

Photonics for Digital Transformation

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Our Vision for Photonics in Horizon Europe: Power Growth and Innovation in literally all future Megamarkets



Instant diagnosis of major diseases



Quality food from farm to fork



Accident and congestions- free road transport



A truly circular economy



Photonics as a flagship science for innovation



Smart Cities



Empowering Industry 4.0 for a million new jobs



Zero downtime in a terabit economy

“..the Photonics sector is an essential key enabling technology and represents an important building block of the next digital revolution...” European Investment Bank, 2018



Photonics Functions: Harnessing Light for a Healthy, Green & Digital future

Types of Photonic Systems	Sensing & imaging systems	Communication systems	Screens, displays, projectors, ...	LED, OLED, lamp systems	Photo-voltaic systems	Laser & production systems
Photonic Functions	Acquiring information	Transmitting information	Delivering information	Light providing	Energy providing	Manufacturing
Examples	  	 	 	 	 	 

Source: Photonics PPP – Tematys Study: Horizon 2020 Projects Analysis and Assessment of the role of Photonics, May 2019



Photonics Driving Europe's Digital Sovereignty

- The digitization of Europe depends on information and communication technologies.
- Growing market sectors such as the IT industry, Industry 4.0, IoT and autonomous vehicles need a competitive and innovative communication infrastructure.



Photonics Driving Europe's Digital Sovereignty

Some Economic Facts

- Added value of the ICT sector to the European economy: €686 billion in 2016 (EITO: ICT Market Report 2016717)
- Employment in the ICT industry: More than 6.2 million people in 2014 (EU Commission: Digital Agenda Scoreboard – The EU ICT Sector and its R&D Performance, 2017)
- R&D intensity in the optical communication sector typically exceeds 10% of revenue.
- 6 of the 20 largest optical equipment manufacturers have major R&D centers in Europe.
- They represent more than 30 % of the global optical equipment market (Ovum Informa: Global Optical Networking Market, Market Share Report, 2017)
- 2 of the 3 largest component manufacturers have operations in Europe.



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Photonics for a secure and resilient infrastructure

- Autonomous vehicles, robots and drones will generate Zettabytes of digital information.
- The digitisation of the industrial production and working environment are expected for a million new jobs in Europe.
- A new programmable network infrastructure will be the 'central nervous system' that the digital society, industry and economy will heavily rely upon.



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Photonics for a secure and resilient infrastructure

Photonics technologies are indispensable for a new secure and resilient ICT infrastructure:

- 5G and beyond networks heavily rely on the availability of optical backhaul and core networks;
- Ultra-broadband residential and enterprise access is not possible without deep fibre solutions;
- Optical wireless emerges as a complementary solution in areas where no fibre is available;
- Data center interconnects cannot cope with the bandwidth surge without photonics;
- Critical and private infrastructures demand optical networks for security and simplicity.



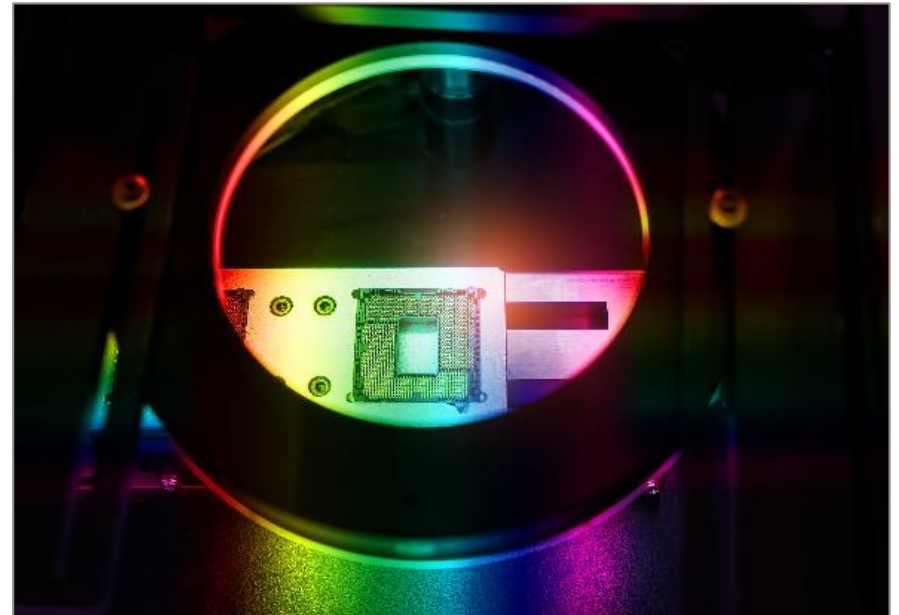
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Photonics for a secure and resilient infrastructure

‘Photonics integration 2.0’:

- A closer integration with sensor and actuator, radio, computing, switch, storage and other functions will be required to take the digitisation of the European industry, economy and society to a much higher level.
- Multi-chip modules in which electronics and photonics buildings blocks are co-integrated into a subsystem or system as a further milestone
- Substitution of electronic functions for photonic functions where additional functionality will be delivered, higher capacity, lower latency or better energy efficiency



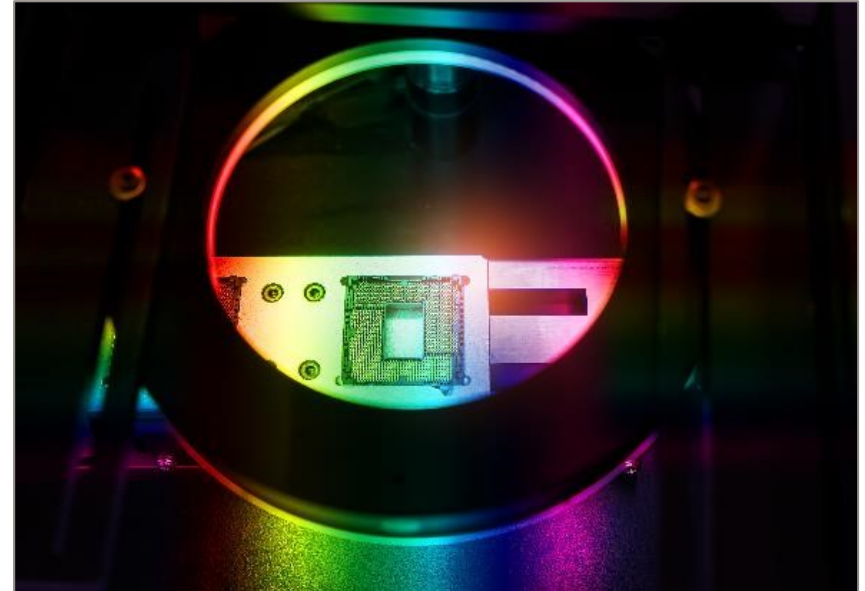
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Photonics research and innovation challenges

- Zero-touch operation - Photonics networks augmented by AI / machine learning
- Instantaneous response - Low and deterministic latency in the optical network connections
- Access Everywhere - Fibre-to-the-Home, FttRadio-Antenna, 'Fibre-in-the-sky' optical satellite comms, LiFi
- Intrinsic security - The resiliency of optical network infrastructure, secure transmission of data, complemented by quantum communications infrastructure
- Sustainable capacity growth - In a 5G and datacenter centric network, capacity in fibre networks has to 'keep up' – hyper-scalability, power consumption, network cost, operational efficiency, green network



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Photonics Driving Europe's Digital Sovereignty

“Photonics and a photonics enabled ICT infrastructure are essential to many European Commission initiatives to increase the quality of life through innovation across Europe.”

(ETP Photonics21: Europe's age of light! How photonics will power growth and innovation, Strategic Roadmap 2021-2027, March 2019)



Thank you very much for your attention!

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