



## Thought Leadership

# Opinion: Safeguarding Europe's Economic Sovereignty Depends on Photonics

**Amid calls for nation-states to conduct risk assessments of critical technologies, Photonics21 President Dr Lutz Aschke says photonics will be crucial for protecting Europe's economic and technological interests.**

Photonics21, Europe's premier Technology Platform representing the photonics community, has expressed its support for the European Commission's current plan for nation-states to conduct risk assessments into critical technologies.

In a recent call for heightened [vigilance against technology leakage](#) to nations outside of Europe, particularly Russia and China, the Commission has [recommended that member states conduct risk assessments](#) in four pivotal technology domains: advanced semiconductors, artificial intelligence, quantum technologies, and biotechnologies.

But, the role played by light science – which is the driving force behind advanced semiconductors, enabling high-speed data transmission and processing – is unarguably the most critical of the technologies listed by the EU Commission in protecting Europe's technological interests.

Light technologies stand out as a way to achieve strategic autonomy and preserve technological independence. Photonics – the science and technology of utilizing, generating and harnessing light and other forms of radiant energy – is a linchpin that supports and enhances the capabilities of other critical technologies.

In a recent EU Commission consultation on future R&I priorities, more than 2,000 technology experts from all disciplines categorised photonics as one of the most important technologies of the next ten years<sup>1</sup>.

China has recognised the strategic impact of photonics and emerged as the predominant force in this field in the past decades. As a consequence, technology monopolies in photonics are now a real concern. The Australian Technology Institute's report "Critical Technology Tracker: The Global Race for Future Power" names photonics sensors, key for many future megamarkets, as one of the few technologies where the risk of a Chinese monopoly is explicitly high<sup>2</sup>. This is supported by a recent industry survey conducted by Photonics21 and EPIC, which revealed that more than 50 % of EU photonics companies stated a dependency on key sources of goods from China<sup>3</sup>.

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<sup>1</sup> European Commission, Directorate-General for Research and Innovation, Synopsis report – Looking into the R&I future priorities 2025-2027, Publications Office of the European Union, 2023; <https://data.europa.eu/doi/10.2777/93927>.

<sup>2</sup> ASPI's Critical Technology Tracker: the global race for future power; <https://techtracker.aspi.org.au/our-report/>; 8 of the 44 strategic technologies were classified as technologies with high monopoly risk.

<sup>3</sup> Photonics Industry Supply Chain Survey, 2023; [https://www.photonics21.org/news/2023/04/2023-04-26\\_supply-chain-survey-2023.php](https://www.photonics21.org/news/2023/04/2023-04-26_supply-chain-survey-2023.php).



While AI and quantum may provide headline-grabbing news stories, photonics is a prerequisite for those future technologies. It is an enabler, ever-present, supporting innovations and technological advancements.

### **Driving Critical Technologies**

A whole host of critical technologies depend on photonics: it is the driving force behind advanced semiconductors, enabling high-speed data transmission and processing in the era of digital transformation. Light science has formed the backbone of artificial intelligence, providing the optical components crucial for machine vision and data communication.

With quantum technologies, for example, photonics plays an indispensable role in the creation and manipulation of quantum states. Quantum technologies have the potential to revolutionise information processing and communication, with implications for both security and computation. But it is only with advanced lasers that we can achieve quantum coherence, which is essential for quantum computing and communication. In biotechnology, photonics facilitates cutting-edge imaging techniques, accelerating advancements in medical diagnostics and treatment.

We would have no high-speed communication without photonics. High-speed communication involves light for communication, which can enable significantly faster data transmission compared to traditional electronic communication. High-speed communication is crucial for various applications, including data centres, telecommunications, and the Internet of Things (IoT). Furthermore, the power consumption of data transmission with light is significantly lower than with electrical signals.

A key application of photonics is fibre optic communication, which is fundamental for long-distance, high-capacity data transmission. This technology is essential for the backbone of modern communication networks, supporting internet connectivity, video streaming, and other data-intensive applications.

Photonics is also instrumental in the development of advanced sensors and imaging technologies. These technologies have applications in various fields, including healthcare, manufacturing, and environmental monitoring. They contribute to the development of smart cities, precision agriculture, and improved medical diagnostics.

Photonics is a flexible and fully digital production tool using versatile laser systems, related manufacturing systems and self adapted process control devices, which provide a wide variety of manufacturing solutions from single products to mass manufacturing.

### **Sovereignty Through Photonics**

Photonics21 President Dr Lutz Aschke says: “Supporting the Commission’s call for European self-sufficiency, photonics acts as a cornerstone for technological sovereignty, providing the



essential tools and capabilities needed to secure communication, process data, and advance innovations across critical technology areas.

By controlling communication channels, processing data securely, and leading in critical technology areas, European nations can ensure autonomy through technological capabilities. This autonomy is essential for protecting national security, preserving strategic advantages, and reducing overreliance on external entities.

Innovation in critical technology areas fosters economic growth and resilience. Nations that lead in these domains can establish themselves as economic powerhouses, attracting investments, creating high-value jobs, and influencing global trade. Economic sovereignty is achieved by reducing dependence on foreign technologies and by participating in the worldwide economy on one's own terms."

He concludes: "We have many family-run, medium-sized companies in Europe that have the courage, strength and stamina to make long-term investments. In hospitals, laboratories, factories and fields, the potential of photonics is far from exhausted. It is driving the most important transformation processes of our time. Investing in photonics is imperative for Europe to maintain control over its technological future, ensuring a resilient and sovereign position on the global stage."

===ENDS===

## **About Photonics21**

Photonics21 is the European Technology Platform (ETP) for photonics, a technology encompassing all of the products and processes around the emission, manipulation and detection of light. Photonics is integral to a wide range of industries, including the medical, healthcare, transport, manufacturing, and telecommunications sectors.

"Photonics21" was set up in December 2005 to bring the community of photonics researchers and industries together. The European Commission defined photonics as one of five European Key Enabling Technologies (KETs) in September 2009. Shortly after, the European Research & Innovation Program "Horizon 2020" invited Photonics21 to become a "Public-Private Partnership". The "Photonics 21 Association", a legal entity under Belgium law, became the private contract partner in November 2013 in a Public-Private Partnership in conjunction with the EU Commission.

Today, Photonics21 represents more than 4,000 personal members from across Europe and abroad. Our members are experts in the photonics industry, research organisations and universities who actively engage with us to develop a joint photonics strategy for future research and innovation in Europe.



Photonics is one of the rare critical technologies in which Europe is still a global powerhouse in research and business. Several Nobel Prizes have been awarded to European scientists for photonics achievements in the past two decades. 5,000 European SMEs are so-called hidden champions and world market leaders in their specific photonics markets. Europe ranks number two in the world in terms of production volume. With more than 400 start-ups, Europe is one of the most thriving and innovative photonics regions in the world. Leadership in the development of photonics components and systems means a competitive advantage in many key markets and policy areas, such as quantum internet, quantum computing, next-generation microelectronics, autonomous vehicles, Industry 5.0, virtual worlds, fusion energy and many more.

As of 2022, the global photonics market was worth € 786.5 billion. The European photonics industry has grown from € 103 billion in 2019 to € 124 billion in 2022. With a 6.5% CAGR, the European Photonics Growth exceeds the EU's GDP. The European photonics industry has considerable global leadership positions and employs about 430,000 people directly.

With a positive growth forecast, current industry trends like digitalisation, resource efficiency, and individual and zero-failure production will drive the photonics industry further.

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