

UK Innovation Strategy Highlights

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Background and top level summary

The UK Innovation strategy represents potentially the biggest change in science and particularly innovation policy direction since the publication of the eight great technologies in 2012. It sets out a new balance between challenge led support and transformative deep tech support.

In a major improvement to the eight great, photonics is clearly identified, with electronics and quantum as one of seven vital technology families on which to focus.

Prioritisation of investments will be led by a new National Science and Technology Council, chaired by personally the Prime Minister, illustrating the importance being given to the strategy

The full 116 page strategy published 22 July 2021 can be viewed at

<https://www.gov.uk/government/publications/uk-innovation-strategy-leading-the-future-by-creating-it>

Quotes direct from the strategy are in **bold** *editorial comments in italics*

Strategy Aims and objectives

The Strategy sets out the long term plan for delivering innovation led growth via **new missions** and **backing technologies of the future**. Clearly signalling where government will focus in the future. **Innovation is critical from fighting Covid to achieving net zero.**

- *Note the forward focus on net zero.*

Major challenges can be resolved by ambitious investment in, and bold pursuit of, science technology, innovation and collective entrepreneurship.... countries that secure leadership in such transformational technologies will lead the world, enjoying unrivalled growth, security and prosperity

- *Backing for science and technology could not be more clear.*
- *Note the inclusion of entrepreneurship.*

Whilst the strategy defines the direction of policy it also makes clear the **primary aim boost private sector investment ... a message to businesses: make innovation central to everything you do.**

All elements contain global dimension... we will maintain a laser-like focus on realising our ambitions for innovation

- *Strong hint gov will not be signing open cheques.*
- *New funding will be reserved for the Autumn Spending review and must fight for its case.'*
- *Photonic puns are clearly in!*

Policy fit: fleshes out detail from Build back better, develops themes in R&D strategy etc. Sits alongside Northern Ireland's Decade of Innovation and Scotland's Innovation Action Plan

Will be followed by Net Zero Strategy, the Digital Strategy, the National Cyber Strategy, the National Space Strategy and Levelling Up white paper

Delivery

UKRI and Innovate UK will **operationalise** strategy. **Innovate UK will bring forward their plan for how they will help to deliver this Strategy with targeted action in the coming months.**

- Note operationalise not deliver.....could interpreted as focus on input not outcome KPIs
- Focus on Innovate UK to work with rest of UKRI – hence the recent call from Innovate for photonics projects themes

Time horizon: ‘make the UK a global hub for innovation by **2035**’ although elsewhere noted PM previously announced intention for UK to be a science superpower by 2030

Strategy Structure

Built around 4 pillars



- Beware that £22bn is not necessarily new money. Indeed many of the headlines under the four pillars have been previously announced or are variants of.
- The new Nurse review could be key to the future role of Catapults, large scale UKRI investments and research infrastructure.
- Potential for PLG to engage with new business innovation forum?

Innovation today -Background on why innovation is important

Slowing rate of innovation over recent decades cited as major cause of slowing growth and productivity. Not only has Public and private R&D spending slowed, **but transformative research has slowed, or at least become far less efficient.....Innovation does not flow neatly in one direction from research to application**

- Hint of understanding that innovating is harder than used to be – or at least more resource intensive
- Recognition of the complexity of innovation process.

Ten innovation lessons from the pandemic identified

1. Prioritise innovation
2. Place bold bets
3. Use weight of public sector procurement to drive innovation
4. Embrace empowered teams
5. Pursue speed
6. Pursue public-private partnership
7. Innovation is international
8. Bring discovery and engineering side by side
9. Build, not just design
10. Value non-monetized benefits

- Fascinating list that offers much potential to align with and formulated novel aligned interventions. Learning from 10 lessons of the pandemic we propose.....
- Hints at fundamental changes in gov procurement, portfolio investment, tolerance of risk, timescales, empowerment of small teams, scale of investment.
- The following statements are particularly interesting as it hints at a new approach to funding low TRL sequentially through high TRL.

We must view discovery, invention, and development as existing in a cycle, not as siloed separate parts... Manufacturing and logistics are critical elements of an R&D ecosystem.

Achieving Vision 2035- the Four Pillars

These have been summarised in reverse order to put the interesting elements first.

Pillar 4- Missions and technologies - driving capability in key technologies

UK government will take a leading role, directing innovation through a suite of Innovation Missions focused on some of this government's foremost policy priorities.... respond directly to pressing national, and global, challenges.

Identifies the key technology ‘families’ where the UK can develop strategic advantage, and which promise transformational benefits for our economy and society.... we can and should be more strategic about emerging technologies, including backing potentially transformative technologies at an early stage.

- Note the new balance between missions/challenges and transformative tech for strategic advantage. Both are now given equal footing

Innovation Missions and technologies are separate but complementary...both compliment each other

Missions

We will establish a new Innovation Missions Programme to tackle some of the most significant issues confronting the UK in the coming years including (from the PM)

- accelerate the solutions that will help us tackle climate change
- build on the UK’s capabilities in medicine and the life sciences to tackle public health challenges
- how we will leverage technology to grip new threats and opportunities in cyber, space and AI

we will identify a suite of ambitious and inspiring missions determined by the new National Science and Technology Council

Missions will be **bold, specific, measurable, and timed**...supported with competitive research and innovation ‘Challenge’ funding that builds on the lessons of the Industrial Strategy Challenge Fund.. missions will leverage the full machinery of government... they will coordinate policy across areas such as skills, regulation and procurement...

Missions offer a compelling platform for deepening international scientific and commercial collaboration

- note the focus on missions as a basis for international collaboration not mentioned in strategic tech

Strategic technologies

Government will work with industry to deliver this ‘more active approach’ to driving technological innovation

we must back the emerging technologies that can make fundamental contributions to those missions and will shape our lives in the decades ahead... it requires prioritising our finite capacity on specific innovations

The seven technology families of UK strength and opportunity:

- Advanced Materials and Manufacturing
- AI, Digital and Advanced Computing
- Bioinformatics and Genomics
- Engineering Biology
- Electronics, Photonics and Quantum
- Energy and Environment Technologies
- Robotics and Smart Machines

The purpose of these technology families is to focus domestic and international attention on the potential of UK tech... We will need to prioritise investments at a granular level.... new National Science and Technology Council, chaired by the Prime Minister, will steer this crucial prioritisation process.... This will bring high rewards and benefits to the UK, including in developing technology to reach net zero

- Not everything within e.g. photonics electronics and quantum will be priority but a subset.
- In a nod to following the science the seven were identified from 'analytical synthesis' in a methodology to be published – could be interesting
- Note our new EPQ family is not the same as previous electronic sensors and photonics (ESP). Will be interesting to see if this has any impact on the organisations at Innovate, KTN etc

Reflecting The greatest benefits will often be at the intersection of these technology families

Reference to Photonics is not confined to the EPQ family

- Metamaterials, 2d materials and additive manufacture, all with strong photonics focus, are specifically called out as opportunities under advanced materials
- Augmented and virtual reality big photonics applications are highlighted in AI digital and Computing.
- Perovskite's and Oxford photovoltaics are flagged in Energy
- Robotics and Smart machines includes autonomous systems and corresponding design technologies.

As these companies grow they often have to look abroad for the investment required to scale. Foreign investment in UK companies is a welcome vote of confidence, but weaknesses in the UK scale-up ecosystem

Without risk there is no innovation, but in some cases governments are better placed to bear some of the risks of technological innovation....

hardware and biologically-based innovations have a prolonged and expensive process of development, including prototyping, testing and verification.... deep tech innovators must build their own industries and markets...can struggle to embed themselves in domestic supply chains

- Common issues flagged by photonics organisations

Some key investments in property partnerships, national centre for digital innovation, national quantum computing centres and clean maritime competition are identified. We will use the tech families to guide prioritisation and assess what technology-specific interventions are needed.....

The forthcoming Spending Review is an important moment to agree some of those priorities

- Nothing radical in these announcement more to come from the spending review and prioritisation via the new National Science and Technology Council.

Gov will evaluate on nature of support for **Semiconductors** and **Cyber physical infrastructure** as well as looking at upcoming **Space and AI strategies** and **Robotics growth partnership**

Pillar 3: Institutions & Places

Must improve the interaction between universities and business... UKRI, including Innovate UK, will develop a simpler way for businesses to understand and interact with the UKRI institutional structure. This will include developing tailored web content and..... a digital portal to provide a gateway to all relevant support across the ecosystem for innovative businesses

Undertake an independent review, (Prof Sir Paul Nurse) , looking across ...organisations undertaking all forms of research, development and innovation....to highlight the strengths to be nurtured and any comparative weaknesses to be tackled

- *Focus on must do better, but how left to Paul Nurse to highlight*

ARIA

will have strongly empowered programme managers able to exercise judgement and take risks on technologies

- *No further info on Aria whilst executive team is recruited.*

Levelling Up

ensure more places in the UK host world-leading and globally connected innovation clusters... increasing research and innovation activity in more places... Making the most of R&D in places around the UK remains a key government priority.... encouraging institutions to increase their local economic and societal impacts

with focus on investments in places with strong R&D potential, increase private investment, maximise local benefits of R&D, partnership with local gov

- *Focuses appears on better leverage of centre of excellence and expanding their local impact, not necessarily trying to create new centres from scratch – see Levelling Up white paper due in autumn not discounting following...*

We will work with local partners and the science, research and innovation sector to develop proposals for a new cross-government approach that enables places outside the Greater South East of England innovation clusters

Wave 2 strength in places announcements are fully integrated in place element of the innovation strategy including £42.4 for Smart Nano nanoscale optical components

Pillar 2 – People i.e. skills

Action in four areas (*two of which repeat from pillar one*)

- Richer diversity of skills critical for innovation i.e. more programming and engineering
- Opening borders to top talent
- Tackling excess bureaucracy
- Innovator-friendly regulation

Recently published R&D People and Culture Strategy reflects and expands on the commitments made in this Pillar including a pilot to help researchers acquire skills and knowledge beyond their own discipline - <https://www.gov.uk/government/publications/research-and-development-rd-people-and-culture-strategy>

Pilots College Business Centres, will explore how targeted support can help further education (FE) providers, working together collaboratively, to address skills and innovation priorities that local employers have identified

Gatsby Charitable Foundation will support centres of innovation to work with industry and training providers to expand industry's capacity to forecast its emerging skills needs

Innovate UK , will develop a leadership role in identifying critical innovation emerging skills gaps

- *opportunities for photonics community to further define future skills needs*
- *skills are a new area for Innovate UK that have previously often been seen as outside its remit.*

Increasing our support for entrepreneurial skills, especially in the academic sector.. and management training via Help to grow

A dedicated cross-departmental unit, the Office for Talent, driving a proactive approach to bringing talent to the UK.

VISAs

A new High Potential Individual (Visa) route to make it as simple as possible for internationally mobile individuals who demonstrate high potential to come to the UK... open to applicants who have graduated from a top global university... no job offer requirement

A scale-up route (VISA) will support UK scale-ups by allowing talented individuals with a high skilled job offer from a qualifying scale-up at the required salary level to come to the UK.. apply through a fast-track verification process if growing >20% a year over 3 years and min 10 employees

- *Potentially useful, but 3 year growth will exclude the earliest start-ups/ spin-outs*

A revitalised Innovator route for innovators and entrepreneurs with simplified conditions.

Diversity

Promoting an inclusive innovation sector will be a central objective across all the innovation programmes the UK government takes forward

Pillar 1: unleashing business

Fostering an ecosystem that encourages and enables all UK businesses to innovate including

1. Accessing private investment at the right stage
 2. Targeted public support
 3. Access to infrastructure
 4. Agile regulatory system
 5. Pro innovation competition regime
 6. Safeguard UK intellectual property
 7. Gov procurement to pull innovation
- *New specifics are short but include a host of consultations including on*
 - *SME access to capital markets,*
 - *pension fund investment,*
 - *digital twinning & cyber physical infrastructure,*
 - *how regulation can support innovation,*
 - *reforms to ensure that the competition framework is effective*
 - *protection of inventions and creations made by AI with minimal human input*

Joint Action Plan on Standards for the Fourth Industrial Revolution, UK Measurement Strategy & National AI strategy to be published this year

On IP, Intellectual Property Office will help with the costs that businesses face when acting to leverage their IP assets or negotiate the IP landscape

- *Note this does not say help with costs of secure IP, but leverage ones IP and help 'UK companies make informed decisions about navigating the international IP environment'.*

National Procurement Policy Statement sets out innovation as one of the key strategic national priorities which all contracting authorities should consider when undertaking procurement

- Apparently includes note that commercial teams should include support for responsible innovation alongside value for money!

Commercialisation

UKRI will establish a UKRI-wide Commercialisation Funding Framework building on best practice... including offering long-term, stage-gated funding to commercialise. Strengthen ICURE and KTPs

- No further detail on what this may cover

We want to invest and support key initiatives which create incentives for universities to work together to pool their expertise and collectively improve the way they engage with the investment community

Expand Made Smarter Adoption in the North West of England and to begin scaling-up support in the West Midlands, North East of England, and Yorkshire & the Humber

Innovate UK will include the adoption and diffusion of cutting-edge innovation in its objectives, with a strong focus on driving an effective innovation ecosystem

- Such a subtle shift may cause a change in interaction with organisation like PLG

Implementation & next steps

New Business Innovation Forum

New Office for Science and Technology Strategy including new Science and technology horizon scanning ... and support for the National Science and Technology Council and the National Technology Adviser

Gov will draw on the expertise and networks of departmental Chief Scientific Advisers

- Good to see Photonics horizon scanning ahead of the game.

Sector Visions...we will come forward with visions for sectors and sub-sectors with high-growth potential prioritising sectors with competitive advantage, growth potential, support net zero, global Britain & Levelling Up, where gov action can help.

- Opportunities for photonics or sub-set thereof to work on sector vision

Further work /reports

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| <ul style="list-style-type: none"> ○ National space strategy ○ Joint action plan on standards for 4th industrial revolution ○ Net Zero Strategy ○ Levelling up white paper ○ Export Strategy | <ul style="list-style-type: none"> ○ National AI Strategy ○ Digital Strategy ○ Food Strategy ○ Sector Visions (12 months) ○ National Cyber strategy |
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Asides and photonics quotes

Number of photonics organisation cited in case studies and elsewhere including Qioptiq, Fraunhofer CAP, CSAC, South Wales Semiconductor cluster

‘Science and Technology Facilities Council whose laser technology is powering safety devices around the world’.