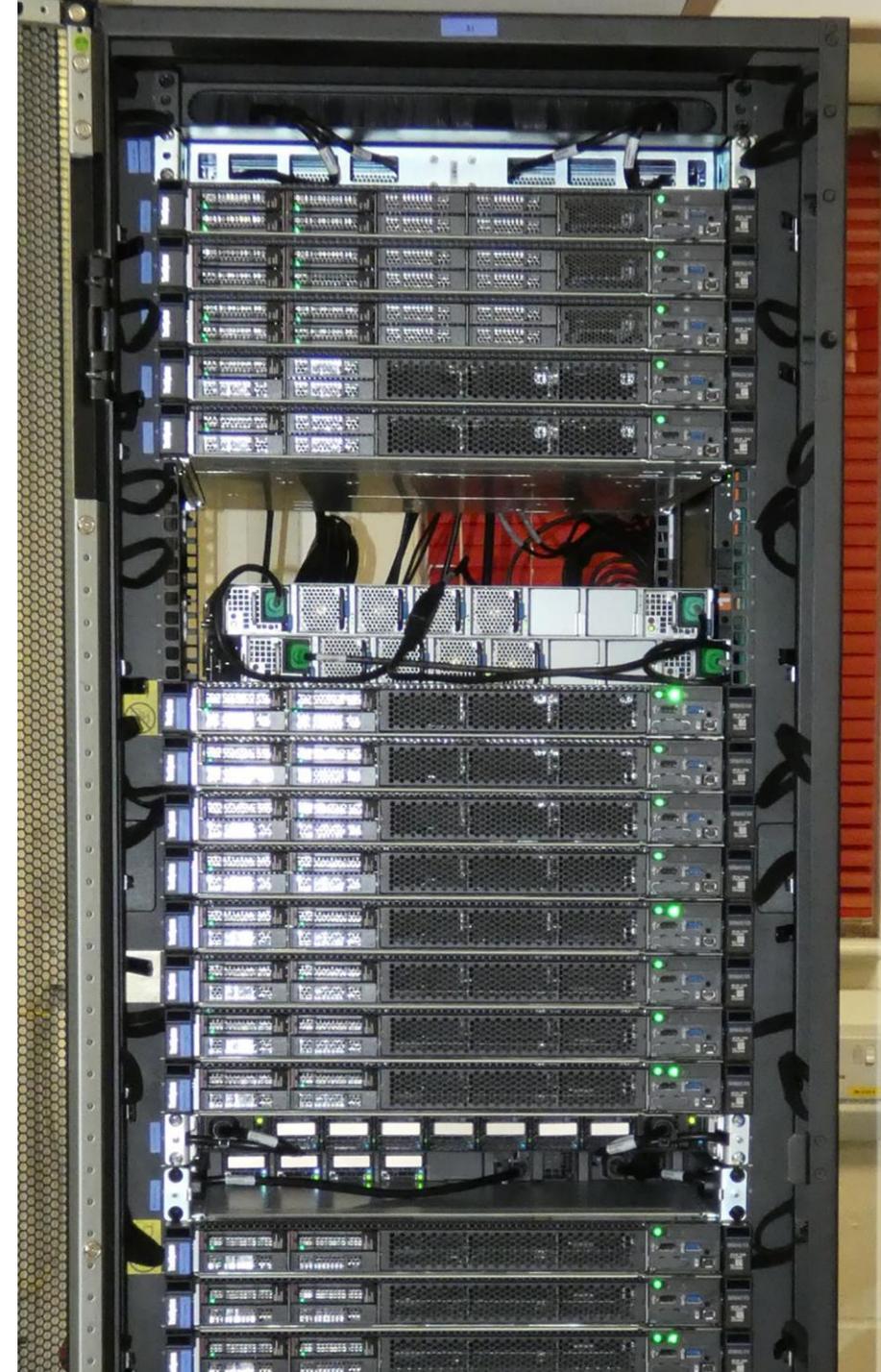
Chief Executive Officer, Logicalis UKI



“We are Architects of Change. We help organisations succeed in a digital-first world.

As a global technology service provider, we harness our collective technology expertise to help our clients build a blueprint for success, so they can deliver sustainable outcomes that matter. Through our deep knowledge of key IT industry drivers such as Security, Cloud, Data Management and High-Performance Computing (HPC) addresses customer priorities such as revenue and business growth, operational efficiency, innovation, risk and compliance, data governance and sustainability.

At Logicalis, our ongoing strategic investment in the UK-based HPC Team is focused on supporting the world’s leading scientific research organisations with industry-leading HPC knowledge, experience and technical innovation.”



How can universities empower researchers?

Northumbria University worked with Lenovo and Logicalis to deliver a world-class HPC facility that will support world-class research.

[Explore Lenovo HPC Solutions](#)