Photonics for Digital Transformation

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

“..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

<table>
<thead>
<tr>
<th>Types of Photonic Systems</th>
<th>Sensing &amp; imaging systems</th>
<th>Communication systems</th>
<th>Screens, displays, projectors, ...</th>
<th>LED, OLED, lamp systems</th>
<th>Photo-voltaic systems</th>
<th>Laser &amp; production systems</th>
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</thead>
<tbody>
<tr>
<td>Photonic Functions</td>
<td>Acquiring information</td>
<td>Transmitting information</td>
<td>Delivering information</td>
<td>Light providing</td>
<td>Energy providing</td>
<td>Manufacturing</td>
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<td>Examples</td>
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Source: Photonics PPP – Tematys Study: Horizon 2020 Projects Analysis and Assessment of the role of Photonics, May 2019
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

- 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.
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.
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 building 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
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
- 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
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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