CREATE OR CONSUME

INVESTING IN BRITAIN'S FUTURE, A KNOWLEDGE ECONOMY FOR TOMORROW

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About Labour Tech

We are a group of professionals with experience in the technology sector and members of the Labour Party, working together to help shape forward-looking policies. We collaborate with experts from industry, academia, and politics to support ideas that drive progress. Britain needs growth now more than ever, and by supporting our homegrown technology sector, we can help deliver the economic renewal our country urgently needs.

labour-tech.org.uk

All experts featured in this report are independent of the Labour Party.

About TYI

Let's Get Britain Growing, Building and Prospering Together

TYI's expertise and services reflect our mission as a pro-growth, pro-abundance, research-focused political consultancy dedicated to creating a secure and prosperous United Kingdom.

Across our team, we work to develop and influence policy using research, data and expertise in planning, development, local government, quantum technologies, defence, energy, and advanced manufacturing.

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Foreword & Executive Summary

Francesca Reynolds
Vice Chair, Policy, Labour Tech

Whether we are able to reap the rewards of the technology revolution will be determined by how seriously we take the knowledge economy. Technology, science, and digital infrastructure are no longer niche sectors or optional extras; they are the foundations on which productivity, resilience and growth now rest. This report brings together a set of contributions that make that case clearly, while also being honest about the scale of the challenge involved in delivering it.

The UK is not short of ideas, research excellence or entrepreneurial energy. Yet too often we fail to turn those strengths into sustained economic advantage. Skills shortages, gaps in late-stage investment, uneven digital infrastructure, and a stretched education system all act as brakes on growth. None of these problems are new, but they are becoming harder to ignore as international competition intensifies and public finances remain under pressure.

Technology offers real grounds for optimism. Advances in digital tools, data and artificial intelligence create opportunities to raise productivity and boost growth. Used well, they can help us do more with limited resources rather than simply asking for more spending. But technology on its own is not a solution. It depends on people with the right skills, institutions that can adapt, and a policy environment that encourages long-term investment rather than short-term fixes.

This places a particular responsibility on the current Labour government. If growth is to be built on firm foundations, education has to be treated as economic infrastructure. That means improving outcomes across the system, strengthening technical and vocational pathways alongside higher education, and making better use of technology to support teachers rather than overwhelm them. It also means being realistic about the cost. But the cost of inaction is higher: weaker productivity, lost opportunity, and a continued reliance on sectors that will not deliver the growth we need.

From the Labour Tech Group, the articles in this report argue for a more deliberate, coordinated approach: aligning education, skills, infrastructure and capital behind a clear vision of a technology-enabled economy that works across the whole country. The task is demanding, but the prize is significant. With sustained focus and intelligent investment, the UK can build an economy that is more productive, more resilient and better equipped for the decades ahead.

Policy Recommendations

1. **Treat knowledge as national infrastructure, not a soft policy area.**

   Education, digital connectivity, data, compute, and skills pipelines should be treated in the same strategic category as energy, transport, and defence. That means long-term planning horizons, cross-departmental ownership, and protection from short-term budget cycles. The knowledge economy only works if classrooms, fibre, data centres, and research facilities are planned as one system, not as disconnected projects.

2. **Unlock patient capital to stop Britain exporting its best ideas.**

   The UK does not lack money; it lacks deployable, patient capital. Reform pension fiduciary duty and public-sector pension mandates to enable long-term investment in domestic growth assets, particularly at scale-up stage. Anchor this with a national scale capital vehicle that co-invests at Series B and beyond, so British companies are not forced offshore at the moment value is created.

3. **Fix the skills bottleneck where it actually exists.**

   The binding constraint on growth is no longer early-stage innovation but people with deep technical capability. That means:

   - Raising mathematical and scientific ambition earlier in schools
   - Paying and retaining specialist teachers as an economic priority
   - Expanding high-quality technical apprenticeships and mid-career retraining

   Skills policy must be aligned to where the economy is going, not where it was in the late twentieth century.

4. **Use the state as a market shaper, not just a funder**

   Government should underwrite early risk, crowd in private capital, and act as an intelligent first customer. Smarter procurement, long-term offtake agreements, shared testbeds, and dual-use technology support can turn public spending into a growth engine rather than a cost. This applies equally to defence, health, energy, transport, education technology, and digital infrastructure.

5. **Deploy technology to amplify human capability, not replace it**

   AI and digital tools should be used to return time, judgement, and agency to people — teachers, engineers, clinicians, civil servants — rather than hollowing out professions. That means automating admin, enabling personalised learning, improving diagnostics, and strengthening safeguarding, while keeping humans in the loop. The goal is higher productivity with human dignity, not automation for its own sake.

Teaching the Future, Not the Past

Dave Robertson
Member of Parliament
for Lichfield

When I first stepped into a classroom nearly twenty years ago, carrying a box of circuit components and a slightly overconfident belief that I could explain quantum phenomena to fourteen-year-olds, I could never have imagined how much technology would reshape both education and the wider society my students were growing up in. Later, during my years representing teachers as a trade unionist, I saw the pressures building inside our schools: rising workloads, recruitment and retention crises, uneven access to opportunity, and systems which simply don't deliver for schools, teachers, families or, crucially, the UK's children.

This report begins a conversation about how we can use the incredible strengths of our world class teaching workforce and the intelligent use of technology to capture the opportunities of the 21st century. It is a roadmap for a United Kingdom that is confident in its scientific foundations, committed to widespread opportunity, and determined to harness emerging technologies not as threats, but as tools for national renewal. Each piece approaches the challenge from a different angle—education, infrastructure, economic strategy, and classroom-level innovation—but what unites them is a belief that the next era of prosperity will depend on our ability to combine technological progress with human flourishing. There are no silver bullets here, no one is suggesting that "more iPads and more AI will make everything better" but this report is an important part of grasping the nettle.

The education-focused papers in this collection make a great case that personalised, adaptive learning is no longer a distant ideal but an achievable, necessary step forward. Some of what is contained within is quite jarring for someone who has spent almost 20 years working in the UK's education system, but they do show how artificial intelligence—when deployed responsibly and anchored in strong safeguarding—can restore the teacher's role in the learning process. Automated marking, real-time diagnostic assessment, multilingual learning tools, and support for pupils with special educational needs are not about replacing teachers and teaching assistants; they are about giving teachers the space to do what they entered the profession to do: teach, inspire, and care. I spent enough evenings drowning in piles of exercise books to know the transformative power of tools that return time and energy to the classroom.

But education cannot be viewed in isolation. The paper on digital infrastructure reminds us that none of this is possible without a strong and reliable technical foundation. Rural connectivity, regulatory coherence, a skilled and stable engineering workforce, and long-term investment strategies matter not only for broadband speeds but for national cohesion. If we expect world-class learning experiences for every child, we need world-class infrastructure—not only in our cities but in every village, valley, and coastal town. This isn't just an engineering challenge; it is a question of fairness and national ambition.

The final pieces on building a science and technology led economy, zooms out even further. It reminds us that the UK has long been a global leader in discovery, but we have struggled to capture the full economic value of our own brilliance. Too many promising companies leave our shores before they scale. Too many breakthroughs become someone else's growth story. The argument here is clear: if we want the jobs, industries, and resilience of the future, we must back emerging technologies with patient capital, smarter procurement, and an ecosystem that supports long-term innovation. Technology is not a luxury—it is the engine of our future prosperity.

Better digital infrastructure empowers better AI-enabled classrooms. Better classrooms produce the skilled workforce needed for a thriving innovation economy. And a thriving innovation economy provides the investment, confidence, and national capability to strengthen both our schools and our infrastructure. This is a virtuous circle—one that the UK is uniquely well-placed to build, if we choose to.

Above all, this report is optimistic. It believes that technology, when guided by values and implemented with care, can expand opportunity, restore professional pride, and position the United Kingdom as a global leader once again. As someone who has spent a career straddling classrooms, staffrooms, negotiating rooms, and now the House of Commons, I share that optimism. We have the talent. We have the creativity. And we have the responsibility to act.

My hope is that this report inspires educators, policymakers, innovators, and our friends and neighbours alike to imagine what is possible—and then to work together to make it real.

Invent Here, Grow Elsewhere

Andrew Turner CB CBE
CEO of Saibre Capital

The United Kingdom is at a strategic inflection point. Long a global leader in scientific discovery, higher education, and innovation, but we fail to translate this Global advantage into a GDP engine. The UK now faces a decisive challenge: how to translate world-class research and entrepreneurial talent into sustained economic growth, strategic autonomy, and national resilience in an era of intensifying global competition.

The traditional foundations of the UK economy — financial services, real estate, and consumption-driven growth — can no longer underpin long-term prosperity or security. Geopolitical competition, supply-chain disruption, climate pressures, and rapid technological change are reshaping the global economic order. Nations that succeed will be those that can systematically convert science and technology into productive economic capability, while those that fail risk long-term decline in living standards and strategic influence.

Building a science- and technology-led economy is therefore not a matter of industrial preference, but of national strategy. This requires an engaged financial community, sustained investment in emerging technologies, deliberate support for emerging companies, and a reconfiguration of the relationship between the state, capital markets, and innovation ecosystems.

Why?

UK productivity growth has lagged peer economies for over a decade. While services dominate GDP, many are low-productivity and exposed to automation, offshoring, or wage inflation. Science- and technology-intensive sectors, by contrast, generate higher value per worker, stronger export potential, and longer-term growth trajectories.

Emerging technologies — such as artificial intelligence, advanced materials, quantum technologies, biotechnology, space, and clean energy systems — are inherently productivity-enhancing. They enable automation of complex tasks, creation of new markets and spillovers across multiple sectors. A science-led growth strategy therefore addresses the UK's structural productivity challenge at its root.

Economic power increasingly is the expression of national power. Dependence on foreign suppliers for critical technologies — semiconductors, energy systems, pharmaceuticals, communications infrastructure — exposes the UK to geopolitical risk, coercion, and supply disruption. Investing in domestic science and technology capability does not imply self-sufficiency, but rather strategic autonomy: the ability to shape, access, and influence critical technologies rather than merely consume them. This is particularly relevant for security, energy, health, transport and communications sectors and systems.

High-value technology sectors expand the tax base without proportionate increases in labour or resource inputs. Over time, this supports fiscal sustainability by generating revenues that can fund public services, defence, and social investment. Without a stronger technology-led growth engine, the UK risks an unsustainable fiscal model driven by rising costs and constrained revenues. It is a downward spiral.

Gaps & Overlaps

The UK consistently ranks among the top global nations for research quality, citations, and academic output. Our universities, national laboratories, and research institutes generate breakthroughs across disciplines — from life sciences and materials to AI and astrophysics.

UK venture capital performs well at seed and early stages but remains relatively weak at late-stage and scale-up financing compared to the US and parts of Asia. Pension funds and insurance capital are under-allocated to high-growth technology assets, limiting domestic funding for capital-intensive emerging technologies. This results in foreign ownership of strategic IP and loss of long-term economic value.

Public investment through UK Research and Innovation (UKRI), alongside charitable funding and international collaboration, provides a robust discovery pipeline. Despite scientific strength, the UK has long struggled to translate research into scale-up companies, manufacturing capability, and globally competitive industries.

As a result, many promising firms are acquired early, relocate overseas, or fail to scale due to lack of capital, skills, or infrastructure. This "valley of death" between research and scale is the central structural weakness of the UK innovation eco-system – it is the company killer and why the UK is referred to as an IP farm – exporting its best ideas to scale (and pay taxes) in others' jurisdictions.

Emerging Technologies

Emerging technologies, which are scientifically validated but not yet commercially mature at scale, are often capital-intensive, high-risk, and strategically important. They make for a poor market-driven investment, so Government has a key part to play in underwriting this early-stage risk without unduly leveraging small businesses with equity positions and Board seats.

The UK has an outstanding track record in generating IP and great small companies in emerging technology. But the Nation cannot chase every good idea as the cost-benefit returns vary. Therefore, the science-led economy that we seek requires clear prioritisation around the subjects that sit at that sweet intersection spot of generating growth and resilience. Innovation encouragement should remain broad, but the UK should focus acutely on driving benefit in the following areas:

- **Artificial Intelligence and Data Infrastructure** including foundation models, edge AI, secure compute, and applied AI in health, defence, and industry;
- **Quantum Technologies** in computing, sensing, communications, and timing — with applications in security, navigation, and materials science;
- **Advanced Materials and Manufacturing** including semiconductors, compound materials, additive manufacturing, and photonics.
- **Life Sciences and Bioengineering** from genomics and diagnostics to advanced therapeutics and synthetic biology.
- **Clean Energy and Climate Technologies** such as power electronics, hydrogen, energy storage, small nuclear, space-based energy, and grid resilience
- **Space and Dual-Use Technologies** including satellite manufacture, Earth observation, in-space manufacturing, and secure communications.

All of these technologies are areas derived from academic and technical points of leadership, where the UK has a Global advantage. These sectors also directly contribute to greater strategic autonomy, and building a stockpile of national resilience. They would position the UK technically and industrially, as we were from the eighteenth century onwards, at the heart of Global rule-setting and not taking, and commodity supply not customer demand.

But emerging technologies often fail to attract sufficient private capital to endure long timelines, uncertain demand, and systemic risk. Necessarily, the state needs to act as the lead investor and market shaper. Its key tools include early-stage grant funding to get ideas from inception to demonstrator, a lead investor position to crowd-in private capital to grow a capability to a manufacturing position and then long-term procurement commitments (revenue). This establishes the co-investment and blended finance climate that would attract the market capital that would hold a company onshore.

If this effort was focussed on areas that fall directly in the Government's writ, such as security, energy, health, transport and communications, it is likely that public money has already been allocated. If capital was directed towards support for shared facilities such as pilot plants and testbeds and greater focus was placed on backing dual-use technology, benefits would multiply.

Emerging technologies require specialised infrastructure — clean rooms, test ranges, compute capacity, bio foundries, and secure data environments. Without these, promising research cannot progress beyond the laboratory. Public investment in shared innovation infrastructure reduces duplication, lowers barriers to entry, and supports clusters of activity around universities and industrial hubs.

Taken together, this approach reduces risk, accelerates learning, advances capability and enables private capital to participate at scale. It is the sort of leadership that would deliver disproportionate benefits to growth and resilience and attract market investors, off-setting pressure on the public purse.

Emerging Companies

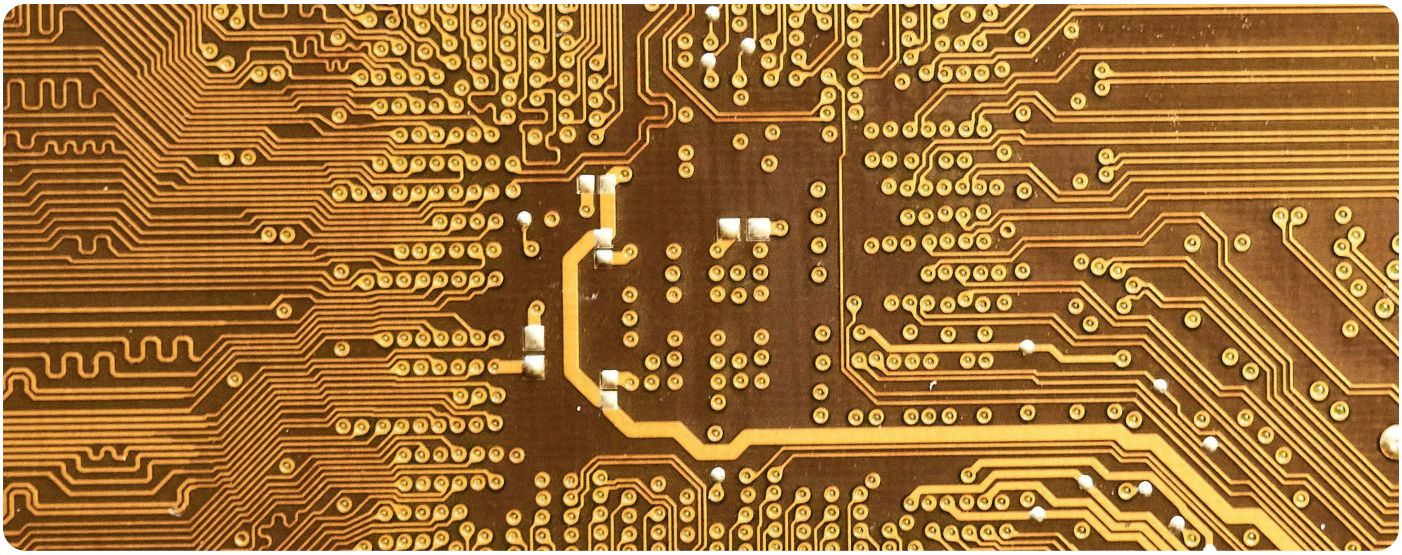
In parallel, work is required to create and curate emerging companies. Supporting them requires more than startup grants; it demands a scale-up ecosystem capable of sustaining growth over decades.

The UK produces many startups but too few large, independent technology companies. Supporting the journey from garage technology to global business requires patient capital willing to support long development cycles, management changes, technical setbacks and market expansion. This is not for the faint-hearted but is vital if the UK is to retain its best brains on shore. But picking winners is difficult and can be as much about character and leadership as technology and finance.

Scale-stage technology investment 'Series B/C and beyond' is the bottleneck. These finance-raising rounds fund team expansion, facility growth, support manufacturing, global expansion, and regulatory approval without which a product is dead. So, mobilising UK institutional capital here is essential. Pension funds, sovereign-style vehicles, and strategic investment platforms can provide this capital, but it flows so much quicker if the Government has signalled interest through a grant, off-take contract or preferably both.

This form of public procurement catalyses growth. Government is often the largest or earliest customer for emerging technologies — particularly in security, energy, health, transport and communications. Here procurement reform (more sole-source and faster) would really help startups to thrive; it is the start-ups that often have the decisive and disruptive technology. This would accelerate them to revenue, support iterative development, and be a reference customer for global market engagement. Procurement policy reform would transform public spending and accelerate innovation.

Talent, skills, and leadership are key too. Scaling technology companies requires not only engineers and scientists, but also experienced operators, regulatory experts, and commercial leaders. If these disruptive businesses are to become the Global giants and unicorns of the future, the UK must attract and retain global talent, enable mobility between academia,



industry, and government, develop leadership pipelines for deep-tech scale-ups, and human capital is often the binding constraint on growth.

Financial Innovation

Traditional funding models are insufficient for the scale and duration required to build a science-led economy. Blended finance structures combine public and private capital to absorb early-stage risk and unlock private investment. This is particularly relevant for capital-intensive technologies such as semiconductors, energy systems, and advanced manufacturing.

The UK government can deploy its balance sheet strategically through long-term contracts, anchor demand and credit support. These tools are often more powerful than direct grants and do not require permanent public ownership. But public capital can also be deployed as: first-loss equity, guarantees and long-term offtake agreements. This approach multiplies the impact of limited public funds.

UK pension funds manage trillions of pounds but invest relatively little in domestic growth assets. Regulatory reform, improved investment vehicles, and co-investment platforms can align retirement savings with long-term national prosperity. This creates a virtuous circle between innovation, growth, and social outcomes.

Building a science-led economy requires coherence across government - fragmented policy undermines impact. If these emerging technology businesses are to thrive, the Government needs to set out its principles around clear national priorities with long-term consistency, coordination between science, industrial, defence, and finance policy, stable institutions capable of learning and adaptation, and an engaged financial sector, facilitated by Whitehall. Innovation policy must be treated as core economic and national security policy, not as a peripheral function.

Conclusion

Building a UK science and technology-led economy is both an opportunity and a necessity. The UK possesses exceptional scientific foundations, entrepreneurial talent, and institutional capability — but these strengths must be systematically converted into economic scale, strategic autonomy, and long-term prosperity.

Investment in emerging technologies and emerging companies is not speculative indulgence; it is infrastructure for the future economy. In a world defined by competition for technology, talent, and capital, the nations that lead will be those that combine scientific excellence with patient capital, effective governance, and strategic intent.

For the UK, success will depend on making deliberate choices: to invest early, to support scale, to share risk intelligently, and to treat science and technology not as costs to be managed, but as assets to be grown. If the Government is to drive growth through emerging tech start-ups and prevent IP flight, they must:

- Codify the technologies at the nexus of resilience, growth and opportunity
- Advocate more strongly for dual-use technology investment and deployment
- Make MOD work closer with other Departments to generate security and growth benefits
- Open the doors to public-private finance and ease on/off balance sheet treatment
- Build stronger bridges between the Government's arms-length investment bodies
- Expand the NWF's remit to drive harder at security and resilience
- Catalyse the City's development of insurance resilience bonds
- Streamline the contract awarding process for SMEs
- Pick winning companies earlier and back them with grants and long-term contracts (revenue)

Britain Builds the Future — Then Gives It Away

Issy Waite
Labour Students

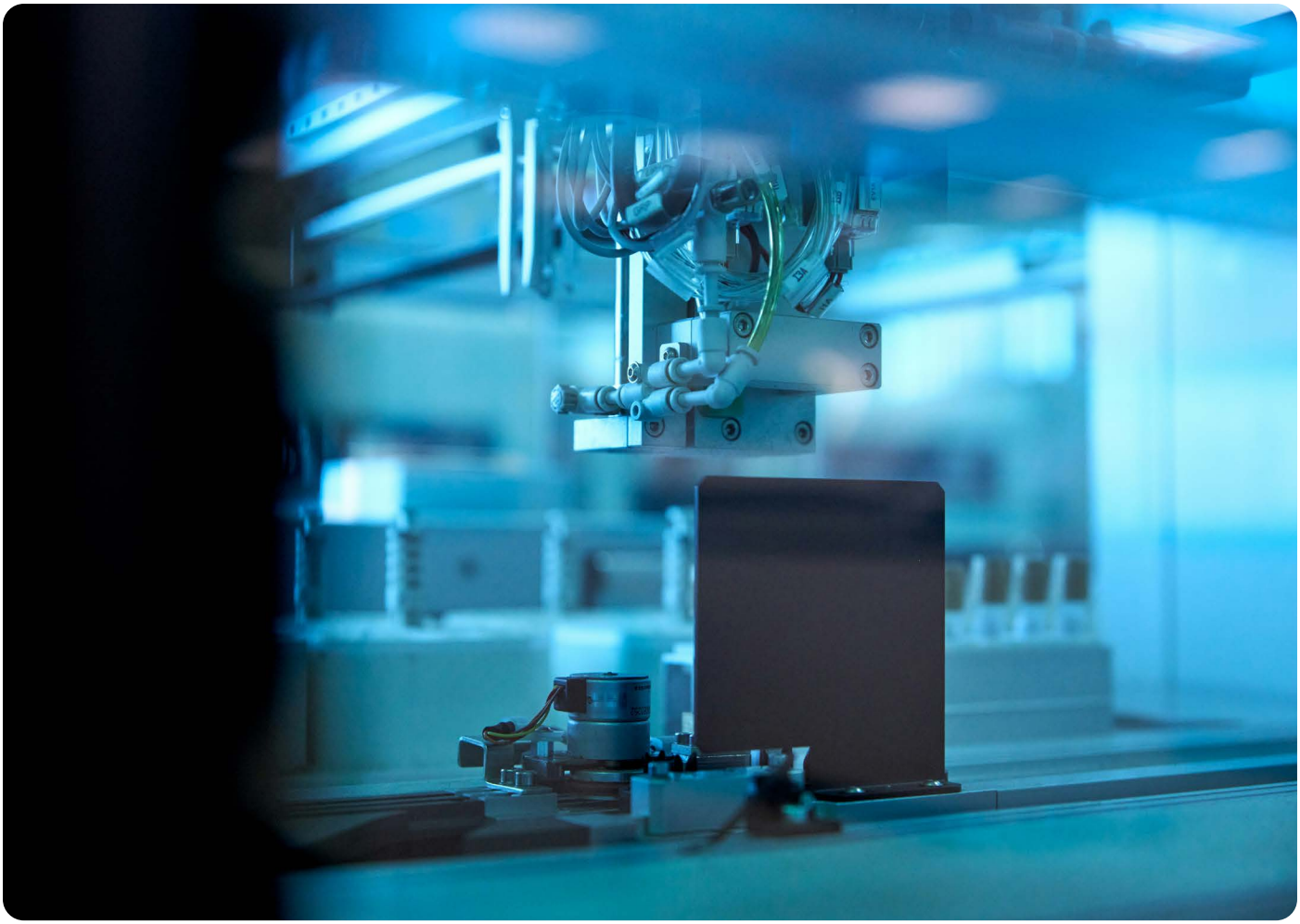
The United Kingdom currently occupies a position of significant paradox in the global economy, existing as a prolific generator of world-leading ideas, with endeavours such as DeepMind and ARM, while struggling to anchor the commercial value of those breakthroughs on its own soil. As we navigate the mid-2020s, the mission of a modernising Labour government must be to bridge the gap between our status as an ideas superpower and our aspiration to be a commercial one. This requires moving beyond a model that treats university research as a purely academic pursuit and instead viewing it as the primary engine for the highest sustained growth in the G7. To achieve this, we must push the sector further by pairing our scientific brilliance with the patient, large-scale private capital necessary to turn a laboratory spin-out into a global market leader. This is not merely an economic challenge but a matter of strategic autonomy in a global marketplace where technologies like quantum computing, engineering biology, and green hydrogen are becoming the foundations of national security.

The relationship between our universities and the entrepreneurs they produce needs a reset. Historically, the process of spinning out a company from a UK university has been hampered by a gatekeeper mentality. By demanding excessive equity stakes that often exceeded twenty-five percent, many institutions inadvertently applied a 'founder tax' that stifled growth before it could begin. Such high equity requirements made British startups inherently less attractive to global venture capital, as investors were wary of cap tables where the founding team's share was diluted to the point of demotivation. In line with the modernising principles of the Progress tradition, the government has moved to implement the recommendations of the Tracey-Williamson Review, establishing a standardised low-equity model. By capping university stakes at five to ten percent for software and under twenty percent for deep tech, we are finally aligning the interests of the academic, the institution, and the private investor. This shift ensures that the next generation of researchers can access the commercial fast lane, reducing the time spent in legal negotiation and allowing them to focus on scaling their innovations.

However, reforming the internal rules of academia is insufficient if the wider capital ecosystem remains stagnant. The UK's persistent scale-up gap is fundamentally a failure of our domestic capital markets. While our rivals in the United States benefit from a deep pool of institutional investment, UK pension funds have traditionally retreated into risk-averse, low-yield assets. To fix this, the current administration has accelerated the Mansion House reforms to consolidate fragmented pension funds into mega-pools capable of taking the long-term risks associated with unlisted deep-tech assets. This consolidation, inspired by the successful Canadian model, creates the scale necessary for domestic funds to back British ingenuity through its most difficult growth phases. The state's role in this process is magnified by the National Wealth Fund, which now operates as a market-defining anchor investor. By deploying public capital to take the first-loss position in frontier sectors, the fund de-risks these technologies for the private sector. The recent support for Highview Power's liquid air energy storage in the North West serves as a prime example of how the government can crowd in billions of pounds in private investment by providing a stable, state-backed foundation.

The spatial dimension of this innovation strategy is equally vital. A centralised approach to R&D has historically ignored the unique regional strengths of the UK, leaving much of our national talent untapped. By empowering regional mayors to act as the strategic architects of innovation districts, we are creating the gravity wells necessary to attract international capital. Leaders in Manchester and the West Midlands are no longer just administrators; they are partners in a national industrial strategy for prosperity. The development of the Sister district in Manchester, a multi-billion-pound innovation hub, demonstrates the power of aligning university IP with mayoral planning and infrastructure investment. These clusters provide the specialised laboratory space and the density of talent that allow spin-outs to stay in their home regions as they scale. A regional focus ensures that the benefits of the high-growth economy are felt across the country, turning our cities into global meridians for specific technologies like cyber security or marine energy.

Talent remains the ultimate currency in the global ideas marketplace, and our immigration system must be calibrated to attract and retain the world's best minds, whilst bearing in mind the current political pressures on the Home Office. A deep-tech economy cannot thrive behind administrative walls. We have moved to digitise and fast-track the Academic Technology Approval Scheme to ensure that security checks are conducted with the speed required by the private sector; the creation of a three-year commercialisation window for



international PhD graduates allows them to focus on building businesses without the immediate pressure of high salary thresholds. Success stories like Bicycle Therapeutics, which scaled in Cambridge to become a global leader in cancer research, prove that when we combine international talent with British science and stable capital, the results are transformative. We must continue to view high-skilled immigration not as a burden to be managed, but as an economic lever to be pulled in the race for technological supremacy.

To secure these gains, the government should now consider a second wave of fiscal reforms designed to provide the private sector with a decadal horizon of certainty. Central to this is the proposal for a Ten-Year R&D Stability Guarantee, which would legislate a lock on tax credits and full expensing for the next decade. Such a move would allow firms in long-cycle industries like semiconductors to plan multi-billion-pound investments with the confidence that the fiscal goalposts will not move. Additionally, the creation of a Spark Fund (a pre-seed bridge co-invested by the British Business Bank and universities) would provide the micro-equity injections needed to turn a lab breakthrough into an investable business plan. Finally, a revised Patent Box 2.0 could allow pre-profit spin-outs to trade future tax credits for immediate liquidity, providing non-dilutive capital when it is needed most. By sticking to this mission-driven framework, we can ensure that the UK is no longer just a laboratory for the rest of the world, but aplace where the future is owned, scaled, and built.

When the Classroom Becomes the Bottleneck

Cllr Matt Collins
Councillor,
Warwick District Council

Demand for skills in the UK tech sector is holding back growth with 93% of businesses saying there is an IT skills gap, according to a report by Forbes in 2023.[1] It is hard to calculate exactly how much this costs the UK economy, but estimates range from £4.4 billion to more than £140 billion in lost opportunity per year.[2] The UK tech economy demands a highly educated populace, and we are struggling to meet these requirements with the current education system.

Over the past decade, educational outcomes have stalled in the UK, and this impacts our ability to produce enough skilled people to meet the demands of a tech economy. An internationally recognised test called the Programme for International Student Assessment (PISA), assesses students from just over 80 countries across reading, mathematics, and science. For many countries, there has been a declining or flat trend in PISA scores since 2012 across all subjects, and the UK is no exception.[3] COVID negatively impacted all scores globally, but even before the pandemic, the stagnation in scores was already apparent. This trend is similarly seen in the UK's A Level results over the last five years.[4] Without improving educational outcomes across the country, it will be hard to deliver the skills needed for the tech economy.

Statistics suggest that teachers are struggling to maintain the status quo and have fewer resources at their disposal. Analysis from the Institute for Fiscal Studies shows that, since 2020, funding per student has increased, but costs have grown faster, leading to tighter budgets in schools overall.[5] The impact of this has been felt in teachers' health. Figures from the Department for Education show that the percentage of teachers who have taken time off work due to sickness has jumped from roughly 55% in the years between 2014 - 2019 to 65.7% in 2023/24.[6] The educational system is under immense strain, and teachers are having to make incredible efforts to keep it going.

The obvious suggestion would be to increase funds, but evidence suggests that spending alone may not necessarily improve outcomes. Indonesia heavily prioritises education and, in 2005, wrote into their constitution that 20% of the government's total budget should be allocated to educational spending (the UK spends just 4.1%[7]). Indonesia achieved this in 2009, but in a large, randomised control trial (the gold standard of testing), it was found that while teacher wellbeing had improved, the spending increase led to no significant improvements in educational outcomes.[8]

Simply increasing spending without targeted solutions will not be enough. We must innovate in education and pursue new methods to improve outcomes. There are three promising areas where advancements in technology and AI have the potential to help improve education and learning outcomes without significant budget impact:

1. Tailoring education to the individual
2. Automating educational processes
3. Sharing detailed educational attainment data across Councils and Government

1. Tailoring education to the individual

The educational attainment of pupils within a year group can vary widely, with some students performing ahead of their peers, and others multiple years behind. Many schools have addressed this by splitting classes into streams based on student capabilities. With more advanced tools, this could be fine-tuned even further, down to the individual pupil.

AI tutors are an exciting prospect for this purpose. The UK Government is currently running a tender for the co-creation of safe, AI learning tools alongside teachers, with the aim of helping disadvantaged pupils benefit from a more tailored learning experience, akin to private tutoring.[9] In addition to having an AI tutor fine-tune maths or science questions to better fit a student's level of learning, it could be also possible to have a live conversation with an AI tutor in a foreign language. In comparison with our European neighbours, the UK is extremely poor at teaching our young people foreign languages.[10] Large language models (LLM) offer an opportunity for students to practice speaking, writing, reading, and conversing in a foreign language without active supervision.[11] Modern language models specialise in communication, with many supporting a large number of languages. While LLM hallucination (where an LLM 'makes up' incorrect information) is a risk when it comes to fact-based learning, this is much less of a concern where the goal is purely to practice speaking, listening, reading, and writing in a foreign language.

While this is a fascinating direction to take education, there are practical steps we can take today without AI, using existing resources to better tailor education.

Many pupils have access to tablets through school in the UK already,[12] but the effect of that distribution is mixed.[13] While there are studies suggesting positive impact, there are also studies suggesting that tablet usage in the UK has a negative impact on educational outcomes. Issuing the tablets alone is not enough to improve outcomes.

A method developed collaboratively by education researchers at Oxford, Harvard, and other institutions[14] suggests daily usage of tablets with software that teaches for each child at the right level will improve outcomes. In their method, the tablets have software installed that assess the level of the student within minutes and then proceed to teach the student at the level that is most appropriate for them. In situations where the student has not completely grasped English yet, it can be configured to teach in their language.

While this method was designed with the aim of improving learning in lower and lower-middle income countries, the large number of randomised controlled trials that have validated this method suggests that the UK could also greatly benefit from building consistent tablet usage for education into the day. Research suggests that just one hour per day with a tablet teaching at the right level is sufficient to allow a student to achieve three years' worth of learning in a single year. Other benefits from one hour use per day is lower costs (as tablets can be shared) and less friction when adapting to the current school day (which should remain unchanged).

Tablets continue to be distributed to students, but we're not using them correctly to teach children. A small pivot in use can have massive benefits in education at no cost. Once we have built the educational framework of daily tablet usage, we will have a strong platform for upgrading the software to an AI tutor.

2. Automating educational processes

On average, teachers spend 6 hours per day on marking.[15] Automating even some of this could save thousands of hours of teacher time. Automated marking has already been used in China for marking English essays, in the USA for marking STEM University courses, and other countries around the world, with promising results.[16] In a small survey of teachers and students in the UK by researchers at the National Institute of Teaching, they found that both teachers and students saw the benefits of using automated marking.[17]

While this would be easiest to implement for routine grading tasks with clear right or wrong answers, such as quizzes, it would also be feasible to fine tune an LLM to follow set marking criteria for factual essay questions in subjects such as history or biology. As AI is not infallible, there are several key design considerations that this kind of AI marking would have to possess to achieve credibility. Across the studies previously mentioned on this topic, trust has been highlighted as a crucial consideration. To allow teachers, students, and parents to trust AI marking, guardrails would need to be implemented to maintain high quality outputs. One key guardrail would be asking multiple LLMs to mark work to the same criteria to build a consensus, effectively checking each other's work. Teachers would also likely need to spot check a proportion of any AI-marked essays to ensure a minimum level of human oversight, allowing trust to be built in the system. With the appropriate guardrails in place, even with the need for spot checking, this could still save a significant amount of time.

3. Sharing detailed educational attainment data across Councils and Government

Currently, it is hard to assess outcomes from teaching in a standardised and continuous way. SATs exams measure primary students in Year 2 and Year 6 annually, while PISA tests are only taken every three years and assess secondary school students aged 15. GCSEs are also taken at around 15 or 16 years of age, and A-levels at post-16. It is challenging to assess whether a new teaching method or tool is improving outcomes when measurements are taken sporadically.

Learning management systems collect detailed educational attainment data and continue to invest in building out better analytics and deeper understanding

[1] https://www.forbes.com/advisor/uk/business/software/digital-skills-gap/

[2] https://enterpriseskills.co.uk/articles/uk-skills-gap-crisis/

[3] https://www.oecd.org/en/publications/pisa-2022-results-volume-i_53f23881-en/full-report/long-term-trends-in-performance-and-equity-in-education_d66743ab.html#chapter-d1e10330-0198a301ef

[4] https://explore-education-statistics.service.gov.uk/find-statistics/a-level-and-other-16-to-18-results/2024-25-provisional

[5] https://ifs.org.uk/sites/default/files/2025-01/IFS-REPORT-EDUCATION-SPENDING-2024-2025.1.pdf

[6] https://explore-education-statistics.service.gov.uk/find-statistics/school-workforce-in-england/2024

[7] https://www.statista.com/statistics/302002/uk-education-spending-as-a-share-of-gdp/

[8] https://www.jstor.org/stable/26539213

[9] https://www.gov.uk/government/news/450000-disadvantaged-pupils-could-benefit-from-ai-tutoring-tools

[10] https://www.hepi.ac.uk/2020/01/09/action-needed-to-avert-the-growing-crisis-in-language-learning/

[11] https://arxiv.org/html/2502.05467v1

[12] https://assets.publishing.service.gov.uk/media/655f8b823d7741000d420114/Technology_in_schools_survey__2022_to_2023.pdf

[13] https://onlinelibrary.wiley.com/doi/10.1111/jcal.12123

[14] https://www.cambridge.org/core/journals/journal-of-benefit-cost-analysis/article/improving-learning-in-low-and-lowermiddleincome-countries/DA3D0AAC19F94DC83B9211F963F8A4D7

[15] https://assets.publishing.service.gov.uk/media/5e12fcb7e5274a0f9e82e4fd/teacher_workload_survey_2019_main_report_amended.pdf

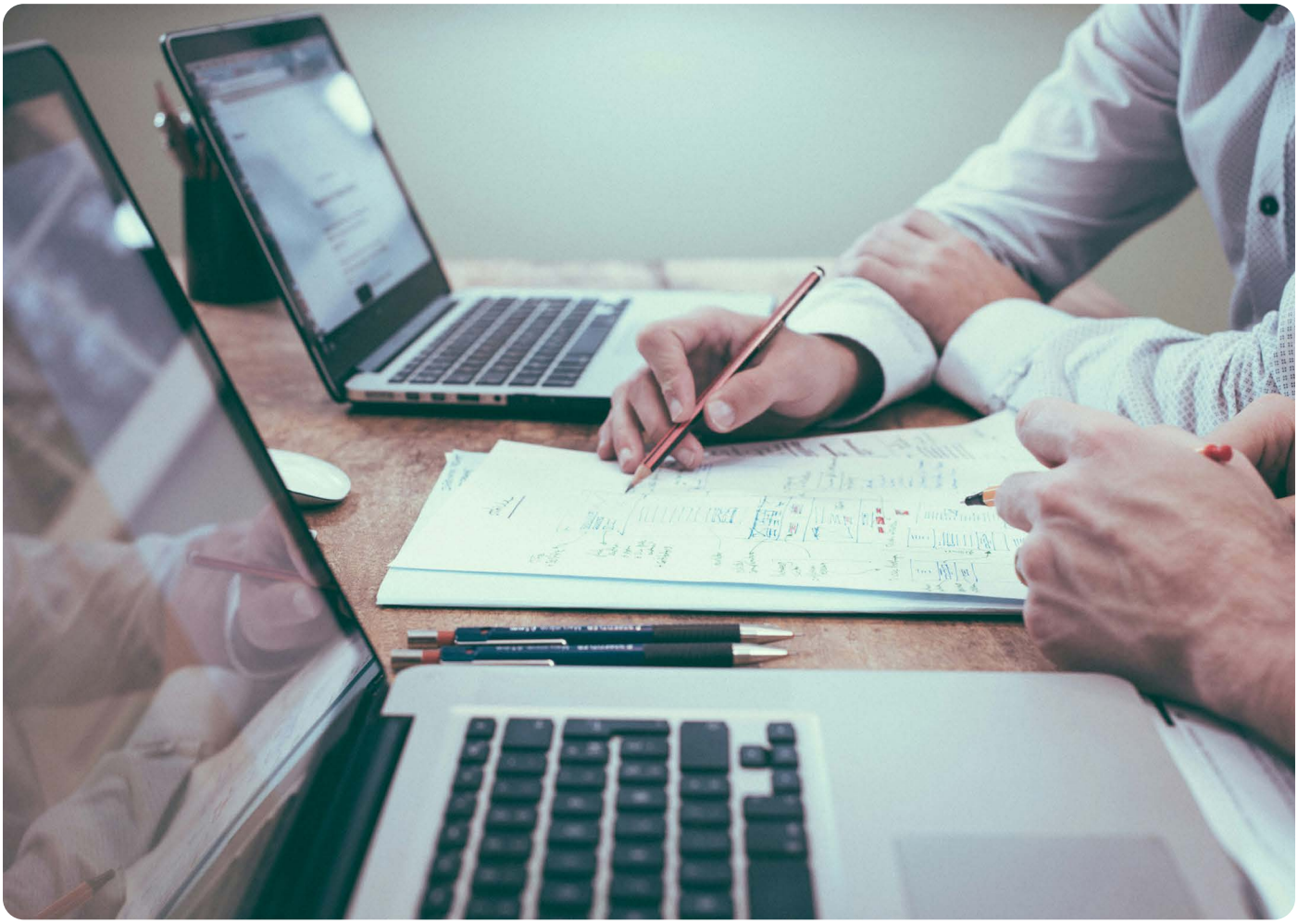
[16] https://ljere.com.ly/index.php/ljere/article/view/5/5

[17] https://link.springer.com/article/10.1007/s10758-025-09903-0

of students[18], but this data is generally owned by the school and not shared more widely.[19] This is a highly valuable dataset and could potentially help improve outcomes across the country. We should create a common data model across learning management systems and set up a framework that allows for the data to be shared with councils and the Government. With access to detailed data, we will gain a clear understanding of the impact of education policy on student outcomes.

A bright future with AI in education

British education has stalled and teachers are approaching breaking point. Technology can be used to fill gaps and improve educational outcomes, but interventions should be targeted and pragmatic. The opportunity for AI and technology to boost educational outcomes with personalised education, ease the administrative burden of marking, and give a detailed insight into educational attainment provides great hope for the future of education in the UK. With improved education we can begin to meet the needs of the UK's tech economy and address the deep skills shortage that is holding back growth.



[1] https://www.tcs.com/what-we-do/industries/education/article/edtech-trends-2026-intelligence-redefining-learning-systems

[2] https://www.tandfonline.com/doi/full/10.1080/17439884.2022.2152838

AI Doesn't Replace Teachers — It Reveals Them

Anita MacDonald
CEO of Grace AI and Meteor EdTech

Firstly, picture your worst school experience…then read on.

There has always been a deficit in classroom learning, and we all tend to use our own examples to shape strategy. This time, we must think of how to educate children in a tech-led environment, unlike anything we have experienced ourselves. Adults can be fearful of change, quite rightly, but AI is here, so we need to work with it and create a policy for the UK.

Last century we moved from didactic 'lecturing' to classes of thirty, and added learning styles and differentiated lesson plans; this paper moves us into the 21st Century in a competitive Global Education Tech market.

Education in schools has been a 'stack em high' model, propped up by external tuition to those whose parents can afford it. Other students sink gradually without 1-1 guidance and AI solves this equality issue.

Poor quality teaching, low investment, high levels of non-specialist staff, supply staff, stress levels, social media issues and a rapidly changing society have made it almost impossible for state schools to compete and teachers are leaving the profession because they can't see a reduction in workload or stress.

Now with the advent of Adaptive AI, the teacher can resume their often hidden role as facilitator, assessor and pastoral carer.

Student benefits

AI uses adaptive learning paths at speed, with instant marking analysis giving teachers the time to assess students' exact requirements for the next lesson, or long term. This creates an immediate feedback loop, with no waiting for results, creating a really positive individually paced learning environment. This will reflect much more with the world of work so that schools and workplaces have a similar theme and ethic.

Adaptive AI models can question students and have an instant dialogue with them about their learning, rather than wait for teacher marking, while the teacher receives instant results and can facilitate immediate change.

Adaptive AI models can also be of use (as UK company Meteor EDTech is already doing in the Arts) with muscle analysis and instant correction, easily extended to P.E., dance etc. Students love data, and their curious minds will use these adaptive models to improve beyond the scope of us as facilitators at times, but that is an opportunity and not a threat.

Most importantly for students the teacher can focus on validation, mentorship and high value instruction, reinforcing the learning that has already taken place. This is not new, in terms of the most affluent 'topping up with tutors',but does now help create a level playing field for working class students en route to Key Stage 4 and 5, University, Apprenticeships et al.

Teachers will always be the human-in-the-loop to ensure summative feedback and accuracy.

Teachers will also have much more time to focus on soft skills, and all the other extra-curricular activities that are so memorable for students. These can also be booked using UK tech and automated processes, to ensure state schools begin to compete with private schools on the wide use of extra-curricular activities and excursions.

EAL provision

Adaptive AI is also essential for EAL students, as it can speak for a certain percentage of the time in the students' native language, switching to English as they learn more, but progressing through levels without worrying about a geographical move or a language barrier.

SEN provision

AI realtime assistive tech ensures students who find speaking difficult are assisted in context-based prediction, in order to communicate more fluently in class.

Cognitive support is available to neurodivergent students breaking down a large-scale project into manageable tasks with timers (like a tech Pomodoro) to help them observe timescales.

The objective of AI is not to automate the teacher, but rather to automate the admin burden, which in turn 'humanises' the classroom.

The benefits of an AI assistant for teachers are huge; reduction in admin time (at least five hours per week), preparation of resources in seconds, and instant marking. They feel refreshed and supported, and can focus on their physically demanding day job, but have a work/life balance without stress.

Teachers will have much more time to focus on soft skills, and all the other extra-curricular activities that are so memorable for students.

Adaptive AI can also provide instant feedback to all staff, with diagnostic assessment straight from the exam syllabuses, e.g. to help teach a missed concept or exam question to the whole class

Adaptive AI can assist teachers with subjects outside their expertise, e.g. as a pianist, I found it difficult to teach sitar, this can be done to a better extent with AI if it is difficult to find a specialist in the area.

Senior leaders benefit too, with early detection of disaffection, emerging attendance patterns, where Pastoral leaders would have more time to start preemptive therapy or conversations with NEET groups.

If SLT had a teacher off sick, they could open the assessment tools, create a lesson plan in seconds, or request that the adaptive AI continue with last week's lesson. This would solve the issue of so many wasted learning hours by supply or non-specialists.

In a recent Dfe survey there is evidence that AI is very popular among teachers, 50% now use it. But what are they using, and how safe is it for children? Oak National Academy is excellent, but more investment in UK-based AI is needed to complete the Government strategy.

Parental Reporting

As every teacher knows when faced with several hundred reports per term, this would be an incredible advantage.

Individual reports could be created weekly for disaffected students, with SMART targets in line with their own ILPs, annual reports in great depth, with charts and other useful feedback, to show where gaps are.

Often schools have issues with parental absence from Parents evenings, this would enable Pastoral staff to engage with parents at other times, downloading a battery of knowledge and feedback based on today, as opposed to several months prior to the meeting. It would prevent staff overload with 'round robins' and most importantly safeguarding feedback could be provided.

AI Safeguarding

This is paramount and should dovetail with the ICO Children's code and Data Impact Assessment, to ensure Adaptive AI is not only self-reflecting and in line with Safeguarding legislation, but monitored at a National level by a tech 'Ofsted' and locally by the Headteacher/ Safeguarding lead. This should include evidence of 'unconscious bias' monitoring and 'explainability' of automated decisions.

There are numerous pieces of safeguarding software on the market, this could be streamlined so that schools know which to use in case of worst case scenarios, such as court appearances.

The tech should also include hard-coded red lines so that inappropriate or familiar language is highlighted to the teacher.

In addition to that, tech can effectively block phone signals in schools, stopping the need for phone confiscation, and the signal can be available in the car park or at the school gate in the evening, so parents know their children are safe.

UK Vision

At the Bett show 2026 there were hundreds of companies creating virtually the same assessment systems, based on current thinking about data.

Having visited Italy and Japan with NCSL, there are many ways to educate, but one must have a strong Governmental thread from birth, to ensure that children who are often at a disadvantage from toddler onwards, receive the targeted support they deserve.

For example, some but not all schools use SIMS, many use other assessment software, but there is such a choice that every school is too different at the moment. Difference is important for belonging, but not an advantage in tech. We need to develop UK tech companies more, but with a clear strategy in order to ensure best value for money and best outcomes for disadvantaged children.

AI can change the way Governments receive school data, streamlining the process, so Ofsted can analyse real time data with an AI generated SEF, and simply visit schools who need it. That would free up time for inspectors too, so that only very subject specific inspectors would assess learning.

UK tech companies can benefit too, e.g. there are already many similar and safer pieces of tech software here, without signing elongated contracts with external providers.

Global Vision

An AI solution for the UK would have to be independent from other nations, both in terms of servers, fibre and tech provision. This would decrease threat and uncertainty.

Currently GDPR is patchy, and child-sensitive data is shared with global superpowers; more could be kept within the UK.

This would not only strengthen our position in the world but would prevent eventual misuse of our own data globally.

The Knowledge Economy Runs on Glass

Conal Henry
Chairman and Co-founder,
Fibrus

Every era sees the deployment of an infrastructure that transforms society. In the 18th century it was canals, the 19th century, railways, and in the 20th century it was electricity. In the 21st century it's full fibre broadband.

Building a modern knowledge economy requires sustained investment in high quality digital infrastructure and a workforce capable of delivering and maintaining it. As a provider deploying full fibre broadband (FTTP) across underserved rural and hard to reach parts of Northern Ireland and Great Britain, Fibrus, like most other fibre builders, has encountered significant structural barriers that reflect wider national challenges. These include difficulties in accessing capital for long term infrastructure programmes, shortages of technical skills across multiple regions, and limitations within the UK's apprenticeship and early career training ecosystem. Together, these obstacles highlight areas where government intervention and strategic reform could materially strengthen the UK's digital and economic resilience, ensuring that essential communications infrastructure is available to all, regardless of their location.

Accessing capital for rural fibre deployment remains one of the most challenging parts of ensuring that the entire country can participate in the knowledge economy and digital transformation. Deployment requires massive upfront investment with a lengthy and uncertain payback, especially in areas with low population density. Rural builds face the sort of engineering, planning, regulatory and environmental risks that can increase both uncertainty and cost, making such projects less attractive to institutional capital. While government subsidy programmes have helped stimulate private investment in rural areas, investment in rural broadband remains challenging. Companies often face unpredictable planning processes, inconsistent local authority requirements and an inconsistent regulatory pricing regime that deters investors. Creating a more stable and predictable investment environment through clearer planning frameworks, a level playing field for rural price regulation as well as reduced regulatory friction and more consistent procurement pipelines would allow the UK to attract deeper institutional and venture capital into digital infrastructure. This is essential if the whole country is to compete internationally in productivity, connectivity and innovation.

Regulatory risk is a significant and often unnecessary barrier for investors. Investors have responded positively to the government's policy of promoting investment in full-fibre networks (FTTP) across the UK. Where not commercially viable, the Project Gigabit programme has helped deploy FTTP to rural and remote communities. Overall, operators other that BT/Openreach (Altnets) have invested in the region of £17bn since 2020 in new FTTP across urban and rural locations. Whilst the government's policy has been clear and consistent since the Future Telecoms Infrastructure Review (FTIR) in 2018, the implementation of that policy by Ofcom has been less so. Any such inconsistency reduces investment appetite and increases the cost of both debt and equity.

A prime example of inconsistency between government policy and Ofcom implementation is Ofcom's explicit policy to actively promote Openreach investment but not Altnet investment in the 30% most rural parts of the country. This objective sits alongside substantial government funding for uneconomic areas being awarded to Altnets and creates an obvious and material tension. The way Ofcom has chosen to set regulated access prices for Openreach's ducts and poles - Physical Infrastructure Access (PIA) - is a clear manifestation of Ofcom's approach and the harm that approach causes to investment in rural connectivity. Using PIA replaces one-off up-front capital investment costs with a perpetual operational cost (the PIA rental payment), and its use has been welcomed by the investment community as it 'de-risks' the initial build phase and substantially reduces disruption to communities during build. Ofcom has, however, set the PIA pricing such that the costs are much higher to serve rural than for urban premises – effectively designing the pricing regime to discourage rural Altnet FTTP investment. Ofcom's pricing rules have made it impossible for operators to recover these extra costs through charges The effect is to radically increase the numbers of premises being categorised as uneconomic and thus requires an increase in government funding whilst also sending contradictory signals to the investment community increasing the actual and perceived risk of rural Altnet FTTP investments.

For some rural Altnets, the PIA rental payments exceed their staffing costs, and PIA costs continue for as long as the network is in use – regardless of the number of premises connected (and the revenues generated). In parallel, Ofcom has set access pricing to Openreach's broadband network at a nationally averaged level, which strongly favours ISPs using that network over Altnets investing in rural FTTP networks. This approach by Ofcom condemns rural communities to depend on old and slow copper connections from Openreach for longer due to a lack of competition and increasing the urban/

rural digital divide. It makes the knowledge economy less accessible for rural communities.

The independence of Ofcom as a regulatory body is important, however, there is scope for better tools to ensure that inconsistencies between government policy and regulatory implementation are avoided or at least minimised. Through the Statement of Strategic Priorities, the government can indicate its priorities to Ofcom's statutory consultation processes where it considers that inconsistencies exist.

Alongside funding challenges, skills shortages present a significant constraint on the UK's ability to scale digital infrastructure. Delivering a full fibre network requires a wide range of specialised technical, civil engineering, operational and project management capabilities. Across the regions where Fibrus operates, the company has consistently found that around 80 percent of applicants for core engineering and build roles have no prior technical certification or relevant field experience. These roles are safety critical and technically demanding, requiring multi-stage training before recruits can enter operational work. This significantly increases both onboarding time and training costs for employers. Regional labour markets further complicate the picture. In areas such as Cumbria, where agriculture, tourism and the nuclear sector dominate local employment, there is limited existing telecoms capability from which to recruit. Companies must therefore look beyond the region and offer relocation, increased travel allowances and higher salaries to attract skilled workers. In contrast, Northern Ireland has benefited from stronger early engineering education and initiatives that cultivate technical interest among young people, creating a more reliable recruitment base. These disparities illustrate how unevenly distributed the UK's digital workforce has become and how dependent progress is on local skills ecosystems.

Retention remains another significant challenge. Because technical training is long, costly and resource intensive, employers make substantial early investments in new staff. However, only around 10 percent of trainees progress into long term roles, with many leaving the sector after completing their qualifications. Some find the work environment, often outdoors, physically demanding and weather dependent, less suitable than expected. Others are recruited by competitors offering higher salaries or more flexible working conditions. This cycle reduces the return on investment for employers, contributes to wage inflation within the sector and limits the continuity of skills development across the UK. For digital infrastructure to support the broader knowledge economy, the country must not only produce more technical workers but also retain them within the industry long enough for their skills to contribute to national capability.

Apprenticeships offer one pathway to addressing the skills gap, and Fibrus has invested in delivering them across both Northern Ireland and Northern England. These programmes combine structured education with on the job learning and lead to industry recognised qualifications. However, running high quality apprenticeships is expensive and requires significant staffing, facilities and mentorship capacity. Completing an apprenticeship in this field can take up to three years, during which trainees are paid full time, provided equipment and supported by experienced technicians whose time is diverted from operational duties. The current funding and support structures does not always reflect the realities of training in safety critical, highly technical roles. Additionally, apprenticeships must compete with more familiar or locally attractive industries, particularly in regions without a strong telecoms tradition, making recruitment inconsistent. Without stronger early exposure to engineering and digital careers in schools, many young people are unaware of the opportunities available within the digital infrastructure sector.

Addressing these challenges requires a coordinated national approach. Strengthening higher level technical apprenticeships, particularly those aligned to emerging technologies and digital infrastructure, would help employers build sustainable pipelines of talent. This could include increased Government support for multi-year training, shared regional training centres to reduce the burden on individual employers, and clearer progression routes into advanced engineering roles. Improving early STEM education, with a greater focus on digital literacy and practical technical skills, would support a stronger foundation for future apprenticeships and technical careers. More broadly, reducing barriers to private capital investment through a more stable regulatory environment, streamlined planning processes and long-term procurement commitments would encourage deeper investment and more competition in infrastructure essential to the UK's economic future.

The UK's ambition to lead in science, technology and innovation will depend on its ability to build and sustain the physical and human infrastructure that underpins a modern digital economy. Fibrus' experience illustrates the interlinked challenges of capital access, skills shortages and workforce retention that confront companies seeking to expand critical infrastructure across the UK. Addressing these issues would help ensure that digital connectivity, technical capability and economic opportunity grow together, strengthening the foundation of a resilient and competitive UK knowledge economy.

Knowledge, Then and Now

Tom Collinge
Deputy Director,
Progress

"There is only one lasting route to higher living standards, better wages, more secure jobs in today's world. We will win by our brains and our skills or not at all." - Tony Blair, 1996.

This collection of essays is about what the government can do to support the knowledge economy. It will contain many detailed and practical essays on the topic. This is not one of those. What this piece will do is sketch out why the knowledge economy was taken up as a progressive cause, a Labour cause, in the first place – why it still is – and what the enormous changes between the New Labour era where it came to prominence and now should mean for how we think about it.

The distinction between 'knowledge workers' and 'manual workers' first appears in the sociology and management studies of the 1960's and 70's. It roughly divides people who labour to produce physical things, and people who generate and trade in ideas and information.

At that time Britain and the developed world are at the start of a time of industrial strife and a process of deindustrialisation that will see manufacturing and extractive industry decline over the subsequent decades to now. Headcounts reduced by automation, out competed on cost, and indeed sometimes quality, by competitors in Asia - totemic industries of British manufacturing, strongly associated with Labour history and Labour voting parts of country like steel and coal mining go into virtually terminal decline. In 1967, Britain is the world 5th largest producer of steel. In 2024, it is 34th and China is number one – at times producing over 50% of the world's supply.

Living through this time, and the social strife incurred by various attempts to manage it (or not manage it, in the case of Thatcherism) are the relatively young architects of New Labour. They are faced with the question, if traditional manufacturing is leaving our country – and along with it an entire social settlement based on secure jobs and high rates of unionisation – what can replace it?

By 1996, as you can see from the opening quote, they - along with other third-way thinkers in the USA and Germany - had arrived at the answer.

A democratised knowledge economy, where everyone has the chance to compete on the basis of their skills, is the new route to prosperity for everyone in society. It is both a reaction to, and an attempt to take advantage of, the growing trend of globalisation. It cashes out in policy terms in a focus on education and free trade. It responds to and creates economic conditions that for many of us, the author included, are the only ones we have ever known.

Today, we appear to be in the foothills of another great transformation. One led by a new kind of automation - that this time threatens the 'knowledge worker', a shift away from free trade, and a new kind of competition, on skills and knowledge, from Asia.

As we look critically to the future, we have to ask - what was good about the knowledge economy, and what did not live up to its promise? What should we fight to retain and what should we hope for from the future?

What is good about the knowledge economy?

As the relative number and value of manual jobs declined, the goal was to make higher skilled jobs more accessible to all. This would bring prosperity through the development and adoption of new technologies as well as via increased competitiveness in global markets. An advantage in skills would insulate British workers from competition in the developing world, and give the worker more security – having more to trade on in any negotiation with employers.

There is an inherently progressive core to this vision (at least as far as the domestic economy is concerned – outsourcing as much heavy and polluting industry as possible to the 'poor' countries of the world should give progressives some cause for concern).

Knowledge work, well remunerated, comfortable to carry out, had been the preserve of the middle and upper classes for most of the 20th century. This has changed. A higher education, and the personal and professional benefits it brings, is now accessible to more people than ever. The rate of participation in higher education was 3.4% in 1950, 8.4% in 1970, and 19.3% in 1990. By 2017, at the age of 25, over 50% of young people had been in higher education.

This is an explosion of the old social hierarchy but of course has not come without quite serious problems. Which we will come on to.

It is also the case that for much of the period where the knowledge economy was being pursued in public policy, Britain was experiencing rising productivity and prosperity. This too, has entered difficult waters in the last 20 years.

What are the problems with the knowledge economy?

Having established that there is a progressive core to the knowledge economy as roughly conceived by New Labour, we must also acknowledge it contained some internal tensions.

The framing of the knowledge economy overlooks a big component of what the newly educated professionals taking part actually do. In Britain at least, the growth was far more in professional services than 'ideas' as they would be recognised in Silicon Valley.

Lawyers, accountants and IT workers (along with many other skilled professionals) sit awkwardly in the between the knowledge and manual worker distinction, requiring high levels of education but not being expected necessarily to do anything 'new' or create 'ideas'. There was likely always a ceiling for what adding more of them could do for productivity (this not to say that the ceiling was not high, or that it has been reached). This distinction between generation and highly skilled execution might seem harsh, but the fact we now have to face is what many of these people do are today being described by the A.I industry as "routine cognitive tasks" ripe for automation.

Even if we put this aside, an innovation led economy logically results in a market, and a jobs market, that is more dynamic than in the past, with innovation meaning more business formation and failure than the old days of 'a job for life'.

There is a positive version of this story where the more dynamic market is more productive and the rising tide lifts all boats, but this situation, should it obtain comes with risks. Upside risk, where a more dynamic economy works well for that worker but not others and inequality is exacerbated, and downside risk where levels of job insecurity are, for all people, necessarily higher.

Progressive social democrats can manage these risks to some extent while they are in power. Redistribution and strong social safety nets shave off some of the yields from the successful and smooth the landing for unsuccessful. Social democrats have to be in power to deploy these measures though, and often they are not – meaning increasing inequality and miserable insecurity for those who suffer it.

More worryingly it is becoming clear that the worker-led innovative dynamism that is supposed to drive the knowledge economy is not as present in the modern economy as it once was. The idea that bright people with a laptop and an idea can push their own and national prosperity that defined the dotcom era is looking creaky as enormous capital now drives the 'industry of the future' A.I - where many interesting companies are 'downstream' but capital intensive infrastructure (compute and data centres) is fundamental.

We will return to A.I later but the idea of individuals driving dynamism waxes and wanes in applicability as the technology changes. In the early days of social media it clearly was driven by certain people with ideas. Once it was established and the number of users required to be relevant and network advantages of existing platforms was so great that even Google failed to get a social network off the ground, that industry is harder to fit into the New Labour vision of a worker led knowledge economy.

Then there is the question of globalisation. In his 1998 book, the Third Way, Anthony Giddens at one point, almost in passing, says

"In an information age, territory no longer matters as much to nation-states as in the past. Knowledge and competitive capability count for more than natural resources and sovereignty has become fuzzier or multiple."

The knowledge economy thinkers imagined we would be selling our knowledge to the world and become rich from it, but the way this cashed out has been more complicated. Territory, resources, and hard productive power are back as major geopolitical concerns. Even before this, the domestic knowledge economy had become subservient to the American knowledge economy with virtually all household name tech companies headquartered in the US.

Meanwhile the services in which we excel are an export success, that part of the vision came true, with the UK being the second largest exporter of services in the world. But good still make up the largest part of global exports. The market has not grown to the size where being a service superpower makes a nation a superpower in its own right.

Finally, in the 90s, it was not a contemporary concern that the developing nations would develop their own skills base to rival ours. Today, it is becoming a reality and in future it will likely be more so as these countries get wealthier and cultivate their own middle classes.

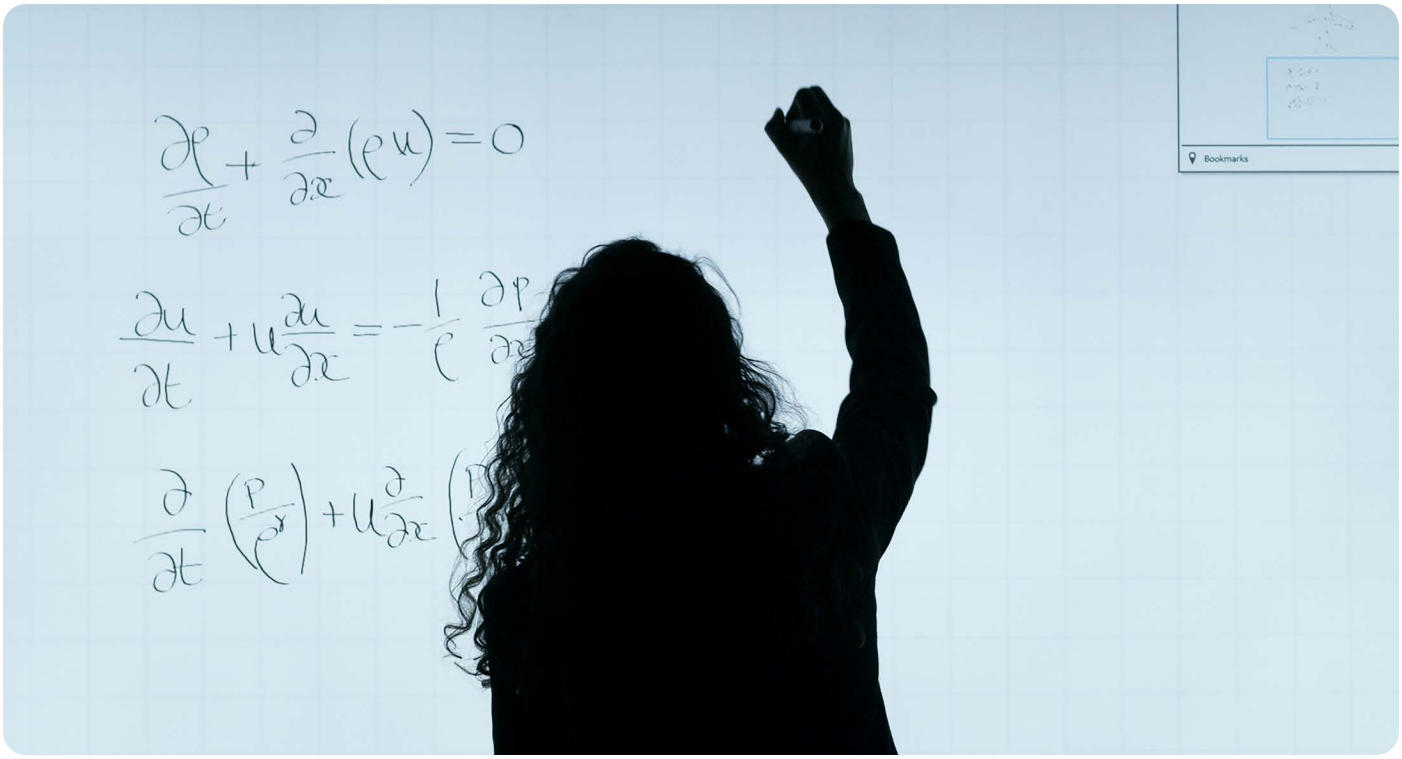
What now for knowledge?

We have raked over the issues with the knowledge economy in more depth than the benefits. This is not because it was somehow a net negative. The benefits, a society of access to opportunity, education, skills and fairness, a society ahead of the curve of automation and being able to stay wealthy in a global competition are apparent all around us. It is hard to even imagine what the counter factual of the shift would have been.

As Tony Blair said, to the TUC in 1999: "There is no future for Britain as a low-wage, sweat shop economy – none. Anybody who fails to realise it, like today's Conservative Party, does not actually understand the new world that is upon us."

That world was avoided. Living standards rose. Fairness increased. But we now must grapple, as he did then, with the new world that is upon us.

Sometimes, what is happening in A.I looks like an extreme version of the promise of the knowledge economy. It is certainly rooted in innovation. And with Facebook recently offering almost $100m a year to



engineers there is a certainly a case it good for some workers.

This kind of compensation likely makes many progressives squeamish in itself but becomes even more problematic when we consider the work they are being employed to do is specifically designed to destroy jobs.

Technical, service, and creative professionals are now all at risk of automation in the same way that people manufactured cars in the 1970s were. There will still be jobs in those industries of course but if it follows the pattern of manufacturing – far less and different.

On his blog American commentator and A.I observer Noah Smith said:

"My entire life has been lived within a well-known story arc — the relentless rise, in both wealth and status, of a broad social class of technical professionals. That rainbow may now be at an end. The economic changes — not just on careers, education, and the distribution of wealth, but on the entire way our cities and national economies are organized — could be profound."

There are two potential responses to this shift and both relate to the knowledge economy. One, says that this scale of automation will make work, and therefore knowledge effectively redundant. It will no-doubt continue to happen, as nice to have, but we cannot expect to order our society and economic worth around our productive capacity any more. There is a grain of value in this, to the extent that it puts the human being at its centre and declares that they have value enough to have their needs met without meeting some sort of instrumental criteria.

But it does terrible things to human beings also. Ideas like UBI in their maximalist form (no work, value redistributed from A.I delivered activities to the individual) make everyone dependent on some force into which they have no input nor even incentive to understand. Aside from the potential for abuse being mindboggling, what incentive is there to learn, to think, or to do? Proponents may argue that there is some deep well of creative impulse in each of us from which activity will spring. On that we will have to agree to disagree.

The other response, I think the better, more progressive response, is to double down on the knowledge economy. If 'routine cognitive tasks' have become automatable, we must equip ourselves – all of us – with the skills to do 'non-routine' cognitive tasks.

Perhaps the service component of the knowledge economy will be shortly redundant. Let's make the knowledge component the real core of it then. This means returning to the egalitarian roots of the idea. First, as much education as possible, as cheap as possible for as many as possible. Second, make the education pay by as far as possible regulating the barriers to entry – including the agglomeration of money and power in capital intensive business models – to be as low as possible.

This has been a canter through some of the history and politics of this idea. It has not been comprehensive so far, and nor will its conclusion offer a comprehensive programme for making the true knowledge economy of the future real. Many of the essays in this collection will address how we should do that.

But as progressives we must not be complacent and assume the knowledge economy that brought education, and prosperity to our citizens is somehow a given. We must be clear that we cannot tolerate letting history end in the hands of a few billionaires and we must assert our faith in people to keep innovating, keep pushing the bounds of what our economy and society can be. Despite its flaws it has improved our society and the lot of most of the people in it. In future it will remain true that 'we' Britain, and now 'we' humanity, will win by our brains and our skills or not at all.

Quantum's Missing Middle

Steve Vaile
Director of Consulting,
Quantum Security Defence

Quantum technology and advanced AI is still early enough that who gets funded - and why - still shapes the field. Yet capital allocation is skewed. Money clusters around the most capital-intensive layer - general-purpose quantum computing - while the most deployable layers remain underfunded: communications, security, sensing, verification and integration. These are exactly the areas where early capital can turn lab capability into field systems for defence, industry, healthcare and data security.

The structure says something awkward: early-stage capital is thinnest where near-term national and industrial demand and capability is strongest.

The nascent monopoly problem: capital concentration narrows the market

Investment is unusually concentrated relative to the breadth of the opportunity. McKinsey's Quantum Technology Monitor 2025 notes that quantum computing attracts roughly 80% of total quantum investment, even as other segments advance.

When one layer dominates funding, two things follow:

- It creates the impression of a "healthy" market - big rounds, big names, big valuations.
- It suppresses the enabling ecosystem that makes adoption possible - security migration, quantum-safe communications, sensing, integration tools, assurance and operationalisation.

That is not just inefficient - it is strategically risky. The enabling layers are where governments and critical industries can buy real capability before fault-tolerant compute arrives at scale.

Capital misallocation: computer takes oxygen and is still yet to deliver significant advantage although at this stage it is clear that computer will become real and tangible it is important to note that enabling tech does the work and connects the dots in the path to quantum adoption.

General-purpose platforms are scientifically extraordinary, but venture economics struggle with their reality: long timelines, heavy capex, reliance on unschedulable breakthroughs and unclear near-term capture.

By contrast, the enabling layer - quantum-secure communications, post-quantum migration, sensing and detection, verification and control, hybrid integration, AI interpretation - can plug into today's infrastructure, procurement cycles and security mandates delivering the steps towards data sovereignty that is demanded at a national level.

Funding patterns help explain the mismatch. McKinsey highlights risk preferences and deal concentration. In 2024, the top two deals absorbed a striking share of total value, reinforcing winner-takes-most dynamics. The market keeps rewarding the big-platform narrative, even as buyers prioritise deployable capability.

Demand is not hypothetical: security and sovereignty drive purchasing

Quantum is no longer only an innovation story - it is a risk and resilience story. Policy and industry attention has shifted to national capability, domestic IP, trusted supply chains and resilience against cryptographic disruption.

Europe's stance is illustrative. Reuters reports EU efforts to crowd in private investment for quantum, linking it to competitiveness and security, while noting the region's small share of global private quantum funding. In parallel, the public sector is acting as early-stage risk capital because private markets often will not. McKinsey notes rising public investment, framed as support for higher-risk early-stage start-ups. When governments underwrite early risk, it is usually because strategic necessity outruns private funding capability

Founder reality: the failure mode is commercialisation, not science

Frontier-tech founders rarely fail because the physics is impossible. They fail because they cannot:

- translate technical truth into procurement-grade value,
- access early strategic customers,
- navigate regulation, assurance and security review,
- or secure enough of the right capital for commercially complex stories at seed.

The gap is not "more money" in general. It is the wrong kind of money - funding experiments without funding the operating machinery that converts experiments into contracts.

Ecosystem work increasingly recognises that early-stage firms depend on a mix of early investment and public funding. The European Patent Office's quantum ecosystem commentary, for example, notes that core quantum firms are typically start-ups that rely heavily on both.

Enabling tech is where near-term value becomes real

If quantum's economic impact is real (which I firmly believe it is) - and major strategy houses say it is - the bottleneck is not "is quantum valuable?" It is how fast capability becomes adoption.

Enabling technologies are the adoption engine:

- Quantum-safe security and cryptography migration - compliance, assurance, operational tooling.
- Secure communications and networking primitives.
- Sensing, timing, detection and signal exploitation.
- Control, verification, benchmarking, integration and interoperability.
- AI-enhanced interpretation and operational decision support.

These layers integrate with existing infrastructure, fit budgets sooner, avoids hyperscaler moats in many subdomains and creates defensible positions with identifiable buyers. This is where early-stage capital should be most catalytic - but too often is not.

The industry is underserved without materially more early-stage capital aimed at enabling layers and commercialisation capacity - not only at compute platforms. Compute matters, but a compute-first capital strategy delays adoption, while an enabling-first strategy accelerates deployment. In some ways our investment strategy places the cart before the horse, without early stage funding into those enabling technologies that seed quantum adoption and prepare our infrastructure with the required level of data security the arrival of meaningful Quantum compute and its impact are also needlessly delayed.

Policy bodies are converging on this view. National strategies are multiplying, public instruments are expanding and governments are de-risking early development precisely because market finance has not matched the strategic timeline.

What early-stage capital must look like

If the market is to correct, "more early-stage capital" needs a specific shape:

- Stage-appropriate patience - not infinite, but aligned to regulated adoption and assurance cycles.
- Commercialisation support as a first-class investment - packaging, certification, procurement fluency and security architecture funded early, not bolted on later.
- Operator-led venture creation - not passive allocation. Pre-seed in deep tech often requires builders who can recruit leadership, form partnerships, navigate compliance and craft credible go-to-market alongside technical founders.
- Alignment with sovereignty and critical-infrastructure demand - governments, defence, critical infrastructure, finance and telecoms value assurance and trust over novelty.

It is a call for capital that understands what "deployable" requires.

The bottom line

Quantum is moving from speculative science to national concern and industrial planning. The paradox is that capital still behaves as if the only real bet is the most expensive layer. Adoption does not start at the top of the stack. It starts where capability meets infrastructure, budgets, regulation and risk.

The enabling layers - and the builders who commercialise them - are not a niche. They are the missing middle of the quantum economy. Until early-stage capital catches up with that reality, we will keep mistaking concentrated funding for genuine progress.

The Knowledge Economy for the Many

People, Power and the Case for Entrepreneurship

Henry Nicholson
CEO,
The Rebel School

Introduction: The Knowledge Economy Is Being Misunderstood

The UK is rightly focused on the knowledge economy however, the way we talk about it is narrow, abstract and exclusionary. It is framed as something that everybody can access, however it happens in tech firms, research labs and elite institutions. That framing is not just incomplete, It is holding the majority of the country back.

A real knowledge economy is built on people, not privilege. It's built on their ideas, judgement, creativity, lived experience and skills. Knowledge does not only sit in universities or in code. It exists in communities, families, workplaces and informal networks across the country. If we fail to recognise this social issue, we'll always try to progress with one hand tied behind our backs.

Currently in the UK, knowledge is restricted. When knowledge is restricted, so too is opportunity; AI is a prime example. Although access to **using** AI is extremely wide through things like OpenAI, Gemini, Apple etc. access to **learning** AI is not. This risks magnifying significant social issues as jobs become replaced. If your focus is about where your next meal is coming from, you're not thinking about training for your future career. When you've never had to think about your environment, learning AI is no trouble at all.

At Rebel School, we see the consequences of this every day. Millions of people could create value but are locked out of the systems that allow them to do so. They are told, directly or indirectly, that starting a business is not for them. That they lack the right background, education or network. That entrepreneurship is risky, elite or unrealistic. Not only is this wrong, it's economically illiterate, destroying the backbone of the UK economy.

If Labour is serious about inclusive growth and social mobility, the knowledge economy must be reframed; It must be about people first. We believe that entrepreneurship or an entrepreneurial mindset, must be treated not as a niche pursuit, but as one of the most powerful (and under used) tools we have. Not everyone will start a business, but everyone should be able to try.

Rebel Business School: A Different Starting Point

Rebel Business School was founded on a simple belief. Anyone should be able to start a business, regardless of background, education or access to money.

Our model is intentionally different from traditional business support, providing more routes to access. We provide free practical entrepreneurship education, funded through partnerships with local authorities, corporates and institutions. There are no fees, no loans and no requirement for prior qualifications. Participants are not expected to write business plans or take on debt. Instead, they are supported to start where they stand, with what they have access to already and starting in profit.

We teach people how to test ideas quickly, trade early and build income step by step. The emphasis is on action, confidence and learning by doing. Fear is the number one barrier to entrepreneurship, and is often rooted in financial risk, created by loans.

Over the last decade, Rebel Business School has worked with tens of thousands of people across the UK, Morocco, Colombia and other parts of the world. In long term local authority programmes, we consistently engage people that traditional systems fail to reach: people who are unemployed and under employed, people on low income, women, older people, young people, ethnic minority communities, people who have never seen themselves as entrepreneurs or never been given the opportunity.

The outcomes are striking. In one five year UK programme, more than a third of participants were unemployed when they joined. Nearly half came from ethnic minority backgrounds. More than half had never run a business before. Hundreds of new businesses were started. Confidence rose dramatically across participants.

These results are not anomalies. They demonstrate something fundamental. The UK does not lack entrepreneurial talent. It lacks access, permission and belief.

Access to Knowledge Remains Exclusive

Despite decades of reform, access to knowledge in the UK remains deeply unequal. Formal education pathways, professional networks and business support are still designed around those who already have advantage.

For many people, entrepreneurship feels culturally and practically out of reach. It is presented as something for people with capital, connections and confidence. Traditional business support reinforces this by assuming familiarity with jargon, systems and financial risk.

For someone already struggling financially, the idea of borrowing money to start a business is terrifying and almost impossible. The emphasis on business plans and finance creates paralysis rather than progress. As a result, millions of people never try or worse: told that their business will never work. We must be investing in people, not business ideas.

Rebel Business School removes these barriers entirely. No cost. No debt. No judgement. We actively go into communities where people feel excluded and invite them in. When knowledge is made practical, human and accessible, people respond.

What participants often tell us is not just that they learned how to start a business, but that they were allowed to. That shift in mindset is transformative.

If the knowledge economy is to work for everyone, knowledge must be treated as a public good, not a private asset. Access should not depend on income, postcode, background or confidence navigating complex systems. Even within government projects, red-tape and eligibility criteria create tremendous gaps for people and a lack of systemic trust.

Entrepreneurship as the Missing Lever

Entrepreneurship is one of the most powerful tools available to policymakers, yet it remains under used and under valued, rarely appearing in strategies and policies.

Entrepreneurship enables people to create work where none exists. It supports flexibility in a changing labour market. It allows individuals to turn skills, experience and ideas into income and value. It drives local economic resilience and community renewal. It empowers those unable to work in traditional environments to build their own and add massive value.

Yet it is still treated as exceptional rather than normal. Positioned as something risky rather than practical. As an elite pursuit rather than a mainstream option. The Jobcentre avoids it out of fear, schools don't push it, institutions discourage it.

At Rebel, we see entrepreneurship unlock more than income. It restores confidence, agency and dignity. Many describe starting a business as the moment they stopped feeling powerless. These outcomes matter, economically and socially.

The UK labour market is changing rapidly. Traditional employment is no longer the only or even the most realistic route for many people. A serious economic strategy must reflect that reality.

Entrepreneurship should be treated as a core pathway alongside employment and education. Not everyone will choose it, but everyone should have access to it.

The Knowledge Economy Is Not Just About Tech

There is a growing tendency to equate the knowledge economy with technology alone. While innovation and digital skills are important, this framing is dangerously narrow.

A people centred knowledge economy recognises that value is created in many ways. Small businesses, sole traders, freelancers and micro enterprises are knowledge workers too. They use insight, creativity and judgement to solve problems and meet needs.

Many Rebel businesses are not technology startups. They are services, creative enterprises, food businesses, care providers and digital micro businesses. They contribute to local economies, support families and build resilience.

An economy focused only on high growth tech will concentrate opportunity and wealth. An economy built around people will spread it.

What the Labour Government Should Do

If Labour wants to deliver inclusive growth and unlock the full potential of the knowledge economy, it must act decisively.

1. Entrepreneurship must be recognised as a core economic pathway. Enterprise skills should be embedded throughout the education system and adult learning, not treated as an optional extra. People should leave school understanding that starting a business is a legitimate and supported option.
2. Government should invest in free and inclusive entrepreneurship support. Scalable programmes that remove financial risk deliver strong outcomes at relatively low cost. Funding should prioritise access, confidence and participation, particularly in disadvantaged communities.
3. Employment policy must fully integrate self employment. Jobcentres and employment services should actively support people to start businesses, with mentoring, grants and flexible welfare rules that recognise the reality of early stage income.
4. Access to small scale finance must improve. Where capital is required, it should be simple, patient and proportionate. Micro grants and community finance can unlock activity that traditional banking will not support.
5. The system must be simplified for micro businesses. Tax, reporting and compliance processes are a major deterrent. Reducing complexity would remove a psychological and practical barrier for millions.
6. Success must be measured differently. Participation, inclusion, confidence and local economic impact matter. Growth should not be measured solely by scale or venture capital.

Conclusion: Putting People Back at the Centre

The UK's greatest untapped resource is not technology. It is people.

A knowledge economy that works for the many requires access to knowledge, permission to try and support to act. Entrepreneurship is not a silver bullet, but it is one of the most powerful tools we have to unlock human potential.

Rebel School's experience shows what is possible when barriers are removed and people are trusted. With the right policy framework, a Labour government can scale this impact nationally.

The knowledge economy must be about people first. That is how we build growth that is fair, resilient and real.

Tech Sisters

Investing in Women, Driving Diversity and Growth in Tech

Kasia Kramer
Chair,
Young Fabians

At the current rate, it will take 283 years to achieve gender parity in the UK tech workforce.

The data is unequivocal: women are leaving tech because the system is failing to support their progression.

The Lovelace Report sets out the scale of the challenge. Women are entering tech, but they are not staying, and the economic cost of that failure is mounting. Every year, between 40,000 and 60,000 women leave roles in the UK's tech and digital sectors. This churn costs employers between £640 million and £1.3 billion annually in recruitment, retraining, and lost productivity. Women who exit the industry altogether take with them an estimated £1.4 billion to £2.2 billion in lost economic value. Combined, this totals between £2 billion and £3.5 billion disappearing each year from a sector already constrained by skills shortages numbering between 98,000 to 120,000 professionals.

These losses are compounded by persistent structural inequities. Women make up only 21% of the UK tech workforce, and attrition is high: one in three women plan to leave their roles due to stalled career progression, poor work-life balance, and unsupportive workplace cultures. Meanwhile, women are paid below the industry average for their seniority, with over 50% earning less than their male counterparts at the same level. Over 75% of women with 11–20 years' experience have waited more than three years for a promotion, despite 70% pursuing additional qualifications and leadership training.

We cannot afford this systemic failure to cultivate and retain highly skilled talent, limiting innovation, weakening productivity, and undermining the UK's long-term growth ambitions.

Against this backdrop, the government has convened a Women in Tech Taskforce. Chaired by Secretary of State for Science, Innovation and Technology Liz Kendall MP, the Taskforce has been established to identify and dismantle barriers to education, training, and career progression, develop practical solutions for government and industry to implement together, and shape policy that drives sustainable and inclusive economic growth. The Taskforce must focus not only on how women enter tech, but on how mid-career women are supported to progress, succeed and remain within tech. One policy initiative that warrants serious exploration is degree-apprenticeships. These earn-and-learn programmes could be specifically designed for currently underrepresented groups, primarily women, providing paid, structured routes into both junior and senior tech roles, alongside a university-level qualification. By funding degree-apprenticeships targeted at female and underrepresented talent, the government can turn the Lovelace Report's insight into action, creating tangible pathways that retain diverse talent, support social mobility, and help build a more inclusive UK knowledge economy.

The Lovelace Report identifies three consistent drivers behind women's exit from tech roles:

1. Stalled career progression
2. Unequal access to high-impact work
3. Opaque career pathways

These are not isolated issues, but structural features of the tech labour market creating symmetrical outcomes between men and women.

Progression often depends on informal networks rather than transparent criteria, giving men an advantage through familiarity and proximity in an overwhelmingly male industry. Similarly, access to strategic or high-visibility projects, critical for career advancement, is frequently uneven and often allocated based on relationships rather than competence, leaving many women feeling sidelined. These structural challenges show up in measurable ways, with one in three women in tech planning to leave their roles due to stalled progression, poor culture, or limited support, and over 50% of women earn less than the industry average for their level of seniority.

The result is a steady loss of women during critical career stages, just as their technical expertise begins to deepen. Over time, this critically narrows the pool of women progressing into senior technical and leadership positions. The tech sector risks losing not just talent, but the diverse perspectives that strengthen innovation, growth and resilience.

Degree-apprenticeships offer a model that directly responds to many of these structural challenges identified in the Lovelace Report. As earn-and-learn pathways, degree-apprenticeships combine paid employment with degree prestige, providing financial stability, formal recognition, and structured career progression. Degree-apprenticeships can not only

funnel more women into tech at a junior level, but graduate-level programmes can also create structured pathways for progression from middle management into senior leadership positions. The Lovelace Report found that 90% of women aspire to leadership, yet only 25% believe it achievable. By embedding competency frameworks, formal assessments, and graduate-level university qualifications these programmes replace opaque career ladders with transparent progression, benefiting women at all stages.

Degree-apprenticeships can also enable women more access to high-impact work. Mandated rotations and exposure to strategic projects ensure experience across teams and functions, bypassing reliance on informal networks and mitigating unconscious bias. By targeting mid-career women alongside continuing to support entry-level female talent, government-funded degree apprenticeships can help diversify the makeup of the tech workforce at all levels, increasing retention, accelerating progression, and translating the Lovelace Report's insights into measurable improvements in both workforce composition and leadership representation.

At a system level, targeted public investment in degree-apprenticeships for women and other underrepresented groups offers a powerful policy lever to embed equity into the tech sector's operating logic. By cultivating not just a larger pipeline of diverse talent but a more inclusive, sustainable tech culture overall, government investment in degree-apprenticeships can help translate diversity goals into measurable workforce change. For the UK to achieve its ambitions as a global technology leader, we must not only attract women into tech but ensure women within the industry stay, progress, and lead. Structured, inclusive programmes like degree-apprenticeships represent a crucial step toward closing the gender gap, unlocking untapped talent, and securing a stronger, more innovative, and sustainable tech sector for the future. Over time, this will drive a sustained cultural shift, embedding equity and inclusion into the very DNA of the UK tech workforce and knowledge economy.

Britain Has Capital — It Just Won't Use It

Lewis Bailey
Chair,
Labour Tech

The prevailing description of the UK as an "IP farm"—a label previously recognised in Labour Tech papers—stems fundamentally from a critical lack of accessible and deployable capital. This deficiency is rooted in a deeply embedded, risk-averse investment culture across the UK and Europe, reinforced by a financial system that overwhelmingly favours low-risk, and consequently low-return, strategies.

This systemic caution is most visible in the behaviour of institutional investors. UK pension fund managers, in particular, exhibit a pronounced preference for assets perceived as safe. Portfolios remain heavily weighted towards government and corporate bonds, gilts, and other fixed-income instruments. While appropriate for capital preservation, this bias materially constrains investment in higher-risk, higher-reward venture capital—the essential mechanism for translating innovative intellectual property into globally competitive commercial enterprises. The result is a structural under-capitalisation of the UK's technology and science sectors, despite a strong underlying research and development base.

This conservatism is mirrored at the individual level. Approximately £340 billion of personal savings is currently held in UK Cash ISAs. While these vehicles offer liquidity and capital protection, their dominance represents a substantial opportunity cost for both savers and the wider economy. Analysis shows that an individual investing just £1,000 annually into a Stocks and Shares ISA rather than a Cash ISA since 1999 would now be around £50,000 better off. This differential illustrates a systemic preference for minimal risk over long-term capital growth, diverting vast sums away from productive, growth-oriented investment.

Addressing this failure requires pension reform to move both faster and further. Proposals advanced by Rachel Reeves for public-sector pension funds represent an important step, but they do not yet go far enough. The world's most effective pension systems—most notably those in Canada and Australia—share a common insight: in ageing societies with relatively small domestic markets, long-term prosperity depends on proactive investment rather than reliance on future tax receipts.

Australia provides a particularly stark comparison. Despite having roughly half the UK's population, it now manages the world's second-largest pension pool, with approximately £2.3 trillion under management. Australian funds routinely allocate capital to venture capital and growth equity, both domestically and internationally. Long-term strategic investments by major funds such as AustralianSuper have directed close to £1.2 billion into the domestic VC ecosystem in recent years, reflecting a deliberate shift towards growth and alternative assets.

For the UK, a clear and effective intervention would be reform of trustee fiduciary duty. Rather than interpreting responsibility narrowly as the pursuit of short-term "best financial interests," trustee obligations should be aligned more closely with the Australian model, which explicitly incorporates long-term, intergenerational outcomes.

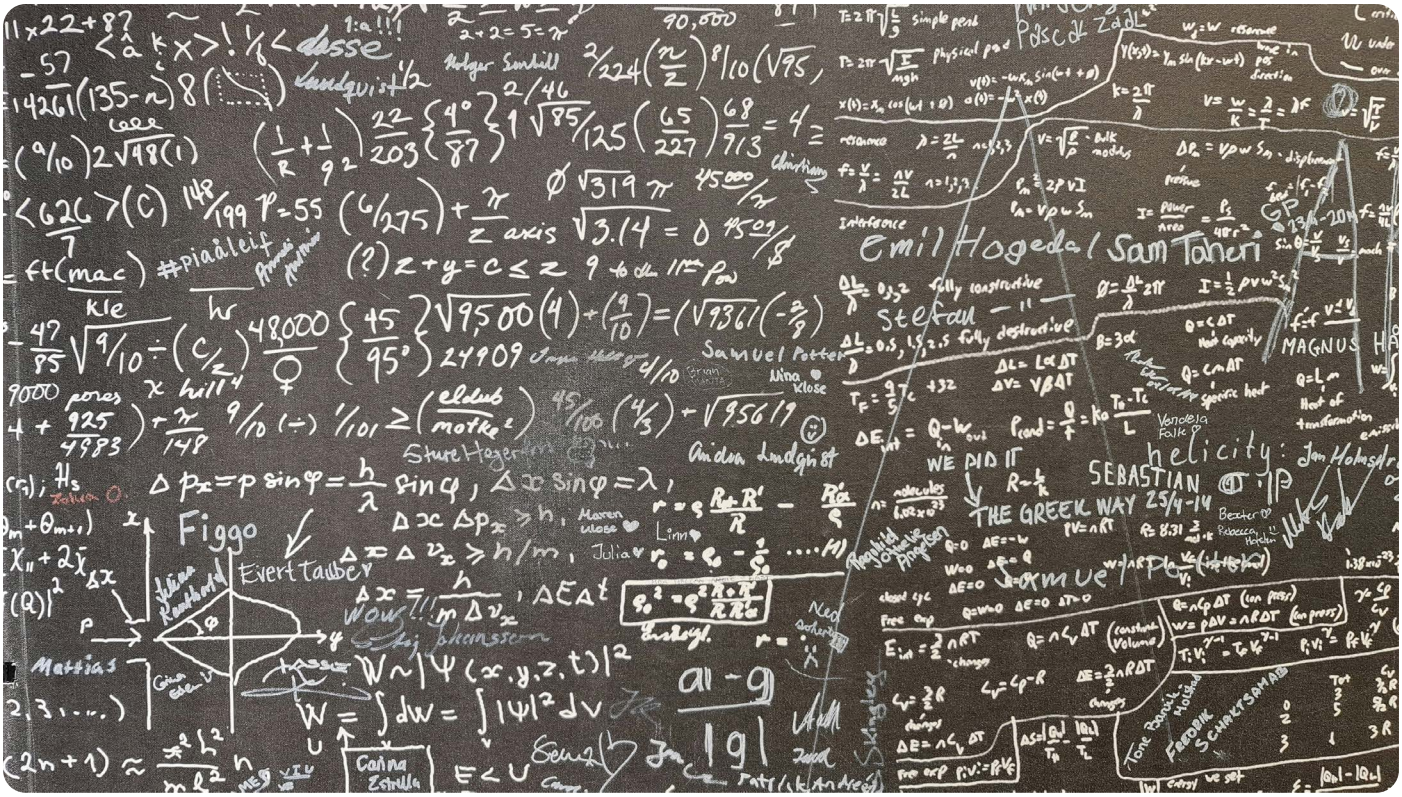
If UK pension funds were required to assess investments on a 30–40 year horizon, rather than a five-year cycle, the domestic venture capital ecosystem would change materially. Funds would be able to grow larger, develop deeper in-house capability, and deploy capital with greater strategic patience—becoming genuinely sovereign sources of scale finance rather than feeder funds for overseas investors.

At present, the constraint is systemic. UK-based funds are active at Pre-Seed, Seed, and Series A, but are often unwilling or unable to lead at Series B and beyond. The consequence is structural: promising British firms are forced to seek American growth capital precisely at the point where scale, governance, and long-term value are determined. Intellectual property, strategic control, and future returns then migrate offshore.

This outcome is not driven by a shortage of capital. The UK possesses abundant pools of long-term savings. It is instead a failure of capital deployment, shaped by fiduciary frameworks that discourage patient risk-taking and systematically under-supply growth finance at scale.

The macroeconomic consequences are now clear. Since the 2008 financial crisis, the United States economy has expanded by roughly 87%, while the United Kingdom has managed only 15%. More starkly, UK GDP per capita, measured in US dollar terms, has barely risen in sixteen years.

This divergence is not accidental. The United States made sustained, large-scale investments in its knowledge economy—technology, research, and innovation—and treated them as engines of national growth. Britain, by contrast, spent much of this period attempting to expand its financial sector at comparable rates, despite clear structural limits and diminishing



returns. The result has been stagnation rather than transformation.

The remaining question is how the UK develops the workforce capable of accessing and deploying this capital.

While headline investment in education broadly tracked inflation under the Conservative Party, this obscures a critical structural shift. The period was marked by rapid academisation, with large multi-academy trusts becoming the dominant organisational form. These trusts increasingly absorbed functions previously delivered by local authorities—such as specialist support services, staff development, and procurement—without receiving commensurate additional funding.

The result has been a quiet but substantial erosion of per-pupil resource relative to earlier funding models. Schools have been required to do more with less, while simultaneously managing greater administrative and operational complexity. This pressure has fallen most heavily on subjects central to the knowledge economy.

Nowhere is this more visible than in mathematics education. Fewer mathematics graduates are entering the teaching profession, driven by uncompetitive pay, workload pressures, and stronger private-sector alternatives. As a result, the system has become increasingly reliant on non-specialists—often graduates with business or unrelated degrees—to teach a subject that underpins engineering, computing, data science, and advanced manufacturing.

This is not a marginal problem. Mathematics is the gateway discipline of the modern economy. A shortage of subject-specialist teachers directly constrains the future supply of engineers, scientists, and technologists, regardless of how much capital is available downstream.

Compounding this is a curriculum misalignment that mirrors the broader economy. The UK mathematics and science curriculum remains oriented towards producing numerate generalists suited to financial services, rather than the depth of mathematical fluency required for computer science, quantum physics, or life sciences.

This is not primarily a pedagogical failure. Students in East Asia and Eastern Europe consistently outperform UK peers not because they share a single teaching method, but because their systems do not dilute mathematical difficulty in the early years. Calculus is introduced earlier, and foundational concepts of space, shape, and measure are embedded at primary level rather than deferred.

By contrast, the UK system delays abstraction and formalism in the name of accessibility. The consequence is a severe discontinuity between school-level mathematics and university study. The transition from A-level Mathematics to an undergraduate degree is so abrupt that university lecturers routinely spend much of the first year unteaching incorrect heuristics and rebuilding foundational understanding.

Mathematics is not merely a subject; it is the language through which modern science, computing, engineering, and advanced manufacturing operate. A curriculum designed around financial numeracy rather than mathematical fluency constrains entry into high-value technical fields.

In effect, the UK has aligned its education system with the needs of a late-twentieth-century financial economy while attempting to finance a twenty-first-century knowledge economy. Until this mismatch is addressed—by raising mathematical ambition earlier and narrowing the gap between school and university—the UK will continue to face a binding constraint on growth that no amount of capital reform alone can resolve.

Policy Recommendations

1. **Reform pension trustee fiduciary duty to mandate long-term growth consideration**

   Amend fiduciary duty so trustees are required to consider long-term, intergenerational outcomes over a 30–40 year horizon, rather than defaulting to short-term risk minimisation. This would align the UK with Australian and Canadian best practice and unlock patient capital for venture and growth equity without mandating specific asset allocations.

   The objective is not to force risk-taking, but to remove structural incentives that currently penalise it.

2. **Establish a minimum domestic growth allocation for public-sector pension funds**

   Introduce a requirement for large public-sector pension schemes to allocate a modest but meaningful proportion (for example 5–10%) of assets to UK-based growth investments, including venture capital, scale-up equity, and strategic technology funds.

   This would not crowd out private capital; it would anchor it. The absence of domestic lead investors at Series B and beyond is the binding constraint in the UK scale-up ecosystem.

3. **Create a National Scale Capital Vehicle as a fund-of-funds**

   Establish a professionally managed, arm's-length national scale capital fund that co-invests with private VC and growth equity funds at Series B and later stages. Its mandate would be explicitly counter-cyclical and patient, avoiding early-stage crowding while preventing promising firms being forced offshore at the point of scale.

   Crucially, this vehicle should be measured on long-term value creation, not short-term financial returns.

4. **Introduce targeted pay and bursary reform for specialist mathematics and science teachers**

   Address the maths and science teacher shortage through subject-specific pay premia, funded bursaries, and loan forgiveness for graduates in mathematics, physics, computing, and engineering who commit to teaching for a minimum period.

   This should be treated as an economic intervention, not an education add-on. Without specialist teachers, downstream capital reforms cannot translate into productive growth.

5. **Reform the mathematics curriculum to raise abstraction earlier**

   Redesign the national mathematics curriculum to introduce formal abstraction earlier, including earlier exposure to calculus, proof-based reasoning, and spatial mathematics. This should be paired with teacher retraining and curriculum support, not left to individual schools.

   The objective is to reduce the discontinuity between A-level and undergraduate study and to reorient mathematical education away from financial numeracy alone and towards the fluency required for science, computing, and engineering.

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