Integrated Photonics
Design needs, services and tools

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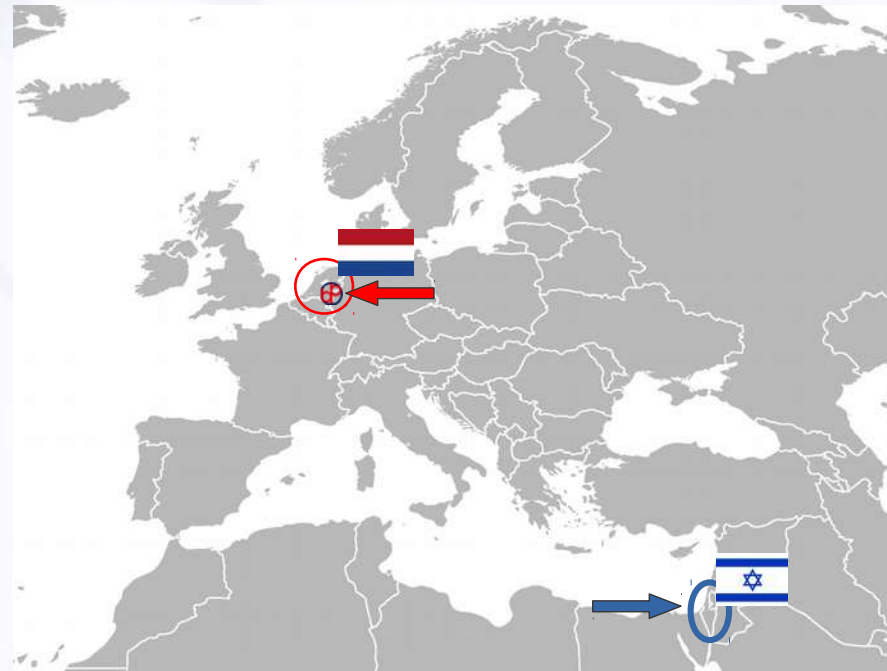22 – April – 2021

BRIGHT Integrated PHOTONICS
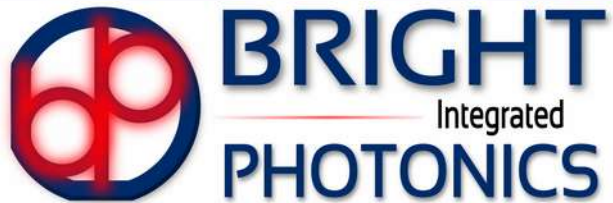
Your 'in house' design partner for photonic ICs

Founded: 2010
Location: Eindhoven, the Netherlands
e-mail: info@BrightPhotonics.eu
www: BrightPhotonics.eu

About BRIGHT Photonics

BRIGHT Photonics deploys photonic integration technology for products & research
to provide novel solutions which revolutionize the way we live and explore.

**BRIGHT Photonics has deep expertise in and around photonic integration**
- a worldwide network and large supply chain
- access to the latest technology nodes
- and extensive R&D activity.

BRIGHT Photonics is a design house
- for layout & circuit design & support
- for feasibility & prototyping & supply chain development
Aimed at servicing customers with applications in any market benefiting from Photonic ICs.

Empowering products
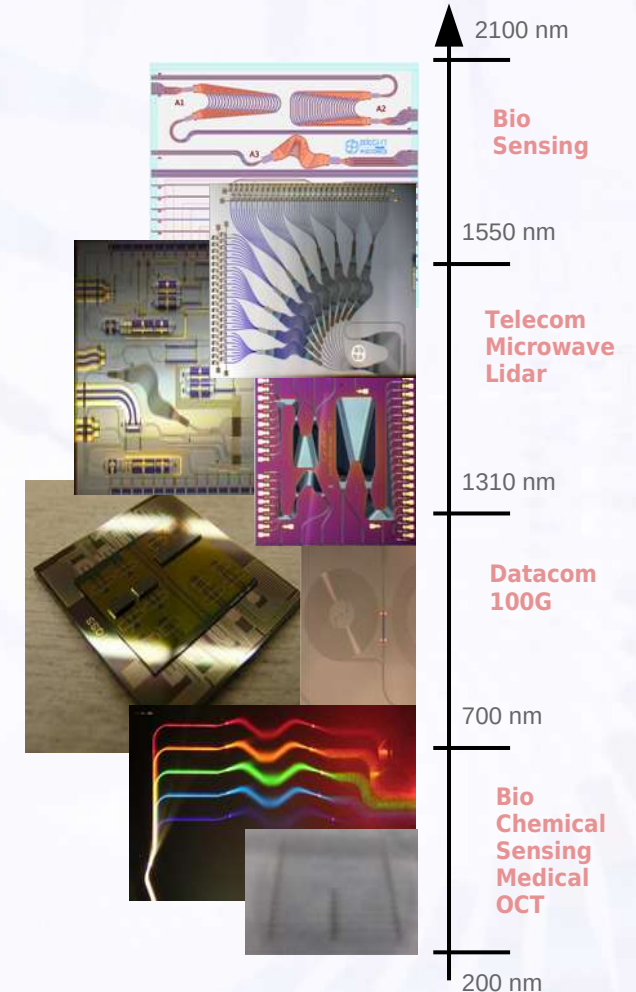## with photonic engineering since 2010
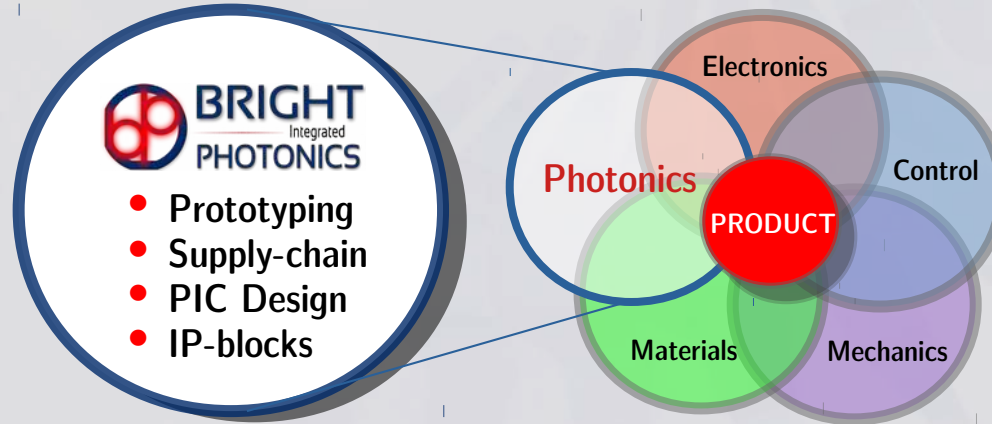
Markets:
- Telecom & Datacom
- Microwave Photonics
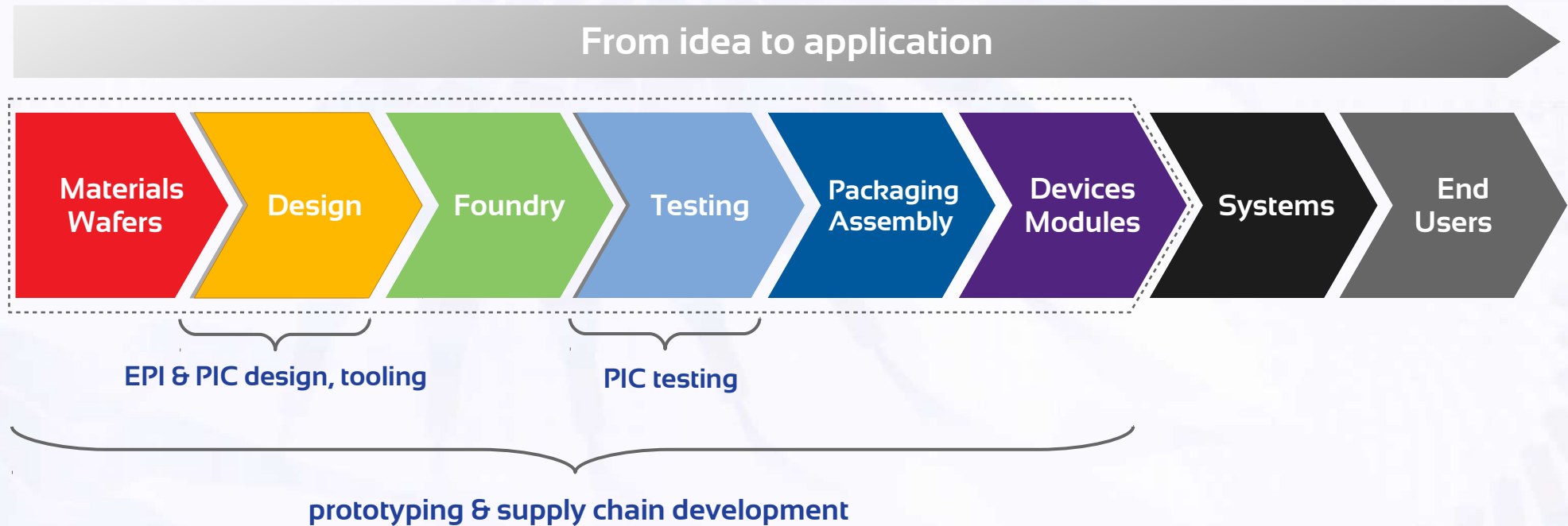- Bio & Medical
- Sensing & Metrology
- Aerospace

Technologies:
- SOI
- InP
- SiN
- SiO2
- Polymer

✓ **Design from UV to IR**   ✓ **Design across technologies**   ✓ **Design flow innovation**

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- **Prototyping**
- **Supply-chain**
- **PIC Design**
- **IP-blocks**

Photonics — Electronics — Control — Materials — Mechanics — **PRODUCT**

2100 nm
Bio Sensing
1550 nm
Telecom Microwave Lidar
1310 nm
Datacom 100G
700 nm
Bio Chemical Sensing Medical OCT
200 nm

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Bright's position in the PIC value chain

From idea to application

| Materials Wafers | Design | Foundry | Testing | Packaging Assembly | Devices Modules | Systems | End Users |

EPI & PIC design, tooling

PIC testing

prototyping & supply chain development
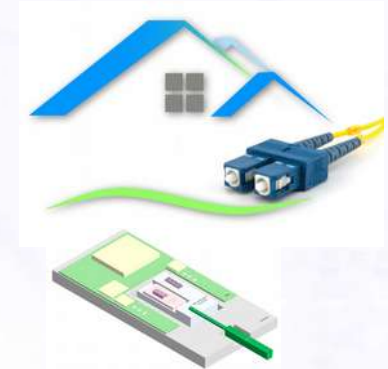
Product and project examples

Datacom:
- State of the Art **MUX & DeMUX**
  design and testing
- Product volume:
  100k modules per month

Telecom:
- Feasibility for **FttH** unit
- Supply chain development
  and assembly scheme
- Targeted volume:
  1M+ modules per year

Medical:
- Haptic feedback grippers
- Design of **on-chip spectrometer**
  for fiber-based sensor

Aerospace:
- Photonic IC design
  for sensing of:
  strain,
  temperature,
  displacement,
  multi-parameter,
  multiplexing
- **World record** in sensing

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Product and project examples

Sensing:
PIC based transmitters and Interrogators for
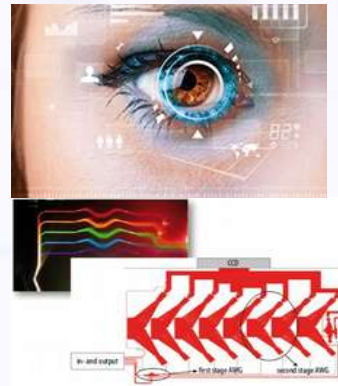FBG, Raman and Brillouin based sensors.

Research:
- **Optical interconnects**:
  PIC design for hybrid integration and assembly
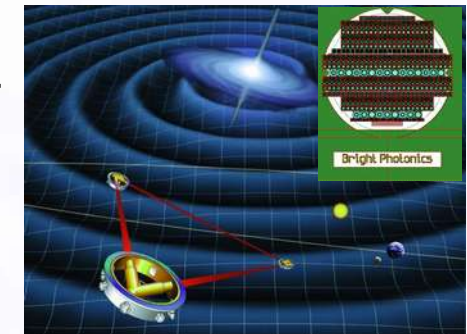- **Astrophotonics**:
  Spectrometers for exoplanet detection
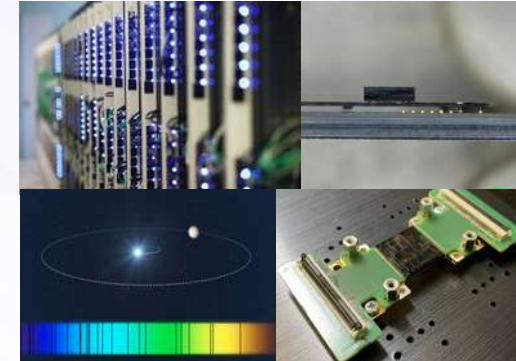
Bio and Medical:
- **OCT** for retina scan and cancer diagnostics
- PIC design in a broad wavelength range from VIS to NIR

Aerospace:
- State of the Art **Detector** development for LISA
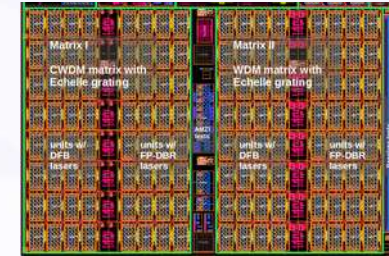- Targeted launch into space 2034

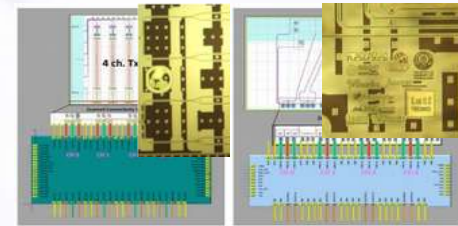# Examples of projects with Israeli companies

Demonstrate high-performance optical data-bus for ASICs

- EU H2020 L3Matrix

- EU H2020 MASSTART

Develop transceivers for mass production

- EU H2020 InPulse

- Project in Metrology

Set up a pilot line for InP PIC production

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Horizon 2020
European Union funding
for Research & Innovation

European Commission

Technology selection
for PIC development and volume scale-up

property	A InP	B SoI	C Si3N4	D SiO2	E LiNbO3	F Polymer
1 Loss						
2 Optical amplification						
3 Photodiodes						
4 Fiber coupling						
5 Spectral range						
6 Polarization indep.						
7 RF modulation						
8 CMOS compatible						
9 Durability						
10 Footprint						
11 All-in-one						
12 MPW						

Material system

- good
- medium
- challenging/no
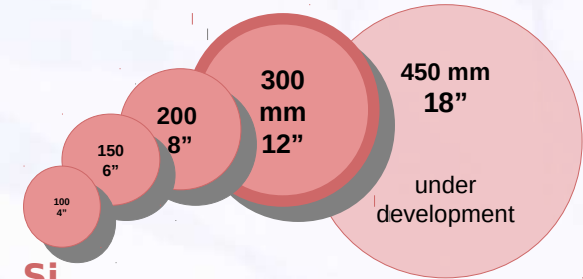
RF: Tx, Rx
All-in-one

Data centers
4x25 Gbit
High volume

True-time delay
Microwave photonics

High quality passives
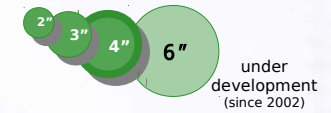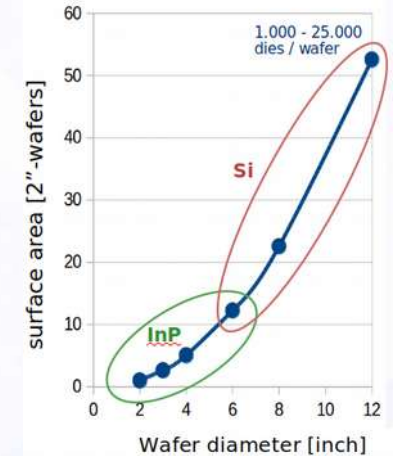Demux. splitters

Telecom Tx
low voltage RF modulators

Modulators
Cheap hybrid

Si
Standard 12", for photonics 8"

InP
standard 3"

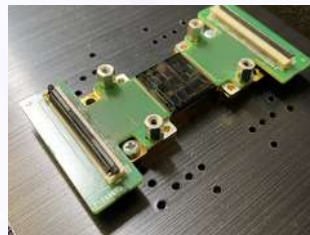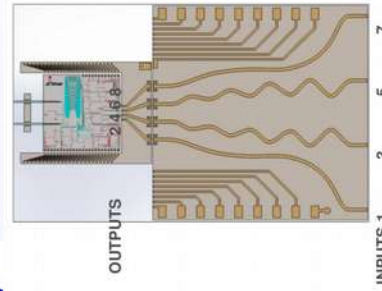- Prototyping
  < 100 dies
- Low volume
  < 100.000
- High volume
  > 1.000.000
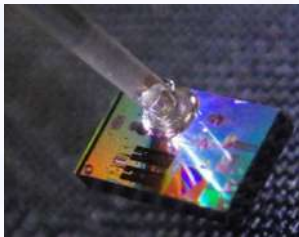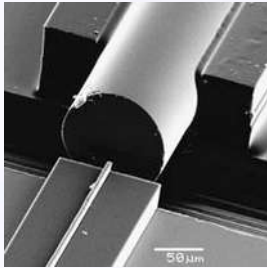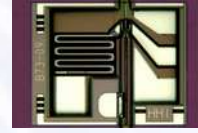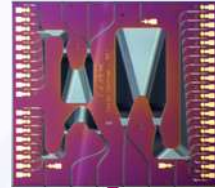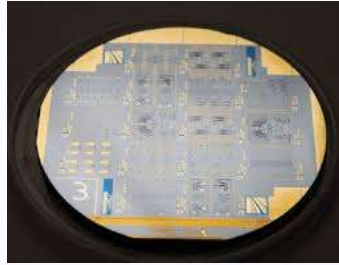
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4. Optical interfaces
5. Electrical interfaces
6. Drivers, thermal
7. Integration, control

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Bright Photonics developed:

Free Open Source Python-based Photonic IC Design Framework
Nazca lowers barriers to PIC development

✓ Hybrid design: **combine** technologies
  ➔ Si-Photonics, III-V, PLC, ...
  ➔ Combine **PDKs** in a single design flow
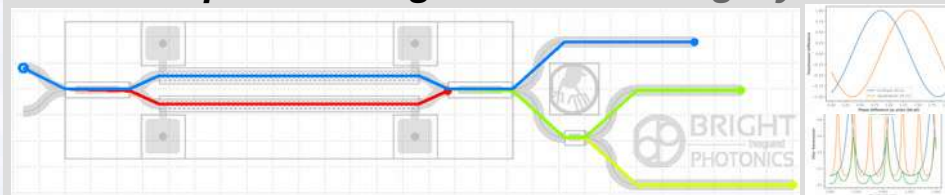 ➔ Packaging templates

✓ IP-Blocks: **reuse & share**
  ➔ Create and share libraries in GDS
  ➔ Protect your intellectual property
  ➔ Enable IP-Block replacement at the foundry

✓ Routing: **solve & verify**
  ➔ Employ interconnects and ribbon routing
  ➔ Use path tracing for circuit integrity
  ➔ Verify your connections for error-free implementation
  ➔ Simulate your circuit at GDS level

path tracing *for circuit integrity*

connection verification *to avoid errors*

√ OK   X xsection   √ OK

X width   X angle   X gap

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Design tooling and validation with Nazca Design

Free Open Source Python-based Photonic IC Design Framework

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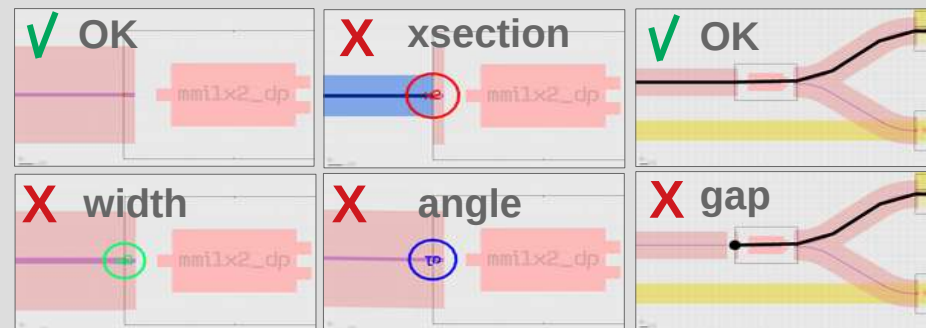- ➔ Enable IP-Block replacement at the foundry

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path tracing for circuit integrity

connection verification to avoid errors

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X width   X angle   X gap

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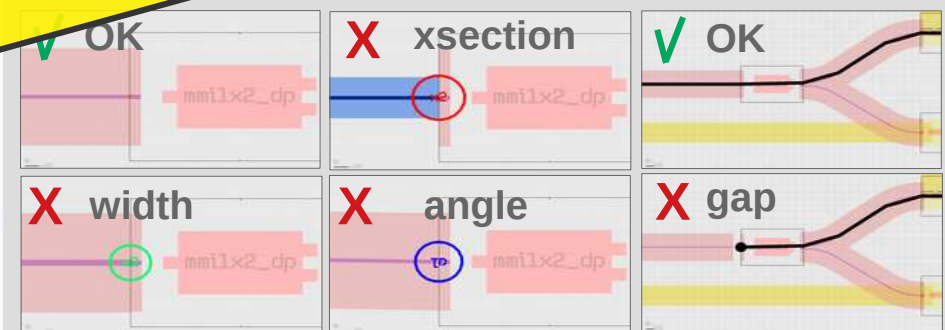
Contact Bright Photonics

and find out what PICs can do for your competitive advantage

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