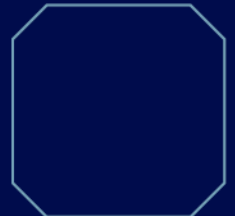
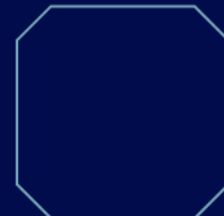
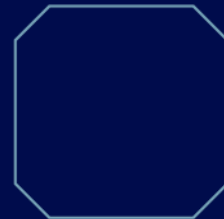
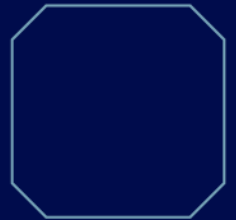




EVENT WRITE-UP: “LIGHT FOR FUTURE SEMICONDUCTORS – UNLOCKING ECONOMIC GROWTH THROUGH PHOTONICS”

18th March 2025, London



EVENT WRITE-UP: ROUNDTABLE, “LIGHT FOR FUTURE SEMICONDUCTORS – UNLOCKING ECONOMIC GROWTH THROUGH PHOTONICS”

On 18th of March 2025, the CORNERSTONE Photonics Innovation Centre held the roundtable on “**Light for Future Semiconductors – Unlocking Economic Growth Through Photonics.**” Photonics is the technology of light. Using photonics devices, we can transmit and process information, in many cases far more efficiently than comparable electronics devices. **While electronic semiconductor chips remain the foundation of our modern devices, photonics chips are set to supercharge their capabilities, enabling faster data transfer and greater energy efficiency.**

This roundtable brought together policymakers, industry leaders and academic experts to explore how photonics can advance the government’s missions, focusing on resilience, infrastructure, and technological leadership.

BACKGROUND

The UK photonics sector is valued at £15.2 billion and employs over 89,000 people in 1,200 firms (expected to grow to £16.5 billion and 90,000+ employees soon).

- It employs more people than automotive, chemical, and pharmaceutical manufacturing.
- The revenue of the sector is **two-thirds the size of the entire aerospace industry** despite primarily producing components.
- 13% of all global innovation relies on photonics, as shown by analysis of 160 million research publications over 35 years.

Traditional photonics involves assembling components manually, which is expensive and limits production. The shift towards wafer-scale photonics (integrating photonic components on semiconductor chips) will dramatically increase efficiency and scalability, similar to how integrated circuits revolutionised electronics.

KEY POINTS FROM THE DISCUSSION

- The attendees highlighted synergies between photonics, quantum and semiconductors. They identified opportunities to manufacture economically in the UK, supporting economic growth as part of the Government's Industrial Strategy - enabled by modest investments in existing infrastructure.
- The attendees discussed areas where the industry is already attracting inward investment, highlighting further opportunities to grow the sector by crowding in private investment.
- Although there's reluctance to pick winners, the attendees highlighted the need to **prioritise technologies of strategic importance**, specifying 'position navigation and timing' (PNT) as a key technology.

Examples of photonics applications

- **Hollow-core fibre** from Southampton is used in major London data centres – including Microsoft's – supporting the City of London.
- **Virtual lithography** is crucial for advancing semiconductors.
- **Autonomous vehicles** rely on LiDAR - a photonics-based technology.
- **Healthcare:** Photonics is transforming diagnostics and treatment:
 - Real-time imaging
 - Laser-based surgeries
 - Genomic analysis for personalised medicine
- **Environmental monitoring:** Photonic sensors track air and water quality.
- **Quantum technologies** (computing, sensing, communications) are underpinned by photonics.
- **Space exploration:** Enables inter-satellite optical communication.
- **High-power lasers** (e.g. Dragon fire system) are crucial for UK and Ukrainian defence. Or UK-manufactured optics are essential for air defence missiles supplied to Ukraine.
 - 3 major high-power laser manufacturers: **Trumpf, Coherent, NKT**
 - Strong in **directed infrared countermeasures** for defence systems

The UK is a world leader in **silicon photonics** (moving data with light on a chip), which is one of the fastest growing sectors and an area where the UK can lead, offering significant economic returns:

POLICY RECOMMENDATIONS

Supply chain and resilience

The future of semiconductor materials is highly uncertain, making it impractical to predict or invest in any single material. As well as developing new materials, the UK should prioritise chip integration capabilities; the ability to combine different chips and materials, regardless of where they are manufactured. By splitting digital functionality across multiple chips; some made domestically, others sourced externally, the UK can maintain control over critical functions while diversifying supply chain risks. This process is called **heterogeneous integration**, where different chips are combined into a single system.

POLICY RECOMMENDATION

Policy and investment should focus on building domestic expertise, infrastructure, and partnerships in chip and system-level integration.

Prototyping platforms for high-value, specialist applications

The UK's competitive advantage in emerging technologies will increasingly rely on its ability to rapidly prototype and test high-value, specialist applications, from advanced communications to quantum sensing and custom AI hardware.

To support this, the UK needs shared prototyping platforms that provide researchers, startups, and industry with access to the tools, facilities, and expertise required to move from concept to functional systems quickly and cost-effectively.

POLICY RECOMMENDATION

Fund and scale national prototyping platforms focused on high-value applications - particularly where the UK has existing research strengths or strategic interest.

Connecting photonics, quantum and semiconductor tech

Photonics, quantum and semiconductor technologies are increasingly **interconnected and mutually reinforcing**. Progress in one area often depends on advancements in the others - for example, photonic interconnects enable faster electronics, while quantum systems rely on precise photonic and electronic control.

POLICY RECOMMENDATION

Establish mechanisms to align the UK's existing photonics, semiconductor and quantum strategies - such as joint funding calls, cross-sector innovation hubs, or a coordinating taskforce.

Cross-collaboration needed

To unlock growth in high-potential sectors, the UK should promote a nationally coordinated strategy that encourages clusters to work together. At present, regional clusters often operate in silos - competing for limited funding, recognition, and talent - rather than working in complementary ways. A more effective model would see government bodies actively incentivising collaboration between clusters, research

institutions, and industry players through targeted investment and shared infrastructure.

POLICY RECOMMENDATION

The UK government should incentivise collaboration among clusters to avoid competition and silos, which hinder industry and research. The UK's strengths in photonics should be leveraged, with a restructuring of funding programs to support interdisciplinary collaboration.

Aligning MoD and DSIT on semiconductor capability

There is a significant opportunity to support UK defence primes with photonics, quantum and semiconductor technologies as part of the forthcoming Strategic Defence Review. While the MoD now owns one of the largest semiconductor fabs in Europe, Octric in Newton Aycliffe, the core semiconductor policy direction resides within DSIT. Aligning the photonic and semiconductor activities of MoD and DSIT has the potential to secure resilient supply chains for defence while also growing the sector.

POLICY RECOMMENDATION

Establish a formal cross-departmental taskforce between the MoD and DSIT focused on collaboration.

ACKNOWLEDGEMENTS

The CORNERSTONE Photonics Innovation Centre thanks all contributors for their insights and collaboration in shaping this shared agenda.



ABOUT THE AUTHOR



Dr Justyna Lisinska has a solid expertise in policy influencing, advising senior policymakers, and hosting high-profile events with Members of Parliament. Prior to her current role, she worked as a Policy Analyst at the Information Technology and Innovation Foundation, one of the world's leading technologies think tanks.

She also served as a Policy Research Fellow at King's College London, where she developed a policy programme for the UK's largest project on autonomous systems.

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