We Are
Staffordshire

DRAFT
INNOVATION FRAMEWORK

STOKE-ON-TRENT AND STAFFORDSHIRE
2026-2033

PAPER 3 : LONG READ & FULL EVIDENCE BASE
FEBRUARY 2026

Foreword

Stoke-on-Trent and Staffordshire is changing.

Across the area, new forms of innovation-led activity are taking root alongside long-standing strengths in manufacturing, health, services and the everyday economy. Businesses are developing and adopting new materials, digital tools, life sciences applications and energy systems. Our two universities, colleges, the NHS and local authorities are working more closely with industry, and with each other, than ever before. Together, these relationships are beginning to shape a more resilient and future-focused local economy.

This Innovation Framework has been developed to help make sense of that change.

It brings together evidence, analysis and insight to build a clearer picture of how innovation happens in Stoke-on-Trent and Staffordshire today – where the area has genuine strengths, where opportunities for growth are emerging, and where barriers remain. It reflects what we have heard from businesses, investors, researchers and delivery partners about skills needs, infrastructure, investment challenges and the realities of operating in competitive national and global markets.

Importantly, this work recognises that innovation is not confined to a single place, sector or type of organisation. It happens across towns and cities, in established firms as well as start-ups, and through collaboration as much as through discovery. The focus of this Framework is therefore not on creating a single "innovation hub", but on understanding how different parts of the system can work better together – linking research and skills, adoption and deployment, and economic opportunity with benefits for local communities.

The Framework also reflects a shared ambition: that innovation-led growth should support good jobs, skills progression and resilience across the everyday economy, not just a small number of high-value firms or sectors. That ambition underpins the emphasis placed here on place-based approaches, partnership working and practical routes to adoption and scale.

This document is intended as a starting point, setting out emerging propositions and areas for focus, grounded in evidence but open to challenge and refinement. Over the coming months, it will be used to engage businesses, investors and partners across the area, helping to shape the next phase of work to grow the Innovation economy.

We invite you to read this Framework, reflect on its findings, and take part in the conversations that follow. Through continued collaboration, Stoke-on-Trent and Staffordshire can strengthen their position as a place where innovation supports inclusive growth, shared prosperity and long-term opportunity for all.

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1. Executive Summary

1.1. Purpose of the Framework

This draft Innovation Framework has been developed to support a shared, evidence-informed understanding of Stoke-on-Trent and Staffordshire's innovation economy.

The innovation economy is the part of our local economy focused on developing and applying new ideas, technologies and ways of working to improve productivity, resilience and long-term growth. It includes businesses and organisations that invest in research, advanced manufacturing, skills and innovation to make better products, processes and services — helping the UK compete internationally, strengthen supply chains and adapt to challenges such as Net Zero, energy security and health reform.

Growing this part of the economy matters not only for national prosperity, but for local jobs, skills and livelihoods, creating opportunities for people and communities across Stoke-on-Trent and Staffordshire.

The document is not a final strategy or delivery plan, but a diagnostic and sense-making tool that brings together existing intelligence, emerging analysis and practical insight to inform future decisions, partnerships and propositions.

Specifically, the Framework aims to:

- Build a clearer picture of the local industry base, with a focus on innovative and emerging activity;
- Understand how research, advanced manufacturing, skills and infrastructure assets can better support innovation-led growth;
- Understand where and how economic impact is most likely to be achieved;
- Explore what innovation means for the everyday and foundational economy, including jobs, productivity and progression;
- Identify where the local innovation system is well aligned, and where gaps, constraints or missed opportunities exist;
- Begin to articulate headline propositions to support wider engagement and future co-production; and
- Begin the task of developing a realistic, evidence-led investment strategy.

The Framework is deliberately exploratory. It sets out what we know, what we think may be possible, and what requires further testing with partners, particularly businesses and communities.

1.2 Why place-based innovation?

Over the past decade, innovation has become central to UK economic policy, viewed as a key driver of:

- productivity and wage growth;
- international competitiveness;
- supply chain resilience and security; and
- the reduction of long-standing regional disparities.

Alongside national programmes, there has been a marked shift towards place-based innovation — recognising that innovation is most effective when it is rooted in local industrial strengths, institutions and relationships. Programmes such as UKRI's Strength in Places Fund and Innovation Accelerators reflect growing consensus that collaboration across sectors and institutions matters.

International and UK evidence points to common features of successful place-based innovation systems:

- collaboration between business, universities, the public sector and investors;
- strong translational capability (moving ideas into use and adoption);
- aligned skills pipelines and infrastructure;
- and clear civic leadership and coordination.

Stoke-on-Trent and Staffordshire are at an important point:

- The area has made significant progress over the past decade in rebuilding innovation capability from a low base.
- There is now clear evidence of frontier and high-value activity in several priority areas.
- Devolution and future governance arrangements will place greater emphasis on strategic clarity and investable propositions.
- National policy increasingly expects credible place-based delivery capacity, particularly in advanced manufacturing, digital adoption, life sciences and energy systems.

This Framework provides an early, shared evidence base to support that next phase — before decisions are locked in, and while there is still scope to shape direction collectively.

1.3 A systems view of local strengths

Rather than focusing on narrow sectors, the Framework identifies four broad, overlapping cluster groupings where innovation activity, business capability, advanced manufacturing and institutional strengths align most strongly:

1. Materials Innovation

2. Digital Economy
3. Life Sciences (health and non-health)
4. Advanced Manufacturing & Energy Systems Innovation

These are interdependent systems, with shared skills, infrastructure and markets. Their overlap — particularly between digital, materials and advanced manufacturing — is a strategic strength.

1. Materials Innovation

- Anchored in advanced ceramics and specialist materials, with national and global relevance.
- Strong concentration of activity in advanced manufacturing, Net Zero, MedTech and engineering applications.
- A rare combination of:
  - discovery and characterisation capability,
  - industrial validation and standards,
  - applied manufacturing and systems integration.
- A clear opportunity to:
  - Focus on immediate economic growth by investing in accelerating the production of novel critical ceramics,
  - strengthen sovereign capability in priority materials,
  - Grow productive R&D activity locally in health and non-health-related biomaterials.

Key insight:

The area's materials strength is not just historical — it is strategically relevant to UK priorities in energy transition, defence, healthcare and high-value manufacturing, with clear pathways to commercial scaling.

2. Digital Economy

- The largest single contributor to local productivity, with very high GVA per employee.
- Two linked digital economies:
  - digital solutions (software, platforms, data, creative);
  - digital hardware and embedded systems (electronics, sensors, semiconductors).
- Strong organic growth, but uneven diffusion across SMEs and sectors.
- Increasingly embedded within manufacturing, life sciences and energy systems adoption.

Key insight:

Applied digital capability functions both as a high-value sector in its own right and as enabling infrastructure embedded across materials, life sciences and energy systems innovation.

As well as supporting the wider growth of tech firms where this is feasible, a powerful local opportunity lies in accelerating digital adoption and systems integration across advanced manufacturing, health and energy.

3. Life Sciences (health and non-health)

- A large and diverse life sciences base, spanning:
  - clinical and health-related innovation;
  - MedTech and diagnostics;
  - non-health biosciences (environmental, agri-tech, bio-Net Zero).
- Strong alignment with:
  - NHS and Integrated Care priorities, including personalised precision medicine;
  - prevention, rehabilitation and long-term conditions;
  - applied biological, materials and data-driven innovation.
- Clear opportunity to strengthen translation, adoption and evaluation, rather than duplicating discovery research.

Key insight:

The opportunity lies in connecting science, systems and adoption — using local health and civic assets as testbeds and deployment environments for scalable innovation.

4. Advanced Manufacturing and Energy Systems Innovation

- A cross-cutting, applied manufacturing and energy systems economy, rather than a single clean-energy sector.
- Strengths lie in:
  - high-value, specialist manufacturing embedded in energy, materials and logistics supply chains;
  - deployment, integration and optimisation of complex systems;
  - Net Zero delivery in real-world industrial and civic environments;
  - energy as a productivity, cost and resilience issue.

- Less about large-scale generation; more about systems adoption, integration and replication.

Key insight:

The area's comparative advantage lies in making complex manufacturing and energy systems work in hard, real places — industrial estates, ceramics facilities, logistics hubs and hospitals — combining advanced manufacturing capability with applied systems innovation.

1.4 Skills: strength with structural gaps

Across all four cluster groupings, the skills picture shows:

- Strong higher-level capability within universities.
- Essential technician and delivery capacity within FE.
- Persistent gaps at the Level 3–5 "missing middle", especially where:

  - digital meets hardware,
  - biology meets data and regulation,
  - energy meets construction and systems integration,
  - advanced manufacturing meets automation and control.

Implication:

The challenge is less about creating entirely new provision, and more about coherent pathways, progression and alignment with live innovation and scaling activity.

1.5 Infrastructure: a place-based portfolio

Different forms of innovation require different places:

- Strategic industrial sites for land- and power-intensive deployment and advanced manufacturing.
- University-anchored science and innovation space for R&D, pilot production, small-footprint high-value manufacturing and spin-outs.
- Town and city centres for digital, professional and consultancy functions.

No single location can do everything. The evidence supports a portfolio approach, with complementary roles across sites and clear progression routes from R&D to scale-up.

1.6 Innovation and the Everyday Economy

A central concern of this Framework is who benefits from innovation.

Across materials, digital, life sciences and advanced manufacturing and energy:

- Many impacts are felt first in everyday sectors — construction, manufacturing, logistics, care, public services.
- Innovation often improves:
    - productivity,
    - job quality,
    - safety and reliability,
    - resilience to cost and regulatory shocks.
- Over time, innovation can open realistic progression pathways — particularly into technician, supervisory and applied technical roles.

Key risk:

Without coordination, innovation can lead to uneven impacts or reinforce low-productivity models.

Key message:

Just outcomes require deliberate alignment between innovation, workforce planning and business adoption.

1.7 A system — and an investment case

The evidence points consistently to one conclusion: the area's challenge is system coordination and targeted investment, not lack of assets.

Across clusters, the most effective interventions are likely to be:

- problem-led rather than technology-led;
- focused as much on the environment for translation, adoption, and scale-up as innovation;
- aligned to viable funding routes, including devolved growth funds, UKRI programmes and co-investment models;
- designed to work across institutional and sector boundaries.

The emerging funding strategy emphasises focusing public resources where they unlock scaling, reduce coordination risk and crowd-in private investment — particularly in materials translation, digital adoption, health innovation adoption, and applied manufacturing and energy systems integration.

1.8 The role of place-based governance

Future governance arrangements (including a Strategic Combined Authority) would add value by:

- providing system stewardship;
- maintaining a shared evidence base and priorities;
- aligning national policy and funding with local opportunity;
- convening partners where markets alone will not coordinate effectively;
- assessing where public investment is most needed, and making a credible case based on robust logic chains and evidence.

Well-informed orchestration is the central role, investment, commissioning and public sector delivery confined largely to compelling areas of opportunity and market failure.

1.9 Some emerging headline propositions

While this Framework is not a strategy, several credible directions of travel are emerging:

- A more integrated materials innovation partnership, building on advanced ceramics and translation capability, with targeted investment in critical ceramics and advanced materials scaling.
- A digital enablement and systems integration model focused on productivity, trust and adoption across the wider economy.
- Strengthened routes to life sciences adoption, evaluation and deployment, aligned with NHS and Integrated Care priorities.
- A place-based advanced manufacturing and energy systems integration offer, supporting industrial decarbonisation, resilience and replication.
- Strengthened cross-cutting innovation leadership and management skills, with a focus on these clusters, adjacent and adoption-area industries.

These are starting propositions for discussion, grounded in existing strengths and realistic funding routes.

1.10 Economic impact potential

At this stage, the Framework does not attempt to quantify economic impact. Robust appraisal would require:

- defined programmes;
- delivery models;
- Green Book-aligned assessment.

However, the direction of impact is clear:

- productivity and resilience gains in existing firms;
- scaling of high-value manufacturing and digital capability;
- improved job quality and progression;
- stronger supply chains and competitiveness;
- public value benefits in health, energy affordability and service efficiency.

1.11 What happens next

The next phase will focus on:

Testing and **refining the focus for place-based intervention** to support the scaling of these high growth clusters at the local level. The logic chains included in this report provide a starting point for this.

Critically this requires the **active involvement of all key actors** in these clusters – businesses, investors, related public institutions, Regional and National R&D partners, and where relevent, community and public experts.

We need to **listen to these expert stakeholders with an open mind,** whilst recognising that not all needs articulated can be met from public-sector resources. This will help us better understand the area's distinctive constraints and opportunities to the growth of these important industries

That work will happen over the Spring and Summer of 2026, enabling us to then refine priorities into a small number of investable programmes, aligning innovation activity with future governance and funding opportunities.

In short:

This Framework provides a shared starting point. Its value lies not in final answers, but in enabling better collective decisions about how innovation can support inclusive, sustainable growth across Stoke-on-Trent and Staffordshire.

This work will take place through Spring and Summer 2026.

2. Introduction

2.1 Purpose and Focus of the Draft Framework

This draft Framework has been developed to support a shared, evidence-informed understanding of the area's innovation economy, and provide a more structured basis for discussion and decision-making about what we can do to stimulate and support its growth.

Frontier industries are critical to the UK's economic future, Innovation continues to deliver growth[1] so at its core, the Framework seeks to build a clearer picture of the local industry base, with particular attention to innovative and emerging areas of economic activity. Alongside this, it sets out the area's research and development assets and expertise, primarily within the two universities but also across wider partners, and considers how these capabilities might be deployed more effectively to support innovation-led growth.

The Framework also explores the skills landscape as it relates to the innovation economy, recognising that skills are both a constraint and an enabler of growth. Rather than providing a comprehensive skills strategy, it focuses on how current provision aligns with the needs of innovative firms and emerging sectors, and where gaps or misalignments may be limiting adoption, productivity and progression.

A further objective is to understand the infrastructure requirements that underpin innovation: the types of locations, facilities, energy systems and digital infrastructure needed to support growth in different parts of the innovation economy. This includes consideration of how place, assets and infrastructure interact, and how a portfolio approach to sites and facilities can better support diverse forms of innovation activity.

It also starts to provide a picture of investment needs and challenges in the innovation-led business base, to assess which industries are best-placed to achieve growth, and where interventions from the Public Sector might need to be focused.

Importantly, the Framework situates innovation within the context of the everyday and foundational economy. It considers what innovation-led growth means for employment, job quality and economic inclusion, and how innovation can support just transitions that deliver benefits beyond higher-value, knowledge-intensive sectors. This reflects an explicit concern with who benefits from innovation, and how its impacts are felt across communities and the workforce.

The analysis is set within the context of UK Government priorities, including the Modern Industrial Strategy, and draws on relevant work by sector specialists and national bodies. It also reflects learning from research and leading practice in

[1] https://www.ukri.org/news/whats-the-state-of-the-nations-innovation/

innovation policy and delivery, including insights from the ESRC-funded Innovation Caucus, the Productivity Institute and the Enterprise Research Centre.

Where available, the Framework draws on industry perspectives and priorities, while recognising that engagement to date is partial. A key next phase will be to use the insights generated here to engage more deeply with business communities and other stakeholders, with the aim of supporting a co-produced innovation strategy or action plan for the area.

Taken together, the Framework begins to build a picture of how well aligned the different components of the local innovation system are, where the most significant gaps and constraints lie, and where there may be opportunities for more effective coordination. It also sets out a small number of headline propositions to act as focal points for broader conversations with partners and communities of interest. These propositions include some ambitious ideas, but are grounded in a realistic assessment of what is achievable, and are intended to be shaped, challenged and refined through wider engagement. In this context, digital plays a central role in adoption and productivity improvement, translating innovation into everyday business practice rather than operating solely as a standalone sector

Finally, the Framework is intended to help prepare the area for future changes in governance and economic development arrangements, including the opportunities and responsibilities that may come with new structures. In this sense, it provides an early evidence base to inform future propositions, rather than a fixed set of recommendations.

At this stage, the Framework does not seek to quantify economic impact. Robust estimates would require clearly defined programmes, delivery models and counterfactuals, assessed in line with HM Treasury's Green Book. That level of specification is not yet in place, and premature quantification would risk overstating impact or obscuring uncertainty.

Nevertheless, it is possible to describe the likely nature of economic impact in qualitative terms. Across the themes explored, the strongest impacts are expected to arise through productivity, resilience and capability-building, particularly within existing firms and sectors. Much of the opportunity identified relates to improving how businesses operate — through technology adoption, systems integration, energy efficiency and skills development — rather than large-scale job creation alone.

Over time, this has the potential to strengthen business competitiveness, support access to higher-value supply chains, and improve job quality and progression. There are also likely to be wider public value benefits, including improved energy affordability, more efficient public services and greater economic resilience. As the Framework develops into defined programmes, more formal Green Book–aligned appraisal can be undertaken.

2.2 The rise of place-based Innovation

Over the last decade innovation[2] has become a prominent feature of national and regional economic policy. It is Increasingly seen as a key mechanism for boosting UK competitiveness and addressing Regional disparities, and has enjoyed a sustained period of public sector investment. This is particularly true of science and technology-based product innovation

Alongside well-established national programmes, it has recently become a focus for place-based economic development. Innovation Accelerator Accounts piloted in the West Midlands, Greater Manchester and Glasgow are being made available through the Local Innovation Partnerships Fund to other parts of the UK. UKRI's pioneering Strength-in-Places programme, which the area has already participated in, is regarded as an important model for accelerating the commercialisation of place-based R&D.

This approach is informed decades of evidence and place-based development globally, such as MIT's REAP model below[3], with broad agreement on the features of successful local and Regional innovation ecosystems – shared leadership and collaboration between businesses, universities, the public and investment sectors, working together to develop and deliver a shared agenda for innovation, R&D, innovation-led entrepreneurship, business growth, and related skills and infrastructure.

This Framework does not assume the existence of a fully formed innovation ecosystem. Instead, it examines the area's emerging place-based innovation system — the capabilities, institutions, firms and infrastructures that shape how innovation occurs in practice.

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[2] For internationally accepted definitions see the Oslo Manual. https://doi.org/10.1787/87954fc6-en

[3] https://reap.mit.edu/about/

It focuses in particular on the area's innovation architecture: how research, skills, firms, facilities and governance currently connect; where alignment is strong; and where gaps, frictions or unrealised potential remain.

2.3 Stoke-on-Trent & Staffordshire's innovation assets

Stoke-on-Trent and Staffordshire has all the ingredients required to deploy this model to make a very strong contribution to the UK's innovation economy:

- A bedrock of frontier industries from high growth entrepreneur-led SMEs to global corporates.
- Research and education-led universities providing graduate talent pipelines and world class research in areas closely aligned to the Modern industrial Strategy, with a strong track-record of collaborative projects with industry and public and patient communities, alongside the successful delivery of large scale place-based programmes to stimulate the innovation economy.
- An Institute of Technology led by an Ofsted Outstanding college, connected to major employers, and UK-leading track-records for widening access to higher education in both Universities.
- A wide-ranging degree level apprenticeship offer across both Universities, delivering professional education to global companies, central government, and health trusts nationally.
- An award-winning University Science & Innovation Park powered by on-site renewables, with draft Local Plan support for expansion to become a fully-fledged Innovation District, connected to the substantial and growing North Staffordshire urban conurbation[4].
- Specialist assets such as the the University of Staffordshire's Zone, Smart Energy Network Demonstrator, low carbon High Performance Computing, and state of the art Bioscience and Chemical engineering facilities

It also benefits from the wider Regional network of assets and institutions, including Midlands Mindforge[5], a patient capital vehicle backed by the Region's research intensive universities . Midlands Innovation Universities[6] is a partnership of eight research intensive universities, sharing facilities and collaborating on significant projects to further the development of a vibrant and sustainable research and innovation ecosystem which adds value to the Region and the UK, Health Innovation West Midlands[7], established to connect industry, health and social care, universities, public and not for profit sectors and citizens to spread innovation and generate economic growth. And the Million Plus[8]

[4] Stoke-on-Trent and Newcastle-under-Lyme, population of c390,000 is, comparable to Nottingham and Newcastle-upon-Tyne

[5] https://midlandsmindforge.com

[6] https://midlandsinnovation.org.uk

[7] https://www.healthinnovationwestmidlands.org

[8]https://www.millionplus.ac.uk/uploads/2024/08/May22_Placemaker_WestMidlands_StatCard_LR.pdf

regional group works collaboratively with local stakeholders at the Regional Level (NHS, businesses and local government) to drive regional development.

The area has made enormous strides over the last 10 years to develop the conditions for a higher value knowledge economy, providing a supportive context that is I n stark contrast to the position during the initial period of the area's post-industrial transition. For many decades the area's story was one of the incomplete transition from its traditional industrial base leaving a legacy of low productivity and wage levels. In common with many other areas of the North and Midlands, this was compounded by some of the new jobs being created. Even those areas, e.g. Logistics have evolved rapidly to innovate, companies such as Witron on Keele's Science & Innovation Park, transforming logistics technologies, and home-grown company Indurent investing in hydrogen and energy systems R&D to support its decarbonisation.

Progress through partnership : Building a track record

When we made the case to DBIS (as was) for EU Innovation Funds funds in 2016, their own LEP benchmarking highlighted the profound and enduring challenges Stoke-on-Trent and Staffordshire in the SME base - the lowest levels of business investment in innovation of any LEP area in England, low turnover generated by innovative goods and services (33rd out of 39 LEP areas). Business R&D expenditure at 422 per FTE within a national range of £114 - £3,063, and Gross Value Added (GVA) 38th out of 39 LEP areas.

Over the last decade, the area's anchor institutions have worked closely together to develop and deliver high impact Local Growth and Innovation programmes, including one of the largest and most successful EU Priority Axis 1 (Innovation) programmes in England. Interventions were informed by leading academic and policy evidence from the UK, Europe and the US to reflect the area's transition status. Programmes were designed and delivered built literacy and practical skills in business innovation, at scale, in areas of comparative advantage, creating a strong pipeline of potential R&D collaborations between business and academia many of which have since been realised.

These programmes generated at least an additional £80+m into the sub-regional economy, succeeded in shifting the dial on decarbonisation, transformed the role triple helix research & innovation plays in advanced manufacturing, healthcare and medical innovation and consolidated both Universities' contributions to the growth of digital, creative and cultural industries.

Specialist materials research and consultancy company Lucideon, working alongside its R&D organisation AMRICC has led one of UKRI's pioneering place-based innovation projects. Part of UKRI's highly competitive Strength-in-Places programme, this has brought together a Regional partners from across the Midlands to accelerate the commercialisation of innovations in advanced ceramics, and established facilities to enable the translation of materials, processes, and technologies into real-world products and solutions.

The area has also led the way in West Midlands on Health Service research & innovation, establishing SSHERPa Health and Care Research Partnership to consolidate the area's already strong track record of research and innovation that seeking solutions to the challenges for health and care, working together to drive research programmes hosted within academia that are recognised as world leading, and enabling Life Sciences businesses to learn from the well established patient and public involvement groups supported by Keele University.

The area has benefited from increasingly strong leadership in this area from Local Authorities, who have deployed their convening, advocacy and investment power in key areas of the innovation economy. This includes Stoke-on-Trent's Silicon Stoke programme which has helped to catalyse a vibrant digital technologies sector, with strong support from University of Staffordshire, and the Fifty 500 Growth Corridor, a partnership facilitated by the County Council. Very much connected, these programmes are encompassed and developed within this framework document.

The agreement to proceed with devolution proposals via Mayoral Combined Authority last year, and the role the Leaders' Board has played in supporting strategic policy-making across the area, has further strengthened the environment for place-based innovation.

Frontier industries within a highly innovative business base

There remain legacy challenges in the economy, but the area is showing very clear signs not only that it has grown its higher value knowledge-led business base, but leads the UK in important frontier industries, which can no longer be considered as 'emergent' . Some areas are among the strongest in the country. We present more wide-ranging evidence of progress, and what's required to consolidate successes throughout this report, but a few key headlines here:

- **Highest nationally on innovation activity.** The UK Govt's 2023 Innovation Survey Report reported that: '*The two LEPs, i Stoke-on-Trent and Staffordshire and ii Oxfordshire had the highest percentage of innovation active businesses in 2020-2022 (52% and 51% respectively)*'[9]
- **Top 5% nationally on digital sector GVA**[10]. Stoke's digital economy[11] cluster turns over at least £2.7bn a year, and generates around £155,000 of GVA per employee, well above the UK average of £91,000. Over the past decade, the real GVA of the digital sector has grown by nearly 50%.
- **Third highest concentration of Omics**. In 2025, Stoke-on-Trent and Staffordshire ranked 3rd out of 38 former LEP areas for Omics[12] after Cambridge/Peterborough and Oxfordshire, 4th on both employment and turnover.[13] A fast-growing frontier sector, Omics is essential for precision medicine, drug discovery, forensics food security and wide range of other applications, aligning well with local Higher Education research strengths in Life Sciences, and engineering biology.

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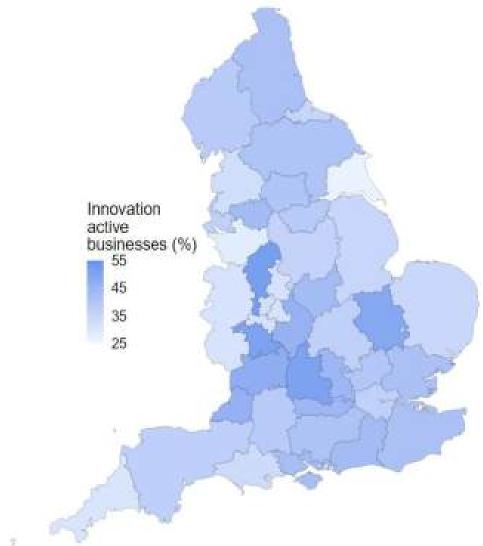
[9] https://www.gov.uk/government/statistics/uk-innovation-survey-2023-report/united-kingdom-innovation-survey-2023-report#geography-of-innovation
[10] Among 168 ITL3 Regions
[11] https://www.innovationclusters.dsit.gov.uk
[12] https://en.wikipedia.org/wiki/Omics
[13] *https://thedatacity.com/product-service/rtics/ based on location quotients*

- **Computer hardware and telecoms concentrations within a semiconductor corridor**. Newcastle-under-Lyme ranks 8th nationally on the computer hardware, Tamworth 4th on telecoms among 284 local authorities, both industries heavily dominated by the Southeast. They sit within a semiconductor corridor stretching from Crewe to Tamworth.
- **Engineering Biology Application employment and research outputs at UK leading levels** with Newcastle-under-Lyme in the top 5% of local authorities nationally from employment concentration (excluding university employment), and Stafford in the top 10%. The area's high levels of academic research in this area (around 22-25% of Keele's total research), further boosts the area's comparative advantage in this area.

Percentage of innovation active businesses by LEP area 2020-22[14]



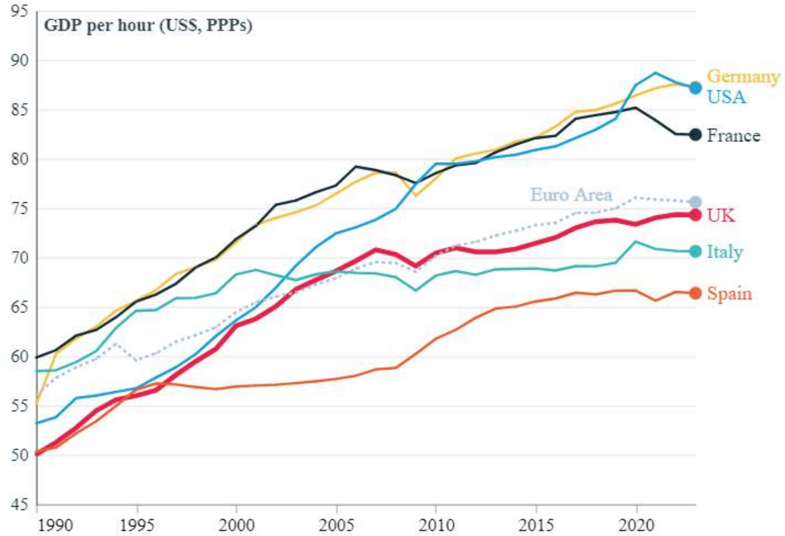
2.4 Addressing the UK's Productivity Challenge

Over the last 15-20 years, the UK has experienced a prolonged period of stagnation in productivity relative to other major economies. This remains one of the country's most significant challenges - productivity plays a vital role in underpinning wage levels and living standards, and supporting the taxes required to sustain strong public services.

Gross Domestic Product Per Hour 1990-2022[15]

[14] UK Govt 2023 Innovation Survey (op.cit)

[15] https://www.productivity.ac.uk/news/what-explains-the-uks-productivity-problem/



A broad range of factors have had an impact on productivity, including low levels of investment, inadequate infrastructure, skills mismatches and periods of economic and policy uncertainty. But as Professors Diane Coyle and Bart Van Ark note below, weak levels of innovation and associated research & development at firm level have played an important role.

> '*Some of the culprits for the dismal productivity performance will sound depressingly familiar…. small and medium enterprises that do not adopt productive practices; too little research and development spending and too little translation of research into commercial success…*'[16]

This is confirmed by a recent comprehensive UK Government analysis of innovation performance across the UK [17] including the relationship between innovation and productivity, the factors explaining innovation performance across UK regions, and the relationships between related economic growth and economic and social inclusion.

Regional benchmarks[18] confirm that UK's innovation performance is strong relative to many other EU nations, but it remains **uneven regionally, and this is holding it back from achieving the world-leading position** consistent with its strong research base globally

In 2021, the East of England, Southeast and London together accounted for £34.4bn (52%) of total UK R&D performed, and in the period 2007-2019 76% of venture capital flowed into the Golden Triangle. Public R&D funding is also disproportionately skewed towards the Golden Triangle, although not as starkly as private spend.

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[16] https://www.productivity.ac.uk/wp-content/uploads/2023/11/TPI-Agenda-for-Productivity-2023-FINAL.pdf

[17] https://assets.publishing.service.gov.uk/media/615d9a36e90e07198108144f/niesr-report.pdf

[18] https://ec.europa.eu/assets/rtd/ris/2023/ec_rtd_ris-regional-profiles-united-kingdom.pdf

This is despite evidence in DSIT's latest Innovation Survey that relatively large returns from R&D investment are more evident in regions not traditionally associated with innovation.[19]

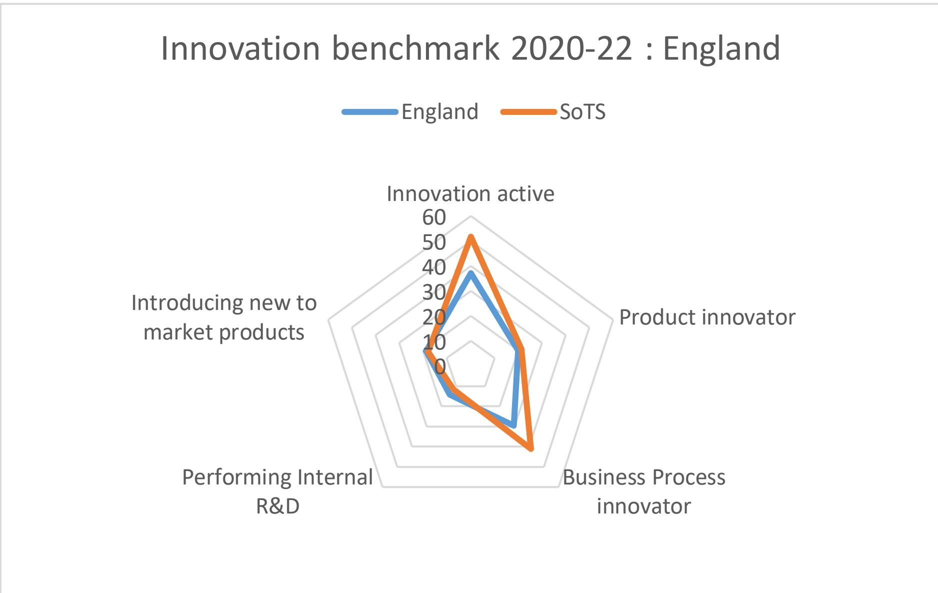
The discrepancy does not reflect research quality in the Region relative to London and the Southeast. The Midlands ranks in the top 3 UK Regions in 10 of 12 science & engineering disciplines on standard measures of research quality. The eight core partner universities in the Midlands[20] also generate the same quality of research as Oxford and Cambridge across assessed subjects.

2.5 Achieving our full potential

Whilst we can gain some comfort from the area's over all performance on business innovation (albeit during an unusual period), it is highly skewed towards process innovation, and much weaker on product innovation.

The LEP area has managed to move steadily up the league table on Business R&D, but still sits in the bottom half in England. Available levels of R&D investment may be a factor, but the reasons will be multifaceted, the nature of the business base, skills, expertise and knowledge, risk appetite and working capital all playing a role.

Types of innovation undertaken: SoTS and England



The costs of this deficit are significant. On average, £1 of civil
public R&D investment generates £8 in net economic benefits for the UK over the long term, the full social benefits taking this even higher. The financial benefits to

[19] 2023 UK Innovation Survey (op cit)

[20] https://investuniversities.midlandsinvestmentportfolio.org

businesses are lower, but still represent a substantial return on investment[21]. Conducting product and process innovations simultaneously allows firms to generate even higher returns than conducting either in isolation[22].

In this context it is very clear why the UK Govt UK is placing such a strong focus on driving up R&D and product innovation related to its science base, because the longer-term dividends are very high.

So what level of ambition for R&D and product innovation could we realistically set for the area? These activities require a higher level of commitment, risk and uncertain returns for businesses. The answer is higher than we might expect. Some unexpected areas of the country perform far more strongly than SoTS. Worcestershire out-performs Oxfordshire on its share of businesses undertaking R&D. And on product innovation. Gloucestershire's new to market product innovation % is among the highest in the country.

Highest ranking areas for business innovation - 2023 UK Govt Survey

	Innovation active	Product innovator	Business Process innovator	Performing Internal R&D	Introducing new-to-market products
England	37.1	20.0	29.6	14.2	18.7
SoTS	**51.7**	**21.4**	**41.1**	**11.7**	**17.9**
Oxfordshire	50.8	27.3	44.2	28.6	15.6
Worcestershire	50.7	35.3	43.6	28.8	19.9
Coventry & Warwick	45.7	23.6	39.3	19.1	25.7
Gloucester/shire	47.3	33.1	31.7	17.4	29.4
Leicester/shire	42.7	27.0	35.1	23.0	26.0

This suggests that there is plenty of scope to expand the number of businesses undertaking R&D, and to grow turnover from this activity, providing the public investment is there to support scaling[23]. The current constraints in the system suggest that this could work better via a sub-regional programme approach.

There is also a need to improve productivity within the area's innovation economy. The average added value of activities in the emerging/innovation economy[24] for the UK as a whole is £13,000 per employee (baseline £63,400). In Stoke-on-Trent and Staffordshire it is just £4,000 (baseline £56,400). Gaining a full understanding of the reasons for that is beyond the scope of this document, but it will be important to better understand this to guide strategy, and the role

[21] https://innovationcaucus.co.uk/app/uploads/2023/11/Innovate-UK-Grants-and-RD-Returns-Impact-on-Business-and-Economy_FINAL.pdf
[22] https://doi.org/10.1080/10438599.2024.2436961
[23] The main constraint in recent years has been capacity in the national KTP system
[24] Companies where there is evidence of undertaking RTIC activities https://help.thedatacity.com/knowledge/what-are-rtics

that civic and public sector partners can play in improving the external environment.

3. Building on cluster strengths

3.1 Clusters as the key to productivity

Policy discussions about innovation and productivity often emphasise clusters and agglomeration, implying that economic impact depends on dense geographic concentration of firms, talent and capital. While proximity can matter — particularly for knowledge exchange, labour markets and shared infrastructure — the evidence shows a more nuanced picture.

Research on regional innovation highlights that clusters operate through different logics, not all of which rely on density. Some benefit from scale and proximity, but many function as networked systems, where innovation is driven by relationships, institutional coordination and access to specialist capability rather than co-location alone. In these cases, knowledge flows, translation pathways and system governance matter more than physical concentration[25]. Applied digital activity provides a clear example of a distributed, networked cluster, operating across sectors and geographies and embedded within supply chains rather than concentrated in a single location."

Recent synthesis work by the Innovation Caucus[26] reinforces this view, showing that innovation performance is often shaped by how well systems are organised, rather than how tightly activity is clustered. Distributed innovation systems can perform strongly where they provide clear access to expertise, facilities and markets, and where public and private actors are aligned around shared priorities.

This perspective is particularly relevant for places such as Stoke-on-Trent and Staffordshire. Rather than replicating large metropolitan agglomerations, economic advantage is more likely to come from:

- specialised industrial and research capability,
- strong anchor institutions,
- applied innovation and translation assets, and
- effective connection into national and international sectoral systems.

In this context, clusters are best understood as fields of related activity, often spanning multiple towns, campuses and industrial sites. What matters is not whether activity is concentrated in a single location, but whether the system supports collaboration, access to capability, and credible routes from research to deployment.

This approach aligns with national frameworks such as the Royce model, which emphasise access over ownership, coordination over duplication, and distributed capability over spatial concentration. Accordingly, this Framework uses the language of clusters pragmatically — as a way of organising evidence and

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[25] https://doi.org/10.1080/21582041.2025.2592674
[26] https://innovationcaucus.co.uk/app/uploads/2023/06/Clusters-Part-1_Place-based-innovation-synthesis-Report-FINAL-22-June-2023.pdf

identifying opportunity — rather than as an endorsement of agglomeration as an end in itself.

Traditionally associated with closed science and technology communities, today's successful innovation systems are increasingly embedded in their local communities, able to benefit from the insights, policy levers, skills, expertise and investment of local and Regional anchor institutions such as local authorities, education and research institutions, public and community partners and infrastructure providers. And crucially, connected to wider regional and national assets and expertise.

Parts of these connected 'eco-systems' can form by themselves. But rarely achieve their full potential to transform local and national economies without public sector support and strong relationships with the local science base. When they work well these models support and encourage the stronger focus needed on the translation and diffusion of ideas and knowledge, alongside 'discovery' research, which could provide the key to reconnecting innovation to productivity.

Clusters, or fields of related activity require more than spatial co-location, a useful definition[27] presented here:

- Interaction and collaboration between actors within the group (e.g. firms, knowledge producers, industrial and support organisations, local authorities);
- Engaged in related activities, for example within the same value chain or producing similar products; and
- Spatial co-location – however, the UK has some large clusters where collaboration can be evidenced.

Identifying existing cluster geographies of innovation intensive companies can be difficult, and remains experimental. But in the context of increased devolution, and the need to target public sector support wisely, has become and important driver of UK Government Policy, to the extent that DSIT now maintains an interactive online clusters map[28].

UK Govt priority industries

The Modern Industrial Strategy targets Eight key Sectors (the 'IS8') - Advanced Manufacturing, Clean Energy, Creative, Defence, Digital & Tech, Financial Services, Life Sciences, Professional & Business Services.

Alongside these, cross-cutting 'emerging sectors' vital to the country's global competitiveness and security are identified - Advanced Connectivity, Advanced Materials, Artificial Intelligence, Cybersecurity, Digital Economy, Engineering Biology Application, Engineering Biology Supply Chain, Materials Innovation, Quantum Technology, Robotics and Autonomous Systems, Semiconductors and the Space Economy

[27] https://innovationcaucus.co.uk/app/uploads/2023/06/Clusters-Part-1_Place-based-innovation-synthesis-Report-FINAL-27-June-2023_.pdf
[28] https://www.innovationclusters.dsit.gov.uk

The UK Govt's Net Zero innovation portfolio highlights - future offshore wind, nuclear advanced modular reactors (supported through the aligned Advanced Nuclear Fund), energy storage and flexibility, bioenergy, hydrogen, homes & buildings innovation, direct air capture and greenhouse gas removal (GGR), advanced carbon capture, usage and storage (CCUS), industrial fuel switching, and disruptive technologies.

Achieving security in the supply and processing of critical minerals[29] is seen as essential most areas of manufacturing. And boosting technology adoption [30] a fundamental to optimal growth of the digital technologies and services sectors.

This framework identifies the key opportunities for Stoke-on-Trent and Staffordshire to support improved outcomes in IS8 industries where the area can demonstrate comparative advantage and credible potential for significant economic impact. These are diverse **networks** of industries, rather than specific sectors, and where there are synergies or co-dependencies, that diversity becomes a strength.

Our main focus is those industries where research and innovation is, or could become, a key driver of growth and productivity, and where the development of local innovation suystems that involve industry, universities and public sector parters working together can and do play a key role in supporting this – the conditions of growth, and the importance of civic institutions, varies across each area with more dependency on research in some areas than others.

3.2 Identifying high potential clusters

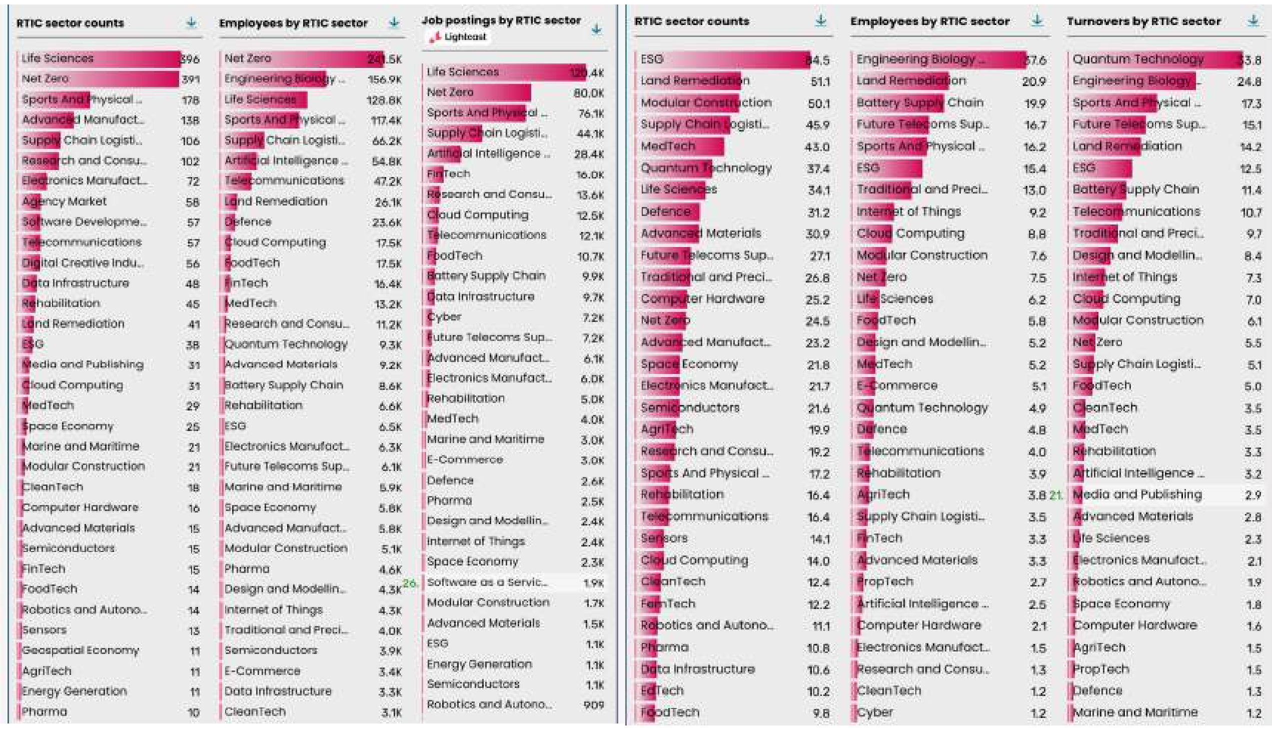
Our local analysis has been supported by what can only be described as a data revolution for the understanding of business innovation - the introduction of Real Time Industrial Classifications (RTICs)[31]. These enable the identification and tracking of emerging industries and activities not reflected in the Standard Industrial Classification system, and are therefore able to capture the dynamism of companies developing and expanding into new areas of science and technology, perhaps through supply chain acquisitions, even where their core business may appear elsewhere.

[29]https://assets.publishing.service.gov.uk/media/6937fa7833c7ace9c4a41e25/uk-critical-minerals-strategy-vision-2035.pdf

[30]https://assets.publishing.service.gov.uk/media/6857e0995225e4ed0bf3ceb5/dsit_technology_adoption_review_web.pdf

[31] https://help.thedatacity.com/knowledge/what-are-rtics

Strongest RTIC Sectors in SOTS | Counts and Location Quotients[32]



RTIC sector counts		Employees by RTIC sector		Job postings by RTIC sector (Lightcast)	
Life Sciences	396	Net Zero	241.5K	Life Sciences	120.4K
Net Zero	391	Engineering Biology ...	156.9K	Net Zero	80.0K
Sports And Physical ...	178	Life Sciences	128.8K	Sports And Physical ...	76.1K
Advanced Manufact...	138	Sports And Physical ...	117.4K	Supply Chain Logisti...	44.1K
Supply Chain Logisti...	106	Supply Chain Logisti...	66.2K	Artificial Intelligence ...	28.4K
Research and Consu...	102	Artificial Intelligence ...	54.8K	FinTech	16.0K
Electronics Manufact...	72	Telecommunications	47.2K	Research and Consu...	13.6K
Agency Market	58	Land Remediation	26.1K	Cloud Computing	12.5K
Software Developme...	57	Defence	23.6K	Telecommunications	12.1K
Telecommunications	57	Cloud Computing	17.5K	FoodTech	10.7K
Digital Creative Indu...	56	FoodTech	17.5K	Battery Supply Chain	9.9K
Data Infrastructure	48	FinTech	16.4K	Data Infrastructure	9.7K
Rehabilitation	45	MedTech	13.2K	Cyber	7.2K
Land Remediation	41	Research and Consu...	11.2K	Future Telecoms Sup...	7.2K
ESG	38	Quantum Technology	9.3K	Advanced Manufact...	6.1K
Media and Publishing	31	Advanced Materials	9.2K	Electronics Manufact...	6.0K
Cloud Computing	31	Battery Supply Chain	8.6K	Rehabilitation	5.0K
MedTech	29	Rehabilitation	6.6K	MedTech	4.0K
Space Economy	25	ESG	6.5K	Marine and Maritime	3.0K
Marine and Maritime	21	Electronics Manufact...	6.3K	E-Commerce	3.0K
Modular Construction	21	Future Telecoms Sup...	6.1K	Defence	2.6K
CleanTech	18	Marine and Maritime	5.9K	Pharma	2.5K
Computer Hardware	16	Space Economy	5.8K	Design and Modellin...	2.4K
Advanced Materials	15	Advanced Manufact...	5.8K	Internet of Things	2.4K
Semiconductors	15	Modular Construction	5.1K	Space Economy	2.3K
FinTech	15	Pharma	4.6K	Software as a Servic...	1.9K
FoodTech	14	Design and Modellin...	4.3K	Modular Construction	1.7K
Robotics and Autono...	14	Internet of Things	4.3K	Advanced Materials	1.5K
Sensors	13	Traditional and Preci...	4.0K	ESG	1.1K
Geospatial Economy	11	Semiconductors	3.9K	Energy Generation	1.1K
AgriTech	11	E-Commerce	3.4K	Semiconductors	1.1K
Energy Generation	11	Data Infrastructure	3.3K	Robotics and Autono...	909
Pharma	10	CleanTech	3.1K		

RTIC sector counts		Employees by RTIC sector		Turnovers by RTIC sector	
ESG	84.5	Engineering Biology ...	57.6	Quantum Technology	33.8
Land Remediation	51.1	Land Remediation	20.9	Engineering Biology ...	24.8
Modular Construction	50.1	Battery Supply Chain	19.9	Sports And Physical ...	17.3
Supply Chain Logisti...	45.9	Future Telecoms Sup...	16.7	Future Telecoms Sup...	15.1
MedTech	43.0	Sports And Physical ...	16.2	Land Remediation	14.2
Quantum Technology	37.4	ESG	15.4	ESG	12.5
Life Sciences	34.1	Traditional and Preci...	13.0	Battery Supply Chain	11.4
Defence	31.2	Internet of Things	9.2	Telecommunications	10.7
Advanced Materials	30.9	Cloud Computing	8.8	Traditional and Preci...	9.7
Future Telecoms Sup...	27.1	Modular Construction	7.6	Design and Modellin...	8.4
Traditional and Preci...	26.8	Net Zero	7.5	Internet of Things	7.3
Computer Hardware	25.2	Life Sciences	6.2	Cloud Computing	7.0
Net Zero	24.5	FoodTech	5.8	Modular Construction	6.1
Advanced Manufact...	23.2	Design and Modellin...	5.2	Net Zero	5.5
Space Economy	21.8	MedTech	5.2	Supply Chain Logisti...	5.1
Electronics Manufact...	21.7	E-Commerce	5.1	FoodTech	5.0
Semiconductors	21.6	Quantum Technology	4.9	CleanTech	3.5
AgriTech	19.9	Defence	4.8	MedTech	3.5
Research and Consu...	19.2	Telecommunications	4.0	Rehabilitation	3.3
Sports And Physical ...	17.2	Rehabilitation	3.9	Artificial Intelligence ...	3.2
Rehabilitation	16.4	AgriTech	3.8	Media and Publishing	2.9
Telecommunications	16.4	Supply Chain Logisti...	3.5	Advanced Materials	2.8
Sensors	14.1	FinTech	3.3	Life Sciences	2.3
Cloud Computing	14.0	Advanced Materials	3.3	Electronics Manufact...	2.1
CleanTech	12.4	PropTech	2.7	Robotics and Autono...	1.9
FemTech	12.2	Artificial Intelligence ...	2.5	Space Economy	1.8
Robotics and Autono...	11.1	Computer Hardware	2.1	Computer Hardware	1.6
Pharma	10.8	Electronics Manufact...	1.5	AgriTech	1.5
Data Infrastructure	10.6	Research and Consu...	1.3	PropTech	1.5
EdTech	10.2	CleanTech	1.2	Defence	1.3
FoodTech	9.8	Cyber	1.2	Marine and Maritime	1.2

RTICs have enabled us to find unexpected areas of comparative advantage with strong growth potential that would otherwise have remained unknown, and also better understand the relationships between innovation active companies and their overlapping markets. There are gaps in the data, the most problematic being the **lack of an advanced ceramics RTIC**, most of the local cluster being classified under Advanced Manufacturing. But when used alongside local knowledge they remain the most useful tool at our disposal for this purpose. RTIC counts can be affected by apportionment methodologies applied to large companies (e.g. Vodafone), but where this is the case, it is generally quite evident, and where it makes sense these records are removed from the more detailed analysis.

The nature of industrial strengths is at the centre of the analysis, but the priorities here also take into account the strength and scale of related R&D capacity within local universities, and relevant FE assets. Indeed one of the backbones of this document is a set of place-based capability analyses across R&D and skills, informed by Royce Institute frameworks.

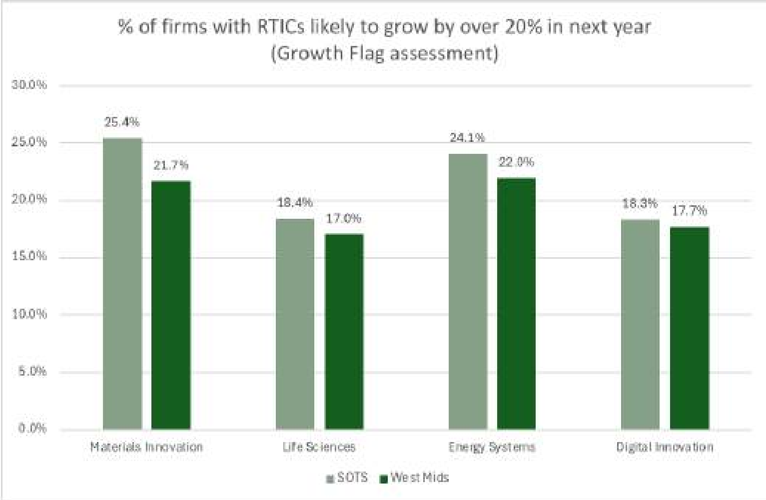
Four broad industry groupings have emerged undertaking emerging/innovation activities, with very clear interlinkages and overlaps – **Materials Innovation, Digital Economy, Life Sciences, and Energy Systems Innovation.** A headline summary of each of these is shown overleaf. The best performing of these SOTS businesses are expected to grow at an exceptionally strong rate over the next year, outperforming similar industries across the West Midlands[33]. Materials

[32] measures an area's industrial specialisation or concentration relative to the UK (>1 = more specialised)

[33] businesses undertaking RTIC activities, based on Growth Flag analysis

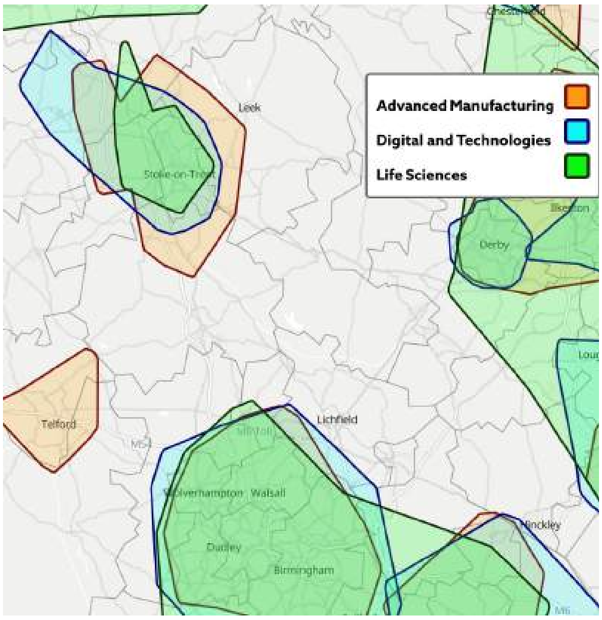
innovation looks set to perform particularly well. A key question is what can we do as a civic partnership , if anything, to support this growth. And perhaps more importantly, how can we help to unlock the barriers to growth for other companies in frontier industries.

% of Companies likely to grow by over 20% in next year

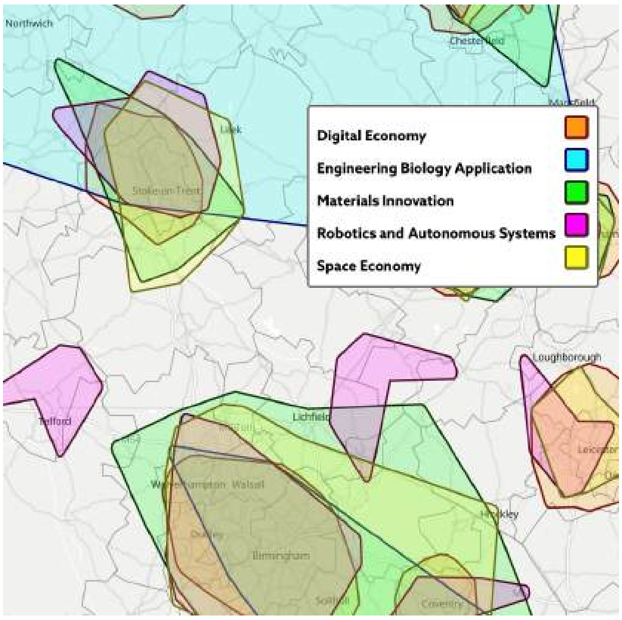


Industrial Strategy Sectors IS8 Sectors strongly represented across each of the groupings, as are DSIT Emerging Sectors. Most North Staffordshire clusters tend to incorporate parts of Cheshire East, particularly Congleton, some also Crewe. A few are part of much larger North West clusters. The clusters encompassing the southern fringes of the County are more likely to form part of very large Greater Birmingham clusters.

Industrial Strategy Sectors ('IS8')



DSIT Emerging Sectors



Key characteristics of primary SOTS cluster groups.

	Life Sciences	Digital Economy	Materials Innovation	Advanced Manufacturing & Energy Systems
IS8 Sectors with SOTS presence	Life Sciences Advanced Manufacturing, Digital & technologies	Digital & Technologies, Advanced Manufacturing, Life Sciences	Advanced Manufacturing, Digital & technologies, Life Sciences	Advanced Manufacturing; Digital & Technologies; Energy & Net Zero systems; Life Sciences manufacturing interfaces
DSIT Emerging Sectors with SOTS presence	Engineering Biology, Materials Innovation	Engineering Biology, Space Economy	Engineering Biology, Space Economy, Materials Innovation	Engineering Biology, Materials InnovationNet Zero technologies; Battery and systems supply chains
Scope of RTIC cluster	Life Sciences (excl human health), Pharma, Medtech, Engineering biology, Omics, Land remediation, Rehabilitation, Sports & Physical activity, Traditional & Precision breading, Food safety	Full scope of digital services, software development and related manufacturing	Selective RTIC verticles across full scope of manufacturing innovation, related Physical Sciences consultancy and digital services	Battery and power electronics supply chains; Energy generation, storage & distribution systems; Net Zero deployment; Modular & offsite construction; Supply chain logistics; Electronics manufacturing; Semiconductors; Sensors; Robotics & autonomous systems; IoT-enabled industrial systems
Top areas of comparative advantage	Omics, Engineering Biology (for employment in NuL)	Omics, Creative digital (when combined), Computer Hardware, Electronics Manufacturing	Advanced Ceramics (keyword analysis). Engineering Biology. Omics	Net Zero systems integration; Supply chain logistics; Energy–manufacturing integration; Power electronics; Sensors & embedded systems; Industrial systems optimisation
Scale of RTIC Cluster	870 businesses, 10,300 employees	975 companies, 13,700 employees	287 companies, 5037 employees	818 companies, 13,339 employees
Financials	Turnover £5,075.121,766, GVA £51,526 per employee. Investment £527,090,000 (10.4% of turnover)	Turnover £4,083,330,750, GVA £115,799 per employee. Investment £56,090,000 (1.4% of turnover)	Turnover £1,280,395,613, GVA £66,021 per employee. Investment £1,200,000 (0,1% of turnover)	Turnover £5,496,830,302, GVA £63,026. Investment 72,830,000 (1.3% of turnover)
Growth trends	Current growth +4.1%. 18% likely to grow by 20% or more in next year,	Current growth +4.4%. 18% likely to grow by 20% or more in next year	Current growth +6.2% North Staffs, +4.3% SOTS. 25% likely to grow by 20% or more in next year	Current growth +3.2%. 24% likely to grow by 20% or more in next year
R&D Assets	Centre for Science and Technology in Medicine. Centre for Applied Entomology, Parasites and Pathogens. Centre for Glycoscience Research and Training.Welcome to the Centre for Musculoskeletal Health Research (Keele). Centre for Health Innovation. Centre for Health and Development (Staffordshire)	Centre for Smart Systems AI and Cybersecurity, Centre for Research in the Digital Entertainment and Media Industries (Staffordshire), Digital Society Institute, Centre for Science and Technology in Medicine, Astrophysics Research Centre (Keele)	AMRICC Centre, Keele Centre for Advanced Materials Engineering, Staffordshire Advanced Materials Incubation and Accelerator Centre (SAMIAC), Centre for Science and Technology in Medicine (Keele)	Centre for Renewable and Sustainable Engineering (Staffordshire).Centre for Smart Systems, AI and Cybersecurity (Staffordshire) Institute for Sustainable Futures, Smart Energy Network Demonstrator, e (Keele). Centre for Advanced Materials Engineering (Keele), Energy Research Accelerator (Midlands Innovation Universities)

3.3 Fostering inclusive growth

There can be concerns that a focus on the innovation-led economy relies on 'trickle-down' personal spend to reach wider communities, and may have limited the positive impacts for communities in lower skilled employment in the 'everyday economy'.

Misconceptions about the exclusivity of industries in this area are not uncommon, but even in the UK's world-leading Life Sciences Sector, over one-third of roles are undertaken by employees who do not hold a degree level qualification[34]. The Sector is heavily dependent on industries that are part the everyday economy, such as specialist facilities management, logistics and waste management. The non health-related parts of the Life Sciences Sector (e.g. biotechnology) contribute to the productivity, growth and sustainability of the waste management sector, undeniably part of the Everyday Economy and a Sector that invests heavily in research & development, for example in waste to energy, materials innovation and the circular economy, digital innovation, AI and robotics. As such it is firmly part of part Life Sciences Sector, as well as driving energy and engineering innovation.

Parallels could be made with the Logistics and Infrastructure Sectors, which are also investing in innovation in decarbonisation and novel materials. Many

[34]https://assets.publishing.service.gov.uk/media/683d69b21a840b2c06ebb98d/Sector_skills_needs_assessments_Life_Sciences.pdf

entrepreneurs in the local innovation economy remain connected to the communities they grew up in and are driven by a need to make a difference to the lives and livelihoods of those communities. We have also seen a growing interest in not-for-profit models in these industries, particularly those linked to environmental sustainability and health.

The insights RTICS are providing will allow us to better understand the real scope of the innovation economy over the coming years, and become more conscious of impacts in different communities.

To support a sufficient focus on fairer outcomes, we can also:

- Encourage a focus on the purpose of innovation, and the role this can play in creating benefits for local communities;
- Explore the role of regional actors in encouraging transitions to Industry 5.0[35], which encourages a more sustainable human-centric approach to advanced digitalisation;
- Better understand and support the creation of inclusive pathways into employment in the innovation economy, extending well beyond the more traditional routes via higher education;
- Build commitment and literacy around the role of community and public engagement in innovation, particularly in Health, Life Sciences and Energy Systems innovation; and
- Consider the implications of place-based innovation for objectives around community wealth-building, including opportunities around procurement, community investment, and developing advocacy networks.

This theme is developed throughout the document, with the potential role of future place-based governance highlighted in the final Enabling Framework section.

[35] https://www.tandfonline.com/doi/full/10.1080/21681015.2023.2216701#d1e279
https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/industry-50_en

4. Materials Innovation

4.1 UK and Global Context

The UK Materials sector represents a £45 billion economy employing over 635,000 people nationwide. Supported by world-renowned materials science expertise across higher education and industry, the UK is uniquely positioned to hold and extend its global leadership in this field.

The global ceramics market alone is worth £200 billion (2024) and is projected to grow to £358 billion by 2035. The UK advanced ceramics market share of 6% is worth £4.5 billion in (2024).

The UK's first National Materials Innovation Strategy, which now forms part of the UK Govt's Modern Industrial Strategy six areas of opportunity for materials innovation:

It highlights some longstanding challenges, including the need to break down barriers between historic industries and clusters to realise the full potential of

The Strategy is anchored around six foundations, addressing the conditions required to secure the Sector's global competitiveness.

- Materials 4.0 | Embracing the digital revolution in materials discovery and translation
- Sustainability and the circular economy | Embedding sustainability into materials innovations
- Translation and manufacturing | Accelerating scale-up, commercialisation and adoption.
- Skills | Nurturing a highly skilled workforce in high-value jobs
- Policy, regulation and standards | Maximising ROI of innovation through an enabling regulatory environment

4.2 The Local Cluster[36]

At the heart of this innovation cluster is advanced ceramics, ceramics composites innovation and related specialist manufacturing and supply chains for computing, automotive, aerospace & space technologies, defence, medtech and telecoms applications. Advanced and broader technical ceramics companies are evident across the UK, particularly the Midlands, but the epicentre of the industry, and associated expertise is undeniably in North Staffordshire, which has been growing at over 6% a year.

The largest area of materials innovation next to ceramics is waste management and the circular economy, including battery supply chain recycling. Pollution remediation also features prominently, and materials-related industries in Biotech, Pharma, Life Sciences and Medtech are also apparent. Alongside this there is a relatively small metals-related manufacturing industry - forging, coating

[36] Companies with RTICs only – application of the taxonomy remains incomplete

and prototyping. And a sizeable and diverse professional services sector in these areas is also apparent, particularly net zero..

Analysis summary

287
COMPANIES CONSIDERED

253
COMPANIES CONSIDERED WITH EMPLOYEES

5,037
ESTIMATED TOTAL EMPLOYEES ATTRIBUTED TO THE 9 SELECTED LOCATIONS

62,727
TOTAL UK EMPLOYEES *253 companies

£1,280,395,613
ESTIMATED TOTAL TURNOVER ATTRIBUTED TO THE 9 SELECTED LOCATIONS

£18,056,317,734
TOTAL TURNOVER *258 companies

£1,200,000
TOTAL INVESTMENT FUNDING
*10 companies

£24,217,294
TOTAL INNOVATE UK GRANT FUNDING *25 grants

+4.3%
ESTIMATED GROWTH PER YEAR *231 companies

£3,303,734,681
BEST ESTIMATE TOTAL GVA

£66,021
ESTIMATED GVA PER EMPLOYEE

30
WOMEN FOUNDED COMPANIES

81
WOMEN LED COMPANIES

193
WOMEN DIRECTORS *858 total directors

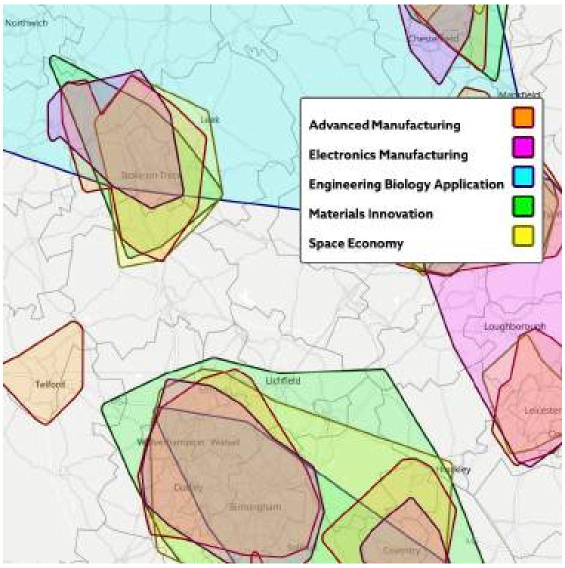
91
COMPANIES WITH IMPORT DATA

87
COMPANIES WITH EXPORT DATA

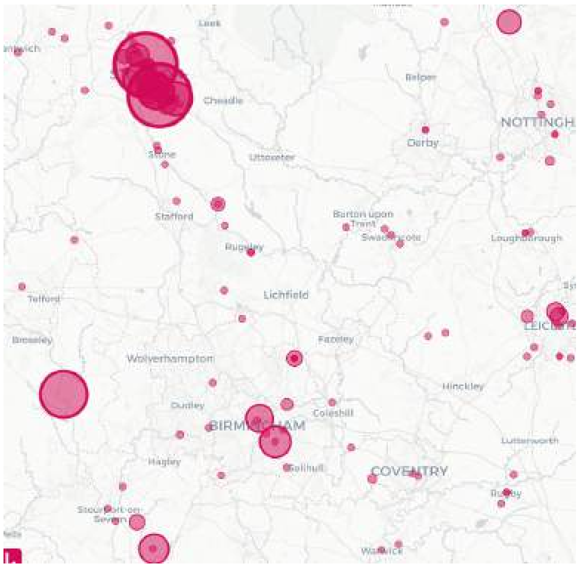
SHOW FIELD AVAILABILITY TABLE

Ceramics Matrix Composites present the immediate growth opportunity having benefited from significant R&D investment over the last five years, providing integrated materials innovation and manufacturing facilities can be created on Keele University's Science & Innovation Park. Stoke-on-Trent and Newcastle-under-Lyme are at the epicentre of this high value industry, with specialist university expertise extending across the West and East Midlands.

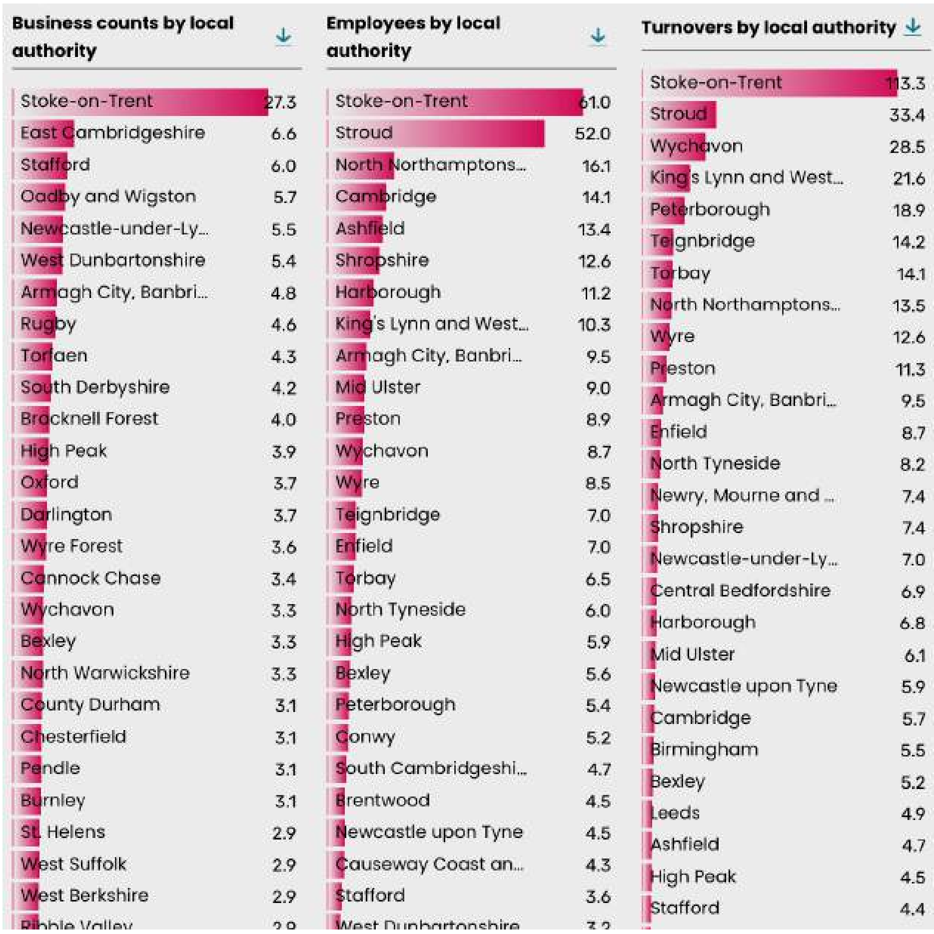
UK Materials related Clusters[37]



Technical Ceramics[38]



Technical Ceramics Location Quotients, former LEP Areas[39]



Business counts by local authority	
Stoke-on-Trent	27.3
East Cambridgeshire	6.6
Stafford	6.0
Oadby and Wigston	5.7
Newcastle-under-Ly...	5.5
West Dunbartonshire	5.4
Armagh City, Banbri...	4.8
Rugby	4.6
Torfaen	4.3
South Derbyshire	4.2
Bracknell Forest	4.0
High Peak	3.9
Oxford	3.7
Darlington	3.7
Wyre Forest	3.6
Cannock Chase	3.4
Wychavon	3.3
Bexley	3.3
North Warwickshire	3.3
County Durham	3.1
Chesterfield	3.1
Pendle	3.1
Burnley	3.1
St. Helens	2.9
West Suffolk	2.9
West Berkshire	2.9
Ribble Valley	[illegible]

Employees by local authority	
Stoke-on-Trent	61.0
Stroud	52.0
North Northamptons...	16.1
Cambridge	14.1
Ashfield	13.4
Shropshire	12.6
Harborough	11.2
King's Lynn and West...	10.3
Armagh City, Banbri...	9.5
Mid Ulster	9.0
Preston	8.9
Wychavon	8.7
Wyre	8.5
Teignbridge	7.0
Enfield	7.0
Torbay	6.5
North Tyneside	6.0
High Peak	5.9
Bexley	5.6
Peterborough	5.4
Conwy	5.2
South Cambridgeshi...	4.7
Brentwood	4.5
Newcastle upon Tyne	4.5
Causeway Coast an...	4.3
Stafford	3.6
West Dunbartonshire	[illegible]

Turnovers by local authority	
Stoke-on-Trent	113.3
Stroud	33.4
Wychavon	28.5
King's Lynn and West...	21.6
Peterborough	18.9
Teignbridge	14.2
Torbay	14.1
North Northamptons...	13.5
Wyre	12.6
Preston	11.3
Armagh City, Banbri...	9.5
Enfield	8.7
North Tyneside	8.2
Newry, Mourne and ...	7.4
Shropshire	7.4
Newcastle-under-Ly...	7.0
Central Bedfordshire	6.9
Harborough	6.8
Mid Ulster	6.1
Newcastle upon Tyne	5.9
Cambridge	5.7
Birmingham	5.5
Bexley	5.2
Leeds	4.9
Ashfield	4.7
High Peak	4.5
Stafford	4.4

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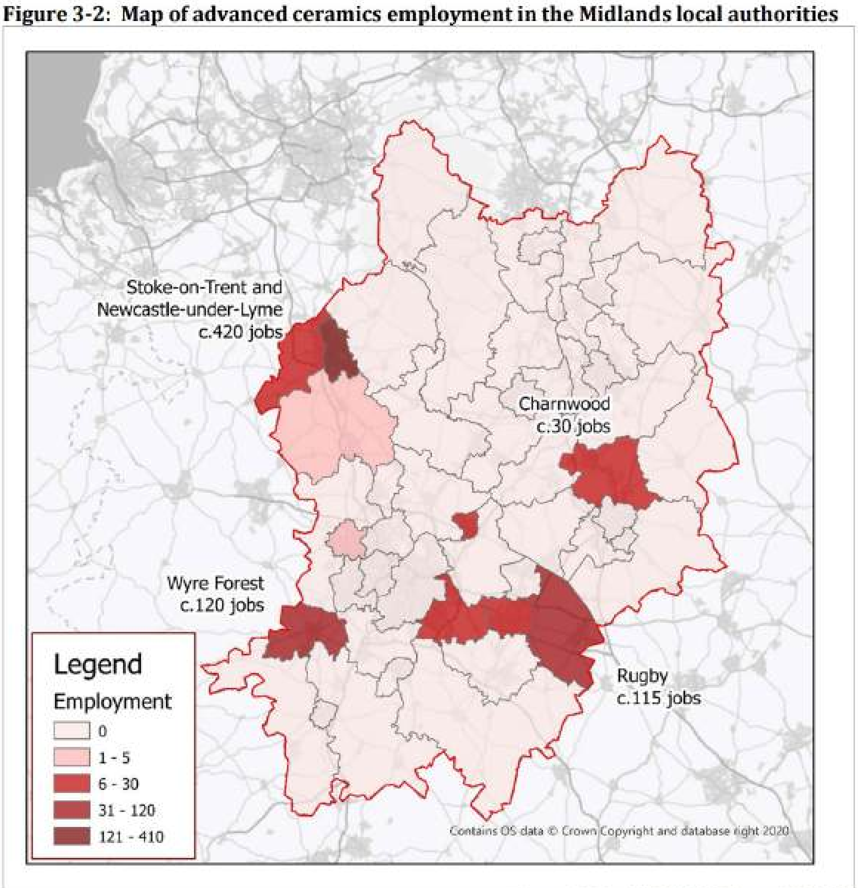
[37] NB, advanced ceramics innovation is not yet recognised as a Real Time Innovation Cluster 'vertical'

[38] Data City Nov 2025

[39] DataCity Nov 2025

Figure 3-2: Map of advanced ceramics employment in the Midlands local authorities



Source: Produced by SQW 2022. Licence 100030994

4.3 Key Industry Trends

Advanced ceramics

The industry has undergone at least three major innovation revolutions during its lifetime, the first turning craft into a global industry in the 18thand 19th Centuries, the second in the late 20th and early 21st Centuries driving increased mechanisation, process innovation, and cost and time efficiencies. And a third, currently underway, encompassing advanced computational methods, novel advanced materials development across materials science boundaries, a focus on innovation in sustainable energy and the development sovereign capabilities in areas of critical national importance.

Whilst no longer the bedrock of the local economy it once was, the area's enduring relationship with ceramic materials has left a legacy of unrivalled scientific and technical expertise to support the high growth industries highlighted in the Modern Industrial Strategy. Ceramic products have found their way into energy, biomedical, defence, electronics, aerospace, automotive and satellite technologies, already contributing their unique material properties to at least four of IS8 Priority Sectors. The industry's longstanding Research & Technology company Lucideon (CERAM as was) has been at the centre of the industry's innovation for many decades, and the creation of AMRICC has put in place a broader collaboration across the Midlands to support the more rapid commercialisation of technical and scientific insights, and address the future skills needs of the industry.

Following the geopolitical turbulence of recent years, the UK Government has now confirmed, in its Modern Industrial Strategy, the Sector's next key mission - to prioritise building sovereign capability in the manufacture of Ceramic Matrix Composites (CMCs), a critical advanced material required for aerospace, energy and defence sectors. CMCs are essential for applications like hypersonic systems and advanced aerospace components due to their high-temperature resistance and strength. The UK's currently underdeveloped domestic supply chain for CMCs has led to an over-reliance on imported materials, presenting associated risks around the decarbonisation of energy sources, competitiveness in aerospace manufacturing, and potentially national security.

The National Materials Innovation Strategy highlights further areas of innovation that would strengthen the UK's position in global markets, including the use of ceramics in heat recovery systems, next-generation nuclear fuels, solid-ion conductors for batteries, fuel cells, electrolysers, and high-temperature and ceramic solid electrolytes. The opportunities to develop and apply novel bio-ceramics for biomedical use are also growing, including engineering biology..

Materials innovation increasingly depends on applied digital capability, including modelling, data analytics, embedded sensing and process control, linking materials discovery to industrial deployment. Alongside this there remains a focus on innovation in the use of advanced analytics and computational techniques (Industry 4.0), supporting the development of alternative fuels, including the role of hydrogen alongside increased electrification, and ensuring the supply of future skills

A strong research base is critical to the success of the UK's advanced ceramics sector, underpinning innovation, driving new material and process development, and enabling the translation of ideas into industrial applications. Universities, research and development consultancy companies, and collaborative industry–academia initiatives all play a central role in ensuring the UK remains competitive in a fast-moving global landscape.

To capture views on this important foundation, the survey asked respondents to rate the strength of the UK's research sector in supporting advanced ceramics production and to explain the reasons for their rating. This provided valuable insight into both the perceived quality of research and the extent to which it is seen as meeting the needs of industry. What is striking is that new material innovation sits firmly at the top of the industry's priorities for new research.

Advanced Ceramics Industry Priorities[40]

Research Priority	Count	%
New material innovation	46	53%
Sustainability	38	44%
New processes innovation	29	34%
Existing processes optimisation	13	15%
Supply chain resilience	13	15%

[40] ADE Reference to be added

Circular Economy	12	14%
Applications in synergistic industries	9	10%
Other	0	0%

4.4 Turbo-charging Advanced Ceramics

Over the last five years, the area has been leading the way nationally in place-based innovation in advanced ceramics, AMRICC and Lucideon playing the lead convening role in the formation of the Midlands Industrial Ceramics Group[41].

Having successfully delivered one of UKRI's first Strength-in-Places programmes, which brought the elements of the innovation system together across the Midlands for the first time, Lucideon is now in a position to capitalise on the results of that work, targeting specific growth markets, enabling the commercial, benefits to be realised very quickly.

Central to that is expand the use of Ceramics Matrix Composites (CMCs), particularly within aerospace and energy; the nuclear sector and its new generation of reactors; capitalising on the growing space cluster in the East Midlands; and linking with automotive manufacturing in the West Midlands on solid-state battery technology for electric vehicles.

CMCs are essential as lightweight replacements for alloys in high-temperature aggressive environments, vital to maintaining technical advantage and capability in defence, offering high temperature resistance, low weight and durability. Carbon matrix and silicon carbide matrix composites will be needed in fusion energy systems, hypersonic vehicles, space vehicles and defence infrastructure. At present, the UK has no sovereign CMC manufacturing capability, or for critical raw materials such as silicon carbide fibres and precursors.

A well-advanced proposal, with strong local authority support is now in place for specialist integrated R&D and manufacturing facility on Keele Science & Innovation Park. Part of a next generation advanced ceramics campus, it would be supported by programmes to meet the emerging skills and R&D needs of these new industries, with Keele playing a central role within the Midlands Industrial Ceramics Group alongside other Midlands Innovation Universities. This would lead to the early generation of 200-300 core specialist roles in Stoke-on-Trent and Staffordshire, and enable the scaling of early pilot-line manufacturing with investment from major players reliant on these specialist materials for their growth and resilience.

With the market for CMCs growing by around 9% a year[42], this positions Stoke-on-Trent and Staffordshire as a global centre of excellence in their development and production, and puts in place the facilities to drive further innovation in ceramic materials.

[41] https://micg.org.uk

[42] https://www.mordorintelligence.com/industry-reports/ceramic-matrix-composites-cmcs-market

4.5 Broader materials innovation

National Materials Innovation Strategy[43] provides a framework to guide the prioritisation of local materials innovation initiatives for ceramics and beyond. The strategy is already guiding national decisions about investment in materials research & innovation. Many of its key opportunity themes are of relevance, both to the the area's complex and diverse industry base, its research base, and civic ambitions locally:

Thematic priorities

- **Energy Solutions** - Rising to the net zero challenge
  Future Healthcare - Delivering beyond biocompatibility for active medical solutions
- **Structural Innovations** - Strengthening our infrastructure, built environment and transport systems
- **Advanced Surface Technologies** - Enhancing product functionality, performance and lifetime
- **Next-Generation Electronics, Telecommunications & Sensors** - Driving the future of high-performance connectivity and computing
- **Consumer products, packaging and specialist polymers** - Paving the way for a greener tomorrow

Cross cutting priorities

- **Materials 4.0** - Embracing the digital revolution in materials discovery and translation
- **Sustainability and the circular economy** - Embedding sustainability into materials innovations
- **Translation and manufacturing** - Accelerating scale-up, commercialisation and adoption
- **Skills** - Nurturing a highly skilled workforce in high-value jobs
- **Policy, regulation and standards** - Maximising ROI of innovation through an enabling regulatory environment

4.6. Materials innovation system analysis

The RTIC company distribution within the materials innovation arena shows a strong concentration in Net Zero (133 companies) and Advanced Manufacturing (88 companies), with a secondary tier spanning MedTech, Life Sciences, Advanced Materials, Semiconductors, and Space Economy. This profile reflects a translation-heavy, deployment-focused regional economy, rather than one dominated by materials discovery and development alone.

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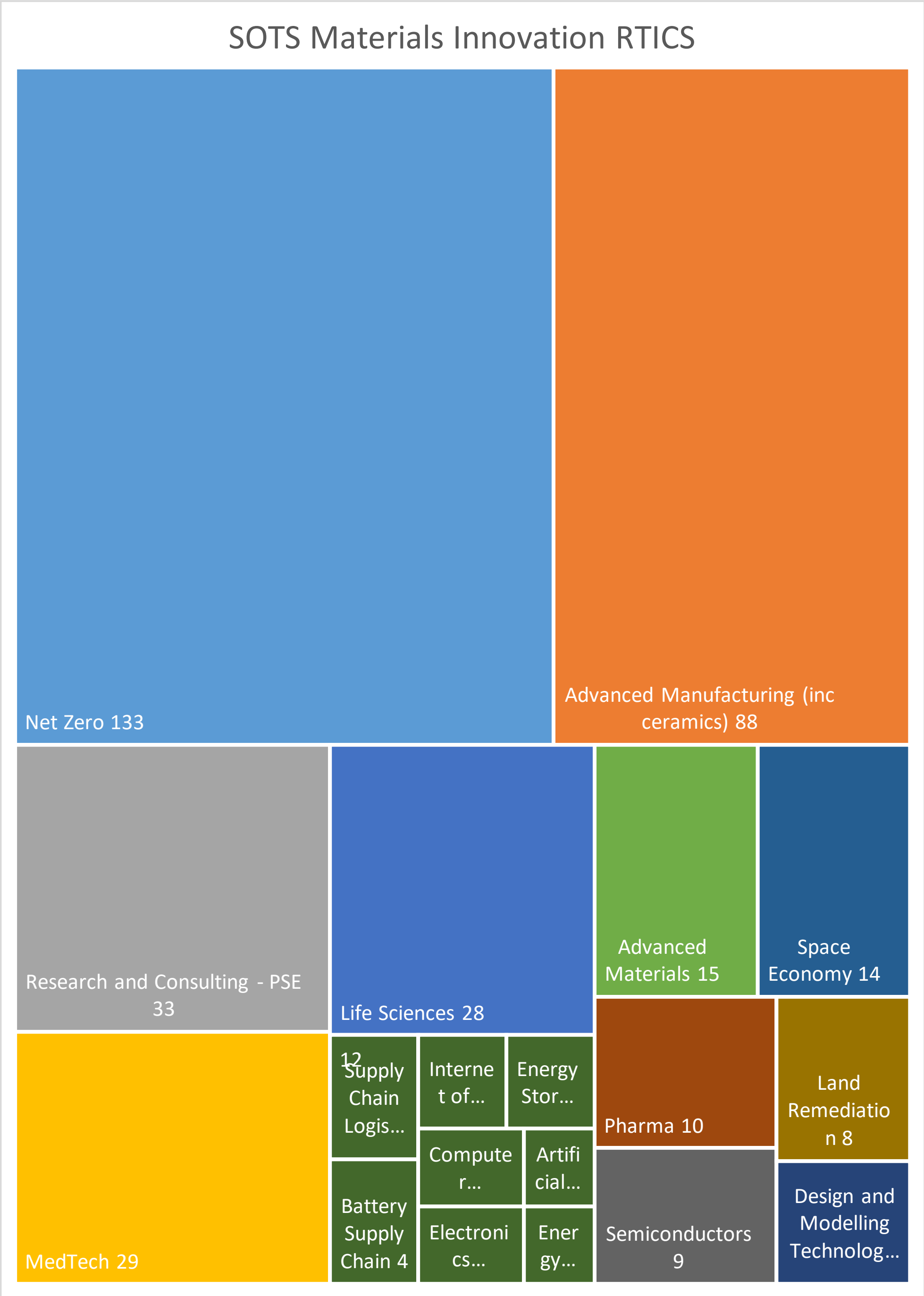
[43] https://www.royce.ac.uk/wp-content/uploads/2025/05/National-Materials-Innovation-Strategy-8-1-25-Website.pdf



University research strengths span multiple disciplines, including materials engineering for energy, structural and biomaterials, associated data science expertise, with applications across energy decarbonisation, regenerative medicine, diagnostics, therapeutics, and forensics.

When mapped against institutional expertise, a clear and complementary division of roles emerges:

- **Keele University** aligns most strongly with discovery-led and science-intensive RTICs, including Advanced Materials, Life Sciences, Pharma, Semiconductors, Energy Generation and Storage, and Land Remediation. Keele provides the materials science depth, characterisation capability, and interdisciplinary research base needed to underpin these sectors.

- **Lucideon / AMRICC** aligns closely with Advanced Manufacturing (particularly ceramics), Net Zero, and sectors requiring validation, scale-up, and standards. Its strength lies in industrial readiness, testing, performance under demanding environments, and regulatory confidence, filling a critical gap between academic research and manufacturing deployment.
- **The University of Staffordshire** aligns most strongly with Advanced Manufacturing, Net Zero (systems and deployment), Design & Modelling Technologies, IoT, AI, Supply Chain, and Electronics Manufacturing. Its expertise supports translation, systems integration, prototyping, and digitalisation, closely matching the highest-volume RTIC categories.

Alignment - materials-related industries, and local expertise/facilities

RTIC (Company Count)	**Keele**	**Lucideon / AMRICC**	**Staffordshire**
Net Zero (133)	🟩	🟩	🟩
Advanced Manufacturing incl. ceramics (88)	🟧	🟩	🟩
Research & Consulting – PSE (33)	🟩	🟧	🟧
MedTech (29)	🟩	🟧	🟧
Life Sciences (28)	🟩	⬜	🟧
Advanced Materials (15)	🟩	🟩	🟧
Space Economy (14)	🟩	🟧	⬜
Pharma (10)	🟩	⬜	🟧
Semiconductors (9)	🟩	🟧	⬜
Land Remediation (8)	🟩	🟧	🟧
Design & Modelling Technologies (6)	🟧	🟧	🟩
Supply Chain Logistics (4)	⬜	🟧	🟩
Battery Supply Chain (4)	🟩	🟧	⬜
Internet of Things (3)	🟧	⬜	🟩
Energy Storage (3)	🟩	🟧	⬜
Computer Hardware (3)	🟧	🟧	🟧
Electronics Manufacturing (3)	🟧	🟧	🟩
Artificial Intelligence Ecosystem (2)	🟧	⬜	🟩
Energy Generation (2)	🟩	🟧	⬜

🟩 = Strong fit / lead capability. 🟧 = Partial fit. ⬜ = Limited fit

The largest RTIC and most relevant sectors (Net Zero, Advanced Materials and Advanced Manufacturing) are covered strongly when institutions are considered together. The region has system coherence, not just pockets of excellence. Lucideon/AMRICC's role alongside the two Universities is structurally essential

Royce Capability Access Statement

To develop this further, we undertook a place-based capability statement based on the Royce Capability Access model, relating this to the themes in the National Materials Innovation Strategy.

This confirmed that the local partnership can provide open, coordinated access to complementary materials capabilities across the full innovation lifecycle, from materials discovery and characterisation through translation, validation, manufacturing and deployment. The collaboration could be explicitly designed to support national Royce objectives, prioritising access over ownership, reducing duplication, and enabling academic and industrial users to progress materials innovation efficiently and safely.

Headline Place-based capability analysis

	Discovery & Design	**Translation**	**Validation & Standards**	**Manufacturing & Deployment**
Keele University Materials Discovery & Early Translation	Materials discovery, synthesis & modelling AI-enabled & data-driven materials (Materials 4.0)	Advanced characterisation & early translation Energy, healthcare, structural & functional materials	Feedback from testing informs redesign (via partners)	Indirect support via materials knowledge & failure analysis
Lucideon / AMRICC Scale-up, Validation & Industrial Readiness	—	Processing development & pilot-scale manufacture Materials scale-up & optimisation	Performance testing in demanding environments Qualification, standards & regulatory compliance	De-risking materials for manufacture Industrial readiness & confidence
University of Staffordshire Manufacturing Systems & Deployment	—	Prototyping, demonstrators & systems integration	Validation of manufacturability & system performance	Digital manufacturing & automation Sustainability & circular economy SME-facing deployment

The combined capabilities span five key stages of the materials innovation lifecycle:

Discovery & Design. Led primarily by Keele University, working with other Midlands Research Intensive Universities providing materials discovery, synthesis, modelling, and advanced characterisation across energy materials, biomaterials, structural and functional materials, surfaces, and electronics. Capabilities are supported by interdisciplinary laboratories across chemistry, physics, life sciences, engineering, and environmental science.

Synthesis, Characterisation & Early Translation. Keele provides open access to experimental and computational facilities for materials development, supported by data-driven and AI-enabled approaches (Materials 4.0). Facilities are accessible to external academic and industrial users via collaborative research, contract research, and funded programmes.

Scale-up, Processing & Validation. Lucideon / AMRICC provides nationally significant capability in materials processing, scale-up, pilot manufacture, and performance testing, with particular strength in ceramics and inorganic materials. Facilities support testing under demanding thermal, chemical, and mechanical environments, bridging the gap between laboratory research and industrial readiness.

Testing, Qualification, Standards & Regulation. Lucideon / AMRICC offers accredited testing, qualification, and standards expertise, enabling materials to be validated against regulatory and industrial requirements. This capability de-risks adoption and supports confidence in materials deployment across multiple sectors.

Manufacturing Systems & Deployment. The University of Staffordshire provides applied capability in manufacturing systems, digital manufacturing, automation, sustainability, and systems integration. Facilities support prototyping, demonstrators, and downstream deployment, particularly for SMEs and sector partners.

4.7 Alignment with National Materials Innovation Strategy

Mapping local research and facilities strengths against the Materials Innovation Strategy highlights a particularly strong alignment for Keele with energy-related materials, notably battery energy storage, large-scale electrochemical energy generation and conversion, and hydrogen transport, storage and use.

These areas closely reflect Keele's established expertise in electrochemistry, materials chemistry and sustainable energy systems. Good alignment is also evident in selected healthcare and polymer-focused themes, including biocompatible materials, bioelectronics, sustainable packaging and sustainable elastomers, where chemistry-led and interdisciplinary /approaches are well developed.

More moderate alignment is seen in areas such as heat exchange and thermal storage, energy harvesting, and the broader consumer products and specialist polymers theme, which intersect with Keele's capabilities but are not central to its research profile.

Again the combined capabilities of all three organisations span five key stages of the materials innovation lifecycle. However, it is very unlikely that we would want to cover the full span of these priorities, given that the main industry and research strengths locally are in areas A2 1-4,

SOTS Research & Facilities - fit with National Materials Innovation Strategy

NMIS Sub-Theme	Keele University	Lucideon / AMRICC	University of Staffordshire
A2-1 Energy Solutions	🟩	🟧	🟧
Battery Energy Storage	🟩	⬜	⬜
Electrochemical Energy Conversion	🟩	⬜	⬜
Hydrogen Transport, Storage & Use	🟩	🟧	⬜
Heat Exchange, Storage & Recovery	🟧	🟧	🟧
Energy Harvesting	🟧	⬜	⬜
Nuclear Fuels & Test Capability	🟧	⬜	⬜
A2-2 Materials for Future Healthcare	🟩	🟧	🟧
Biocompatible Materials	🟩	🟧	🟧
Bioelectronics	🟩	⬜	⬜
A2-3 Structural Innovations	🟩	🟩	🟧
Low-carbon Construction	🟩	🟧	🟧
Sustainable Composites	🟩	🟧	🟧
Metallic Materials	🟩	🟧	⬜
Ceramic Materials	🟩	🟩	⬜
A2-4 Advanced Surface Technologies	🟩	🟩	🟧
Surface Engineering & Tribology	🟩	🟩	⬜
Surfaces for Demanding Environments	🟩	🟩	🟧
A2-5 Next Gen Electronics & Sensors	🟩	🟧	🟩
Power Electronics Materials	🟩	🟧	🟧
Quantum Materials	🟧	⬜	⬜
Connectivity & Telecoms Materials	🟩	🟧	🟧
A2-6 Consumer Products & Polymers	🟧	🟧	🟩
Sustainable Packaging	🟧	🟧	🟩
Sustainable Elastomers	🟧	⬜	⬜

🟩 Very strong fit (Tier 1). 🟧 Enabling fit (Tier 2–3). ⬜ Limited fit (Tier 4–5)

4.8. Skills

Levels 2-6

The RTIC company distribution highlights a skills demand profile dominated by Net Zero, Advanced Manufacturing, and applied digital technologies, with secondary demand in MedTech, Life Sciences, Advanced Materials, Semiconductors, and Energy Storage. This reflects an economy that requires technicians, technologists, engineers, and applied graduates more than large volumes of discovery-led researchers.

Mapping skills provision across Keele University, The University of Staffordshire, Newcastle and Stafford Colleges Group (NSCG), and Stoke College reveals a strong overall foundation, but also several systemic gaps:

Universities provide strong higher-level skills, but at different points in the pipeline. Keele supplies scientific depth, analytical capability, and postgraduate-level skills. The University of Staffordshire supplies applied engineering, digital, manufacturing, and systems skills.

Colleges provide essential technician and operator skills, particularly for manufacturing, logistics, construction, and digital operations. NSCG has strong provision in engineering, manufacturing, construction, and energy-related trades. Stoke College plays a critical role in entry-level technical, construction, and digital skills.

However, the analysis shows persistent gaps in:

- Semiconductor and electronics manufacturing technicians
- Battery supply chain and energy storage operatives
- Cross-cutting Net Zero skills (retrofit, hydrogen systems, thermal systems integration)
- Mid-level materials technicians (testing, quality, compliance)

These gaps sit between FE and HE provision and represent opportunities for new pathways, apprenticeships, and modular provision. Keele's new Engineering programmes will play a role in addressing some, but not all of these gaps.

SOTS Skills provision - fit with National Materials Innovation Strategy

NMIS Theme / Sub-theme	Keele	Staffs	NSCG	Stoke College
A2-1 Energy Solutions	Green	Amber	Green	Amber
Battery energy storage	Green	Amber		
Large-scale electrochemical generation & conversion	Green			
Hydrogen transport, storage & use	Amber		Amber	
Heat exchange, storage & heat recovery	Amber	Amber	Green	Amber
Energy harvesting	Amber	Amber		
Advanced nuclear fuels & test capability				
A2-2 Materials for Future Healthcare	Green	Amber	Amber	
Biocompatible materials	Green	Amber	Amber	
Materials for bioelectronics	Green	Amber		
A2-3 Structural Innovations	Amber	Green	Green	Green
Low-carbon construction	Amber	Amber	Green	Green
Sustainable structural systems – composites	Amber	Amber	Amber	Amber
Metallic materials	Amber	Green	Green	Amber
Ceramic materials	Amber	Amber	Amber	Amber
A2-4 Advanced Surface Technologies	Amber	Amber	Amber	
Surface engineering & tribology	Amber	Amber		
Surface treatments for demanding environments	Amber	Amber	Amber	
A2-5 Next Gen Electronics, Telecoms & Sensors	Amber	Green	Amber	
Power electronics	Amber	Amber	Amber	
Quantum technologies				
Connectivity & telecommunications	Amber	Green	Amber	

A2-6 Consumer Products, Packaging & Specialist Polymers	🟧	🟩	🟧	🟧
Sustainable packaging	🟧	🟩	🟧	🟧
Sustainable elastomers	🟧	🟧	⬜	⬜

🟩 = Strong skills provision 🟧 = Partial provision. ⬜ = Limited/absent provision

In addition to the skills gaps identified against the area's RTIC profile, the analysis revealed further specific gaps in the mid-pipeline (Level 3–5 transition) and specialist technician roles:

- Power electronics, electronics manufacturing technicians
- Hydrogen and net-zero heat/thermal systems integration roles

Evidence suggests that these are best addressed through HTQs, apprenticeships, modular CPD, and shared facilities access, rather than entirely new provision. Working strategically across industries and providers could present a powerful opportunity to support further progress on inclusion and social mobility within the area.

The LSIP provides a partial but uneven fit with the skills needs associated with materials innovation. It performs reasonably well in supporting foundational and technician-level skills linked to advanced manufacturing, ceramics, materials processing and quality control, particularly where employer demand is well articulated and closely tied to existing FE provision. In this respect, the LSIP aligns with the operational end of the materials innovation pathway, including production, maintenance, testing and applied manufacturing roles.

However, the analysis highlights gaps where materials innovation intersects with R&D translation, digitalisation and system integration. Skills linked to materials characterisation, surface engineering, advanced testing, materials data, and scale-up from lab to production are less well captured within a sector-based LSIP framework. These roles often sit at Levels 4–6 and require closer alignment between FE, HE and specialist facilities. Addressing these gaps is less about expanding provision and more about pathway coherence, progression and access to shared facilities, suggesting the need for stronger coordination alongside LSIP delivery rather than changes to LSIP governance itself.

Levels 7 and 8

Level 7 provision in materials innovation is primarily about applied specialisation and translation: advanced ceramics, composites, surface engineering, materials validation, and materials for Net Zero systems. These are areas where professionals already working in engineering, manufacturing, testing and compliance need to deepen expertise beyond undergraduate training.

Keele University is best placed to lead Level 7 specialisms that are science-intensive but application-focused, including advanced ceramics, materials characterisation, surface engineering, materials for energy systems, and data-enabled materials engineering (Materials 4.0). Keele's interdisciplinary strength (chemistry, physics, life sciences, engineering) supports this well.

University of Staffordshire offers a strong complementary role in manufacturing systems, digital manufacturing, modelling, design, and quality systems, particularly where materials knowledge needs to be embedded into production, scale-up and industrial deployment.

Lucideon and AMRICC are partners in shaping Level 7 content around industrial relevance, standards, validation, performance testing and real-world case studies. While not education providers, they are well placed to co-design curricula and host applied learning.

Level 8 (Postgraduate Research)

Traditional academic PGR. Keele University is clearly best placed to lead discovery-led and science-intensive PGR in advanced materials, ceramics, composites, degradation, and structure–property relationships, supported by national materials infrastructure rather than local duplication.

Collaborative / industry-linked PGR. Keele University – academic lead for applied and translational materials research. Lucideon / AMRICC are essential co-anchors for scale-up, manufacturability, validation and standards-driven research. The University of Staffordshire could provide downstream contributions where PGR interfaces with manufacturing systems, automation, and digitalisation.

4.9 Developing a wider Materials Innovation Partnership Model

Realising integrated R&D and manufacturing facilities for novel ceramic materials for harsh environments, including CMCs is the most significant opportunity in front of us. Supporting the Lucideon/AMRICC-led partnership taking that forward, which will involve key businesses in the wider Midlands, clearly needs to be our main area of focus over the coming years. This will require a high degree of commitment from civic partners, and we cannot afford to allow

However, that may not prevent us from making progress to a more supportive innovation system for a productive materials innovation environment, particularly innovation in materials engineering is becoming more fluid, with a greater than ever need to bring together interdisciplinary teams together across the lifecycle.

Minimal investment option : Improve co-ordinaton

At a very basic level a stronger partnership model could present and organise this capability in a more integrated and co-ordinated way through a single hub for materials businesses operating in Stoke-on-Trent and Staffordshire, with flexibility to work across boundaries where the cluster geography suggests this is useful (the current model for the Strength-in-Places programme), rather than the multiple routes currently available. This would include:

- Academic access - Collaborative research projects, doctoral and postdoctoral research, and participation in UKRI-funded programmes and skills provision

- Industrial access - Contract research, testing and validation services, pilot-scale trials, and collaborative R&D.
- SME access - Supported through translational programmes, knowledge transfer partnerships, and innovation funding routes.
- Bidirectional access - Users can enter the system at any stage of the lifecycle and move forward or backward as required (e.g. failure analysis informing redesign).

Ultimately this could broaden the successful AMRICC model to encompass co-ordination between Keele University, Lucideon / AMRICC, The Universit of Staffordshire and the colleges and IoT, as well as broader academic research relationships of value to the local materials cluster. It would create a welcoming front door for areas of capability in materials innovation, ensure clear referral pathways between facilities, avoid of duplication and consistent standards of access, quality, and data handling. This supports Royce's objective of creating a coherent national materials infrastructure, while remaining flexible to the needs of diverse user communities.

It would almost certainly require additional public funding at its core for co-ordination, brokerage and project development, but this would strengthen the area's ability to capture, and deploy more effectively, the public sector resources available. More importantly, it would accelerate commercialisation and private sector investment flows into these industries, directly addressing the challenge of low value add in the area's emerging/innovation economy.

Higher ambition level : Devolved Strategic Programmes, National Facility

There is a strong case that, given the strengths of the area's assets and expertise, we should be setting a higher level of ambition around Ceramics Innovation, particularly in view of the further planned investment in researchers in this area. By working across the research and skills base across the Midlands, there is potential to grow a **national innovation hub (centre?)for ceramics engineering**, not only integrating support for all stages of the product development and commercialisation life cycle, but also developing the bespoke technical and firm-level leadership programmes that are proven to generate significant early growth.

There is also very credible case for developing the area's capabilities in **Engineering Biology.** Lucideon are active in this area[44], having been part of an international partnership to set a future agenda to support the uptake and commercialisation of synthetic biology. We estimate that between 22% and 25% of Keele's total researchers are already involved in Engineering Biology, much of it with industry and NHS partners.

The area's industrial base is rich in potential end users across health and non-health applications, and our comparative advantage in Omics provides a platform for scaling and inward investment. Cluster analysis undertaken by the Oxford Economics as part of the Innovation Caucus identifies a large and diverse non

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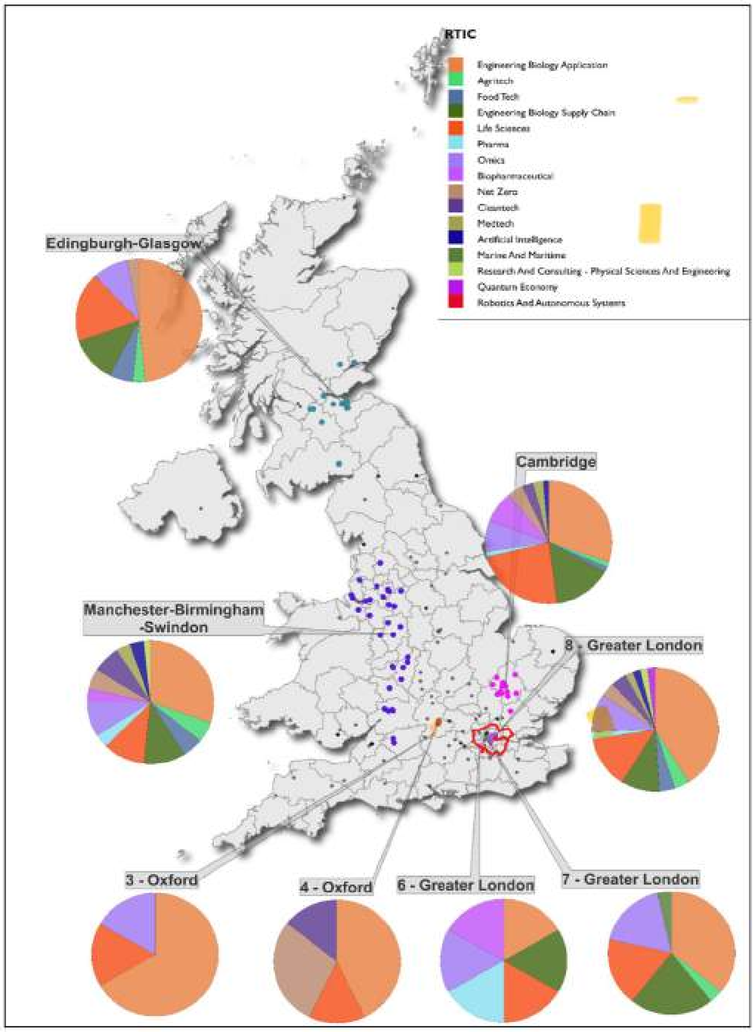
[44] https://www.lucideon.com/uk/news/engineering-biology.
https://www.bioindustry.org/static/f2107137-cc5c-48cd-9a3f4a0309d9d1b9/SynBio-Summit-Report-2025.pdf

health-related Engineering Biology cluster running from Manchester to Swindon (arguably incorporating Merseyside), of which Stoke-on-Trent and Staffordshire is part.

As with earlier examples, bringing together the disparate parts of the innovation system has the potential to create not just long-term benefits though improved co-ordination, but may also generate more immediate impacts. The proposal here is to further scope this opportunity at an early stage, with a view to organising an **Engineering Biology Summit**, as the basis for building strategic cross-sector collaboration shaping place-based proposals to create

UK Engineering Biology Clusters and their composition[45]



4.10 Firm-level Investment

In materials innovation, the UK investment landscape is characterised by strong public R&D support and comparatively limited private risk capital, particularly outside the Golden Triangle. This reflects the nature of materials development

[45] https://innovation-research-caucus-uploads.s3.amazonaws.com/production/uploads/2025/04/IRCP0004_Places_FinalReport_FINAL-v.1-April-2025.pdf

itself: long innovation cycles, high validation costs, and dependence on industrial adoption rather than consumer markets. In Stoke-on-Trent and Staffordshire, many materials-led firms are technically strong, capital-efficient and closely aligned to manufacturing and infrastructure markets, but these same characteristics can make them less legible to mainstream venture capital.

From an investor perspective, the principal constraints are rarely doubts about scientific quality. Instead, concerns tend to focus on time to revenue, scale economics, customer concentration and exit pathways. Materials businesses often rely on one or two anchor customers during early growth, which increases perceived risk even where those relationships are strategically valuable. Management teams are frequently led by technical founders with deep domain expertise but limited experience of scaling manufacturing businesses or engaging with institutional investors.

In this context, the most effective place-based interventions are not aimed at increasing the volume of early-stage finance, but at reducing uncertainty. This includes supporting translation, validation and manufacturability; strengthening access to national testing and scale-up assets rather than duplicating them locally; and helping firms articulate credible scale-up pathways grounded in industrial demand. Public sector support has particular value where it improves investment readiness by clarifying cost structures, production routes and customer pipelines

4.11 Infrastructure and Location for Materials Innovation

The final part of the jigsaw is to better understand the infrastructure needed to support the growth and development of this very diverse cluster – location, capacity, facilities, related infrastructure and ecosystem.

To support this, we have undertaken an assessment of demand across Stoke-on-Trent and Staffordshire through a small number of Materials-related industry archetypes, each with distinct spatial, infrastructure, and ecosystem requirements. These archetypes align closely with the sub-region's existing and emerging portfolio of employment locations, including town and city centres, university-anchored innovation space, high-spec business parks, and strategic industrial sites.

Net Zero, Energy & Advanced Manufacturing. This archetype is the primary driver of land-intensive demand, encompassing manufacturing, energy systems, and materials processing. Such activity is best suited to strategic industrial locations, including sites along the M6, A50 and A500 corridors, such as those within the Ceramic Valley Enterprise Zone and other established industrial areas across Staffordshire. These locations provide the scale, power capacity, and logistics access required.

The role of Keele University Science & Innovation Park (KUSIP) is complementary rather than substitutive: providing space for early-stage R&D, pilot demonstrators, and spin-outs, before firms transition to larger industrial premises elsewhere in the sub-region.

Advanced Materials, Semiconductors & Electronics. Advanced materials and electronics activities are high-value but highly selective. Firms prioritise proximity to researchers, graduate talent, specialist facilities, and high-quality utilities. This archetype aligns most strongly with university-anchored science parks and high-spec business parks, such as Keele University Science & Innovation Park, Trentham Lakes, and comparable locations around Stafford and Lichfield.

The proposed expansion of KUSIP materially strengthens the sub-region's ability to attract and retain this activity, particularly at the R&D and pilot scale. Standard industrial estates and town or city centres are generally less suitable due to infrastructure and building specification constraints.

Life Sciences, Pharma & MedTech. Life sciences activity is ecosystem-led, typically clustering near universities and healthcare assets. In the local context, this includes Keele University, the Royal Stoke University Hospital, and related health and research infrastructure. Firms often begin at small scale but require grow-on space, making flexible science park environments particularly valuable.

KUSIP plays a critical incubation and early growth role, while later-stage activity may transition to high-spec business parks elsewhere in Staffordshire. Town and city centres can accommodate administrative, digital health, and professional functions, but laboratory-intensive uses are better suited to dedicated science environments.

Digital, AI & IoT. Digital activity underpins the job-density and productivity ambitions of Stoke-on-Trent and surrounding towns. These firms are talent-led, relatively footloose, and highly responsive to place quality, making town and city centres — including Stoke-on-Trent city centre and other Staffordshire towns — the primary growth locations.

KUSIP plays a secondary role for digital firms operating at the interface with materials, manufacturing, health, or energy, where proximity to researchers and test facilities adds value. Hybrid and remote working models are common, but high-quality urban hubs remain important for collaboration and visibility.

Research, Consulting & the Space Economy. Research-led consultancies and space-economy activities require credibility, connectivity, and secure environments. In Staffordshire, this demand aligns with both university-adjacent locations (notably KUSIP) and town and city centres, depending on the balance between technical and professional activity.

KUSIP provides an anchor for technically intensive organisations requiring access to research infrastructure, while town and city centres can be best placed to support programme management, consultancy, and commercial functions.

Taken together, these archetypes reinforce the need for a portfolio of employment locations across Stoke-on-Trent and Staffordshire, with town and city centres, an expanded Keele University Science & Innovation Park, and strategic industrial sites each playing distinct but complementary roles.

Stoke-on-Trent and Staffordshire site portfolio indicative best fit

Industry Archetype	Primary Drivers	Best Fit Locations	Least Fit Locations	Role of KUSIP
Net Zero, Energy & Advanced Manufacturing	Power; logistics; land scale; compliance; cost efficiency	D (Ceramic Valley EZ; M6/A50/A500), C (early-stage)	B, campus core	Early-stage R&D, pilots, spin-outs feeding strategic sites
Advanced Materials, Semiconductors & Electronics	Research proximity; utilities quality; building spec; talent	A (KUSIP), C (Trentham Lakes; Stafford/Lichfield)	B, low-spec D	Anchor site for R&D, pilot and early scale-up
Life Sciences, Pharma & MedTech	Ecosystem links; lab compliance; grow-on space; credibility	A (KUSIP; hospital-adjacent), C (later stage)	D, most B	Incubation, early growth, research translation
Digital, AI & IoT	Talent access; connectivity; amenity; flexibility	B (Stoke city centre; towns), A (secondary)	D	Secondary role for deep-tech and research-linked firms
Research, Consulting & Space Economy	Credibility; security; research access; connectivity	A (KUSIP), B (town & city centres)	D	Anchor for technically intensive, research-led activity

A - University-anchored Science & Innovation Parks (e.g. KUSIP)
B - Town & City Centres (e.g. Stoke-on-Trent city centre; Staffordshire towns)
C - High-spec Business Parks (e.g. Trentham Lakes; sites around Stafford & Lichfield)
D - Strategic Industrial & Manufacturing Sites (e.g. Ceramic Valley EZ; M6/A50/ A500 corridor sites)

4.12 Materials Innovation and the Everyday Economy

Materials innovation intersects with the everyday economy primarily through large, locally rooted workforces in construction, ceramics, manufacturing, maintenance, logistics and utilities. Many roles in these sectors are relatively lower paid and physically demanding, with productivity constrained by legacy processes, energy costs, waste and rework. Incremental materials innovation — improved durability, lower-carbon inputs, better surface treatments, or more consistent quality — can generate immediate productivity gains that reduce scrap, downtime and manual intervention.

For workers, these changes often translate into better job quality rather than job loss: safer processes, more predictable workflows, and reduced physical strain. For example, improved materials consistency can reduce repetitive inspection and rework tasks, while energy-efficient processes lower operational pressures on firms that employ large numbers of semi-skilled staff. These gains are rarely visible as “innovation jobs”, but they matter significantly to earnings stability and working conditions in the everyday economy.

Over time, materials innovation also opens progression pathways. As firms adopt new materials and processes, demand grows for technicians skilled in testing, quality assurance, digital monitoring and compliance — roles that often sit at Levels 3–5 and offer realistic upward mobility for existing workers. Place-based materials innovation therefore supports inclusion not by creating large numbers of high-end research roles, but by upgrading the skills content and resilience of existing jobs, particularly in traditional industries undergoing transition.

While materials innovation can improve productivity and job quality across construction, ceramics and manufacturing, its impacts on lower-paid and lower-skilled roles are unlikely to be uniform. Process improvement and automation may reduce demand for some manual tasks, even as new technical and quality-focused roles emerge. Supporting just outcomes therefore depends on early engagement between employers and workers, clearer progression routes into technician and assurance roles, and alignment with national skills and employment frameworks that support retraining and redeployment rather than displacement.

4.13 Strengthening Economic Impacts

The economic impact of materials innovation in Stoke-on-Trent and Staffordshire is best understood as deepening and upgrading an existing industrial base, rather than creating a new sector. The area’s distinctive advantage lies in applied materials, ceramics, validation and scale-up capability, which supports productivity, resilience and competitiveness across multiple industries.

The strongest impacts are likely to arise through:

- Productivity and margin uplift in existing manufacturing firms, driven by improved materials performance, reliability, energy efficiency and reduced failure rates.
- Higher-value specialist production and scale-up, particularly where materials innovation enables firms to move from commodity supply into regulated, performance-critical or bespoke markets.
- Supply chain anchoring, where access to validation, testing and standards reduces the need for firms to locate near national facilities, supporting retention and reinvestment locally.
- Inward investment in specialist manufacturing and translation, attracted by proximity to materials expertise, talent and shared infrastructure rather than low-cost land alone.

These impacts accrue gradually but persistently, favouring long-term economic resilience over short-term job creation spikes. Importantly, materials innovation supports a wide range of applied technical and technician roles, offering progression within the everyday economy while reinforcing the region’s national position in materials-led industries.

4.14 The case for place-based intervention

To help us better understand the role of place-based interventions in unlocking the full potential for economic impact, we have developed some initial logic chains in key areas of opportunity aligned to the area's strengths. These will form the basis for both further engagement with partners and the future case for resources to address areas of market failure

Logic Chain: Materials Innovation (Translation, Scale-up & Specialist Production)

Element	Description
Starting conditions / assets	Established base of materials-intensive firms; specialist ceramics and materials manufacturing capability; proximity between R&D, validation and small-scale production; growing interest in tighter R&D–manufacturing integration
Binding constraints	Scale-up risk; access to validation, standards and pilot-scale capability; shortages of advanced technical and translational skills (Levels 6–8); investment challenges linked to long timelines and capital requirements
Why the market alone doesn't fix this	High failure costs at scale-up stage; limited private appetite for first-of-kind production; difficulty financing shared validation and pilot facilities
Place-based intervention	Strengthening end-to-end translation pathways that connect research, validation and specialist production, using Science & Innovation Park environments alongside strategic industrial sites
Primary translation pathways	Collaborative scale-up with existing firms Specialist, high-value manufacturing rather than volume production Increasingly, selective spin-outs and IP-led ventures where materials platforms mature
Economic & system outcomes	Higher survival and growth rates for materials firms; attraction of inward investment aligned to specialist production; stronger integration of innovation, skills and manufacturing employment

Logic Chain: Materials Innovation (Core & Cross-Sector Platform)

Element	Description
Starting conditions / assets	Long-standing strengths in advanced ceramics, functional materials and applied materials science; strong academic capability (Keele); nationally significant materials testing, characterisation and standards expertise (Lucideon / AMRICC); materials demand embedded across life sciences, energy systems and digital hardware
Binding constraints	Fragmentation between discovery, characterisation and downstream application; limited coordination across sectors; skills constraints at Levels 6–8 in materials science, characterisation, modelling and data-enabled materials

Why the market alone doesn't fix this	High capital intensity and long development cycles; shared infrastructure requirements; weak incentives for individual firms to invest in upstream capability that benefits multiple sectors
Place-based intervention	A coordinated materials innovation platform focused on access, integration and translation, aligned with national materials infrastructure rather than duplicating it locally
Primary translation pathways	Collaborative research and applied projects Cross-sector materials deployment (health, energy, digital hardware) Selective IP generation where platform materials justify protection
Economic & system outcomes	Stronger productivity and resilience across multiple sectors; reduced innovation risk for firms; positioning the area as a credible node within the national materials system rather than a standalone centre

Digital Economy.

5.1 The Local Cluster

Analysis summary

975
COMPANIES CONSIDERED

830
COMPANIES CONSIDERED WITH EMPLOYEES

13,711
ESTIMATED TOTAL EMPLOYEES ATTRIBUTED TO THE 9 SELECTED LOCATIONS

72,844
TOTAL UK EMPLOYEES *830 companies

£4,083,330,750
ESTIMATED TOTAL TURNOVER ATTRIBUTED TO THE 9 SELECTED LOCATIONS

£66,995,430,095
TOTAL TURNOVER *855 companies

£56,090,000
TOTAL INVESTMENT FUNDING dealroom.co *52 companies

£33,790,655
TOTAL INNOVATE UK GRANT FUNDING *44 grants

+4.4%
ESTIMATED GROWTH PER YEAR *752 companies

£3,653,576,415
BEST ESTIMATE TOTAL GVA

£115,799
ESTIMATED GVA PER EMPLOYEE

125
WOMEN FOUNDED COMPANIES

297
WOMEN LED COMPANIES

653
WOMEN DIRECTORS *2,738 total directors

201
COMPANIES WITH IMPORT DATA

167
COMPANIES WITH EXPORT DATA

3
COMPANIES WITH POTENTIAL ANOMALIES

SHOW FIELD AVAILABILITY TABLE

Recently the subject of a Productivity Institute report[46], the digital economy has become the main engine of Stoke-on-Trent's economic growth, delivering a level of GVA per employee of £155,000 a year, well above that of other parts of the Midlands. The RTIC analysis reveals sizeable digital and technologies clusters across the wider area, with concentrations in Stafford, Lichfield and Tamworth, bringing GVA up to £3.6 bn (£4bn with the inclusion of Bet365). The City has also

46 https://www.productivity.ac.uk/wp-content/uploads/2025/07/Digital-Stoke-report-1-25-July-2025.pdf

focused on linking data centre infrastructure to renewable energy sources, including key culture and heritage projects, with scope to integrate these into broader networks. The digital economy is therefore best understood as enabling infrastructure that supports delivery, integration and productivity across the wider innovation system.

The digital economy is now one of the most significant and dynamic sectors across Stoke-on-Trent and Staffordshire. A large and growing base of digital firms, strong specialist employment and high productivity in core ICT activities have made it a principal engine of high-value growth for the area. Strengths span software and digital services, digital creative industries, telecommunications and data infrastructure, with clear concentrations across the wider geography.

Importantly, this growth has been sustained in a non-metropolitan context. The sector has developed organically and competitively, demonstrating that digital specialism can emerge at scale outside the UK's established core tech geographies. Productivity per employee in key ICT activities is strong by regional standards, and the scale of activity across the wider functional economy underlines that digital is not peripheral — it is central to the area's economic performance.

The structure of the local digital economy differs from the dominant national narrative of standalone, platform-led technology firms. While there is a significant base of software, data, creative and ICT businesses, much of this activity is not oriented towards generic consumer or enterprise platforms. Instead, digital firms in the region are disproportionately embedded within other sectors, supplying applied solutions to manufacturing, logistics, health, energy and regulated service environments.

RTIC analysis shows that a large share of digital firms operates at the interface between software, hardware and operational systems rather than as pure digital producers. This includes embedded systems firms linked to manufacturing and logistics, data and cyber specialists serving regulated sectors, and creative digital businesses providing applied simulation, visualisation and user experience design. These firms often generate high productivity but scale through long-term client relationships and adoption cycles rather than rapid product-led growth.

National evidence supports this distinction. The Productivity Institute's analysis highlights that applied and embedded digital firms can achieve productivity levels comparable to nationally recognised tech hubs, despite operating outside conventional venture-backed growth models. This suggests that the relative scarcity of large platform firms locally should not be interpreted as a structural weakness, but as a reflection of a different, more deployment-focused digital specialism.

Within this applied digital economy, several specialist areas are best understood as extensions of other cluster strengths rather than as standalone sectors.

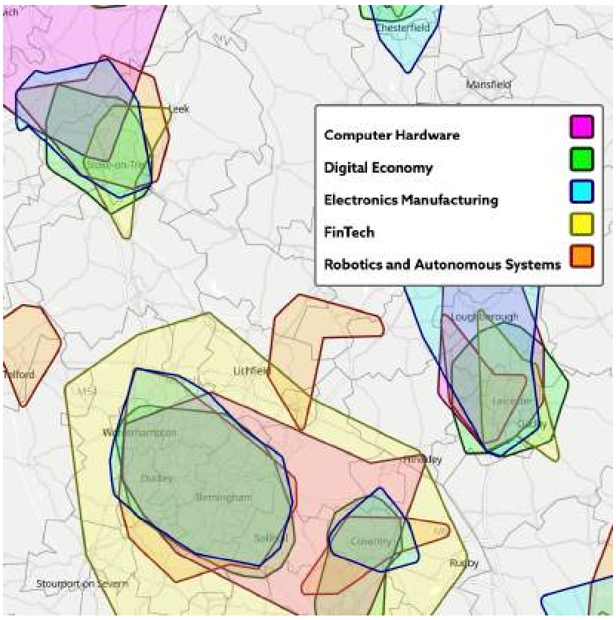
Regulated digital and cyber capability has grown alongside health, life sciences and critical infrastructure activity. Firms specialising in secure data platforms, cyber-security and compliance-driven systems serve NHS partners, regulated industries and public services. These capabilities depend heavily on trust, governance and proximity to users, rather than on scale alone, and benefit from close relationships with local institutions.

Embedded systems, electronics and semiconductor-adjacent activity has developed in close connection with materials innovation and advanced manufacturing. Clusters of firms operating in sensors, power electronics, robotics and hardware–software integration are evident along the A34 corridor and are partly rooted in the region’s ceramics and materials expertise. These firms exhibit long development cycles, higher capital intensity and strong dependence on validation and standards infrastructure.

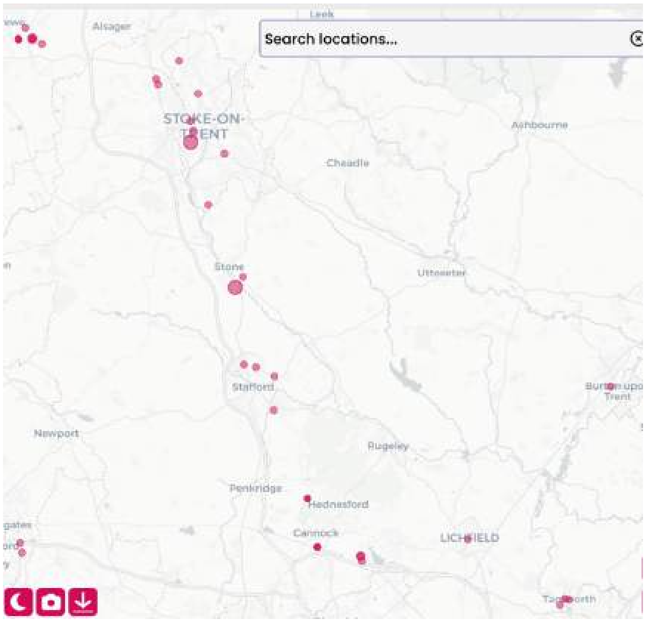
Digital creative and applied simulation activity, while often classified within the creative industries, plays a functional role across manufacturing, games, training and cultural sectors. Small agencies dominate numerically, particularly in Stafford, but their value lies in applied problem-solving rather than scale.

Omics-related digital infrastructure represents a further special case. While the area ranks highly on standard measures of Omics concentration, the market structure is dominated by a small number of global providers. As a result, local economic opportunity lies primarily in skills, data literacy and integration with life sciences and engineering biology, rather than in shaping the Omics market.

Digital & technologies Clusters(TO BE REVISED).



A500-A34-M6 Semiconductor Corridor?



However digital solutions firms (software, platforms, data, services) have almost the opposite profile:

Characteristic	Hardware	Digital solutions
Capital intensity	High	Low
Innovation cycle	Long	Short

Infrastructure dependence	Shared labs	Laptops & cloud
Failure cost	High	Low
Knowledge flow	Research-led	Practice-led
IP model	Patent-heavy	Tacit / fast-moving

For most digital solutions companies growth depends on people, practice, and adoption, rather than infrastructure. For these parts of the cluster, a 'Digital Enablement' model is applied, which better reflects the enablers and barriers for digital solutions firms – skills, adoption and trust, enabling the role of universities and civic institutions to be framed more realistically

Applying a Royce capability framework to the digital solutions space is appropriate only where digital innovation is materially constrained by hardware performance, manufacturability, reliability, or scale-up. In these domains, access to materials expertise, characterisation, prototyping, and pilot-scale facilities is a critical enabler of innovation and industrial adoption.

Place-based Capability Assessment – hardware-related industries

Digital Hardware Domain	Keele	Lucideon / AMRICC	Staffs Uni
Electronics Manufacturing	🟧	🟩	🟩
Semiconductors (materials, devices, packaging)	🟩	🟧	⬜
Sensors (materials, fabrication, reliability)	🟩	🟩	🟧
Power Electronics (Net Zero, energy systems)	🟩	🟧	🟧
Advanced Manufacturing (digital hardware systems)	🟧	🟩	🟩
Robotics & Autonomous Systems (hardware)	🟧	🟧	🟩
Hardware for Net Zero (thermal, energy, control)	🟩	🟩	🟧
Advanced Materials for Digital Hardware	🟩	🟩	🟧
Surface Engineering & Coatings (electronics, sensors)	🟩	🟩	⬜
Reliability, Testing & Standards (digital hardware)	🟧	🟩	🟧

Within Stoke-on-Trent and Staffordshire, a coherent Royce-relevant capability stack exists across a subset of digital RTICs, notably electronics manufacturing, semiconductors, sensors, robotics and autonomous systems, manufacturing systems, and hardware-enabled Net Zero technologies. These areas depend on materials selection, surface engineering, thermal management, packaging, reliability testing, and device integration—all core Royce concerns.

- Keele University provides strong materials science depth underpinning digital hardware, including functional electronic materials, wide-bandgap semiconductors, sensors, surface engineering, and data-enabled materials characterisation (Materials 4.0). Keele's role aligns with materials discovery, early-stage translation, and advanced characterisation, consistent with Royce's upstream mission.
- Lucideon / AMRICC provides nationally significant translation, validation, and industrial readiness capability, particularly in ceramics, substrates, packaging, coatings, thermal management, and reliability under demanding

environments. This maps directly onto Royce priorities around scale-up, manufacturability, standards, and industrial confidence, especially for electronics, sensors, power devices, and robotics deployed in harsh or regulated settings.

- The University of Staffordshire contributes most strongly at the systems integration and deployment layer, including electronics manufacturing systems, robotics, automation, digital manufacturing (Industry 4.0), and test-bed style prototyping. While not a materials discovery centre, its facilities and applied engineering capability support downstream Royce access, particularly for SMEs needing demonstrators and applied validation.

Taken together, the region presents a credible, end-to-end Royce access pathway for digital hardware innovation, from materials and device physics (Keele), through validation and scale-up (Lucideon/AMRICC), to system integration and deployment (University of Staffordshire).

Digital Solutions industries

The Digital Stoke project, undertaken by the University of Staffordshire and published by The Productivity Institute, provides rigorous evidence that the digital economy in and around Stoke-on-Trent is not incidental, but structurally significant to the local economy. Using industry data and firm analysis, the research shows that Stoke's ICT sector, though rooted in a post-industrial context, has grown organically to become both large and productive — contributing a disproportionate share of Gross Value Added and employment relative to economy size, and with productivity per employee that ranks highly compared to the national average. This emergent digital cluster is dynamic, with robust firm entry and a specialisation in computer programming, consultancy and telecommunications that makes it a potential engine of regional economic complexity.

Despite these strengths, the Digital Stoke research also highlights the dual realities of opportunity and constraint. While the sector's emergence has been largely organic and lightly supported, there are clear structural challenges in skills supply, firm diffusion and ecosystem readability — particularly for firms lagging the productivity frontier. Skills shortages, especially in specialist and higher-value domains, act as a brake on growth and retention, and the relatively low local retention of high-earning digital workers suggests that the sector's potential is not yet fully translating into local economic and social benefit.

This evidence complements the broader RTIC and skills analysis set out later in this report. The RTIC profiling shows that digital capabilities intersect with major priority clusters (Net Zero, advanced manufacturing, life sciences) and that the "digital enablement" imperative is as much about diffusion and adoption as creation. The Digital Stoke findings enrich this picture by demonstrating that strong digital sectors can coexist with persistent gaps in adoption capacity, reskilling pathways and ecosystem cohesion, particularly for SMEs and non-digital firms seeking to engage with digital productivity tools. This aligns with the broader analysis here that emphasises skills supply, adoption support, and trust & assurance as the three axes of an effective place-based digital system.

The Digital Stoke evidence suggests that investment and convening should build on existing organic strengths, rather than replace them. The strong base in ICT employment and firm productivity provides a platform on which to align RTIC-driven skills development, demonstrator programmes and neutral governance mechanisms. Policies that connect digital capabilities into Net Zero, energy systems, materials and health clusters — underpinned by shared intelligence and civic leadership — stand the best chance of translating local digital dynamism into wider economic impact. In doing so, they should address the specific constraints identified in the Digital Stoke research — skills scarcity, talent retention, ecosystem read-through and equity of access — ensuring that digital growth contributes to inclusive, productivity-led regional development.

This framework draws only on the Digital findings published to date. The more recent work includes interviews with industry leaders, which will be incorporated into this framework once published.

Digital solutions industries Place-based Digital Enablement assessment

The area's RTIC profile demonstrates a large, diverse and dispersed digital economy, with particular weight in software development, digital creative industries, data infrastructure, electronics manufacturing, telecommunications, and applied digital services embedded across non-digital sectors such as manufacturing, health, energy and logistics. This profile aligns closely with the findings of the Productivity Institute analysis of Stoke-on-Trent's digital sector, which highlights both strong applied capability and structural barriers to diffusion and productivity uplift, particularly among SMEs.

Applying a Digital Enablement model helps distinguish where intervention adds most value. Rather than treating digital as a single sector, the model frames digital as a set of enabling functions that support productivity, innovation and resilience across the whole economy.

Axis 1: Skills Supply

Universities and colleges play a decisive role in supplying graduate, postgraduate and specialist digital skills. Keele University contributes high-level analytical capability in data-enabled domains, AI-adjacent methods, ethics and regulation, and domain-specific digital skills linked to health, environment and materials. The University of Staffordshire anchors applied digital, creative, cyber, data, games, UX and software skills, with clear relevance to the region's dominant RTICs. FE provision underpins technician-level and progression pathways but faces pressure in fast-moving specialist niches.

Axis 2: Adoption & Diffusion

The dominant constraint on digital productivity locally is not technology creation, but adoption and diffusion. The RTIC evidence shows many firms operating outside the "core" digital sector that nonetheless rely on digital tools. In this space, effective support is practice-led, consultancy-like and co-produced, involving demonstrators, diagnostics and trusted intermediaries rather than R&D. Universities' value here lies in acting as honest brokers, conveners and translators

— a point echoed in the Productivity Institute work. Initiatives such as Silicon Stoke illustrate both the potential and the challenge: strong grassroots energy, but variable reach across dispersed sub-sectors such as createch, software services and embedded digital.

Axis 3: Trust, Assurance & Governance

As digital adoption deepens, trust becomes a system-level constraint. Cybersecurity, data ethics, AI assurance and regulatory understanding increasingly determine whether firms can adopt digital tools with confidence. This is an area where universities contribute disproportionate value relative to scale, providing neutral expertise, standards awareness and assurance capacity that individual SMEs cannot replicate.

Overall, the analysis suggests that digital enablement investment should prioritise diffusion, trust and skills alignment, rather than additional technology creation. The area's opportunity lies in strengthening the connective tissue between its digital capability and its wider RTIC economy.

5.2 Skills

Levels 2-6

Alignment of skills provision with SOTS Industry RTICs

Digital Economy RTIC (count)	Keele	Staffs	NSCG	Stoke
Digital Creative Industries (208)	🟧	🟩	🟧	🟧
Electronics Manufacturing (163)	🟧	🟩	🟧	🟧
Software Development (144)	🟧	🟩	🟩	🟧
Data Infrastructure (126)	🟧	🟩	⬜	⬜
Telecommunications (115)	🟧	🟩	🟧	🟧
Agency Market (109)	🟧	🟩	🟧	🟧
Cloud Computing (64)	🟧	🟩	⬜	⬜
Advanced Manufacturing (inc ceramics) (60)	🟧	🟩	🟩	🟩
Robotics & Autonomous Systems (54)	🟧	🟩	🟧	⬜
Cyber (42)	🟧	🟩	⬜	⬜
Media & Publishing (35)	🟧	🟩	🟧	🟧
Sensors (35)	🟧	🟩	🟧	⬜
Net Zero (37)	🟩	🟧	🟩	🟧
E-commerce (30)	🟧	🟩	🟧	🟧
Computer Hardware (28)	🟧	🟧	⬜	⬜
Geospatial Economy (27)	🟩	🟧	⬜	⬜
Immersive Technologies (27)	🟧	🟩	🟧	🟧
Semiconductors (22)	🟩	🟧	⬜	⬜
AgriTech (22)	🟧	🟧	🟩	🟧
Artificial Intelligence Technologies (≈22)	🟧	🟩	🟧	⬜
Omics (21)	🟩	🟧	⬜	⬜
Software as a Service (20)	🟧	🟩	🟧	🟧
Gaming (20)	🟧	🟩	🟧	🟧
Supply Chain Digital (≈20)	🟧	🟩	🟧	🟧

Design & Modelling (≈18)	🟧	🟩	🟧	🟧
Research & Consulting (≈15)	🟩	🟧	☐	☐
EdTech (15)	🟧	🟩	🟧	🟧
Internet of Things (≈14)	🟧	🟩	🟧	☐
Life Sciences (18)	🟩	🟧	☐	☐
Pharma (15)	🟩	🟧	☐	☐
Space Economy (≈12)	🟩	🟧	☐	☐
MedTech (10)	🟩	🟩	🟧	☐

The Digital Economy RTIC profile is broad and high-volume, dominated by Digital Creative Industries (208), Electronics Manufacturing (163), Software Development (144), Data Infrastructure (126) and Telecommunications (115), with a substantial long tail covering AI, cyber, robotics, cloud computing, sensors, semiconductors, immersive technologies and gaming. This profile reflects a regional digital economy that is deployment- and adoption-heavy, requiring large volumes of applied digital skills, supported by electronics and hardware capability, and underpinned by advanced data, AI and cyber expertise.

The local skills system is comparatively strong in digital delivery and applied computing, Applied computing and digital design Agency, SaaS, and platform-based roles, but shows clear pinch points where digital converges with hardware, manufacturing, data infrastructure, and regulated domains. Software development and digital creative skills

The highest priority skills gaps (with a focus on UKRI priority areas) are:

- Data infrastructure engineers (cloud, edge, secure data platforms)
- Cyber-security specialists linked to regulated and critical systems
- Digital–hardware convergence skills (electronics + software + manufacturing)
- Semiconductor-adjacent skills (design, test, packaging, reliability)

There are emergent gaps in:

- AI engineers with domain knowledge (health, energy, manufacturing)
- Robotics and autonomous systems technicians
- Sensors and IoT deployment and maintenance

The LSIP provides a reasonable foundation for addressing skills needs in the digital industries, particularly in relation to applied digital, software, creative technologies and technician-level provision. Employer engagement mechanisms, FE responsiveness and emphasis on progression pathways align well with the structure of the local digital economy, which is characterised by dispersed firms, embedded digital roles and a strong applied orientation. In this respect, the LSIP is broadly aligned with demand in areas such as software development, digital creative, applied computing and elements of electronics manufacturing.

However, the evidence suggests that the LSIP is less well equipped to address the most binding digital constraints, which increasingly sit at the interfaces between digital and other sectors. Skills gaps in digital–hardware integration, data infrastructure, cyber and regulated domains (health, energy, life sciences), and systems-level adoption are not easily captured through sector-based planning alone.

A central issue is the growing importance of hybrid and enabling skills. Many of the most acute gaps identified across digital, Net Zero, life sciences and advanced manufacturing sit in the "missing middle" (Levels 3–5) and involve combinations of capabilities: digital–hardware integration, lab–data interfaces, regulatory and quality assurance roles, and systems integration skills. These are not easily addressed through sector-specific training alone and require coordinated pathways spanning FE, HE and employers. The current LSIP acknowledges these challenges, but tends to frame them in broad occupational terms rather than as system-enabling capabilities that underpin innovation adoption and diffusion.

The broader implications for the LSIP are addressed in the final 'Enabling Framework' section.

Levels 7 and 8

Level 7 demand is uneven and concentrated in specialist, fast-moving domains: data infrastructure, cyber for regulated systems, AI with domain context, embedded and digital–hardware systems, and digital transformation leadership.

The University of Staffordshire is best placed to lead Level 7 provision in applied digital, software, cyber, AI, UX, embedded systems, and digital–hardware integration, building on strong applied computing and industry engagement.

Keele University can play a strong complementary role in data-enabled domains where digital intersects with health, environment, materials and energy, including ethics, regulation and domain-specific analytics.

For Post-graduate research provision, Keele University exhibits strengths in data ethics, digital health, AI-adjacent methods and interdisciplinary digital research. Staffordshire has strengths in applied digital research, simulation, human-centred design and digital systems.

Given the nature of the industrial base, Collaborative Post-Graduate research is likely to be most effective when embedded within other clusters, rather than as standalone digital research, including:

- Materials-enabled digital hardware (with Keele + Lucideon)
- Energy systems optimisation (with Keele + ERA)
- Health technologies and diagnostics (with Keele + NHS partners)

5.3 Firm-level investment

The digital investment landscape for the digital sector is quite polarised. Software-led digital businesses operate in a highly competitive national market with abundant early-stage capital, but also intense competition for attention and talent. Hardware-related and embedded digital firms, by contrast, often fall between established investment categories: too capital-intensive and slow-moving for software investors, yet too systems-focused to attract traditional deep-tech or manufacturing finance.

Locally, this distinction matters. Many digital firms in the area operate at the interface between software, hardware and applied systems, often embedded within manufacturing, health, logistics or energy markets. While these models can be commercially robust, they are harder to describe within standard investment narratives. Investors frequently cite unclear market positioning, limited visibility beyond the region, and management capacity as binding constraints, particularly for firms seeking to move beyond early revenues.

From a place-based perspective, the opportunity lies less in attempting to reshape national digital investment patterns and more in improving legibility and confidence. Publicly backed demonstrators, reference customers, and clearer articulation of digital business models can significantly reduce perceived risk. Support for leadership development and commercial capability is often as important as technical funding, particularly for firms whose growth depends on adoption rather than invention.

5.4. Infrastructure and Location for the Digital Economy

The digital economy is best understood as distributed enabling infrastructure, embedded across sectors rather than concentrated in a single geography or building type. Digital firms are typically talent-led, footloose and highly sensitive to place quality, connectivity and amenity, with infrastructure requirements that differ markedly from manufacturing- or lab-based activity.

Digital infrastructure demand in the sub-region can be interpreted through a small number of digital industry archetypes, which align closely with town and city centres, university-anchored innovation space, and selective use of business parks.

Software, Creative & Agency-led Digital.

This archetype represents the largest share of digital firms and employment. These businesses prioritise access to skilled labour, collaboration space, transport connectivity and urban amenity, making town and city centres — including Stoke-on-Trent city centre and Staffordshire towns — the primary growth locations.

Hybrid and remote working models are common, but high-quality urban hubs remain important for visibility, networking and client engagement. Standard industrial sites are generally unsuitable, and science parks play only a limited role for this archetype.

Digital Manufacturing, AI & Embedded Digital Systems.

Where digital activity interfaces with manufacturing, materials, health or energy systems, infrastructure needs shift toward proximity to researchers, test facilities and applied demonstrators. This archetype aligns more closely with university-anchored science parks and high-spec business parks.

KUSIP plays a secondary but important role for digital firms operating at these interfaces, particularly those developing AI-enabled systems, IoT applications, sensors or digital twins linked to physical assets.

Data, Cyber & Regulated Digital.

Digital activity operating in regulated environments (health, energy, infrastructure) places greater emphasis on secure environments, trusted data infrastructure and governance. These firms may locate either near universities (to access expertise and credibility) or within town and city centres for professional and commercial functions, depending on their balance of technical and client-facing activity.

The infrastructure challenge here is less about new physical space and more about access to trusted environments and integration with national digital infrastructure, rather than local duplication.

Stoke-on-Trent and Staffordshire site portfolio indicative best fit

Industry Archetype	Primary Drivers	Best Fit Locations	Least Fit Locations	Role of KUSIP
Software, Creative & Agency-led Digital	Talent; amenity; collaboration; connectivity	B (Stoke city centre; towns)	D	Minimal; occasional spin-outs
Digital Manufacturing, AI & Embedded Systems	Research access; test facilities; integration	A (KUSIP), C (high-spec parks)	D	Secondary role for research-linked firms
Data, Cyber & Regulated Digital	Security; credibility; governance; connectivity	A (KUSIP), B (professional functions)	D	Anchor for technically intensive, regulated activity
Digital Professional Services	Client access; flexibility; visibility	B (town & city centres)	D	Limited

5.5 Digital industries and the Everyday Economy

The digital economy's most significant impact on jobs is not through the creation of specialist digital roles, but through raising productivity across everyday sectors such as retail, logistics, hospitality, construction, manufacturing, care and public services. Many workers in these sectors are in lower-paid roles where productivity is constrained by inefficient scheduling, manual record-keeping, poor data visibility or outdated systems.

Digital adoption — even at a basic level — can reduce time spent on low-value tasks, improve rota planning, streamline compliance, and support more predictable workloads. For workers, this often means less administrative burden, fewer errors, and more stable hours, rather than automation-driven displacement. These gains are especially important in sectors with high turnover and tight margins, where small productivity improvements can support wage stability and job retention.

At the same time, digital diffusion creates new hybrid roles that offer progression from existing positions: digital supervisors, data-literate team leaders, systems coordinators and digital champions embedded within non-digital firms. These roles typically require modest additional training rather than full retraining and can provide realistic progression routes for workers who might not otherwise access the digital economy. A place-based digital strategy that focuses on adoption, skills and trust can therefore support both productivity and inclusion, particularly if it is designed around everyday job transitions rather than headline tech growth.

Digital adoption has the potential to improve productivity and working conditions across the everyday economy, but it can also lead to uneven impacts, including job redesign, deskilling or loss of lower-value roles. Managing this transition depends less on predicting job losses and more on building shared understanding of how work is changing, supporting in-work progression, and ensuring that digital skills and confidence are accessible to existing workers. Collaboration between employers, worker representatives and national institutions is critical to translating digital productivity gains into more inclusive outcomes.

5.6 Strengthening Economic Impacts

The digital economy delivers economic impact in two distinct but complementary ways: direct high-productivity activity within digital firms, and indirect productivity gains across the wider economy through adoption and enablement.

Direct impacts include:

- High GVA per worker in software, platforms, data and digital services, contributing disproportionately to economic output.
- Firm formation and churn, supporting economic dynamism even where individual firms remain small.
- Talent attraction and retention, particularly where digital roles are embedded within wider sectoral activity rather than isolated clusters.

However, the most significant system-wide impact arises indirectly:

- Productivity uplift in non-digital sectors (manufacturing, logistics, health, construction, services) through improved scheduling, data use, automation and decision support.
- Business resilience and adaptability, particularly for SMEs adopting digital tools to manage cost pressures and regulatory complexity.
- Creation of hybrid roles that support progression within existing firms, rather than displacing employment.

Economic impact is therefore less about expanding the digital sector in isolation, and more about embedding digital capability across priority clusters, supporting inclusive growth and diffusion rather than concentration.

5.7 The case for place-based intervention

To help us better understand the role of place-based interventions in unlocking the full potential for economic impact, we have developed some initial logic chains in key areas of opportunity aligned to the area's strengths. These will form the basis for both further engagement with partners and the future case for resources to address areas of market failure

The rationale for place-based intervention in the digital economy differs from that in materials or life sciences. Much digital innovation locally is adoption-led and practice-based rather than research-led. Productivity gains arise through adoption, systems integration and workforce capability rather than through proprietary technology creation alone.

Market failures in this context relate less to invention and more to coordination. SMEs frequently lack the time, confidence or trusted intermediaries needed to adopt digital tools effectively. Benefits are diffuse and aggregate across supply chains and workforces, reducing incentives for individual firms to invest in adoption support. These characteristics mean that market forces alone do not tend to provide the support required for widespread digital adoption.

The Framework suggests that public-sector backed demonstrators, reference customers and skills pathways can reduce adoption risk, particularly for firms operating in regulated or operationally complex environments. The case for intervention therefore rests on accelerating diffusion and coordination, not on attempting to reshape national digital investment patterns.

Arguably, in our region, the most significant economic impact of the digital economy is indirect. While digital firms contribute high GVA per worker, the larger system-wide gains arise from productivity improvements in everyday sectors such as logistics, manufacturing, care, construction and public services.

National studies consistently show that basic digital adoption can deliver productivity gains of 5–15 percent in SMEs through improved scheduling, data visibility and compliance processes. Local evidence refelcts with this pattern, with digital tools reducing administrative burden, stabilising workloads and supporting resilience in sectors facing cost and regulatory pressures.

This digital adoption also creates hybrid roles that support career progression within businesses which addresses the Level 3- 5 "missing middle" roles identified in the Framework. Digital supervisors, systems coordinators and data-literate team leaders typically require modest additional training.

Taken together, the evidence suggests that the digital economy in Stoke-on-Trent and Staffordshire should be understood as enabling infrastructure as much as a sector in its own right. Its strength lies in application, integration and deployment across materials, life sciences, energy systems and advanced manufacturing.

The strategic opportunity therefore is not to concentrate digital activity in isolation, but to improve coordination, skills pathways and trust mechanisms that allow digital capability to diffuse more rapidly and equitably across the wider economy. This logic underpins the digital enablement proposition and connects directly to the cross-cutting skills, governance and investment themes developed later in the Framework.

Logic Chain: Digital Enablement

Element	Description
Starting conditions / assets	Productive and growing digital services base; local capability in software, data and applied digital systems; evidence that basic digital adoption delivers 5–15% productivity gains in SMEs; strong FE/HE capacity to support upskilling.
Binding constraints	Uneven digital adoption among SMEs; limited internal digital leadership capacity; low confidence in selecting and integrating tools; persistent Level 3–5 "missing middle" skills gaps.
Why the market alone doesn't fix this	Productivity gains from digital tools are diffuse and incremental; SMEs lack time and trusted intermediaries; benefits often accrue across teams rather than to a single budget-holder; modest training needs are rarely prioritised without external stimulus.
Place-based intervention	A coordinated digital adoption and workforce progression model focused on SME diagnostics, trusted advisory support, and targeted Level 3–5 upskilling linked directly to business process improvement.
Primary translation pathways	• SME digital readiness assessments and implementation support • Adoption demonstrators in cost- and regulation-sensitive sectors • Short-course and modular training for digital supervisors, systems coordinators and data-literate team leaders
Economic & system outcomes	5–15% productivity gains in participating SMEs; reduced administrative burden and workload volatility; stronger business resilience; creation of hybrid digital–operational roles supporting career progression and wage stability; wider diffusion of digital capability across non-digital sectors.

Logic Chain: Hardware (Royce Framework relevant)

Element	Description
Starting conditions / assets	Strength in electronics, sensors, power electronics, robotics and embedded systems; materials expertise at Keele; validation and standards capability via Lucideon/AMRICC; applied engineering at Staffordshire
Binding constraints	Capital intensity; long development cycles; access to testing, validation and scale-up; shortage of advanced skills at Levels 6–8 combining hardware, software and manufacturing
Why the market alone doesn't fix this	High failure costs; need for shared facilities and standards; SMEs unable to finance validation independently

Place-based intervention	Use of a Royce-style access model focused on materials, characterisation, validation and manufacturability, linked to national assets rather than local duplication
Primary translation pathways	• Collaborative R&D and validation• Hardware-enabled spin-outs (selective)• Scale-up support through national and commercial facilities
Economic & system outcomes	Higher survival rates for hardware innovation; stronger SME competitiveness; integration into national supply chains; attraction of specialist inward investment

5.8 Place-based proposition for the Digital Economy

We now consider what a place-based proposition for the digital economy might look like. This builds strongly on the the Silicon Stoke model, where digital industries are not presented as a standalone sector, but as strategic enabling infrastructure for productivity, resilience and innovation across the wider economy. The central organising principle would be a clear separation between system leadership and local delivery: strategic coordination at Combined Authority level, with experimentation and execution retained by unitary authorities and delivery partners.

This avoids both fragmentation and over-centralisation — a balance that aligns closely with DSIT's emerging place-based digital thinking.

The core offer is a place-based digital enablement model that accelerates productivity across priority sectors by aligning skills supply, adoption support, and trust and assurance at system scale. Strategic direction and coherence are provided by the Combined Authority, while delivery is undertaken locally through unitary authorities, universities, colleges and intermediaries.

This speaks directly to DSIT priorities: SME digital adoption, cyber resilience, AI assurance, confidence in data infrastructure, and levelling-up through productivity gains rather than subsidy.

The Strategic Combined Authority would be responsible for system stewardship. Its role is to create coherence, reduce duplication and provide a clear interface with national policy — not to run programmes or substitute for local delivery.

The SCA would hole responsibility for maintaining a single, **shared evidence base for digital enablement** across the functional economic area. This includes RTIC analysis, skills intelligence, adoption barriers and productivity constraints. It translates national priorities from DSIT, UKRI and Innovate UK into a small number of place-specific focus areas, providing clarity about what matters and where collective effort should be concentrated. Crucially, this function establishes strategic discipline: what the system will prioritise, and what it will not.

The SCA would provide **leadership on trust as enabling infrastructure**, including cyber resilience, data ethics, AI assurance and regulatory alignment. These issues require neutral authority and public legitimacy, and are poorly served by fragmented project-level approaches. At SCA level, trust functions are positioned as shared system assets rather than optional add-ons, supporting confident adoption by businesses, public services and citizens.

It would convene universities, FE, local authorities, industry and intermediaries to **orchestrate the system** rather than manage it. Its role is to broker collaboration where market incentives alone are insufficient, align funding streams and pilots, and ensure that digital enablement supports wider economic and social objectives. This builds on existing convening practice in Stoke-on-Trent, but gives it strategic reach and durability.

Unitary authorities would retain clear responsibility for delivery and place-specific action. Their role is not to set system-wide strategy, but to make digital enablement work in real contexts.

Unitary authorities lead **direct engagement with SMEs** and non-digital sectors, supporting diagnostics, applied demonstrators and practice-led adoption. They integrate digital enablement with wider business support, skills and regeneration activity, drawing on trusted local relationships that cannot be replicated at strategic level.

While skills priorities are aligned strategically at SCA level, unitary authorities work with FE, HE and employers to design and deliver provision locally. This includes piloting new pathways, apprenticeships and upskilling models, and responding to local labour market conditions rather than uniform system-wide solutions.

As with the Silicon Stoke model, Unitary authorities would act as hosts and sponsors for **applied demonstrators and public-sector use cases** — such as digital retrofit, health technology adoption or smart infrastructure — that de-risk adoption for SMEs. These demonstrators generate learning for the wider system, but are grounded in specific places and services.

6. Life Sciences

6.1 The Combined Life Sciences Cluster

Analysis summary

1,157
COMPANIES CONSIDERED

947
COMPANIES CONSIDERED WITH EMPLOYEES

15,038
ESTIMATED TOTAL EMPLOYEES ATTRIBUTED TO THE 9 SELECTED LOCATIONS

209,464
TOTAL UK EMPLOYEES *947 companies

£4,231,956,435
ESTIMATED TOTAL TURNOVER ATTRIBUTED TO THE 9 SELECTED LOCATIONS

£50,910,526,877
TOTAL TURNOVER *989 companies

£583,340,000
TOTAL INVESTMENT FUNDING dealroom.co *41 companies

£38,179,812
TOTAL INNOVATE UK GRANT FUNDING *35 grants

+8.2%
ESTIMATED GROWTH PER YEAR *866 companies

£7,373,022,231
BEST ESTIMATE TOTAL GVA

£49,002
ESTIMATED GVA PER EMPLOYEE

204
WOMEN FOUNDED COMPANIES

391
WOMEN LED COMPANIES

781
WOMEN DIRECTORS *3,084 total directors

168
COMPANIES WITH IMPORT DATA

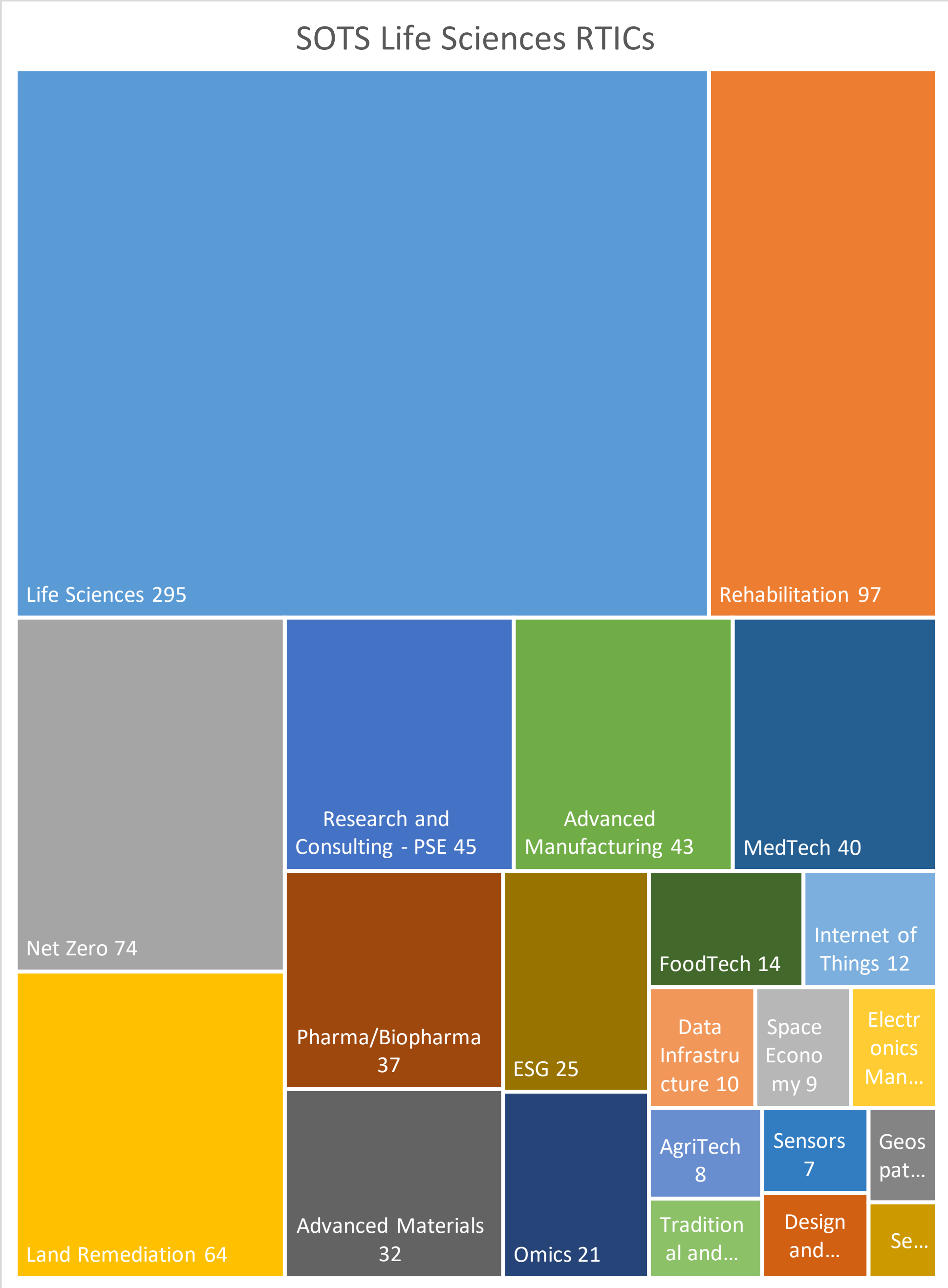
134
COMPANIES WITH EXPORT DATA

6
COMPANIES WITH POTENTIAL ANOMALIES

SHOW FIELD AVAILABILITY TABLE

Located on the edge of Cheshire East, home to one of the largest health-related Life Sciences clusters in the in the UK, multi-dimensional relationships across the County border are evident within the Sector Keele's Science and Innovation Park has benefited from this, and has been able to sustain and grow its longstanding Life Sciences cluster, including Foreign-owned and Global companies.

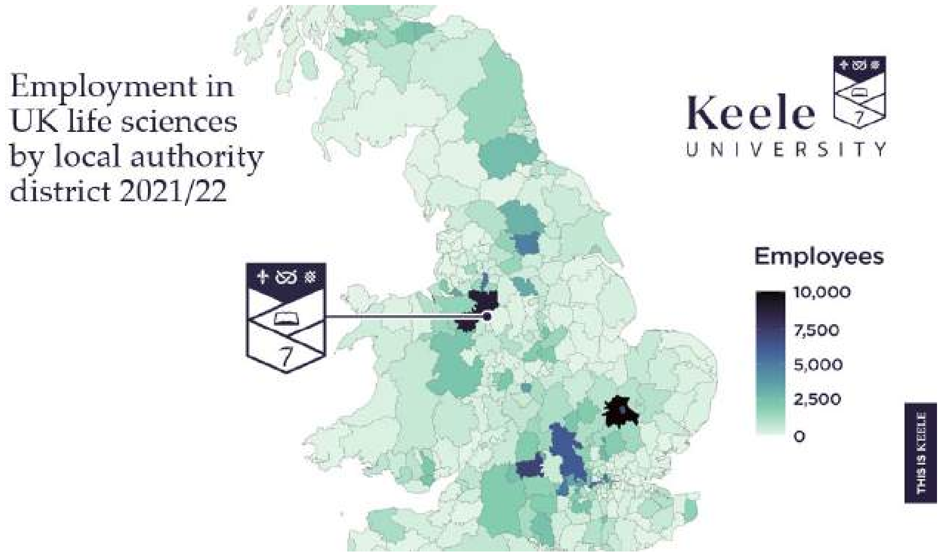
The Keele cluster is diverse, spanning specialist ceramic materials, nuclear medicine, photonics and optical, cell therapy production, digital health technologies, population health data technologies, and soon commercial clinical trials. Availability of student and graduate talent from both Universities and Newcastle and Stafford College Group has been a key driver of growth, alongside increasing relationships with academic researchers.



The Life Sciences RTIC cluster in Stoke-on-Trent and Staffordshire is large, diverse, and skills-intensive, dominated by Life Sciences (295) and Rehabilitation (97), with strong secondary demand in Net Zero, Land Remediation, Advanced Manufacturing, MedTech, Pharma/Biopharma, and Advanced Materials.

The combined SOTS Life Sciences cluster is diverse and substantial, dominated by Life Sciences (295 companies), with strong secondary concentrations in Rehabilitation, Net Zero–linked bio-environmental activity, MedTech, Pharma/Biopharma, Advanced Manufacturing (life-science adjacent), and Omics. This reflects a region with both clinical-facing innovation demand and non-clinical biological, environmental, and data-driven life sciences activity.

6.2 Health-Related Life Sciences System



The area is part of the UK's second largest Regional Medtech Sector (East and West Midlands), Stoke-on-Trent representing one of its larger sub-regional clusters. Despite a general decline in Medtech employment in the West Midlands (against growth the East Midlands), the SOTS cluster continues to thrive, growing by 10.2% in the last year.

Applied digital capability underpins diagnostics, pathway design, data governance and evaluation, supporting life sciences innovation that is adoption-led rather than discovery-led.

With mature research and innovation [47] relationships, and a prime location for further Life-Sciences growth within a new Innovation District, we are about to take the natural next step – broadening the focus of existing partnerships to the economic impacts of working as quintuple-helix local partnership – healthcare institutions, higher education, public and patient partners, public sector partners and industrial partners in Life Sciences and Medtech. Working as part of the West Midlands health innovation ecosystem, the new partnership (NAME) will aim to transforming the health, wellbeing and economic growth of our sub-region.

Higher Education strengths

To provide a picture of some of the component parts, Keele University is nationally recognised for the quality and breadth of its Life Sciences and Healthcare research. Notable strengths include Molecular & Cellular Biology, Biomedical Sciences, Neuroscience, Biochemistry & Proteomics, Physiology, Environmental Science, regenerative medicine, glycoscience, musculoskeletal-health related co-morbidities, primary care, health in global majority settings, and public and patient engagement.

[47] https://staffsstokeics.org.uk/ssherpa-research-and-innovation-strategy/

SOTS Medtech Sector[48]

Staffordshire’s Key Research Areas are encompassed by the the Centre for Health and Development (CHAD), a hub for translational research aimed at improving health equity in the local population. The Centre for Health, Wellbeing and Education, encompassing nursing, midwifery, social work, sports science, biomechanics, biomedical science, and psychology, The Molecular & Cellular Biology Research Group, focusing on molecular and cellular aspects of health and Applied Science & Technology, including research in areas such as forensics and drug policy.

The area has a track record in triple-helix innovation in Life Sciences, at scale. Staffordshire offers businesses access to specialist technical facilities, research teams, and clinically experienced lecturers, commercial collaborations, including Knowledge Transfer Partnerships (KTPs) and opportunities for incubation, hatchery, and office space, a portfolio of flexible professional training, short courses, and bespoke training packages is available for employers, and support in navigating funding opportunities, including regional growth initiatives.

Keele’e Centre for Science & Technology in Medicine (now absorbed into the Centre for Regenerative Medicine)[49] has been providing a longstanding engineering and translational support offer to businesses innovating in medical technologies. Keele’s Business Bridge programme[50], has provided businesses

48 DataCity, January 2026

49 https://www.keele.ac.uk/stm/

50 https://www.keele.ac.uk/media/k-web/k-business/Business%20Bridge%20-%20Interim%20Summative%20Assessment%20Report%20%20-%20Final.pdf

developing new products with access to academic researchers, appropriate clinicians in the NHS, and specialist support on adoption pathways, and the University offers specialist brokerage within its Business Gateway Team for Life Sciences businesses across research & innovation, skills and facilities.

Local and Regiional Strategic Healthcare partners

University/NHS relationships are both broad and deep across clinical research and education. From a strategic perspective, Keele has been a key player in the development of SSHERPa[51], the partnership formed to build research into Integrated Care Partnerships. Launched in 2019, the model places research and innovation at the heart of health and care transformation, an essential platform for stronger business engagement..Its Strategic Objectives include Innovation i.e.- working with business and commercial partners, facilitating deeper partnerships, securing co-investment, connecting research and innovation, accelerating, translation, commercialisation and knowledge exchange.

Local life-science and health tech companies (including in omics/bioinformatics) are beginning to engage via clinical trials, collaborative research projects, and shared research governance. But there is not yet a clear, high-volume pipeline of commercial innovation outcomes, and this suggests that the innovation ecosystem around it may benefit from being strengthened to convert structures and partnerships into measurable commercial engagement.

Another valuable part of the ecosystem is Health Innovation West Midlands[52] (HIWM), one of 15 Health Innovation Networks across England. The Health Innovation Network was established by NHS England to connect health and social care, academic organisations, local authorities, third sector, industry and citizens to spread innovation at pace and scale – improving health and generating economic growth. It works to transform the West Midlands' health and social care by supporting the development of innovation and giving patients access to the most effective medical discoveries.

Alignment with HE Research & Innovation Capabilities

To start with the foundations, the SOTS Heath-related industry RTIC profile against an independent assessment of HE research and innovation capability. The purpose being to assess the potential contribution areas from local universities to the local Life Sciences industry base. This reveals a highly complementary system.

Keele's existing research priorities are

- Mental Health. Supporting mental wellbeing through research, digital innovation, and community engagement. By working with local partners, we aim to develop practical solutions that support people across all stages of life.

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https://www.keele.ac.uk/business/newsandevents/ournews/2018/january/nhsqualityimprovementthroughbusinessbridge/nhsqualityimprovementthroughbusinessbridge.php

[51] https://staffsstokeics.org.uk/ssherpa-research-and-innovation-strategy/

[52] https://www.healthinnovationwestmidlands.org

- Life Sciences & Precision Medicine
  From neuroscience and pharmacology to bioengineering and metabolic disease, Keele's School of Life Sciences is at the forefront of biomedical research.

- Healthy Ageing & Long-Term Conditions
  Building on Keele's expertise in musculoskeletal health and primary care, we'll explore new ways to support ageing populations and manage chronic conditions like arthritis.

- Digital Health & Data Innovation
  Working with the Digital Society Institute and local tech SMEs, we'll harness data, AI and digital platforms to improve care delivery and system efficiency.

Research & Innovation Capability Heat Map – health-related industry areas

RTIC	Keele	Staffs Uni
Life Sciences (health core)	Strong	Limited
Rehabilitation	Strong	Strong
Primary Care & MSK Health	Strong	Supporting
MedTech	Supporting	Supporting
Pharma / Biopharma	Strong	Limited
Omics	Strong	Limited
Sensors (health / bio)	Supporting	Strong
IoT (health applications)	Supporting	Strong
AI (health & life sciences)	Supporting	Strong
Data Infrastructure (health)	Supporting	Strong
Advanced Materials (biomedical)	Supporting	Limited

Strong capability Supporting capability Limited capability

Keele University provides the primary research engine for life sciences innovation. It has strength across biomedical science, molecular and cellular biology, omics, bioinformatics, environmental and plant sciences, public health, and health data, alongside strong translational interfaces with clinical partners. Keele is best positioned to lead discovery, early translational research, and interdisciplinary innovation, including non-clinical life sciences and environmental biology.

University of Staffordshire plays a supporting and enabling role, strongest in rehabilitation technologies, digital health, data infrastructure, design, modelling, and medtech deployment rather than wet-lab life sciences. Its innovation strength lies in systems integration, simulation, human-centred design, and translation into practice, complementing Keele's research depth and UHNM's clinical environment.

Taken together, the system forms a clear end-to-end life sciences innovation pathway. This alignment mirrors national priorities under UKRI, NIHR, OLS, and NHS innovation frameworks, and provides a strong platform for coordinated investment. Staffordshire adds value downstream, particularly in digital health, sensing, and deployment.

We then undertook an assessment of the potential fit between the area's industrial base and ICB priorities The table reflects where the industrial base could contribute, not where it currently does at scale.

Alignment of Industrial Innovation Capacity with ICB Priorities

ICB Priority Area	RTIC / Industrial Capability Alignment
Prevention & Population Health	Life Sciences (incl. non-health bio), Omics & Bioinformatics, AI & Data, Environmental & Net Zero RTICs
Musculoskeletal Health & Rehabilitation	MedTech, Rehabilitation Technologies, Sensors & Wearables, Sport & Exercise Industry
Long-Term Conditions	Digital Health, AI, Data Infrastructure, MedTech, Omics (stratification & monitoring)
Elective Recovery & Productivity	Digital Health, AI, Workflow & Decision Support Technologies, Advanced Manufacturing (process improvement)
Care Closer to Home / Community Care	IoT, Remote Monitoring, Sensors, Digital Platforms, Assistive Technologies
Healthy Ageing & Frailty	MedTech, Sensors, Assistive Devices, Sport & Exercise, Rehabilitation & Community Health RTICs
Cancer Pathways & Diagnostics	Omics, Bioinformatics, Diagnostics, AI (pathway optimisation)
Urgent & Emergency Care Flow	Digital Systems, Data Analytics, Modelling & Simulation
Workforce Productivity & Wellbeing	Digital Tools, Assistive Tech, Rehabilitation, Sport & Exercise, Training & Simulation Technologies
Health Inequalities & Inclusion	Non-health Life Sciences, Community Health Tech, Environmental & Place-based RTICs

Strong capability Supporting capability Limited capability

The area's health-relevant industrial innovation capacity, as defined through the RTIC framework, aligns strongly with the Integrated Care Board's priorities when viewed through two complementary lenses: health-related life sciences and enabling technologies. Together, these provide a coherent basis for place-based health innovation focused on prevention, productivity, and care closer to home.

The health-related RTICs — including life sciences, rehabilitation, medtech, pharma/biopharma and omics — provide the core scientific and clinical innovation base. These capabilities underpin advances in musculoskeletal and rehabilitation science, long-term condition management, diagnostics, therapeutics, and evidence-based models of care, all of which map directly onto ICB objectives around population health, elective recovery, healthy ageing, and improved outcomes for children and young people.

Alongside this, a set of enabling RTICs plays a critical role in turning clinical and scientific insight into deployable solutions. Capabilities in digital health, artificial intelligence, health data analytics, sensors and connectivity, advanced manufacturing (particularly for medtech), and design and modelling technologies support the development, testing and adoption of practical innovations. Examples include remote monitoring and virtual ward technologies, digital triage and decision-support tools, assistive and rehabilitation technologies, and data-enabled pathway redesign to improve productivity and patient flow.

The strongest opportunities for impact sit in the overlap between these RTICs and the ICB’s priority objectives. In population health and inequalities, this includes the use of linked primary care and public health data, predictive analytics, and digital tools to support prevention and early intervention, particularly for musculoskeletal conditions and long-term illness. In elective care and urgent and emergency pathways, opportunities centre on digital productivity tools, remote monitoring, and modelling and simulation technologies to support demand management, virtual wards, and care closer to home. For children and young people, innovation opportunities include digitally enabled mental health support, remote assessment and monitoring, and improved service design to enhance access and experience. In healthy ageing and frailty, there is strong alignment around rehabilitation science, assistive technologies, home-based monitoring, and the evaluation of new models of community-based care.

Across all priorities, a consistent theme is the importance of evaluation, implementation and adoption, rather than innovation for its own sake. The greatest value is likely to come from technologies and approaches that are not only developed, but tested in real pathways, evaluated rigorously, and adopted at scale, including through procurement and service redesign. This creates a clear agenda for coordinated action across health partners, universities and the wider innovation ecosystem, focused on areas where economic capability and health system need reinforce one another.

6.3 Skills

SOTS skills capability mapping across main areas of Life Sciences innovation

Life Sciences RTIC (count)	Keele	Staffs	NSCG	Stoke Coll
Life Sciences (295)	Strong	Supporting	Supporting	Limited
Rehabilitation (97)	Supporting	Strong	Supporting	Supporting
MedTech (40)	Strong	Strong	Supporting	Limited
Pharma / Biopharma (37)	Strong	Supporting	Limited	Limited
Omics (21)	Strong	Supporting	Limited	Limited
Sensors (7)	Supporting	Strong	Supporting	Limited
Electronics Manufacturing (small)	Supporting	Strong	Supporting	Supporting
Design & Modelling (small)	Supporting	Strong	Supporting	Supporting

Strong capability | Supporting capability | Limited capability

The skills ecosystem shows a clear vertical structure:

- Keele University provides scientific, clinical, and analytical depth, particularly for Life Sciences, Omics, Pharma/Biopharma, MedTech, Land Remediation, and data-enabled bioscience.
- University of Staffordshire provides applied health, rehabilitation, digital health, manufacturing systems, and data skills, aligning strongly to Rehabilitation, MedTech, Data Infrastructure, Sensors, and Design/Modelling.
- NSCG and Stoke College provide essential technician, operator, and practitioner skills, strongest in Rehabilitation support roles, Manufacturing, Net Zero operations, FoodTech, and Applied Laboratory / Health pathways.

The local skills ecosystem demonstrates clear functional differentiation, which aligns well with UKRI's system-based view of innovation. Together, these providers cover much of the innovation pipeline, but with structural gaps at critical interfaces. The RTIC-aligned analysis highlights persistent and systemic skills gaps that constrain the translation of research into economic and societal impact:

1. Mid-level technical skills (Levels 3–5) in:

   - Laboratory and bioprocessing
   - MedTech manufacturing, quality, and regulatory compliance
   - Advanced materials testing and characterisation

2. Digital convergence skills for life sciences:

   - Data infrastructure, AI, and sensors embedded in healthcare and diagnostics

These gaps sit between traditional FE and HE provision and represent a classic "missing middle" that UKRI has repeatedly identified as limiting innovation diffusion. This analysis suggests that incremental investment in new courses alone will not resolve the issue. Instead, the opportunity lies in:

- Integrated, place-based skills pathways aligned to research and innovation activity
- Shared facilities and co-designed provision linking universities, colleges, and industry
- Modular, stackable and apprenticeship-aligned routes that support mobility across Levels 3–7
- Skills provision explicitly linked to active research programmes, translational facilities, and industrial testbeds

The existing institutional configuration provides a strong foundation for such an approach, with limited duplication and clear role differentiation.

The **LSIP** aligns most clearly with life sciences skills where demand is operational, clinical-facing or laboratory-based, including health-related technician roles, applied bioscience, and elements of MedTech and diagnostics. Employer engagement through health and care pathways supports responsiveness in these areas, and FE provision plays an important role in underpinning the workforce required by trusts and associated supply chains.

Where the fit is weaker is in relation to translational and enabling life sciences skills, particularly those linked to engineering biology, precision medicine and Omics-enabled pathways. The evidence shows that the binding constraints are not headline shortages, but hybrid roles combining biological, digital, regulatory and clinical competencies, often at Levels 4–7. These are not easily addressed through LSIP mechanisms alone, as they depend on close collaboration with universities, clinical partners and external expertise. As with materials innovation, this points to a need for better alignment between LSIP delivery and wider place-based coordination, rather than a fundamental redesign of the LSIP.

6.4 Alignment of Local Economic Development Strategies

In the specific area of health-related Life Sciences, for illustrative purposes we felt it would be useful to look at how any future Growth Plan for the area might encompass the needs of the health-related Life Sciences economy and the contributions it can make to local health and care priorities. This started with an independent analysis of the two existing Economic Development Plans.

Stoke-on-Trent's strategy is explicitly foregrounds inclusive/wellbeing-centred growth, business support/innovation, green growth, and place renewal, and it characterises the city's key sectors as advanced manufacturing (incl. ceramics/materials/metals), digital/tech, and creative industries. It also explicitly recognises the link between economic performance and population health / health-related economic inactivity (including supporting people with long-term sickness back into work).

Staffordshire's strategy is countywide and opportunity-led, with ambitions that include town centres, skills, start-ups, innovation, investment-ready projects, strategic corridors (A50/A500/A38), and Net Zero. Importantly for your question, it does name parts of the industrial base including medical technologies (examples cited include Cobra Biologics and Biocomposites) alongside aerospace, energy, logistics, digital, etc., and it positions innovation as connecting research to companies and products.

Across both economic strategies, there is strong implicit alignment to the enablers of ICB priorities, but limited explicit articulation of how the local business base (life sciences and beyond) could contribute to delivery:

- Strong coverage of upstream determinants and enabling conditions: skills, good work, place, connectivity, and inclusive growth (all highly relevant to population health and inequalities). Stoke especially makes this link overt through its wellbeing framing and focus on employment/skills and living standards, including the long-term sick returning to work.
- Some direct recognition of life sciences/medtech in the industrial base at county level, but it sits as one sector among many and is not consistently connected to "health system outcomes" as a growth opportunity (e.g., adoption pathways, NHS-as-a-platform, evaluation/testbeds).
- Less explicit business-facing "health innovation" logic: neither strategy (as written) strongly translates ICB priorities like elective recovery, cancer pathways, care at home, or frailty into concrete opportunity areas for local firms (digital health, diagnostics, rehab tech, remote monitoring, data/AI, workflow tools, prevention, etc.).
- Procurement is present, but the NHS role isn't fully "activated": Stoke's emphasis on responsible procurement/social value is potentially powerful, but it's not clearly tied to NHS/ICB adoption and supplier development as a deliberate growth mechanism.

The balanced conclusion is that the strategies cover many of the right foundations, and Staffordshire in particular acknowledges relevant sectors, but the "business contribution to ICB priorities" storyline is mostly indirect rather than a deliberate, visible strand.

Recommendations for a future joint Growth Plan

A joint Growth Plan could strengthen this by adding a single, explicit "Health & Prosperity" strand that treats the ICB priorities as market-shaping demand and the business base as part of the delivery system. Practical suggestions include:

1. A crosswalk between ICB priorities and business opportunity areas

   Turn each ICB priority into 3–5 "innovation/adoption opportunity themes" (e.g., elective productivity tools; MSK/rehab and return-to-work; cancer diagnostics/pathway optimisation; care-at-home tech; frailty and falls prevention; data/AI for population health). Anchor these in the local sector mix (life sciences, medtech, digital, materials).

2. An "adoption and evaluation offer" (not just R&D)

   Define a place-based proposition for firms: clinical evaluation routes, real-world evidence, testbeds, and support to navigate procurement/governance — so businesses can contribute to ICB priorities and grow.

3. Use procurement/social value as an economic development tool (carefully)

   Build on Stoke's responsible procurement framing by adding NHS/ICB and anchor institutions into a supplier development and innovation adoption approach (transparent, compliant, not protectionist; more "help local SMEs meet requirements and scale" than "buy local").

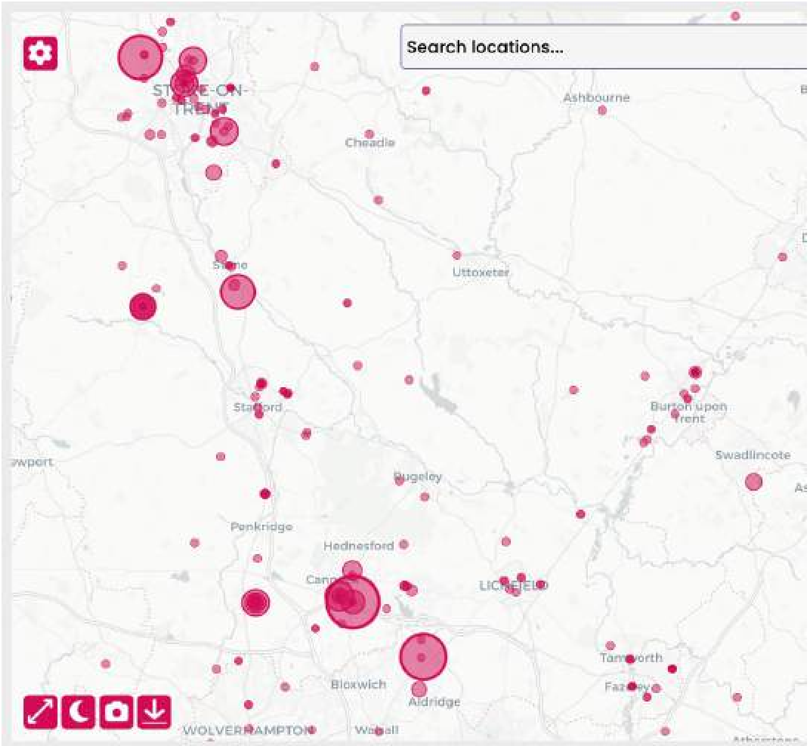
4. A small joint governance mechanism

   A light-touch joint board/subgroup spanning the two councils, the ICB, universities and business representation, focused purely on: (a) priority opportunity themes, (b) adoption pipeline, (c) investable propositions.

6.5 Non-Health-related Life Sciences

The area is also well-represented in non-health-related Life Sciences, with over 200 businesses employing over 3,000 people. Indeed a strong **V-shaped corridor** of these industries is evident (see above), bookended by major players Genus , Veolia (a Keele research partner), with Unilever (also a Keele research partner) sitting between them, smaller clusters along the route to Burton-upon-Trent. Engineering Biology dominates employee numbers followed by Net Zero, Land Remediation, ESG and Traditional/precision breeding. The largest number of companies are in ESG consultancy, Land Remediation traditional and precision breeding and agritech.

SOTS Non health-related Life Sciences cluster[53]



Keele University is the dominant anchor for non-health life sciences. It holds strong and, in several areas, nationally competitive capability in environmental biosciences, land remediation, agri-tech, food systems, bio-environmental Net Zero research, and geospatial/environmental data. This includes both fundamental biological science and applied, place-relevant research on soils, ecosystems, sustainable land use, climate resilience, and bio-based solutions. Keele therefore provides the intellectual and scientific engine for non-health life sciences innovation in the area.

R&D Capability Heat Map – non-health-related industry areas

RTIC	Keele	Staffs
Land Remediation / Environmental Bio	Strong capability	Limited capability
AgriTech	Strong capability	Limited capability
FoodTech	Strong capability	Limited capability
Net Zero (bio-environmental)	Strong capability	Supporting capability
Geospatial / Environmental Data	Strong capability	Supporting capability

Strong capability (green) · Supporting capability (orange) · Limited capability (blank)

The University of Staffordshire contributes in a more targeted but still important way. Its strengths lie not in biological discovery, but in data, modelling, digital systems, design, and applied innovation that can support translation of biological and environmental research into deployable solutions. This includes geospatial analytics, digital modelling, environmental data handling, and systems

[53] DataCity December 2025

integration. Staffordshire therefore plays a bridging role, particularly where non-health life sciences intersect with digital technologies, environmental monitoring, or applied Net Zero solutions.

Taken together, the heat map shows a system that is well positioned upstream, but less well organised for business innovation, scale-up, and growth. The main constraint is not the absence of research excellence, but the lack of structured translation pathways, shared innovation infrastructure, and coordinated engagement with SMEs and land-based industries. To address this:

Despite overlaps with other areas, non-health life sciences could be developed as a distinct growth pillar, not as an adjunct to health or materials. Its markets, timescales, and innovation pathways in some areas can be different, and it requiring a specific organising logic:

- Keele would be positioned explicitly as the scientific anchor, with a clear outward-facing role in supporting innovation in agri-tech, environmental bio-solutions, food systems, and bio-Net Zero.
- Translation capacity needs to be strengthened, particularly around demonstrators and pilots (e.g. land, agri-food, environmental testbeds), data-enabled innovation (geospatial, environmental analytics) and SME access to expertise, facilities, and proof-of-concept support
- The University of Staffordshire role should be formalised as an enabler of deployment, providing digital, modelling, design, and systems capability that helps turn biological research into scalable products, services, and platforms.

The biggest gains are likely to come from coordination, not new institutions — aligning existing research, digital capability, and regional assets into a coherent offer for business innovation.

From a business perspective, the opportunity lies less in creating new science and more in reducing risk and time-to-market for firms working in agri-tech, environmental bio-solutions, food systems, and Net Zero applications. A coherent offer would emphasise access to scientific expertise (via Keele), data and modelling capability (via Staffordshire), and real-world testing environments, alongside clear routes to pilots, demonstrators, and early customers. For businesses, the value proposition should be practical: support to prove performance, validate environmental or productivity claims, navigate regulation, and integrate digital tools, rather than abstract collaboration. Organised in this way, non-health life sciences can become a credible, growth-oriented innovation platform for regional SMEs and inward-investing firms alike.

In summary, the area already has the scientific depth required for non-health life sciences growth. The strategic opportunity now lies in organising around translation, data, and demonstrators, so that biological and environmental research can more consistently convert into commercial innovation, SME growth, and Net Zero-aligned economic impact.Non-health life sciences innovation in the area is well aligned with a mix of public, mission-driven and commercial funding sources. Public funding opportunities include UKRI (BBSRC, NERC and cross-council Net Zero calls), DEFRA-linked programmes, Innovate UK support for agri-tech, environmental monitoring and sustainable food systems, and place-based growth funds where demonstrators and SME engagement are central.

These sources are particularly suited to applied research, pilots, and translation rather than late-stage manufacturing. Commercially, the most relevant investment is likely to come from SME-led innovation funding, corporate partnerships in agri-food, environmental services and utilities, and patient capital focused on bio-enabled Net Zero, land remediation, and data-driven environmental services, rather than venture capital models typical of pharma or digital health.

6.6 Skills

Levels 2-6

Skills capability analysis non-health Life Sciences

Skills / Workforce Domain	Keele	Staffs	NSCG	Stoke
Environmental & bioscience graduates	🟩	🟧	⬜	⬜
Agri-tech & land-based science skills	🟩	⬜	🟧	🟧
Food science / food systems skills	🟩	⬜	🟧	🟧
Environmental data & geospatial skills	🟩	🟧	🟧	⬜
Net Zero & sustainability skills (bio-related)	🟩	🟧	🟧	🟧
Laboratory & field technicians	🟧	🟧	🟩	🟩
Environmental monitoring & compliance roles	🟧	🟧	🟩	🟩
Applied digital skills (environmental contexts)	🟧	🟩	🟧	⬜
Community & land-based delivery workforce	⬜	⬜	🟩	🟩
Entry-level pathways (Level 2–3)	⬜	⬜	🟩	🟩
Applied progression routes (Level 4–5)	🟧	🟧	🟧	⬜

The non-health-related life sciences capability in the area is substantial but unevenly distributed, with a clear concentration of strength in biological, environmental, agri-food, and bio-enabled Net Zero domains, and more limited capacity in downstream translation and industrial scaling. The RTIC profile and capability mapping together indicate an ecosystem that is research-rich but commercially under-leveraged.

Keele provides depth in bioscience, environmental science and data-enabled capability. Staffordshire contributes enabling digital and applied skills, particularly around data and systems. FE colleges provide scale, inclusion and delivery capacity, especially for technicians, environmental services, and land-based roles. The main gap is coherent Level 4–5 progression linking bioscience, data and environmental application.

Levels 7 and 8

Level 7 (Postgraduate Taught) demand is driven by regulation, translation and adoption, rather than basic bioscience. Priority areas include MedTech, diagnostics, regulatory science, digital health, rehabilitation technologies, and environmental biosciences.

Based on available evidence, Keele University is best placed to take the lead role in life sciences, omics, precision medicine, environmental bioscience and translational health, drawing on strong links to NHS and public partners. The University of Staffordshire, might play a lead role in rehabilitation, applied health, digital health, modelling, simulation and MedTech deployment, particularly where innovation intersects with workforce practice and service delivery. University Hospitals of North Midlands NHS Trust (UHNM) is a critical system partner for shaping Level 7 provision linked to clinical relevance, evaluation and adoption pathways.

6.7 Firm-level Investment

Life sciences investment in the UK is strong but highly segmented. Large-scale venture capital is concentrated in pharmaceutical and platform biotech activity, while MedTech, diagnostics and applied life sciences face more constrained and fragmented funding pathways. Non-health life sciences, including agri-tech, environmental biology and bio-enabled Net Zero activity, rely heavily on public funding, corporate partnerships and SME-scale investment rather than venture models.

In Stoke-on-Trent and Staffordshire, this results in a landscape where scientific capability and business activity are evident, but where continuity of growth capital is harder to secure. Investors commonly point to regulatory complexity, adoption risk, unclear procurement routes and limited translational experience within leadership teams as barriers, particularly where routes to NHS or public-sector adoption are central to the business case.

The implication for place-based policy is that strengthening the adoption and evaluation environment can be as important as supporting new research. Clearer pathways into clinical trials, real-world evidence generation, environmental validation and early customers help to convert innovation into investable propositions. Public sector action is most effective where it reduces uncertainty around markets and adoption, rather than attempting to replace private capital.

6.8 Location and Infrastructure for Life Sciences

The life sciences cluster spans a wide range of activity, from clinical research and diagnostics to MedTech, digital health and elements of engineering biology. Infrastructure requirements vary significantly by activity type, but are consistently ecosystem-led, with strong dependencies on proximity to healthcare assets, universities, regulatory-compliant laboratory environments, and translational support.

To support this analysis, life sciences demand can be understood through a small number of life sciences industry archetypes, each with distinct spatial and infrastructure needs. These archetypes align with the sub-region’s existing portfolio of university-anchored locations, healthcare sites, high-spec business parks and, to a more limited extent, town and city centres.

Clinical Research, Diagnostics & Precision Medicine.

This archetype is anchored around NHS trusts and clinical research environments, where access to patients, clinicians and governance structures is essential. In the local context, this aligns strongly with Keele University, Royal Stoke University Hospital and associated healthcare infrastructure. Activity is typically small- to medium-scale, but requires highly compliant laboratory and data environments.

Keele University Science & Innovation Park (KUSIP) plays a complementary role, providing flexible space for translational research teams, spin-outs and university–clinical collaborations. Larger-scale or later-stage activity may transition to high-spec business parks elsewhere in Staffordshire, but proximity to clinical ecosystems remains a key locational driver.

MedTech, Devices & Digital Health.

MedTech and digital health activity prioritises proximity to clinical users, applied testing environments and regulatory expertise, rather than large-scale manufacturing infrastructure. University-adjacent science parks and hospital-linked locations are typically best suited at early stages, while later-stage firms may require grow-on space with good transport connectivity.

Town and city centres can accommodate corporate, software and professional functions within digital health firms, but laboratory-intensive and device-testing activity is better suited to dedicated science and innovation environments. KUSIP provides a critical incubation and early growth role within this archetype.

Engineering Biology & Translational Bioscience.

Engineering biology activity is infrastructure-light at early stages but capability-intensive, relying on specialist laboratories, data infrastructure, and access to interdisciplinary expertise. This activity aligns most strongly with university-anchored science parks, where proximity to research capability, graduate talent and external partners is maximised.

As with materials innovation, the strategic value of KUSIP lies in supporting early-stage R&D, pilot-scale activity and translational partnerships, rather than hosting large-scale biomanufacturing infrastructure, which is typically accessed through national or commercial facilities.

Stoke-on-Trent and Staffordshire site portfolio indicative best fit

Industry Archetype	Primary Drivers	Best Fit Locations	Least Fit Locations	Role of KUSIP
Clinical Research, Diagnostics &	Clinical access; governance; compliant labs; data security	A (KUSIP; hospital-adjacent), C	D, most B	Translational research base; spin-outs;

Precision Medicine		(select grow-on)		clinical–academic interface
MedTech, Devices & Digital Health	Clinical proximity; testing; regulation; connectivity	A (KUSIP), C (later-stage)	D, most B	Incubation, prototyping, early growth
Engineering Biology & Translational Bioscience	Research capability; specialist labs; interdisciplinary talent	A (KUSIP), C (select)	D, B	Early-stage R&D, pilots, partnership brokerage
Life Sciences Professional & Digital Functions	Talent access; amenity; connectivity	B (town & city centres)	D	Limited – indirect linkage to research-led activity

6.9 Life Sciences and the Everyday Economy

The life sciences intersect with the everyday economy most directly through health, care and wellbeing systems, which are among the largest employers in the region. Many roles in these systems — healthcare assistants, laboratory support staff, clinical technicians, administrative and care roles — are relatively lower paid, highly localised, and under sustained pressure from demand and workforce shortages. Life sciences innovation affects these roles not by replacing them, but by changing how work is organised and supported.

Advances in diagnostics, MedTech, digital health and applied biosciences can improve productivity in frontline services by reducing duplication, speeding up decision-making, and enabling earlier intervention. For lower-paid roles, this can mean less time spent on manual data handling, fewer avoidable repeat tasks, and clearer workflows — improving both efficiency and job satisfaction. Importantly, these benefits depend on successful adoption and workforce confidence, not just technology availability.

Life sciences innovation also creates structured progression opportunities within the everyday economy. As new tools and pathways are embedded, demand increases for roles such as clinical technologists, diagnostics technicians, data-literate support staff and specialist care coordinators. These roles often build on existing experience and offer progression without requiring a full transition into research or clinical practice. A place-based life sciences strategy that prioritises skills, translation and workforce development can therefore support upward mobility within health and care, not just high-end biomedical research.

In life sciences, innovation is more likely to reshape roles than remove them, particularly across health, care and laboratory support functions. However, without deliberate action, new technologies risk intensifying work or excluding parts of the workforce from progression opportunities. Achieving more equitable outcomes will require coordination between employers, unions and the state to support job redesign, skills development and ethical deployment, ensuring that innovation strengthens frontline services and career pathways rather than reinforcing existing pressures.

6.10 Firm Level Investment

Life sciences investment in the UK is strong but highly segmented. Large-scale venture capital is concentrated in pharmaceutical and platform biotech activity, while MedTech, diagnostics and applied life sciences face more constrained and fragmented funding pathways. Non-health life sciences, including agri-tech, environmental biology and bio-enabled Net Zero activity, rely heavily on public funding, corporate partnerships and SME-scale investment rather than venture models.

In Stoke-on-Trent and Staffordshire, this results in a landscape where scientific capability and business activity are evident, but where continuity of growth capital is harder to secure. Investors commonly point to regulatory complexity, adoption risk, unclear procurement routes and limited translational experience within leadership teams as barriers, particularly where routes to NHS or public-sector adoption are central to the business case.

The implication for place-based policy is that strengthening the adoption and evaluation environment can be as important as supporting new research. Clearer pathways into clinical trials, real-world evidence generation, environmental validation and early customers help to convert innovation into investable propositions. Public sector action is most effective where it reduces uncertainty around markets and adoption, rather than attempting to replace private capital.

6.11 Strengthening Economic Impacts

The economic impact of **health-related** life sciences is tightly linked to system performance as well as commercial growth. The strongest effects arise where innovation improves health outcomes, workforce productivity and service efficiency, rather than through standalone biomedical breakthroughs.

Key impact pathways include:

- Health system productivity gains, particularly through prevention, rehabilitation, diagnostics and pathway optimisation, reducing repeat demand and improving flow.
- Growth of MedTech and digital health firms aligned to real clinical needs, supporting sustainable SME growth rather than speculative scaling.
- Strengthening of translational activity, converting research and partnerships into commercial engagement, evaluation contracts and adoption pathways.
- Attraction of inward investment in applied health innovation, where proximity to clinical environments, governance and evaluation capability matters more than scale.

These impacts are inherently place-based and cumulative. While headline job creation may be modest, benefits are durable and locally embedded, improving economic participation, reducing health-related inactivity and supporting progression in health and care roles.

Non-health life sciences generate economic impact primarily through upgrading land-based, environmental and Net Zero–related activity, rather than through high-growth venture models.

Likely impacts include:

- Productivity and compliance improvements in agri-tech, land remediation, environmental services and food systems.
- Creation of applied SME growth pathways, where innovation reduces risk and time-to-market rather than pursuing radical disruption.
- Strengthening of environmental and Net Zero service markets, supporting local supply chains and regulatory delivery.
- Exportable applied expertise, particularly in environmental data, bio-enabled Net Zero solutions and land-based innovation.

The economic contribution is therefore broad, incremental and resilient, aligning well with mission-driven public and private investment. This activity supports skilled technical roles, field-based employment and applied digital work, reinforcing the everyday economy while contributing to national Net Zero and environmental objectives.

6.12 The case for place-based intervention

To help us better understand the role of place-based interventions in unlocking the full potential for economic impact, we have developed some initial logic chains in key areas of opportunity aligned to the area's strengths. These will form the basis for both further engagement with partners and the future case for resources to address areas of market failure

Logic Chain: Life Sciences and Engineering Biology

Element	Description
Starting conditions / assets	Strong life sciences research base (biomedical, MSK, primary care, environmental biology); growing omics and bioinformatics firms; nationally significant materials and validation capability; NHS/ICB with articulated priorities
Binding constraints	Fragmentation between discovery, validation, clinical adoption and scale; regulatory and clinical risk; weak mid-stage translation pathways; skills gaps at Levels 6–8 combining biology, data, regulation and engineering
Why the market alone doesn't fix this	High technical and adoption risk; long timelines; misaligned incentives between firms and health systems; individual SMEs unable to carry validation and evaluation costs
Place-based intervention	Coordinated engineering biology approach linking biological insight, materials validation, digital capability and adoption pathways, using existing institutions rather than new infrastructure
Primary translation pathways	Adoption-led innovation via NHS and public services Collaborative R&D with existing firms. Selective IP development and spin-outs where platform technologies justify it

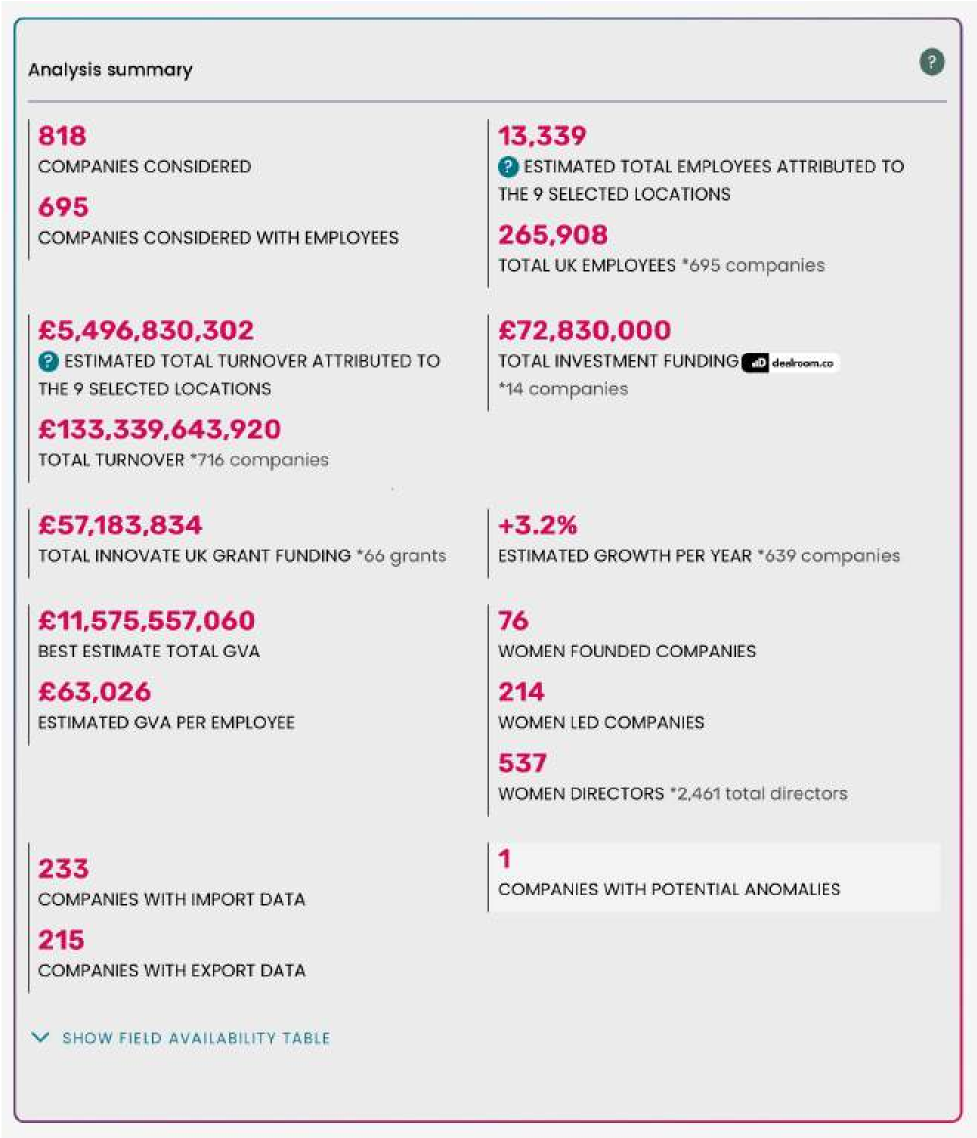
Economic & system outcomes	Improved innovation productivity; faster adoption of effective solutions; SME growth and inward investment; economic value aligned to health outcomes and service productivity

Logic Chain: Non-Health Life Sciences (Environmental, Agri-tech, Bio-Net Zero)

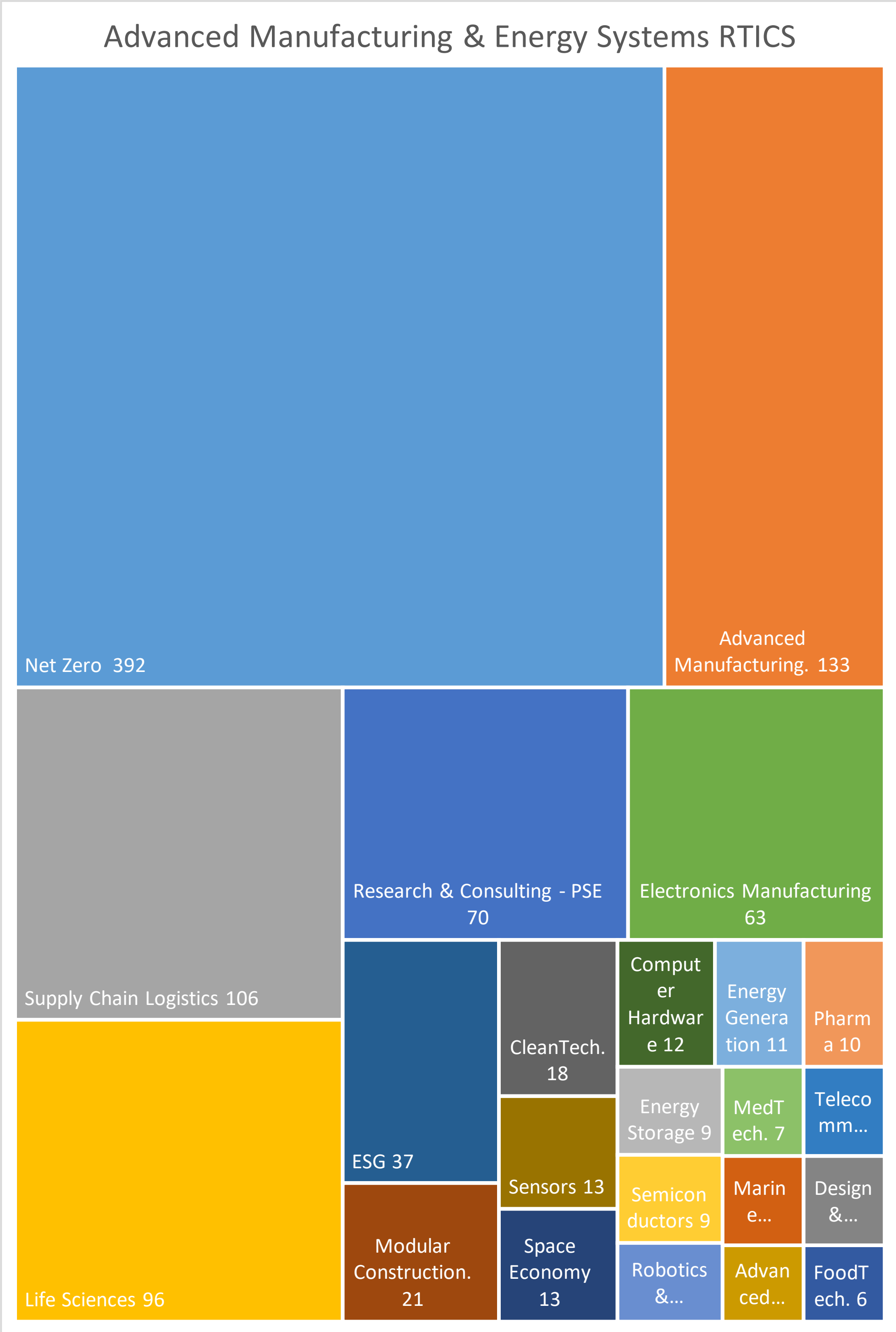
Element	Description
Starting conditions / assets	Strong environmental and bioscience research at Keele; applied digital and modelling capability at Staffordshire; substantial SME base in agri-tech, land remediation and environmental services
Binding constraints	Weak translation and demonstration pathways; limited access to pilots and testbeds; fragmented engagement with SMEs; skills gaps at the biology–data interface
Why the market alone doesn't fix this	Long timelines; diffuse markets; difficulty proving performance and value; limited private finance for early pilots
Place-based intervention	Organising existing assets into a coherent translation and demonstrator offer, focused on applied pilots, data-enabled validation and SME engagement
Primary translation pathways	• Demonstrators and pilots (land, agri-food, environmental)• Collaborative R&D with SMEs• Services-led innovation rather than spin-out-heavy models
Economic & system outcomes	SME growth; productivity and resilience in land-based and environmental services; Net Zero-aligned economic impact without reliance on high-risk venture models

7. Advanced Manufacturing & Energy Systems

7.1 The Local Cluster



The area's energy systems cluster is broad, applied and system-oriented, reflecting the way Net Zero transition is being delivered in practice rather than through a narrow definition of the "energy sector". It encompasses activity linked to energy generation, storage, distribution, management and use, but also a substantial volume of activity embedded in manufacturing, logistics, construction, digital systems and professional services. The cluster is therefore best understood as a cross-cutting energy systems economy, rather than a standalone clean energy industry.



At its core, the cluster is anchored by Net Zero delivery and enabling activity, including supply chain logistics, advanced and electronics manufacturing, energy storage, sensors, robotics, control systems, data infrastructure and energy management services. These activities support deployment at scale: retrofit, infrastructure delivery, modular construction, smart systems integration and operational optimisation. A notable feature of the cluster is the prominence of supporting and enabling functions — research and consulting, ESG services, digital infrastructure and systems integration — which reflects strong demand for implementation, assurance and coordination rather than early-stage energy technology discovery. Applied digital systems provide the connective layer enabling optimisation, monitoring and control across complex manufacturing and energy environments.

Equally important is what the cluster does not primarily include. The area is not characterised by large-scale energy generation assets, frontier energy science, or vertically integrated clean energy majors. Nor is it dominated by a single technology pathway. Instead, its comparative strength lies in applied capability, integration and deployment, supporting the transition of existing industries and infrastructure rather than displacing them. This makes the cluster highly relevant to productivity, jobs and resilience across the wider economy, but also means that growth is shaped more by adoption, skills and systems coordination than by breakthrough R&D alone.

Alongside energy systems delivery, the cluster incorporates a substantial base of high-value advanced manufacturing, particularly where production is:

- energy-intensive or heat-critical (e.g. ceramics, materials processing, food systems);
- dependent on power electronics, control systems or embedded digital technologies;
- focused on specialist, small-footprint production rather than volume assembly;
- closely integrated with R&D, testing, validation or systems adoption.

For the purposes of this Framework, Advanced Manufacturing includes firms and activities that involve:

- Production of high-value, precision or performance-critical components, materials or systems (e.g. advanced ceramics, electronics, specialist materials, embedded systems).
- Use of advanced processes or technologies in production, including automation, robotics, AI-enabled optimisation, digital twins, additive manufacturing or advanced process control.
- Integration of manufacturing with R&D and systems design, particularly where production environments are closely linked to testing, validation, standards or regulatory requirements.
- Manufacturing within complex, energy-intensive or highly regulated environments, where competitiveness depends on innovation, materials performance, systems integration or digital enablement rather than labour cost alone.

This includes advanced ceramics and materials, electronics and embedded systems, specialist production for energy, logistics and mobility supply chains, and manufacturing activities associated with Net Zero infrastructure, retrofit and modular systems. In many cases, manufacturing activity is not a downstream beneficiary of energy transition, but one of the primary drivers of demand for systems integration, optimisation and innovation.

The cluster therefore reflects an advanced manufacturing–energy systems complex, rather than two separable sectors. Firms often operate across multiple RTICs, combining production, engineering, digital capability and energy management within a single operating model. This reinforces the area's comparative advantage in applied innovation, deployment and system adoption, rather than frontier manufacturing science or single-technology energy development.

The dominance of Net Zero, supply chain logistics, manufacturing, digital systems and professional services indicates that the area's strengths lie in deployment, integration and delivery, not in frontier energy science or large-scale generation assets. Many firms operate across multiple RTICs, supporting energy transition indirectly through construction, electronics, data, automation, consultancy and systems management.

Smaller blocks do not imply low importance. Activities such as energy storage, sensors, semiconductors and energy management play a disproportionate enabling role, underpinning productivity and resilience across the wider cluster. Taken together, the chart illustrates an energy economy shaped by adoption and coordination, where growth depends on skills, infrastructure and systems capability rather than a single dominant technology or industry.

Rather than positioning itself as a centre for any single energy vector, the area's opportunity lies in becoming a testbed and analytical hub for complex, place-based energy systems, focused on:

- integration of electricity, heat, storage and demand
- optimisation under real operational constraints
- resilience and cost management alongside decarbonisation
- and the adaptation and replication of solutions across similar sites nationally

Stoke-on-Trent and Staffordshire are hubs for energy system innovation, driven by major projects like the Keele University Smart Energy Network Demonstrator (SEND), testing low-carbon tech, and large-scale infrastructure like the Stoke-on-Trent District Heat Network using geothermal energy, alongside developments at Chatterley Whitfield for solar, battery storage, and data centre heat. Universities (Keele, Staffordshire) lead R&D in micro-generation, hydrogen, and smart grids, collaborating with industry (Siemens, Engie) to develop real-world solutions for net-zero buildings, micro-CHP, and local energy systems, aiming to create a blueprint for national energy transition.

7.2 R&D Capability

R&D capability: Advanced Manufacturing & Energy Systems Innovation

Energy Systems RTIC	Keele University	University of Staffordshire	Energy Research Accelerator (ERA)
Net Zero (systems & deployment)	🟧	🟧	🟩
Energy Storage	🟧	⬜	🟩
Energy Generation	🟧	⬜	🟩

Power Electronics	🟧	⬜	🟩
Sensors & Instrumentation	🟧	🟧	🟩
Electronics Manufacturing	🟧	🟧	🟧
Advanced Manufacturing (energy-related)	🟧	🟧	🟧
Robotics & Autonomous Systems	🟧	🟩	⬜
Data Infrastructure & Digital Energy	🟩	🟩	🟧
Energy Management & Control Systems	🟧	🟧	🟩
Cleantech & ESG Services	🟧	🟧	🟩
Research, Consulting & Systems Integration	🟩	🟧	🟩

Taken together, Keele University, University of Staffordshire and the Energy Research Accelerator form a complementary, system-level energy capability, rather than a single concentrated centre of excellence. This aligns closely with the structure of the local energy cluster, which is dominated by deployment, integration and Net Zero delivery, rather than frontier energy science or large-scale generation technology development.

Keele University provides strong capability in applied research, systems integration and translational activity, particularly where energy systems intersect with materials, manufacturing, environmental systems and health. Its strengths lie in whole-system thinking, applied demonstrators, and the ability to connect energy innovation to real-world settings and users. Keele's capability is broad rather than deep in any single energy technology, which is appropriate given the applied nature of local demand and the availability of national facilities for specialist testing and scale-up.

The University of Staffordshire contributes complementary strengths in digital systems, data infrastructure, robotics and applied computing, which are increasingly critical to modern energy systems. These capabilities support areas such as smart energy management, automation, sensing and data-enabled optimisation. Staffordshire's role is strongest where energy systems overlap with digital adoption and applied technology deployment, rather than in core energy science or hardware development.

The Energy Research Accelerator (ERA) provides the strongest concentration of capability in energy-specific technologies, including energy generation, storage, power electronics, sensors and systems integration. ERA's role is not place-bound in the same way as a university campus, but it significantly strengthens regional access to specialist facilities, expertise and networks that would not be viable to replicate locally. From a Royce perspective, ERA functions as an enabling platform that allows local partners to participate credibly in national energy innovation without needing to host full-spectrum infrastructure.

Critically, the value of this combined capability lies in coordination rather than duplication. No single institution provides end-to-end energy R&D capability, nor should it. Instead, the system is well configured for applied innovation, demonstrators, adoption and diffusion, drawing on national assets for specialist or capital-intensive activity. This mirrors the Royce Institute's broader model: distributed capability, shared access, and strong translational pathways.

The R&D capability profile also supports the integration of advanced manufacturing into this cluster. Capabilities in power electronics, sensors, electronics manufacturing, robotics and applied digital systems underpin both energy systems deployment and specialist manufacturing activity.

From a Royce-style perspective, the region's strength lies not in duplicating deep national manufacturing science infrastructure, but in accessing national assets while providing applied translation, validation and system integration capability locally. This positions the area well for manufacturing activity that requires:

- materials selection and performance evaluation;
- systems-level design and optimisation;
- validation in real operational environments;
- integration with energy, digital and regulatory systems.

Keele's contribution already extends into manufacturing-relevant research and translation, particularly where production intersects with materials performance, energy use, environmental constraints and system integration. Keele is best positioned to support:

- early-stage experimentation and de-risking for advanced manufacturing;
- materials-energy-digital interfaces;
- applied doctoral research linked to real production environments;
- manufacturing challenges that require system-level insight rather than process optimisation alone.

The University of Staffordshire plays a critical role in applied advanced manufacturing, particularly in:

- digital manufacturing systems and Industry 4.0;
- robotics, automation and control;
- electronics manufacturing and embedded systems;
- professional postgraduate upskilling for manufacturing leadership and transformation.

This positions UoS as a key delivery partner for firms seeking to modernise, integrate and scale advanced manufacturing operations within existing sites.

ERA strengthens access to specialist energy and manufacturing-adjacent facilities and expertise that would be neither viable nor desirable to replicate locally, reinforcing a distributed, access-led model consistent with national expectations.

This is particularly relevant for energy-adjacent manufacturing, where performance, reliability, cost and compliance are shaped by system context rather than component design alone.

There is scope over time to strengthen elements of this capability, particularly as the local academic community in engineering and applied systems continues to grow. This would most naturally build on existing strengths in applied research, systems integration and digital–physical interfaces, rather than seeking to replicate large-scale national energy research infrastructure.

7.3 Skills

Levels 2-6

The Energy Systems and Net Zero skills base across the area is broad but layered, with clear differentiation between strategic capability, applied technical skills, and delivery capacity. The strength of the system lies not in any single institution, but in the combined pipeline from research-informed systems thinking through to on-the-ground installation and maintenance.

Keele University provides depth in energy systems, sustainability, environmental science and Net Zero systems thinking, including the analytical capability required to understand whole-system transitions. This includes energy-environment interactions, data-informed decision-making, and policy-relevant insight, which are essential for designing credible Net Zero pathways but do not, on their own, generate delivery capacity.

The University of Staffordshire plays a complementary role, contributing applied digital, data, engineering and smart systems capability. This is particularly relevant for energy optimisation, building management systems, power electronics, modelling, and the integration of digital technologies into energy infrastructure. Staffordshire therefore sits at the translation interface, bridging strategic energy ambitions and deployable technical solutions.

Delivery at scale is anchored by Newcastle & Stafford Colleges Group and Stoke College, which together provide the core workforce for Net Zero implementation. This includes electrical and mechanical technicians, low-carbon manufacturing skills, building retrofit, energy installation, and environmental compliance roles. These skills are central to the everyday and foundational economy and are inherently place-based, supporting jobs that are locally rooted and resistant to offshoring.

Across Levels 2–6, energy systems and advanced manufacturing skills are increasingly inseparable. Delivery roles in low-carbon manufacturing, power electronics, automation, controls and retrofit sit at the intersection of both clusters. At higher levels, demand shifts towards:

- systems-literate manufacturing engineers;
- production leaders able to manage energy, digital and materials constraints simultaneously;

- specialists in power electronics, sensing, controls and IoT-enabled manufacturing environments.

The key constraint is not volume of provision, but progression and integration. In particular, there is a gap in Level 4–5 pathways that link FE delivery roles to higher-level technical, digital and systems skills. Addressing this gap would significantly strengthen productivity, career progression, and retention within the Net Zero workforce.

Overall, the local skills system is well aligned to a delivery-led Net Zero transition, with strong potential to support energy systems innovation, retrofit programmes, low-carbon manufacturing, and infrastructure investment. The strategic opportunity now lies in connecting system-level insight, applied digital capability, and FE delivery at pace, rather than creating new provision from scratch.

Skills capability analysis Energy Systems Innovation

Skills / Workforce Domain	Keele	Staffs	NSCG	Stoke
Energy systems & sustainability graduates	🟩	🟧	⬜	⬜
Net Zero systems thinking & policy	🟩	🟧	⬜	⬜
Environmental & energy data analytics	🟩	🟩	🟧	⬜
Smart systems, digital & AI (energy-relevant)	🟧	🟩	🟧	⬜
Power electronics & applied engineering	🟧	🟩	🟧	⬜
Low-carbon manufacturing skills	🟧	🟧	🟩	🟩
Energy installation & retrofit skills	⬜	⬜	🟩	🟩
Electrical & mechanical technicians	⬜	🟧	🟩	🟩
Building energy management & controls	⬜	🟧	🟩	🟧
Net Zero construction & retrofit pathways	⬜	⬜	🟩	🟩
Entry-level energy & green skills (L2–3)	⬜	⬜	🟩	🟩
Applied progression routes (L4–5)	🟧	🟧	🟧	⬜

Levels 7 and 8

Level 7 energy demand is systems-focused: integration, optimisation, power electronics, digital energy, and delivery under real constraints.

Keele University is best placed to lead energy systems integration, place-based energy analysis, and whole-system thinking, building on SEND and related demonstrators. University of Staffordshire offers complementary leadership in digital energy systems, data infrastructure, automation, and applied computing.

The Energy Research Accelerator (ERA) is an essential regional partner providing access to specialist energy expertise and facilities that the area can connected to.

Traditional Post Graduate Research (PGR) is appropriate at Keele where energy intersects with systems modelling, materials, and applied engineering. Specialist energy science could accessed through ERA-linked national assets.

For collaborative PGR, Keele University clearly able to lead for place-based energy systems, replication science and applied demonstrators, ERA – access to specialist testing, networks linked to national programmes. Local authorities and industry would play a critical role in defining real deployment challenges.

7.4 Localised Energy Systems – Current trajectory

The area's engagement with localised energy systems is grounded in long-standing, practical investment and experimentation, rather than recent policy repositioning. A central foundation has been Keele University's Smart Energy Network Demonstrator (SEND), developed initially through collaboration with Siemens. This work focused on the real-world operation of a smart, integrated energy system at campus scale, providing early insight into system optimisation, demand management, governance and user interaction — issues that have since become central to national thinking on Smart Local Energy Systems (SLES).

Building on this, Keele invested in a multi-vector energy system, integrating wind, solar, battery storage, hydrogen, and the local gas network within a single analytical and operational framework. Crucially, this was not framed as a technology showcase, but as a live system designed to test reliability, resilience, affordability and user acceptability over time. The value of this work lay as much in the data, modelling and governance learning as in the physical assets themselves.

This capability directly informed subsequent UK Research and Innovation Place-Based Energy Futures (PFER) work in Rugeley, which extended the approach from campus to town scale. That programme focused on designing a place-based energy system around local assets, constraints and users, alongside explicit work on public acceptability, trust and engagement. Together, these activities established a robust analytical and practical foundation for understanding how localised energy systems function in real places — technically, socially and economically.

In parallel, Stoke-on-Trent City Council has taken a deliberate, asset-led approach to developing and joining up its own sustainable energy infrastructure. This has been driven by an explicit understanding that local energy systems matter not only for decarbonisation, but for affordability, resilience and local control in a city with high levels of energy vulnerability. While distinct from the university-led work, this civic investment reflects a shared recognition that energy systems must be understood as place-based public infrastructure, not just market-delivered technology.

Alongside this, there is growing national interest in hydrogen as part of the Net Zero transition, but the evidence suggests that inland hydrogen deployment faces significant structural constraints. These include high transport and storage costs, safety and planning considerations, and unresolved business models outside tightly defined industrial clusters or port-based environments. As a result, the majority of national hydrogen investment remains coastal, industrially concentrated, or tied to very specific anchor demand such as steel, ceramics, chemicals or refining.

Along the Stoke-on-Trent and Staffordshire corridor, hydrogen activity is therefore best understood as hydrogen-adjacent rather than hydrogen-led. This includes R&D, components, logistics interfaces and a small number of demonstrator projects, rather than system-wide deployment. The principal risk for the area is allowing hydrogen to become a symbolic organising narrative, rather than an evidence-led economic proposition. This does not imply that hydrogen should be excluded, but that it should be nested within a wider systems approach, rather than foregrounded as a primary growth driver.

Turning to Keele University's work on hydrogen as part of the Energy Research Accelerator partnership, this can be understood as part of its wider systems capability rather than as a standalone sector proposition. Building on the Smart Energy Network Demonstrator (SEND), Keele has developed hydrogen production, storage and utilisation facilities explicitly to test integration within a live, multi-vector energy system. This includes interaction with electricity, heat, storage and gas networks, and a strong emphasis on data, control, safety, and system optimisation. The value of this work lies less in hydrogen scale-up per se, and more in the insights generated around whole-system design, operational constraints, user behaviour, and governance — areas that are increasingly central to national energy policy and Net Zero delivery.

In this context, hydrogen functions as an enabling and learning technology, supporting R&D, skills development, demonstrators, and industry engagement in areas such as materials testing, safety, standards, power electronics, and systems integration. This provides credible support for regional firms operating in hydrogen-adjacent activities — components, logistics interfaces, digital control, and validation — while remaining realistic about deployment constraints in inland locations. The strategic relevance of Keele's hydrogen capability therefore sits in its contribution to applied energy systems innovation and replication science, rather than in positioning Stoke-on-Trent and Staffordshire as a hydrogen production or distribution hub.

There is increasing scope for the facilities to create impact across the Midlands. For example, the East Midlands Combined County Authority's Vision for Growth highlights the strategic repurposing of large former power-station sites — notably West Burton, High Marnham and Cottam — into a clean-energy "Supercluster" that attracts innovation-led firms as part of a broader regional transformation towards net zero and advanced technologies.

While much of this regional vision is built on nationally significant investments — including fusion energy via STEP and industrial-scale hydrogen production — there are clear synergies with Keele's applied energy systems capability. Keele's work on multi-vector energy demonstrators and integrated systems optimisation aligns with the analytical, deployment-focused challenges that the Supercluster and associated developments aim to address in practice: how to manage cost, resilience and decarbonisation in real-world industrial and urban contexts. This shared focus on integration, optimisation and skills generation complements EMCCA's growth agenda without requiring Stoke-on-Trent and Staffordshire to replicate large generation assets locally.

On this basis, the most credible opportunity areas are deliberately focused and intermediary:

- **Industrial and logistics energy transition,** including on-site generation, battery storage, demand response and fleet electrification, with relevance to local manufacturing and logistics estates.
- **Energy for "hard places"**, such as ceramics, heat-intensive processes, hospitals and food processing, where hybrid systems are required and hydrogen remains in scope but not dominant.
- **Energy system resilience and cost optimisation,** treating energy as a business risk as much as a carbon issue, particularly for SMEs and mid-sized firms.
- **Data-enabled energy systems**, including digital twins, optimisation and forecasting, with strong crossover into digital and materials capability.

These areas support national priorities while remaining grounded in local demand and delivery capability.

Localised energy systems activity has also created direct learning value for advanced manufacturing, particularly around:

- operating production in constrained energy environments;
- managing cost, resilience and carbon simultaneously;
- integrating energy systems into existing industrial estates and facilities;
- understanding how production processes interact with multi-vector energy systems in practice.

These insights are highly transferable to manufacturing-intensive sites across the Midlands and beyond, where energy transition is a constraint on competitiveness rather than an abstract policy goal.

7.5 Firm level investment

Investment in energy innovation is strongly shaped by national policy and infrastructure priorities. Large-scale capital flows towards generation, grid-scale storage and hydrogen infrastructure, predominantly in coastal or heavily industrialised locations. Inland regions such as Stoke-on-Trent and Staffordshire therefore see limited direct investment in energy assets, but significant activity in systems integration, deployment, optimisation and professional services.

From an investor perspective, the constraints in this space are well rehearsed: policy volatility, fragmented demand, long payback periods and high integration risk. Hydrogen, while strategically important, remains challenging to deploy economically outside tightly defined industrial clusters, reinforcing the importance of treating it as part of a broader systems approach rather than a standalone investment proposition.

For advanced manufacturing firms, particularly SMEs, investment barriers often sit less in technology readiness and more in:

- energy cost volatility;
- uncertainty around future compliance requirements;
- integration risk when adopting new systems;
- limited access to real-world demonstrators and validation environments.

The strongest place-based opportunity lies in service-led and systems-focused innovation, where public support can underwrite early deployment risk, support diagnostics and design, and enable replication across multiple sites. This form of innovation is less capital-intensive but highly dependent on credibility, coordination and access to real-world environments — areas where civic institutions and universities can add distinctive value.

7.6 Location and Infrastructure for Advanced Manufacturing & Energy Systems

Energy systems activity spans generation, retrofit, storage, control systems and Net Zero delivery. Unlike early-stage energy science, local demand is concentrated at the deployment, integration and demonstration end of the innovation spectrum, with infrastructure needs shaped by land availability, power capacity, logistics and regulatory compliance.

Energy systems infrastructure demand can be grouped into several energy system archetypes, each aligning with different parts of the sub-region's employment land portfolio.

Net Zero Deployment, Retrofit & Infrastructure Delivery.

This archetype is the most land- and power-intensive, encompassing retrofit programmes, modular construction, energy infrastructure and associated supply chains. Strategic industrial locations along the M6, A50 and A500 corridors, including the Ceramic Valley Enterprise Zone and established industrial areas, are best suited to this activity.

University science parks are not substitutes for these locations, but play a complementary role by supporting early-stage pilots, demonstrators and innovation partnerships before deployment at scale elsewhere.

Energy Systems Integration, Storage & Power Electronics.

This archetype includes battery systems, power electronics, sensors and digital control technologies. Infrastructure requirements include specialist testing, high-quality utilities and proximity to applied research expertise. High-spec business parks and university-anchored locations are best suited at early and pilot stages.

KUSIP supports R&D, prototyping and early validation, while later-stage activity may transition to industrial sites or specialist facilities beyond the sub-region where scale and certification demands increase.

Data-enabled Energy Management & Smart Systems.

Smart energy systems rely on digital infrastructure, analytics and secure environments rather than large physical assets. These activities can locate flexibly, with town and city centres accommodating professional, software and consultancy functions, and university-adjacent sites supporting research-led or demonstrator activity.

The strategic value of local infrastructure lies in enabling integration and learning-by-doing, rather than hosting large-scale energy R&D platforms.

Within advanced manufacturing in this cluster two distinct patterns are evident:

- Large-scale, land- and power-intensive activity, best suited to strategic industrial locations (M6 / A50 / A500 corridors);
- Light, high-value, specialist manufacturing, often R&D-linked and small-footprint, which can be well suited to science and innovation parks where access to talent, testing and knowledge exchange matters more than scale.

This validates the role of KUSIP and similar locations in supporting scale-up and specialist production, not just early-stage R&D.

Stoke-on-Trent and Staffordshire site portfolio indicative best fit

Industry Archetype	Primary Drivers	Best Fit Locations	Least Fit Locations	Role of KUSIP
Net Zero Deployment, Retrofit & Infrastructure	Land scale; power; logistics; compliance	D (Ceramic Valley EZ; M6/A50/A500)	B, A	Early-stage pilots and demonstrators
Energy Systems Integration, Storage & Power Electronics	Testing; utilities; research proximity	A (KUSIP), C (high-spec parks)	B, D (non-specialist)	R&D, prototyping, validation
Smart Energy & Data-enabled Systems	Digital capability; security; integration	B (professional), A (demonstrators)	D	Support for applied demonstrators
Energy Consultancy & Systems Design	Credibility; connectivity; professional space	B (town & city centres), A (research-led)	D	Anchor for technical consultancy

7.7 Energy Systems Innovation and the Everyday Economy

Energy systems innovation has particularly strong connections to the everyday economy because it reshapes how people build, heat, power and maintain homes, workplaces and infrastructure. Many of the jobs involved — construction workers, retrofit installers, maintenance engineers, logistics staff and technicians — are locally rooted, relatively lower paid, and exposed to volatility as energy systems change.

In the short term, innovation in energy systems can improve productivity and job quality in these roles by standardising processes, improving materials and components, and reducing rework and failure rates. For example, better-designed retrofit systems or modular energy components can reduce installation time, improve safety, and make work more predictable. These improvements benefit workers directly, even where skill levels remain broadly similar.

Over the medium term, energy systems innovation opens clear progression pathways. As systems become more complex and integrated, demand grows for technicians skilled in power electronics, energy storage, digital monitoring, diagnostics and compliance. Many of these roles build naturally on existing construction, engineering and maintenance experience, creating opportunities to move from manual installation into higher-value technical and supervisory positions. Place-based energy innovation therefore supports inclusion by creating ladders within existing occupations, rather than relying on external recruitment into specialist roles.

Crucially, these benefits depend on coordination between innovation, skills and deployment. Without this, the energy transition risks reinforcing low-paid, low-productivity work. With it, energy systems innovation can support better jobs, clearer progression and more resilient local labour markets, while delivering Net Zero objectives.

The transition to new energy systems will create demand for new skills and roles, but it may also disrupt existing occupations in construction, maintenance and energy-intensive industries. Without careful coordination, this risks concentrating costs on lower-paid workers and smaller firms. More just outcomes will depend on aligning innovation and deployment with workforce planning, national training and accreditation frameworks, and social protections that support reskilling and progression, enabling workers to move into higher-value roles as energy systems evolve.

7.8 Strengthening Economic Impact

Energy systems innovation delivers economic impact less through new energy production, and more through cost, risk and resilience management across the economy.

Primary impact mechanisms include:

- Cost reduction and predictability for energy-intensive firms, improving competitiveness and investment confidence.
- Improved infrastructure resilience, particularly for logistics, manufacturing, health and public assets.
- Development of specialist applied services in energy systems design, optimisation, diagnostics and replication.
- Capability export, where place-based energy system expertise can be applied across similar sites nationally.

Economic value accrues through adoption and integration, not scale of generation. The most significant benefits arise where energy innovation reduces volatility, supports operational continuity and enables firms to navigate Net Zero transition without undermining viability.

These impacts support both private-sector competitiveness and public-sector affordability, with strong spillovers into construction, maintenance and technical services employment.

Advanced manufacturing strengthens the economic impact of energy systems innovation by anchoring value locally. Where firms can integrate production, systems adoption and optimisation within the same place, benefits accrue through higher productivity, improved margins, workforce progression and greater resilience. This reinforces the case for focusing on adoption and integration, rather than attempting to attract footloose volume manufacturing or speculative energy generation assets.

7.9 The case for place-based intervention

To help us better understand the role of place-based interventions in unlocking the full potential for economic impact, we have developed some initial logic chains in key areas of opportunity aligned to the area's strengths. These will form the basis for both further engagement with partners and the future case for resources to address areas of market failure

Logic Chain: Energy Systems Integration

Element	Description
Starting conditions / assets	Strong applied energy systems capability; Smart Local Energy Systems foundations (SEND, PFER); civic energy assets; strengths in manufacturing, logistics, digital systems and consultancy
Binding constraints	Complexity of multi-vector systems; lack of investable deployment models; skills shortages in systems integration and digital-physical interfaces; uncertainty around hydrogen viability inland. manufacturing sites with complex energy and process requirements poorly served by standard Net Zero models
Why the market alone doesn't fix this	High coordination costs; unclear business cases for complex sites; fragmented supply chains; national models poorly reflect real operational constraints
Place-based intervention	Positioning the area as a testbed and analytical hub for place-based energy systems integration, optimisation and replication rather than a single-technology centre
Primary translation pathways	Energy systems diagnostics and optimisation services Demonstrators in industrial, logistics and public-sector settings Replication support across multiple sites. Demonstrators embedded in live manufacturing environments

Economic & system outcomes	Lower energy costs and risk for firms Improved Net Zero delivery Productivity gains in existing industries; development of exportable systems capability rather than speculative generation assets

Logic Chain: Advanced Manufacturing Systems adoption

Element	Description
Starting conditions / assets	• Strong base of specialist, high-value manufacturers across ceramics, energy supply chains, electronics, precision engineering and advanced materials • Deep applied materials and systems capability (Keele; Lucideon/AMRICC; ERA access) • Growing digital, automation and robotics capability (University of Staffordshire) • Significant exposure to energy cost, volatility and regulatory pressure
Binding constraints	• High technical and commercial risk in adopting integrated energy, digital and manufacturing systems • Limited internal systems engineering capability in SMEs • Unclear payback for complex upgrades (energy, automation, digital twins) • Fragmented support between R&D, skills, finance and deployment
Why the market alone doesn't fix this	• Individual firms cannot absorb integration risk alone • Benefits accrue at system level (cost stability, resilience, learning), not just firm level • Conventional finance struggles with hybrid energy–manufacturing investments • National programmes focus on technology, not site-specific adoption
Place-based intervention	Organising a manufacturing-led systems adoption offer, focused on integrating energy, digital and production systems in real operating environments rather than promoting single technologies
Primary translation pathways	• Whole-site diagnostics (energy, production, digital readiness) • Co-designed upgrade pathways for manufacturing estates and specialist producers • Demonstrators combining materials, automation and energy optimisation • Skills alignment at Levels 4–8 around systems adoption
Economic & system outcomes	• Improved competitiveness and resilience of existing manufacturers • Retention and upgrading of high-value industrial employment • Reduced exposure to energy volatility • Stronger inward-investment proposition for specialist manufacturing rather than footloose mass production

Logic Chain: Energy Systems for Industrial & Logistics Sites

Element	Description

Starting conditions / assets	• Proven Smart Local Energy Systems foundations (SEND; PFER) • Large stock of complex industrial, logistics and public-sector sites • Strong capability in systems modelling, optimisation and governance • Applied manufacturing, digital and consultancy strengths
Binding constraints	• Energy solutions rarely transfer cleanly between sites • High uncertainty around inland hydrogen deployment • Lack of standardised approaches to multi-vector optimisation • Skills gaps in digital–physical systems integration
Why the market alone doesn't fix this	• High coordination and learning costs • Weak incentives to invest in first-of-a-kind site integration • Benefits of learning spill across firms and places • National energy models poorly represent real operating conditions
Place-based intervention	Positioning the area as a testbed and analytical hub for place-based energy systems, focused on learning, optimisation and replication rather than generation scale
Primary translation pathways	• Funded energy systems diagnostics for industrial and logistics sites • Living-lab demonstrators (campus, estates, hospitals) • Codification of transferable design principles ("replication science") • Support for firms exporting systems expertise nationally
Economic & system outcomes	• Lower energy costs and risk for firms • Stronger Net Zero delivery without undermining viability • Growth of specialist energy–manufacturing–digital services • National relevance and exportable capability without large-scale assets

8 A Funding Strategy for Innovation-Led Growth

8.1 Purpose and positioning

This Funding Strategy sets out how Stoke-on-Trent and Staffordshire can most effectively deploy public and co-investment resources to support innovation-led growth over the coming decade. It is not a bid document, nor a list of projects. Rather, it provides a clear, evidence-led framework for prioritising investment, grounded in a realistic understanding of:

- the area's industrial structure and comparative advantages;
- where market mechanisms alone under-invest;
- how national funding systems now operate in practice; and
- what forms of intervention are most likely to deliver productivity, GVA growth and scalable impact.

The Strategy is framed from the perspective of a place-based partnership of local authorities, universities, colleges and innovation-active businesses, and is intended to inform engagement with:

- devolved growth and investment funds;
- UKRI and Innovate UK;
- relevant government departments and agencies; and
- private and institutional co-investors.

8.2 Strategic principles for funding

Focus public funding where markets under-invest. Across all four priority clusters, the evidence is consistent: the binding constraints are not ideas or ambition, but coordination, risk and adoption. Public funding should therefore be focused on:

- translation and deployment, not duplicating discovery research;
- integration across systems and sectors, not isolated projects;
- building demand-side capability, not supply-side capacity alone; and
- creating investable pathways, not one-off demonstrations.

Align with how national funders now operate. UKRI's emerging approach differentiates more clearly between:

- Discovery-led research (frontier science);
- Use-inspired and translational research;
- Mission-oriented and place-based programmes; and
- Adoption, diffusion and capability-building activity.

This Strategy deliberately aligns each cluster with the types of research and innovation funding it is most suited to attract, rather than assuming uniform access across all streams.

Sequence funding realistically. The area is emerging from a long period of structural under-investment in public R&D. The priority is therefore to:

1. rebuild credibility and absorptive capacity;
2. demonstrate coordinated delivery at place scale; and
3. leverage this into larger national and private co-investment.

8.3 Cluster-specific funding priorities

Each cluster requires a distinct funding logic, even where mechanisms overlap.

Materials Innovation

Funding rationale:

Materials innovation in Stoke-on-Trent and Staffordshire is anchored in advanced ceramics and specialist materials with national and global relevance. The opportunity is not to replicate national discovery assets, but to strengthen translation, validation and industrial adoption.

Priority funding focus: Public funding is most justified where it:

- accelerates translation from lab to industrial use;
- de-risks adoption for manufacturers in regulated or safety-critical contexts;
- supports scale-up and manufacturability of advanced materials; and
- reinforces sovereign capability in strategically important materials.

Best-fit funding sources

- UKRI / Research Councils: Use-inspired research; translational materials science; interdisciplinary programmes linking materials to energy, defence and health.
- Innovate UK: Scale-up, validation, standards, pilot manufacturing, supply-chain resilience.
- Devolved growth funds: Co-investment in translational infrastructure, demonstrators and shared facilities where market provision is weak.

Realism and constraints

- National materials assets matter more than local duplication.
- Viability depends on sustained industrial demand and standards-driven confidence.
- Public funding should crowd-in, not substitute for, industrial investment.

Digital Economy

Funding rationale:

The digital economy is already the area's largest contributor to productivity, but growth is uneven and diffusion constrained. The challenge is not technology creation, but skills, adoption, trust and integration.

Priority funding focus: Public funding is most effective where it:

- accelerates SME adoption of digital tools;
- supports trusted intermediaries and demonstrators;
- builds capability in data infrastructure, cyber and AI assurance;
- strengthens digital–hardware and digital–sector interfaces.

Best-fit funding sources

- Innovate UK. Adoption programmes, digital demonstrators, sector-specific digitalisation.
- Devolved growth funds. Place-based digital enablement, skills alignment, local intermediaries.
- UKRI (selectively). Where digital intersects with regulated or hardware-constrained domains (e.g. health, energy, advanced manufacturing).

Realism and constraints

- Digital firms rarely require capital-intensive infrastructure.
- Returns depend on practice change, not research outputs.
- Public funding should prioritise diffusion, not new platforms.

Life Sciences (Health and Non-Health)

Funding rationale:

Life sciences activity is substantial but fragmented. The strongest opportunity lies in adoption, evaluation and system integration, particularly in health, prevention and applied biosciences.

Priority funding focus: Public funding should support:

- evaluation and evidence generation in real-world settings;
- adoption pathways within health and care systems;
- applied biosciences linked to environmental, agri-tech and Net Zero priorities;
- regulatory, data and assurance capability.

Best-fit funding sources

- UKRI / NIHR - Applied health research, evaluation, place-based health innovation.
- Innovate UK - MedTech adoption, diagnostics, regulated innovation.
- Devolved growth funds - System-level coordination, testbeds and translational support.

Realism and constraints

- Discovery science is nationally competitive and capital-intensive.
- Adoption is slow without institutional buy-in and evaluation capacity.
- Public sector demand is a critical lever.

Energy Systems & Advanced Manufacturing Innovation

Funding rationale: The local cluster is not about energy production, but about making energy and manufacturing systems work in real places. The opportunity lies in deployment, integration and replication.

Priority funding focus: Public funding is most impactful where it:

- supports energy systems diagnostics and optimisation;
- enables demonstrators in industrial, logistics and public settings;
- integrates advanced manufacturing with Net Zero delivery;
- builds capability in systems engineering, digital-physical integration and replication science.

Best-fit funding sources

- UKRI (place-based and mission-oriented programmes): Systems integration, Smart Local Energy Systems, replication science.
- Innovate UK: Deployment-led innovation, industrial decarbonisation, energy services.
- Devolved growth funds: Co-investment in demonstrators, applied infrastructure and skills pathways.

Realism and constraints

- Hydrogen is hydrogen-adjacent, not hydrogen-led.
- Inland locations face structural limits on large-scale energy investment.
- Value lies in services, systems and capability export

8.4 Cross-cutting funding priorities

Across all clusters, four funding themes recur:

- Translation and adoption
- Public funding should prioritise moving capability into use, especially where:
- benefits are diffuse;
- risks are high;

- payback is long; or
- coordination costs deter private investment.

Skills and leadership capability

Investment in innovation leadership, systems skills and cross-sector capability (including L7–8) is a legitimate productivity intervention, not a soft add-on.

Shared infrastructure and demonstrators

Where infrastructure is justified, it should:

- serve multiple clusters;
- enable learning-by-doing;
- be demand-led; and
- complement national assets.

Governance and orchestration

Modest, sustained investment in system stewardship can unlock far greater downstream value than fragmented project funding.

8.5. The role of devolved and national funding together

A key conclusion of this Strategy is that no single funding source is sufficient. Devolved growth funds are best used to:

- de-risk early deployment;
- support coordination and capability;
- crowd-in national and private investment.

UKRI and Innovate UK are essential for:

- scale, credibility and national alignment;
- linking local strengths to national missions.

The area’s ambition should therefore be strategic leverage, not substitution.

8.6. A credible investment proposition

Taken together, this Funding Strategy positions Stoke-on-Trent and Staffordshire as:

- a place that understands its constraints as well as its strengths;
- focused on productivity, adoption and real-world impact;
- aligned with national funding logics rather than competing with them; and

- capable of deploying public funding with discipline and purpose.

This is the foundation for a funding approach that is credible, investable and scalable — and one that can evolve as evidence, partnerships and governance mature.

9. Cross-cutting Enabling Environment - Some key areas of development

9.1 Skills

The analysis presented in this report highlights a set of cross-cutting skills challenges that sit only partially within the scope of the last Local Skills Improvement Plan (LSIP). As local partners begin work on the next plan, they are adopting a greater focus on alignment between skills, innovation and productivity objectives. Including the integration of skills at all levels, including doctoral research.

A central issue is the growing importance of hybrid and enabling skills. Demand for applied digital skills increasingly cuts across clusters, particularly where digital capability intersects with materials, health, energy and systems integration. Many of the most acute gaps identified across digital, Net Zero, life sciences and advanced manufacturing sit in the "missing middle" (Levels 3–5) and involve combinations of capabilities: digital–hardware integration, lab–data interfaces, regulatory and quality assurance roles, and systems integration skills. These are not easily addressed through sector-specific training alone and require coordinated pathways spanning FE, HE and employers. The current LSIP acknowledges these challenges, but tends to frame them in broad occupational terms rather than as system-enabling capabilities that underpin innovation adoption and diffusion.

A second, closely related issue is the role of skills as enabling infrastructure, not simply workforce supply. In areas such as digital enablement, engineering biology, precision medicine and energy systems, skills shortages limit the ability of firms and public services to absorb new technologies, adopt innovation and improve productivity. This extends beyond filling vacancies to include confidence, literacy, ethical understanding and regulatory competence. These dimensions are critical to trust, assurance and adoption, but are not easily captured within traditional LSIP metrics or governance structures.

This raises important questions about governance and coordination. The LSIP governance model is well suited to its core purpose — employer voice, FE alignment and delivery — but it is not designed to convene universities, innovation actors and civic institutions around cross-cutting, longer-term capability building. Rather than stretching the LSIP beyond its remit, the evidence suggests the need for a complementary place-based coordination function that aligns LSIP priorities with higher-level skills, innovation and productivity agendas. In this model, the LSIP remains central to delivery, but operates within a clearer strategic framework that connects skills supply to digital adoption, Net Zero transition and life sciences translation.

Taken together, this points to an opportunity to refresh the LSIP's strategic framing, not by expanding its scope indiscriminately, but by sharpening focus on a small number of high-leverage, cross-cutting skills domains and strengthening links with HE, innovation and civic partners. Doing so would improve coherence across the skills system, enhance productivity impact, and better position the area to respond to UKRI and DSIT priorities without undermining the employer-led foundations of the LSIP.

The Innovation Strategy aims to make the UK "the most exciting place for innovation talent" (BEIS 2021a, 52). The Innovate UK Strategic Delivery Plan includes "innovation talent and skills" as one of the elements of its strong foundations and prioritises people and careers as one of its strategic objectives (Innovate UK 2022, 6-7). The BEIS R&D People and Culture Strategy (BEIS 2021b) specifically focuses on the role of people, arguing that they are at the core of R&D and that there is nothing more important than attracting, developing, and retaining enough people to meet ambitions around innovation.

A future-facing postgraduate landscape to support innovation-led growth

Supporting ambitious but realistic growth across materials innovation, life sciences, energy systems and enabling digital capability requires a postgraduate landscape that does what undergraduate provision cannot: develop deep specialism, integrate across disciplines, and support the translation and adoption of innovation in complex, regulated environments.

This framework therefore views postgraduate education not as an extension of undergraduate pipelines, but as critical economic infrastructure — enabling innovation, productivity and system change across the local economy.

The analysis suggests that Level 7 and Level 8 provision play distinct but interdependent roles, and that future growth depends on strengthening the relationship between them rather than treating them as separate policy domains.

Level 8 (Doctoral) provision: depth, credibility and translation

Level 8 provision underpins the long-term competitiveness of the area's innovation economy. It sustains scientific depth, attracts talent and investment, and provides the research credibility required to participate in national and international innovation systems.

Two complementary forms of doctoral activity are required:

Traditional doctoral research remains essential in areas where Keele already demonstrates strong national standing: materials science, biosciences and life sciences, environmental systems, omics, energy materials and systems analysis. Over the next three to eight years, the priority is not expansion for its own sake, but consolidation and focus around fewer, clearer themes aligned to national missions (e.g. materials innovation, engineering biology, Net Zero delivery). This strengthens visibility, funding success and inward investment potential.

Alongside this, collaborative and industry-embedded doctoral activity is increasingly critical. This form of doctoral provision supports innovation not by producing more research outputs, but by embedding doctoral-scale problem-solving within firms, public systems and applied innovation environments. Its value lies in translation, de-risking and systems integration.

Demand for this form of doctoral activity is currently uneven across the local economy. However, the evidence suggests this reflects immaturity of models rather than lack of need. Firms in materials, life sciences, energy and infrastructure increasingly face problems that exceed the capacity of ad hoc consultancy or incremental skills development. Over time, collaborative doctorates offer a structured way to address these challenges — provided they are framed around real system problems and supported by brokerage, public co-investment and flexible delivery models.

The strategic opportunity is therefore to grow collaborative doctoral provision incrementally, starting with anchor organisations and public-system challenges, and scaling as confidence and absorptive capacity increase.

Level 7 provision: specialism, adoption and system capability

If Level 8 underpins depth and credibility, Level 7 provision is the fastest lever for productivity and innovation adoption.

Across all four clusters, the analysis highlights growing demand for specialist roles that:

- Sit beyond undergraduate capability
- Combine technical, regulatory and systems knowledge
- Are required to scale and embed innovation rather than invent it

These roles are particularly evident in materials scale-up and validation, life sciences regulation and adoption, energy systems integration, and digital assurance in regulated environments. They are often filled informally or through experience, creating bottlenecks to growth and adoption.

Future Level 7 provision should therefore prioritise:

- Specialist, interdisciplinary programmes
- Modular and stackable formats
- Strong alignment with real occupational roles
- Clear progression links to collaborative doctoral activity

Here, the complementary strengths of Keele and University of Staffordshire are especially important. Keele contributes scientific depth, analytical rigour and legitimacy in regulated domains, while Staffordshire brings applied delivery, systems integration and employer-aligned provision. Together, they can support a coherent Level 7 landscape that strengthens innovation diffusion without duplicating undergraduate provision.

The relationship between Level 7 and Level 8

A key insight from the analysis is that Level 7 and Level 8 should be designed as a connected system, not parallel tracks.

Level 7 provision:

- Builds absorptive capacity in firms and public systems
- Creates demand and readiness for collaborative doctoral activity
- Supports career progression within the everyday and foundational economy

Level 8 provision:

- Anchors innovation capability
- Supports translation of complex challenges
- Reinforces the credibility of Level 7 specialisms

Over time, this creates a virtuous cycle: stronger Level 7 capability increases appetite for collaborative doctorates, while doctoral activity informs and enriches advanced professional education.

Skills for Innovation

UK evidence on the value of leadership and management development to the economy was drawn together on behalf of BIS in 2012[54] and this has strongly informed the inclusion of a leadership and management intervention in the suite of investments by the University to support local economic growth. The headlines are:

- Poor leadership causes 56% of corporate failures;
- Inefficient management costs businesses over £19bn a year;
- A single point improvement in leadership and management practices (on a scale of 1-5) is equivalent to a 25% increase in the labour force or a 65% increase in invested capital

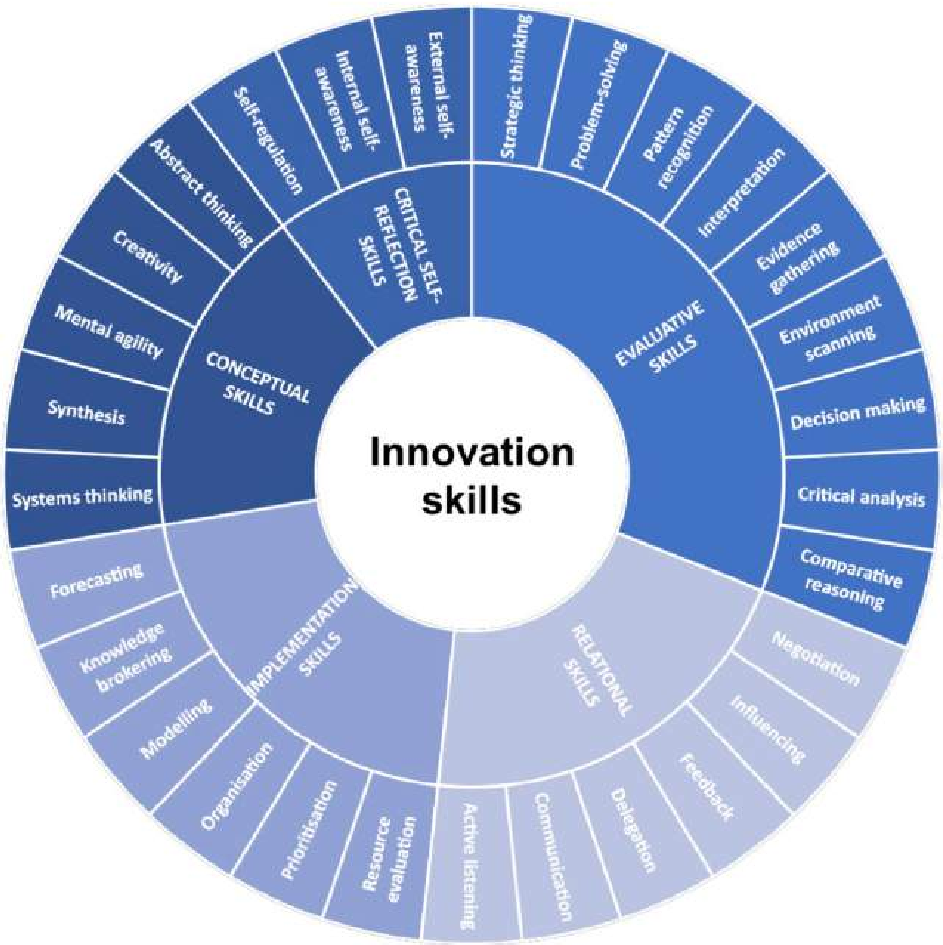
UK Government commissioned research into micro-businesses identified the internal capability and capacity to grow, and the psychological limits or vision of the owner as two of three key barriers to business growth. This points to the need for effective leadership and management programmes able to address both skills and psychology. The research also confirmed the existence of market failures in relation to investment in training by SMEs, providing a rationale for government intervention.

In response to this challenge, and the wider need for non-specialist skills, Innovate UK partnered with the Institute for Apprenticeships and Technical Education (IfATE) to develop an evidence base and understanding of innovation skills to influence its programmes and qualifications.

[54] BIS (2012) Leadership and management in the UK- the key to sustainable growth: A summary of the evidence for the value of investing in leadership and management development

The Innovation Caucus was commissioned to develop an Innovation Skills Framework[55] to identify the skills critical for innovation, support the development of an innovative workforce, encourage the next generation of entrepreneurs and innovators to drive economic growth, and support the UK's position as a leader in innovation. As part of this process, we worked closely with Innovate UK, IfATE, and their stakeholders to develop, test, and refine the Framework.

The Innovation Caucus framework moves beyond narrow definitions of innovation skills as entrepreneurship or leadership alone. Instead, it identifies a set of cross-cutting capabilities that enable individuals, organisations and places to innovate effectively, regardless of sector.



At its core, the framework highlights five interconnected domains:

- Creative and Problem-Framing Skills – the ability to identify problems worth solving, frame challenges from multiple perspectives, and generate novel but relevant solutions.

[55] https://innovationcaucus.co.uk/app/uploads/2023/05/Innovation-Skills-Framework-V5-Updated-July-2023.pdf

- Translation and Boundary-Spanning Skills – working across disciplines, sectors and organisational cultures; translating between research, industry, policy and practice.
- Implementation and Change Skills – turning ideas into action, managing uncertainty, navigating regulation and procurement, and embedding innovation in organisations and systems.
- Collaboration and Relationship Skills – building trust, managing partnerships, co-producing solutions and working effectively across institutional boundaries.

- Strategic and Reflective Skills – understanding systems, learning from failure, adapting approaches and aligning innovation activity with wider missions and outcomes.

Crucially, the framework emphasises that these skills are distributed across systems, not concentrated in a single role or sector. They are needed in businesses, universities, colleges, local authorities, healthcare organisations and intermediary bodies — often in different combinations and at different levels.

Relevance to Stoke-on-Trent and Staffordshire's innovation priorities

The relevance of this framework to the area's innovation ambitions is particularly strong:

- In materials innovation and energy systems, firms face complex challenges around scale-up, integration, regulation, skills transition and investment readiness. Translation, implementation and systems skills are as critical as technical excellence.
- In life sciences and engineering biology, innovation depends on collaboration between researchers, clinicians, businesses and public bodies, with strong requirements for trust, evaluation and adoption.
- In the digital economy, productivity gains are constrained less by technology availability than by adoption, diffusion, organisational change and confidence — all areas where innovation skills are decisive.

The Innovation Caucus model therefore provides a common language for discussing capability gaps that appear repeatedly across clusters, even where the technologies and markets differ.

International evidence suggests that the greatest economic and social returns come not from treating innovation skills as a niche intervention, but from embedding them across mainstream activity — in businesses, higher education, further education and professional development.

From a place-based perspective, this suggests an opportunity to:

- Support innovation skills development within existing HE and FE provision, including undergraduate, postgraduate and professional education, rather than relying solely on stand-alone programmes.

- Strengthen innovation leadership and absorptive capacity within firms, particularly SMEs, through employer-informed provision that is closely linked to live innovation challenges.
- Embed innovation skills within collaborative R&D, adoption and demonstrator programmes, so that capability is built as a by-product of doing, not as an abstract training exercise.

This approach aligns well with the reality of constrained public sector capacity. Rather than creating a new delivery structure, the focus is on amplifying impact through coordination, curriculum alignment and shared frameworks.

The area already has relevant experience to draw on. Previous place-based initiatives — including leadership and innovation capability programmes delivered through Keele University — demonstrated that well-designed innovation skills interventions can generate meaningful economic impact, including measurable GVA and employment effects, while strengthening firm resilience and growth potential.

While funding conditions have changed, the underlying lesson remains relevant: innovation capability can be developed at scale when programmes are employer-informed, applied, and embedded within wider innovation activity.

This suggests scope to:

- Revisit innovation leadership and capability development as a strategic enabler, rather than a discretionary add-on.
- Explore how existing provision across the area's two universities and colleges might incrementally align with the Innovation Caucus framework, without requiring large new public investment.
- Consider whether a light-touch partnership approach — potentially involving the Innovation Caucus itself — could support evidence-led experimentation, evaluation and learning over time.

9.2 A Just Transition Approach to Innovation

Implications for a Strategic Combined Authority

Innovation-led growth across materials, life sciences, digital and energy systems has the potential to improve productivity, resilience and long-term prosperity. However, the evidence also shows that innovation can produce uneven labour market impacts, particularly for lower-paid and lower-skilled workers whose roles are most exposed to automation, process change or system reconfiguration. A Strategic Combined Authority therefore has a critical role in ensuring that innovation delivers fairer outcomes, without constraining growth or technological progress.

A just transition in this context should not be understood as a single programme or compensation mechanism, but as a set of enabling conditions embedded into how innovation is governed and delivered. The focus is less on predicting job losses, and more on anticipating change early, supporting progression, and ensuring that the costs and benefits of innovation are more evenly shared across the workforce and communities.

Potential Strategic functions for a SCA

At SCA level, the most effective contribution is to act as a system steward rather than a delivery body, creating the conditions in which employers, workers and institutions can respond constructively to change.

In practice, this involves three core functions:

- **Shared intelligence** and early warning. The SCA can provide a neutral forum for bringing together evidence on how innovation is reshaping work across sectors — drawing on employer insight, skills data, RTIC analysis and union intelligence. This shared understanding helps surface risks early, before displacement becomes entrenched, and allows partners to focus on job redesign and progression, not just redundancy response.
- **Alignment of innovation, skills and workforce support.** A just transition requires tighter alignment between innovation activity and workforce planning. The SCA can support this by ensuring that skills provision, retraining routes and progression pathways are explicitly linked to innovation deployment in areas such as Net Zero, digital adoption and life sciences translation. This does not replace employer responsibility, but helps ensure that workers can realistically move into emerging roles as systems evolve.
- **Convening for trust and fairness.** Innovation transitions are more likely to succeed where there is trust between employers, workers and public institutions. The SCA can play a convening role that supports dialogue around job quality, training access and redeployment, particularly in sectors where change is rapid and fragmented. This function is especially important where national policy levers (employment law, social security, regulation) shape outcomes but local impacts are felt most directly.

Roles Within the System

A just transition approach depends on complementary roles:

- Employers lead on implementation, job design and investment in skills, with early engagement and transparency about how innovation affects roles.
- Trade unions and worker representatives support interpretation, negotiation and feedback, helping ensure that change translates into progression and improved job quality.
- The state, primarily at national level, provides the regulatory, funding and social protection frameworks that make adaptation viable.
- The SCA aligns these actors around shared evidence and place-based priorities, without assuming delivery or ownership of outcomes.

Why This Matters for Place-Based Innovation

Without an explicit just transition lens, innovation risks reinforcing existing inequalities, particularly in places with high concentrations of lower-paid work and legacy industries. With it, innovation can become a vehicle for upgrading jobs, strengthening progression pathways and improving economic resilience, rather than a source of disruption.

For a Strategic Combined Authority, embedding just transition principles within the enabling framework signals maturity, realism and credibility — to employers, workers and national partners alike — and strengthens the case for devolved responsibility in shaping the future of work.

9.3 Firm-level Investment Readiness

The preceding sections set out the investment landscape for each of the priority clusters — Materials Innovation, Digital Economy, Life Sciences and Energy Systems Innovation — recognising that each operates within distinct national markets, funding regimes and risk profiles. Taken together, however, they reveal a set of shared structural features that shape how innovation-led firms in Stoke-on-Trent and Staffordshire engage with investment, and where place-based action may add the greatest value.

Across all clusters, firms typically sit between strong public research and innovation support and more selective private capital, with the most challenging point occurring at the transition between early-stage innovation and scalable commercial growth. This is not unusual for regions outside the UK's most established investment hubs, and it reflects the way capital markets assess risk, scale and exit rather than a lack of underlying capability.

Cluster-specific investment dynamics

- **Materials Innovation** firms benefit from strong national public R&D funding and industrial demand, but face longer development cycles, higher validation costs and investor caution around time-to-market and customer concentration. Investment readiness is closely tied to translation, manufacturability and credibility with downstream adopters rather than scientific excellence alone.
- **Digital Economy** investment conditions differ significantly between the two sub-clusters. Software and services firms operate in competitive but well-capitalised markets, while hardware, embedded systems and applied digital firms often sit between conventional investment categories. Investor confidence is shaped by leadership capability, market clarity and demonstrable adoption rather than technology novelty.
- **Life Sciences**, both health-related and non-health, attract substantial public funding but face fragmented private investment pathways, particularly for MedTech, diagnostics, engineering biology and environmental biosciences. Here, adoption routes, regulatory clarity and evaluation capacity are often more decisive for investment than research strength.
- **Energy Systems Innovation** investment is driven by deployment and systems integration rather than frontier technology. Capital tends to follow large-scale infrastructure and clearly defined demand, while inland regions see most opportunity in services, optimisation, replication and risk reduction rather than asset ownership.

These differences matter, but they sit alongside a common set of investor concerns that recur across sectors.

Cross-cutting constraints from an investor perspective

Viewed across the clusters, investor hesitancy is rarely explained by a single factor. Instead, it reflects the stacking of multiple risks within individual propositions. Common themes include:

- **Translation and adoption risk**: uncertainty about whether innovation will be taken up at scale, particularly where public-sector or regulated markets are involved.
- **Leadership and governance capacity**: strong technical founders without equivalent commercial, operational or scale-up experience.
- **Market legibility**: difficulty articulating addressable markets, customer pipelines and growth pathways in ways that resonate beyond the local context.
- **Capital efficiency and scale economics**: concern over whether businesses can grow without repeated infusions of capital, particularly in capital- or asset-adjacent models.
- **Time and coordination**: fragmented support environments that increase transaction costs for both firms and investors.

These are not unique failings of individual businesses or institutions. They are characteristic of innovation systems where public and private capital are insufficiently aligned around the transition from discovery to deployment.

Implications for place-based intervention

The analysis suggests that the most effective role for place-based action is not to replace markets or attract investment indiscriminately, but to focus on areas where public actors, universities and civic institutions can reduce uncertainty and improve confidence.

Across all four clusters, the highest-value interventions are those that:

- strengthen translation, validation and adoption pathways;
- improve the quality and credibility of investment propositions;
- support leadership, governance and scale-up capability;
- create clearer signals of demand, particularly where public services or regulated sectors are involved; and
- reduce duplication by connecting firms to national assets, funding and networks rather than attempting to recreate them locally.

This points toward the value of a coherent, visible anchor function that operates across clusters, rather than a series of disconnected sector-specific initiatives.

A proposed anchor proposition: a place-based innovation and investment enablement function

As a starting point for discussion, the evidence points toward the potential value of a place-based innovation and investment enablement proposition, operating across the priority clusters and aligned to national funding and investment frameworks.

The purpose of such an anchor would not be to act as an investor or fund, but to improve the conditions under which investment decisions are made.

At a high level, this could involve:

- **Translation and validation support.** Helping firms reduce technical, regulatory and adoption risk through access to demonstrators, testbeds, evaluation environments and national facilities — particularly in materials, life sciences and energy systems.
- **Investment readiness and leadership capability**. Supporting management teams to articulate growth pathways, strengthen governance and engage confidently with investors, drawing on external expertise where appropriate.
- **Demand articulation and adoption pathways.** Working with public-sector partners, health systems, infrastructure providers and major employers to clarify demand signals and routes to early customers, particularly in regulated or system-led markets.
- **System brokerage and coordination.** Acting as a neutral convenor between firms, universities, national funders and investors, reducing fragmentation and transaction costs while maintaining openness to different models and partners.

This function would sit alongside, not replace, existing sectoral strengths and institutional roles. Its value would lie in connective capacity — aligning research, skills, infrastructure, adoption and investment into clearer pathways for growth.

The role of anchors

Universities, local authorities, colleges, NHS partners and other civic institutions already play a significant role in shaping the innovation economy. Collectively, they contribute:

- credibility and neutrality in early-stage validation and evaluation;
- access to skills, talent and applied research capability;
- convening power across public, private and community actors; and
- long-term commitment that complements the shorter horizons of private capital.

The opportunity is not to centralise control, but to use these anchor strengths more deliberately to support innovation-led firms through critical transition points, while remaining open to challenge, refinement and alternative perspectives as the strategy evolves.

9.4 The inward investment landscape

Inward investment in innovation-led activity is increasingly selective, mission-driven and place-sensitive. Both domestic and international investors are seeking environments that can support translation, adoption and scale, not simply early-stage research or speculative growth. This is particularly true in regulated and system-intensive sectors such as advanced materials, life sciences, energy systems and digital technologies embedded in critical infrastructure.

Across the UK, competition for this type of investment is intensifying. Established innovation geographies — including the Golden Triangle, parts of the West Midlands conurbation, and selected northern city-regions — offer deep capital markets, dense labour pools and highly visible ecosystems. However, these advantages are often accompanied by high land values, constrained infrastructure, rising operating costs and limited capacity for real-world testing and deployment. As a result, many innovation-led firms — particularly those moving beyond discovery into validation, adoption or early scale — are seeking alternative locations that offer a better balance between capability, cost and deliverability.

Within this context, Stoke-on-Trent and Staffordshire sits in a distinct but credible position. The area is not competing to attract frontier science clusters or large volumes of speculative venture capital. Instead, it offers an environment suited to applied innovation, where businesses are looking to integrate R&D with production, testing, validation, skills and real-world use. This applies equally to UK-based firms seeking space to grow and international organisations looking for a UK or European base for delivery-focused activity.

Opportunities and constraints at a strategic level

The area presents a number of clear opportunities for innovation-led inward investment:

- Strong alignment between industry, research and public systems in priority clusters, particularly materials innovation, life sciences, energy systems and digitally enabled manufacturing and services.
- A portfolio of locations — including town and city centres, university-anchored innovation space, high-spec business parks and strategic industrial sites — capable of supporting different stages of the innovation lifecycle.
- Lower land and operating costs relative to core competitor regions, improving viability for space-intensive or capital-constrained activity.
- Access to national assets and networks (rather than duplication), enabling firms to plug into specialist facilities, standards and funding while operating locally.
- Growing experience in place-based innovation delivery, including demonstrators, adoption programmes and collaborative R&D.

At the same time, there are real constraints that need to be acknowledged:

- Land value viability can be challenging for some high-spec uses, particularly where development costs are high but market rents remain modest. This is most acute for laboratory-intensive life sciences and some advanced manufacturing uses.

- Infrastructure demands — notably power capacity, grid connectivity, digital resilience and specialist building specification — can exceed what is readily available on standard employment sites.
- Sector-specific limitations apply. For example, large-scale biomanufacturing, frontier energy generation or hydrogen-led industrial development are unlikely to be competitive locally without substantial public intervention.
- Perception and visibility remain issues: while the area's capabilities are strong, they are not always well understood externally, particularly by international investors or national intermediaries.
- Competition from higher-profile locations means the area must be clear about what it will prioritise — and what it will not attempt to attract.

Recognising these constraints is not a weakness. It is essential to maintaining credibility and focusing effort where inward investment is both realistic and value-creating.

A distinctive inward investment proposition

The area's inward investment proposition is therefore deliberately differentiated. It is built around delivery, integration and outcomes, rather than scale for its own sake.

At its core, Stoke-on-Trent and Staffordshire offers a place-based innovation environment for complex, applied activity, where firms can:

- Validate and deploy technologies in real-world settings;
- Integrate R&D with small-scale production, testing and early commercialisation;
- Work alongside public systems (health, energy, infrastructure) that shape adoption;
- Access skills pipelines across FE, HE and professional education;
- Operate at lower cost while retaining strong connectivity to national and international markets.

This proposition resonates most strongly with:

- Materials and advanced manufacturing firms moving from research into scale-up or specialist production, particularly in harsh environments, energy, defence and medtech supply chains.
- Life sciences and medtech businesses focused on adoption, evaluation and pathway integration, rather than standalone laboratory research.
- Energy systems and Net Zero firms working on integration, optimisation and replication, rather than single-technology deployment.
- Digital and data-enabled companies operating in regulated, industrial or public service contexts, where trust, assurance and systems understanding matter.

Rather than promoting a single flagship site or sector, the proposition emphasises fit: matching firms to the locations, infrastructure and partners that best support their stage of development and operational model.

Applied digital capability strengthens the area's investment proposition by supporting scalable adoption, systems integration and productivity gains across multiple priority sectors.

The role of anchors in enabling success

Anchor institutions play a central role in making this proposition work. Their contribution is less about direct investment and more about system stewardship.

Universities provide:

- Research depth and interdisciplinary capability aligned to priority clusters;
- Translation, brokerage and convening functions that reduce risk for firms;
- Skills pipelines and workforce development across multiple levels;
- Credibility with national funders, regulators and international partners.

Local authorities contribute:

- Strategic coordination across sites, infrastructure and investment priorities;
- Planning, land assembly and enabling interventions where market failure exists;
- Convening power across public services, utilities and delivery partners;
- A long-term place commitment that underpins investor confidence.

Specialist assets and intermediaries (such as Lucideon/AMRICC, health and energy partnerships, and national innovation networks) provide:

- Access to validation, standards and industrial readiness;
- Connections to national programmes and sector leadership;
- Pathways for firms to scale beyond the local area.

Critically, success depends on alignment rather than expansion: using these anchors to connect existing capability, provide clear routes through the system, and present a coherent offer to investors.

An enabling framework, not a closed offer

Taken together, this creates an inward investment environment that is open, selective and purposeful. It does not promise to be all things to all sectors, nor does it seek to replicate the attributes of more established innovation centres. Instead, it offers something complementary: a place where innovation can be made to work — technically, commercially and socially — in real settings.

This enabling framework should be seen as a starting point. As propositions mature into defined programmes, and as governance and delivery arrangements evolve, there will be opportunities to sharpen targeting, refine incentives and quantify impact. For now, the priority is clarity: about the kind of innovation the area is well placed to support, the conditions required to attract it, and the collective role of anchors in making inward investment translate into long-term economic value.

Appendix 1 | Stoke on Trent and Staffordshire Innovation Board Terms of Reference

Objectives

- **Leadership**. To provide Cross-Sector leadership to accelerate the growth of the area's innovation-led economy, placing industries in innovation-active clusters, knowledge partners and expert user communities at the heart of the area's economic growth ambitions.
- **Innovation systems**. To shape and grow supportive local innovation ecosystems so able to create the optimal conditions for innovation-led companies to flourish, and the community to grow though new enterprises, inward investment and knowledge diffusion.
- **Funding**. Assume the lead role for the area in securing strategic funding for innovation, including private sector investment and other co-funding. Work across key stakeholder groups to develop forward funding plans and co-ordinate fundraising activities.
- **External connections.** To ensure that the local ecosystem is nationally and globally connected, contributing usefully to the UK's economic future, and attracting what it needs from elsewhere to thrive. Act as the primary channel for place-based innovation with key external bodies and stakeholders.
- **Communications**. Provide the expert voice on innovation, locally, nationally and internationally, acting as a strategic advisory body, developing the role of the Board and its members in advocacy, and co-ordinating public affairs in this area.
- **Strategy, Policy and Commissioning**. To play the primary role in the development of strategy and policy on innovation, building the Board's capabilities in direct commissioning as Stoke-on-Trent and Staffordshire moves towards arrangements for a Strategic Mayoral Combined Authority.
- **Delivery**. To oversee at the strategic level the delivery, outcomes, and ongoing development of the area's ambitious plans to boost growth in the innovation-intensive economy (including any plans linked to funded programmes) working proactively with other parts of the system to address any challenges or obstacles, and holding delivery partners to account.
- **Evidence and insight.** To oversee a portfolio of purposeful strategic evidence and insight work in this area, maintaining an up-to-date picture of the needs and opportunities of the changing innovation economy, ensuring effective use is made of emerging insights, and that future interventions

Membership

- Private Sector Chair with strong track-record of leadership in a partnership setting, as well as knowledge and experience of the innovation landscape.
- One local business leader from each innovation cluster – e.g. Advanced Manufacturing, Advanced Materials, Life Sciences, specific Digital clusters (or variants to respond to cluster analysis). (
- Trade/Sector body representative, or similar industry specialist for each cluster to bring a national/international perspective
- One Executive-level and one subject specialist academic from each University
- Two Local Authority representatives – one Member and one Officer (to be determined by Leaders' Board). To report to the Leaders' Board on Innovation Board activities, with a focus on alignment of objectives and activities, building local authority knowledge and leadership capacity in this area, and developing arrangements for place-based innovation under a future Strategic Authority.
- Specialist economic advisor, ideally with firm-level expertise
- Appropriate end user/expert citizen/community representative to support 'Quadruple Helix' innovation i.e. partnerships between businesses, universities, the public sector and end users, informed by lived experiences (an example being Public and Patient Involvement groups). Membership to be agreed once industry focus is clear.
- Co-opted members as advised by UK Research & innovation as co-commissioner, possibly the Department of Science, Innovation and technology, and relevant Catapults, and Innovate UK.

Operation

The Board would meet at least four times a year, more frequently as required at the discretion of the Chair. It would initially operate with a just a dotted line relationship of the Leaders' Board, on the clear understanding that its role is to shape and drive economic growth in line with the agreed

Growth Plan. Local Authority Board members would be responsible for reporting progress and issues of relevance into the Leaders' Board, and for ensuring productive development work to support potential future devolution in this area. Public Sector and University Board members would be expected to fund their own expenses associated with Board Membership. Private Sector Board members would be encouraged to do so, and treatment of expenses for any Board Members from charitable and community sectors (unlikely initially) would need to be funded in full by one or more of the anchor institutions, or appropriate external funds secured. To enable rapid progress in setting up the Board, the University should be able to underwrite this initially from the Higher Education Innovation Fund.

All Board members would be expected to uphold Nolan Principles, with training provided on induction, alongside sessions on Board effectiveness in the partnership context, providing clarity on the expectations of individual members and collective Board behaviours. The Board pack would include clear processes for dealing with any concerns about probity.

The Board would also agree dispute resolution mechanisms at its inaugural meeting alongside Terms of Reference. Should the Board encounter problems that cannot be resolved within the Board (e.g. failure to make progress, significant disputes, governance concerns) mediation would be available in the first instance, with scope to escalate to Local Authority and University Chief Officers for final resolution.

Appendix 2 | Potential National Materials Strategy Contributions

Keele University

NMIS Sub-Theme	Research Alignment	Facilities / Infrastructure Alignment
A2-1 Energy Solutions	Strong research in energy materials, electrochemistry, catalysis, hydrogen, and energy systems	Chemistry & physics labs; electrochemistry suites; energy materials characterisation; campus energy demonstrators
A2-1.1 Materials for Battery Energy Storage	Battery materials, interfaces, degradation	Electrochemical testing; materials synthesis & characterisation
A2-1.2 Materials for Large-scale Electrochemical Energy Generation & Conversion	Fuel cells, catalysis, electrochemical conversion	Electrochemistry labs; spectroscopy & surface analysis
A2-1.3 Materials for Hydrogen Transport, Storage & Use	Hydrogen materials, catalysts, storage	Hydrogen research facilities; applied energy infrastructure
A2-2 Materials for Future Healthcare	Biomaterials, tissue engineering, diagnostics, medical interfaces	Biomedical labs; chemistry & life sciences facilities; NHS links
A2-2.1 Biocompatible Materials	Polymers, ceramics, surfaces for biomedical use	Biomaterials labs; microscopy & surface analysis
A2-2.2 Materials for Bioelectronics	Neural interfaces, sensors, bioelectronic materials	Electronics labs; imaging & clean working environments
A2-3 Structural Innovations	Metals, composites, ceramics, structural performance	Materials synthesis labs; mechanical testing; microscopy
A2-3.1 Materials for Low-carbon Construction	Sustainable construction and low-carbon materials	Civil engineering and materials testing labs
A2-3.2 Sustainable Structural Systems – Composites	Polymer and composite materials research	Composite fabrication and characterisation
A2-3.3 Metallic Materials	Metallurgy, corrosion, functional metals	Metallurgical labs; surface analysis; mechanical testing
A2-3.4 Ceramic Materials	Structural and functional ceramics	High-temperature processing; ceramic characterisation
A2-4 Advanced Surface Technologies	Surface engineering, coatings, tribology, interfaces	Surface analysis (SEM/XPS); tribology and coatings rigs
A2-4.1 Materials & Modelling for Surface Engineering & Tribology	Experimental and computational tribology	Modelling infrastructure; surface testing
A2-4.2 Surface Treatments & Materials for Demanding Environments	Corrosion, durability, extreme environments	Environmental chambers; surface treatment labs
A2-5 Next Generation Electronics, Telecommunications & Sensors	Functional electronic materials, sensors, device physics	Electronics labs; materials physics facilities
A2-5.1 Materials for Power Electronics	Wide-bandgap materials and power devices	Device fabrication and testing labs
A2-5.3 Materials for Connectivity & Telecommunications	Electronic and photonic materials	Optoelectronics and communications labs
A3-1 Materials 4.0	AI-driven materials discovery, modelling, data-led materials science	HPC facilities; modelling and data infrastructure

A3-2 Sustainability & Circular Economies	Circular materials, lifecycle analysis, environmental impact	Environmental science labs; analytical facilities
A3-4 Translation & Manufacturing	Strong industry collaboration and translational research	Science park links; pilot-scale and applied labs

University of Staffordshire

NMIS Sub-Theme	Research Alignment	Facilities Alignment
A3-4 Translation & Manufacturing	Core applied research strength focused on translation, manufacturing systems, and SME collaboration	Prototyping workshops, manufacturing and engineering labs
A3-1 Materials 4.0	Applied research in digital manufacturing, AI, IoT, cyber-physical systems	Digital innovation hubs, automation and computing facilities
A3-2 Sustainability & Circular Economies	Strong applied sustainability and circular systems research	Sustainability labs, design and systems modelling spaces
A2-5 Next Generation Electronics, Telecommunications & Sensors	Applied electronics, IoT, sensing, and digital systems research	Electronics labs, digital prototyping and test facilities
A2-6 Consumer Products, Packaging & Specialist Polymers	Applied product design, sustainable materials use, lifecycle research	Product design studios, materials prototyping labs
A2-3 Structural Innovations	Applied engineering research on structures, materials selection, and systems performance	Engineering workshops, Advanced Materials Lab
A2-1 Energy Solutions	Applied energy systems, thermal engineering, efficiency and integration	Engineering and energy systems labs
A2-4 Advanced Surface Technologies	Surface performance, durability, and manufacturing-focused research	Manufacturing and surface testing facilities
A2-2 Materials for Future Healthcare	Health innovation, biomechanics, medical simulation (not materials discovery)	Centre for Health Innovation, biomechanics labs
A2-3.1 Materials for Low-carbon Construction	Applied construction and sustainability research	Civil engineering and materials testing labs
A2-3.2 Sustainable Structural Systems – Composites	Manufacturing and prototyping focus	Advanced Materials Lab
A2-2.1 Biocompatible Materials	Device and biomechanics evaluation	Health and applied science labs
A2-5.3 Materials for Connectivity & Telecommunications	Networking and digital systems rather than materials science	Communications and electronics labs
A2-1.4 Materials for Heat Exchange, Storage & Recovery	Thermal systems and applied energy research	Thermal engineering labs
A2-3.3 Metallic Materials	Materials application and testing only	Engineering and testing labs

A2-3.4 Ceramic Materials	Limited applied materials testing	Materials labs (non-specialist)
A2-4.1 Surface Engineering & Tribology (fundamental)	Modelling and applied performance focus	Computing and test facilities
A2-1.1 Materials for Battery Energy Storage	Systems integration rather than materials chemistry	Electrical engineering labs
A2-1.2 Materials for Electrochemical Energy Generation & Conversion	Applied power systems perspective	Power systems labs
A2-1.3 Materials for Hydrogen Transport, Storage & Use	Conceptual and systems-level engagement	Engineering teaching facilities
A2-1.6 Advanced Nuclear Fuels & Nuclear Test Capability	No significant research alignment	No specialist facilities
A2-5.2 Materials for Quantum Technologies	No significant research alignment	No specialist facilities

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NMIS Sub-Theme	Capability Alignment	Facilities Alignment
A3-4 Translation & Manufacturing	Core national capability in materials translation, scale-up, manufacturability, and industrial readiness	Pilot-scale manufacturing, process development facilities, industrial test environments
A3-5 Policy, Regulations & Standards	Deep expertise in standards, qualification, certification, and regulatory compliance	Accredited testing laboratories; standards development and validation infrastructure
A2-3 Structural Innovations	World-leading expertise in structural ceramics, refractories, glass, and inorganic materials	Mechanical testing labs; high-temperature and extreme-environment facilities
A2-3.4 Ceramic Materials	Core strength in ceramic materials formulation, processing, performance, and failure analysis	Ceramic processing, firing, sintering, and characterisation facilities
A2-4 Advanced Surface Technologies	Expertise in coatings, surface treatments, tribology, corrosion, and durability	Surface engineering labs; tribology rigs; environmental exposure chambers
A2-4.1 Materials & Modelling for Surface Engineering & Tribology	Applied modelling and performance-driven surface optimisation	Surface testing, wear, and friction characterisation facilities
A2-4.2 Surface Treatments & Materials for Demanding Environments	Specialism in materials performance under thermal, chemical, and mechanical extremes	High-temperature, corrosive, and cyclic loading test facilities
A2-1 Energy Solutions	Expertise in materials for harsh energy environments (thermal, chemical, mechanical resilience)	Energy materials testing; thermal cycling and degradation facilities
A2-1.4 Materials for Heat Exchange, Storage & Recovery	Materials performance, longevity, and reliability expertise	Thermal testing, heat-flow, and degradation labs

A2-2 Materials for Future Healthcare	Expertise in bioceramics, medical ceramics, and materials qualification	Medical materials testing and compliance facilities
A2-2.1 Biocompatible Materials	Biocompatibility, performance testing, and failure analysis (non-clinical)	Accredited biomedical materials labs
A2-6 Consumer Products, Packaging & Specialist Polymers	Product performance, durability, and lifecycle testing (ceramics, glass, coatings)	Product testing, materials evaluation, and ageing facilities
A3-2 Sustainability & Circular Economies	Lifecycle assessment, recyclability, and low-carbon processing expertise	Sustainability testing, materials reuse and recovery labs
A3-1 Materials 4.0	Data-rich testing, digital twins, and process optimisation	Digital data platforms; instrumentation-rich facilities
A2-5 Next Generation Electronics, Telecommunications & Sensors	Ceramic substrates, packaging, thermal management, reliability testing	Electronics packaging and thermal characterisation labs
A2-5.1 Materials for Power Electronics	Thermal and reliability expertise for power devices	Power electronics test and thermal cycling facilities
A2-5.3 Materials for Connectivity & Telecommunications	Performance testing of ceramic and inorganic components	Materials and device reliability labs
A2-1.1 Materials for Battery Energy Storage	Testing and safety evaluation rather than materials development	Battery safety and abuse testing interfaces
A2-1.2 Materials for Electrochemical Energy Generation & Conversion	Peripheral relevance via materials durability testing	Electrochemical testing support
A2-1.3 Materials for Hydrogen Transport, Storage & Use	Materials compatibility and degradation expertise	High-pressure and chemical exposure testing
A2-1.6 Advanced Nuclear Fuels & Nuclear Test Capability	Outside core remit	No specialist nuclear facilities
A2-5.2 Materials for Quantum Technologies	Outside core remit	No specialist quantum facilities

Appendix 3: Potential content Health, Prosperity and Place: Aligning Economic Growth with ICB Priorities

Purpose

This insert sets out how the area's industrial base (life sciences and beyond) could play a more explicit role in supporting ICB priorities, while also creating credible growth and innovation opportunities for local businesses. It is intended to complement existing economic strategies by making the health–economy connection more visible and actionable.

Page 1: Narrative – Making the Health–Growth Connection Explicit

Across Stoke-on-Trent and Staffordshire, economic development strategies already place strong emphasis on inclusive growth, skills, innovation, Net Zero and productivity. In parallel, the Integrated Care Board has articulated clear priorities around population health, prevention, elective recovery, long-term conditions, rehabilitation, care closer to home, and productivity within the health and care system.

There is significant latent alignment between these agendas. The area has a diverse and growing business base spanning life sciences, medtech, digital, data, advanced manufacturing, materials, and environmental technologies, alongside universities and NHS partners with strong research, clinical and innovation capability. However, the contribution that this business base could make to delivering ICB priorities is not yet consistently framed as a growth opportunity in its own right.

A future joint Growth Plan could strengthen this connection by treating ICB priorities as sources of demand and innovation opportunity, rather than solely as public service challenges. In this framing, businesses are not peripheral beneficiaries of better health outcomes, but active contributors to delivery — developing, testing, adopting and scaling solutions that improve productivity, outcomes and system resilience.

This does not require a wholesale rewrite of existing strategies. Instead, it suggests the addition of a focused "Health and Prosperity" strand that:

- translates ICB priorities into clear opportunity themes for business and innovation;
- highlights the role of local firms, universities and NHS partners in co-delivery;
- and emphasises adoption, evaluation and scale-up, not just research or pilots.

Such an approach would support inclusive growth by:

- anchoring innovation in everyday services (health, care, rehabilitation);
- creating demand for applied technical, digital and manufacturing roles;

- and strengthening local supply chains through procurement, validation and deployment.

Page 2: Opportunity Matrix – ICB Priorities and Business Contribution Routes

This matrix illustrates how key ICB priorities could be connected to specific business opportunity areas, drawing on the local industrial base.

ICB Priorities and Business Opportunity Alignment

ICB Priority	Business Opportunity Areas	Relevant Local Capabilities
Prevention & Population Health	Data analytics; risk stratification; environmental and lifestyle interventions; digital engagement tools	Life sciences & omics; bioinformatics; AI/data firms; environmental life sciences
Elective Recovery & Productivity	Pathway optimisation tools; diagnostics; workflow automation; scheduling and decision support	MedTech; digital health; applied AI; systems integration
MSK, Rehabilitation & Long-Term Conditions	Rehab technologies; remote monitoring; assistive devices; digital therapeutics; return-to-work solutions	MSK & primary care research; rehab science; sensors; digital design & modelling
Care Closer to Home	Remote monitoring; home-based diagnostics; interoperable data platforms; community care tools	IoT; digital platforms; data infrastructure; applied electronics
Healthy Ageing & Frailty	Falls prevention; mobility aids; monitoring technologies; service redesign tools	MedTech; materials; design; applied digital
Cancer & Complex Pathways	Diagnostics; pathway analytics; data integration; patient support technologies	Omics; bioinformatics; diagnostics; data science
Workforce Productivity & Wellbeing	Digital tools; assistive technologies; training and simulation; service redesign	Digital; design & modelling; applied engineering