

The EPIC logo features three small circles (blue, green, and red) to the left of the word "EPIC" in a blue serif font, followed by a large red circle.

500 members organizations
www.epic-assoc.com/membership/epic-members

EPIC European Photonics Industry Consortium



Objective:

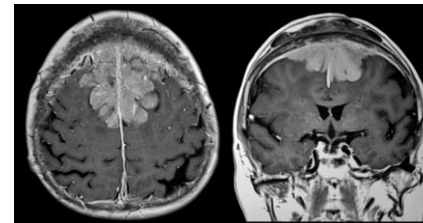
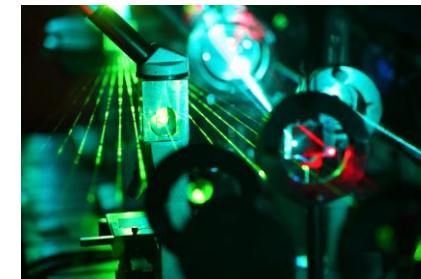
1. Support EPIC members for technology & business development
2. Help European companies access the markets outside Europe
3. Provide leading edge technology to system integrators / manufacturers worldwide.

EPIC publishes **market and technology reports**, **organizes technology workshops and B2B roundtables**, **coordinates EU funding proposals, advocacy and lobbying**, **education and training activities**, **standards and roadmaps**, **pavilions at exhibitions**.

www.epic-assoc.com

Our members and activities encompass the entire value chain from:

- Biophotonics
- Displays
- Imaging
- Lasers (for industrial, military, medical applications)
- LED, OLED, and Smart Lighting
- Optic fiber
- Optical components
- Photonic Integrated Circuits: III-V, Silicon Photonics, and TriPleX
- Projectors
- PV solar energy including CPV and OPV, and Batteries
- Sensors (for automotive, defense, medical, ... applications)
- and all other photonic related technologies





17-18 October

- EPIC Meeting on VCSEL Technology and Applications at Sony, Stuttgart, Germany

18 October

- EPIC Networking Lunch + Distributor Introductions at Laser World of Photonics, Mumbai, India

22-25 October

- EPIC Delegation to Singapore

30-31 October

- EPIC Meeting on LIDAR for Automotive at Anteryon, Eindhoven, The Netherlands

7-8 November

- EPIC Meeting on Wafer Level Optics at SUSS Micro Optics, Neuchatel, Switzerland

19 November

- EPIC TechWatch on Medical Lasers at MEDICA, Dusseldorf, Germany

11-12 December

- EPIC Meeting on Photonics for Cancer Diagnostics and Treatment at NKI, Amsterdam, The Netherlands

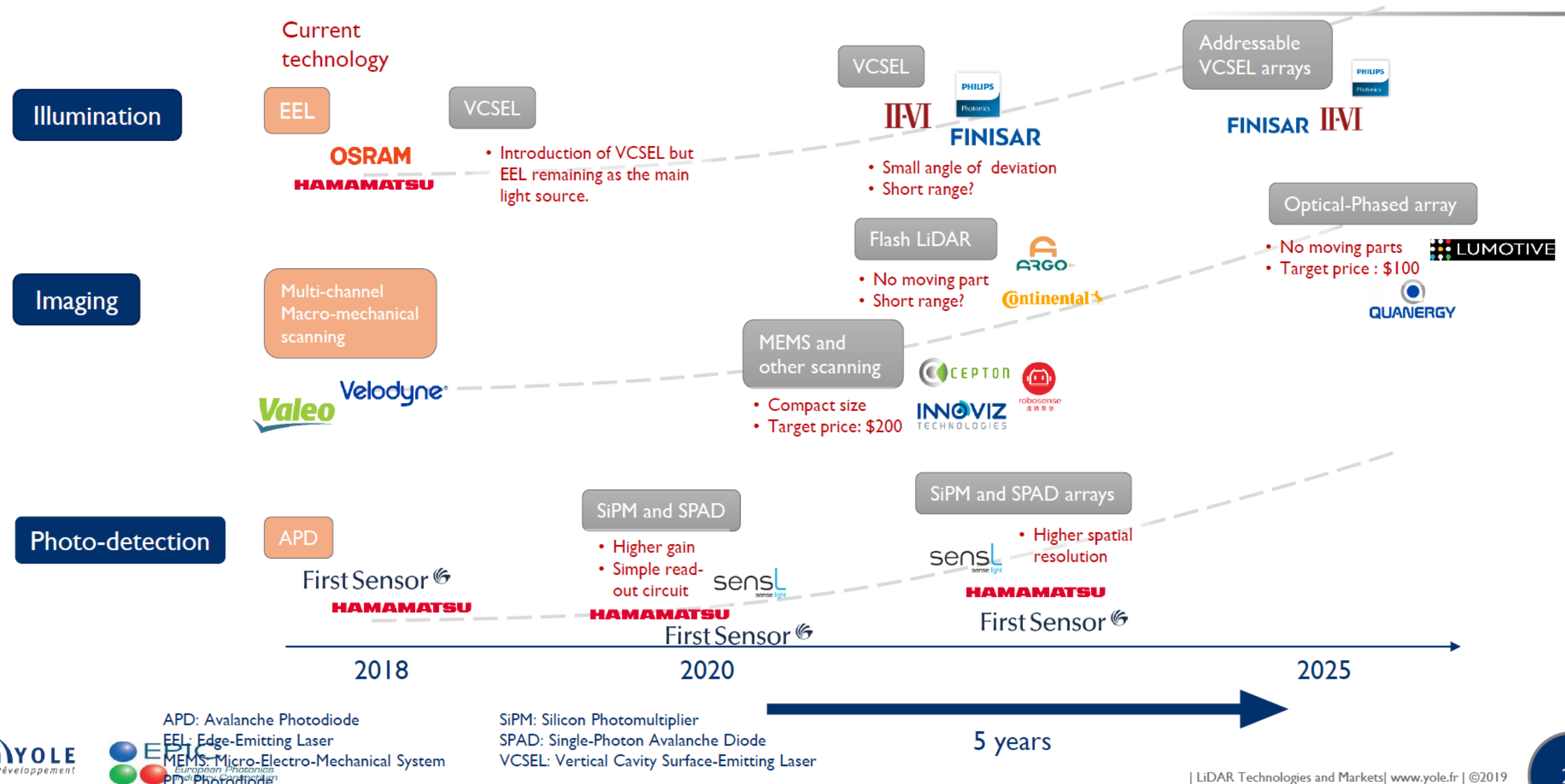
Special report on
**LiDAR for
Automotive and
Industrial
Applications**

*Technology, Industry
and Market Trends
for EPIC*



TIME-TO-MARKET ANALYSIS

Introduction of new automotive LiDAR technologies










**Special report on
Status of the
Camera Module
Industry - Focus on
Wafer Level Optics**

*Technology, Industry and
Market Trends
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MARKET SEGMENTATION

Known WLO application
Potential WLO application
Unknown WLO application

	Segment	Sensor application (light Rx)	Lighting application (light Tx)
	Industry/space/defense	Machine vision, barcode readers , professional & broadcast, defense, night vision camera	Datacom , 3D printing , AOC, Laser printer
	Security	Security & surveillance cameras	Security & surveillance cameras
	Medical	PET scan, x-ray, endoscopy	OCT systems, pulse oximeter , dermatology laser
	Automotive	In-cabin, infotainment, front ADAS cameras, lidar	POF, lidar , eye tracking , Gesture recognition, automotive lighting
	Computing	Laptop PC, tablets, computer mice	computer mice
	Consumer	DSLR, DSC, video cam, action cam, consumer drones, personal robotics, game stations, AR-VR headsets , smart home devices, smart watch	Laser printer, proximity sensors, autofocus systems, facial recognition, gas sensor, driver monitoring , gesture recognition
	Mobile	Smartphones , feature phones	Smartphones , feature phones

**Special report on
Medical Wearables**
*Technology, Industry and
Market Trends
for EPIC*





**Special report on
InP Wafer and
Epiwafer -
Photonics & RF**
*Technology, Industry and
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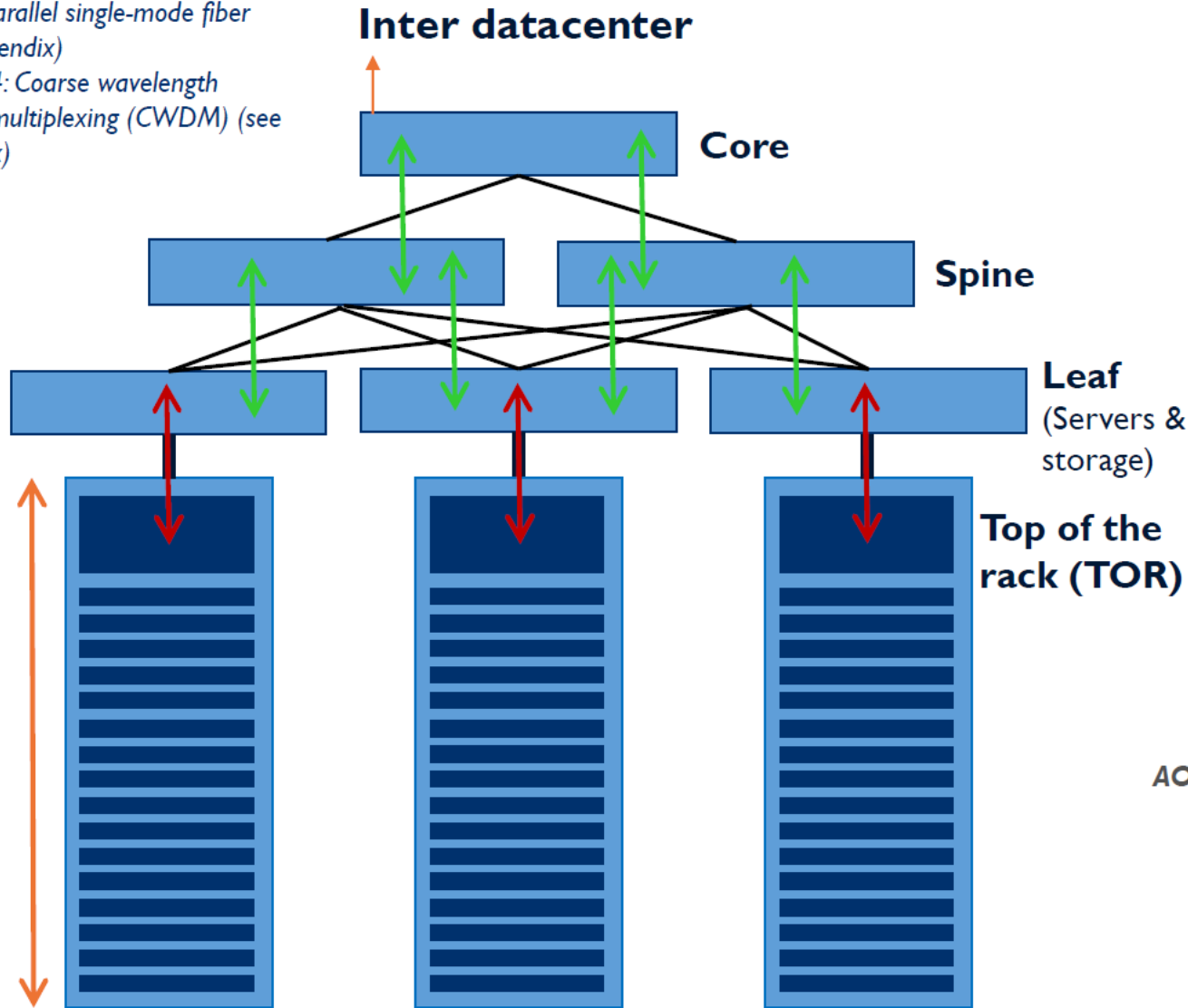
DATA CENTERS - ARCHITECTURE AND DATA RATE

DC: Data Center

DCI: Data Center Interconnect

PSM4: parallel single-mode fiber
(see appendix)

CWDM4: Coarse wavelength
division multiplexing (CWDM) (see
appendix)



Inter DC: 100G & beyond (200G, 400G)

DWDM

DCI Long Haul >600km

DCI Metro 100km-600km

DCI Edge 2km-100km

InP

InP

Spine-Core: 40G - 100G & beyond (200G, 400G)

Single-mode fiber

PSM4 or CWDM4

500m - 2 km

Optical transceivers (transmitter-receiver) with detachable connectors

InP/GaAs

INTER-RACK: 40G, moving to 100G

Multimode/singlemode fiber

< 100m: active optical cable (AOC) with VCSELs

100 - 500m: InP

Lowest-priced optical link

AOC: transceivers with integrated fibers

INTRA-RACK: 10G Direct attach cable (DAC)

moving to 25G AOC

1 - 30 m

Lowest-priced link

DAC: copper cables

Special report on Silicon Photonics and Photonic Integrated Circuits (PICs)

*Technology, Industry and
Market Trends
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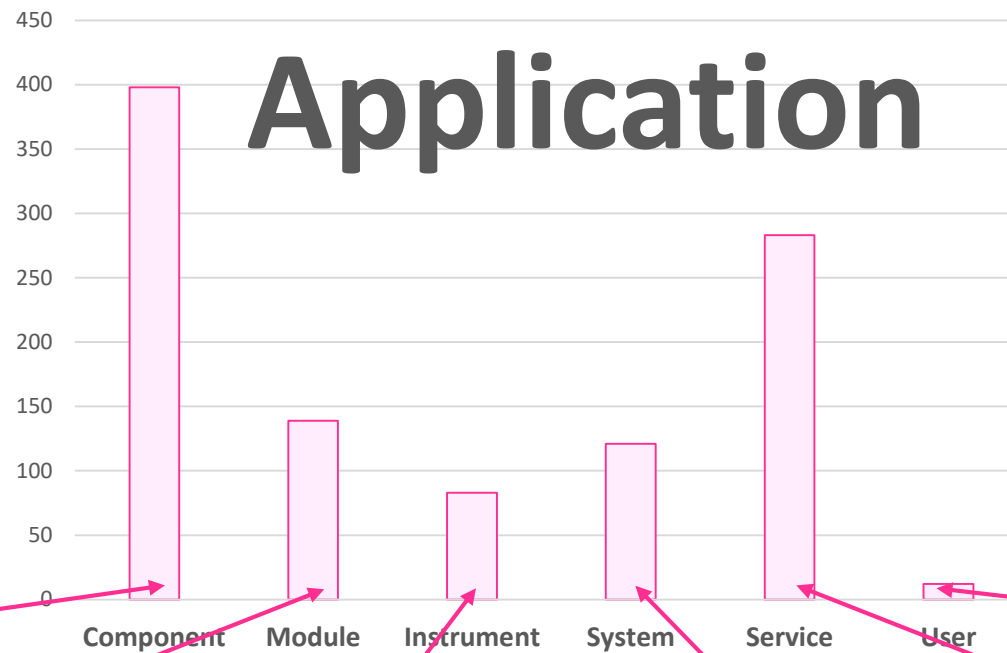


THE DIFFERENT PIC PLATFORMS AND POSSIBLE FUNCTIONS

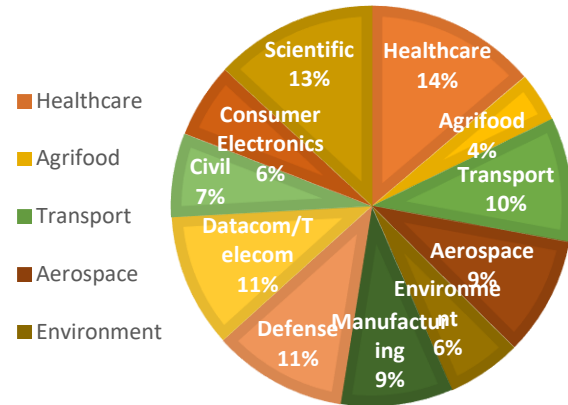
Table below shows which optical functions can be integrated into a PIC die (green).

		SIGNAL MODULATION	EMISSION	AMPLIFIER	GUIDING	GUIDING	ELECTRONICS CONTROL	FILTERING	DETECTION	CONVERSION	ELECTRONICS CONTROL	COUPLING
PIC	Si photonics	SiPh die			SiPh die (SOI)	SiPh die (SOI)		SiPh die (SOI)	SiPh die (PN photodiode or PIN diode: Si or Ge)		SiPh die	
PIC	InP	EML: EAM + DFB/DBR	EML: EAM + DFB/DBR	PIN diode	WG							
PIC	InP	EML: EAM + DFB/DBR	EML: EAM + DFB/DBR	PIN diode	WG					EML w/ SOA		
PIC	InP		Laser			DWDM			APD			
PIC	SiN				Low loss WG							Coupler
PIC	Polymer	Modulator			WG	Mux/Demux						Spot converter
PIC	GaAs		VCSEL						PIN			
PIC	Silica				Splitters	AWG						
PIC	LiNbO3											
PIC	Glass				WG	splitters, taps, Mux/Demux, polarizers						Coupler

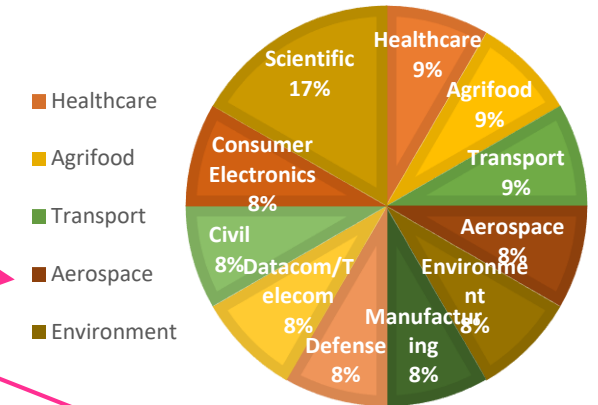
Application



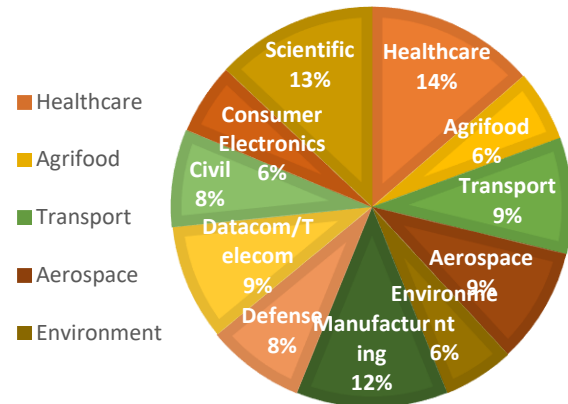
COMPONENTS



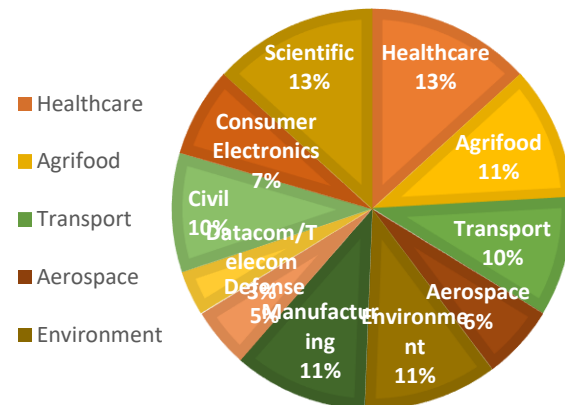
USER



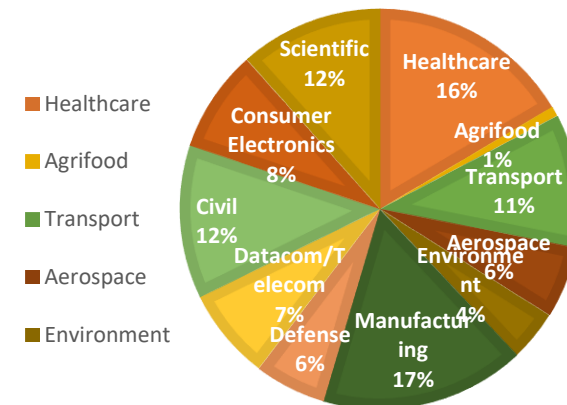
MODULE



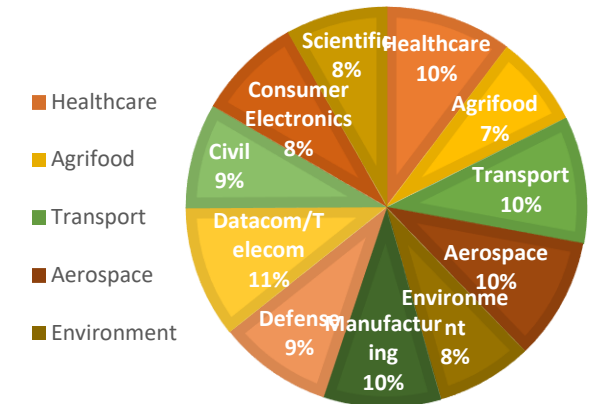
INSTRUMENT



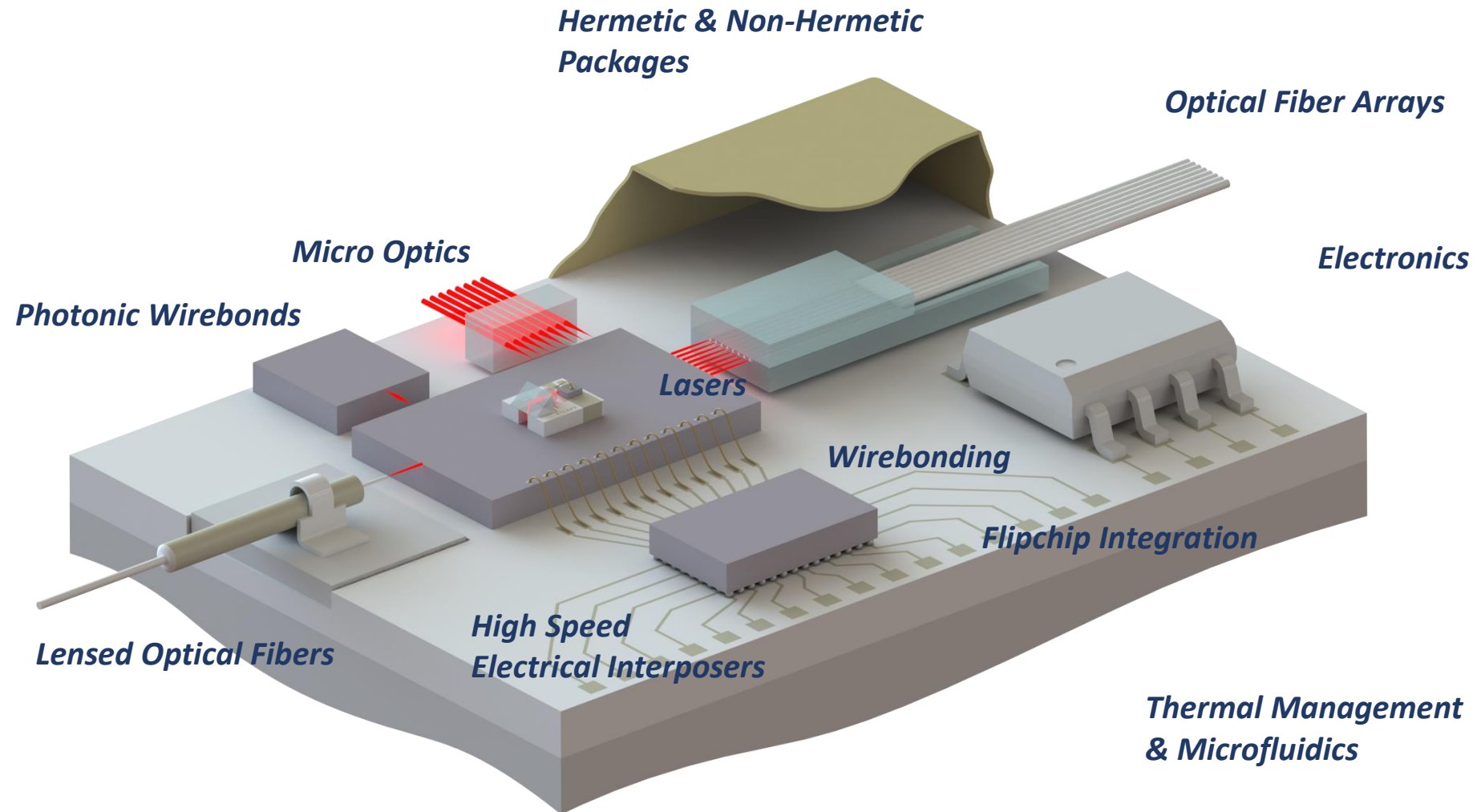
SYSTEM



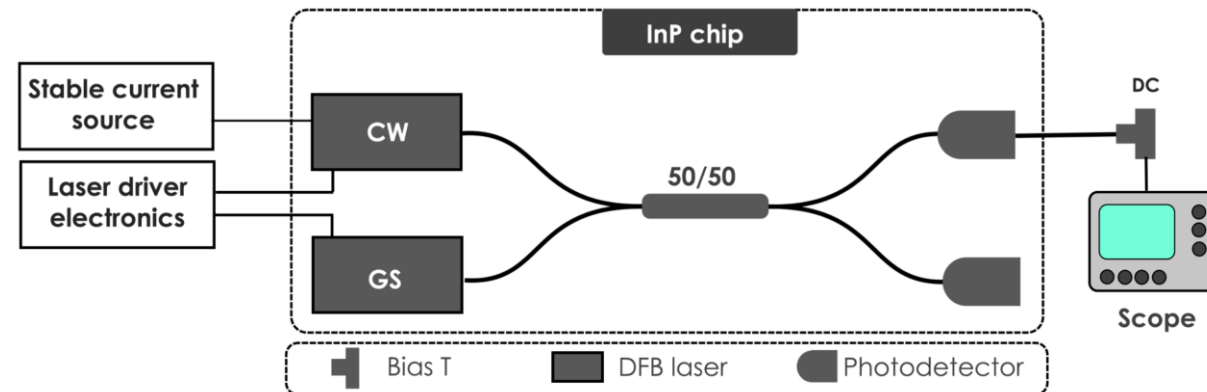
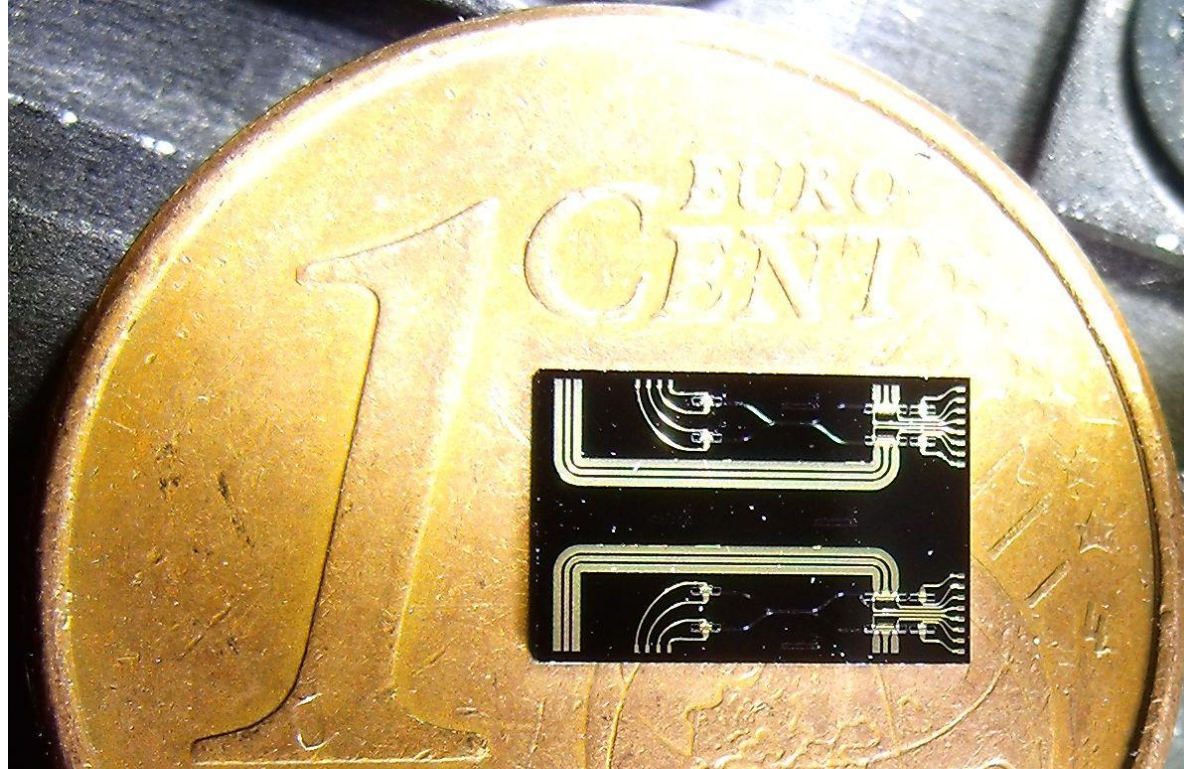
SERVICE



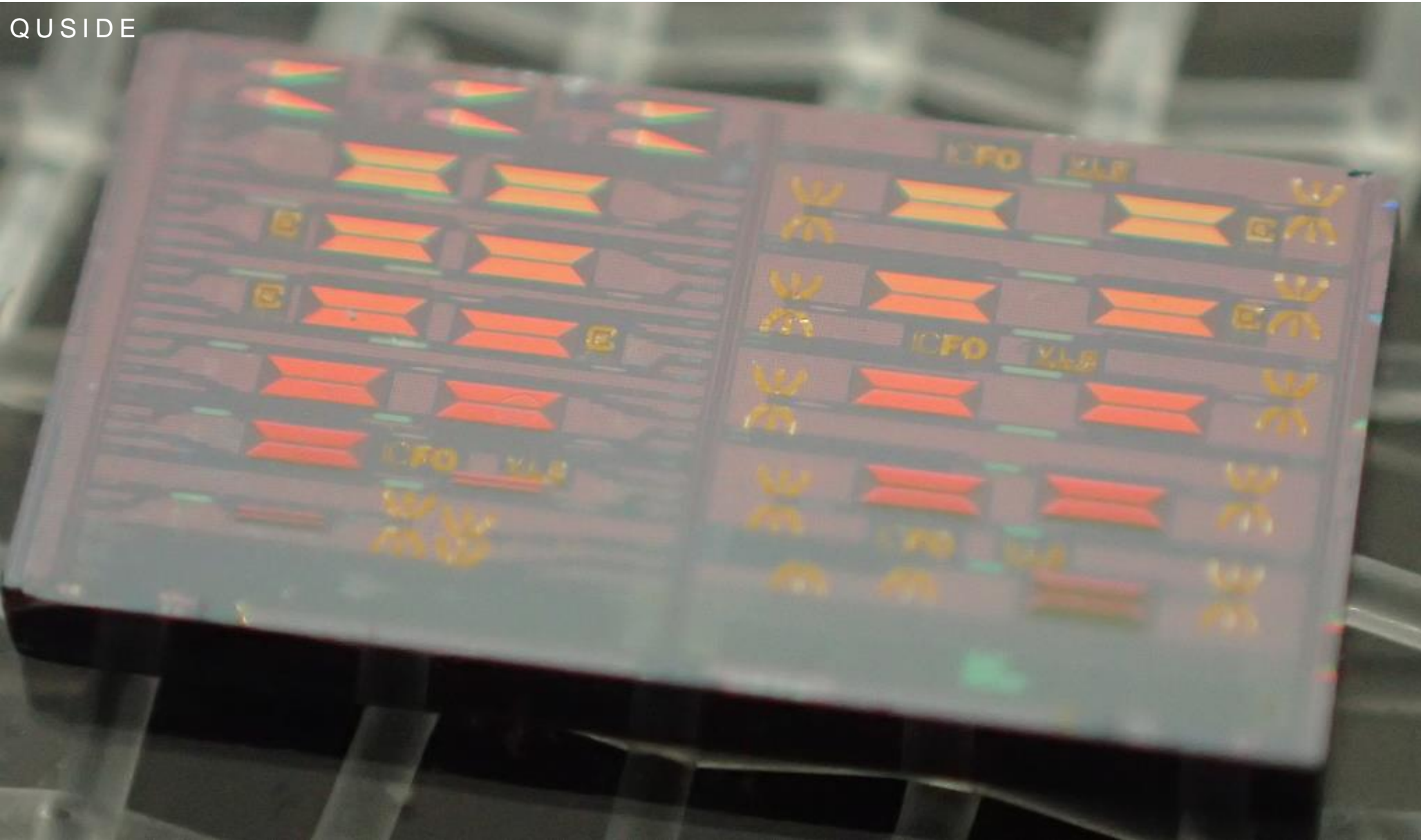
The Photonic Packaging Technologies



Fully integrated quantum entropy source



C. Abellan et al., *Optica* **3**, 9, 989–994 (2016)



M. Rude et al., arXiv:1804.04482 (2018)

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