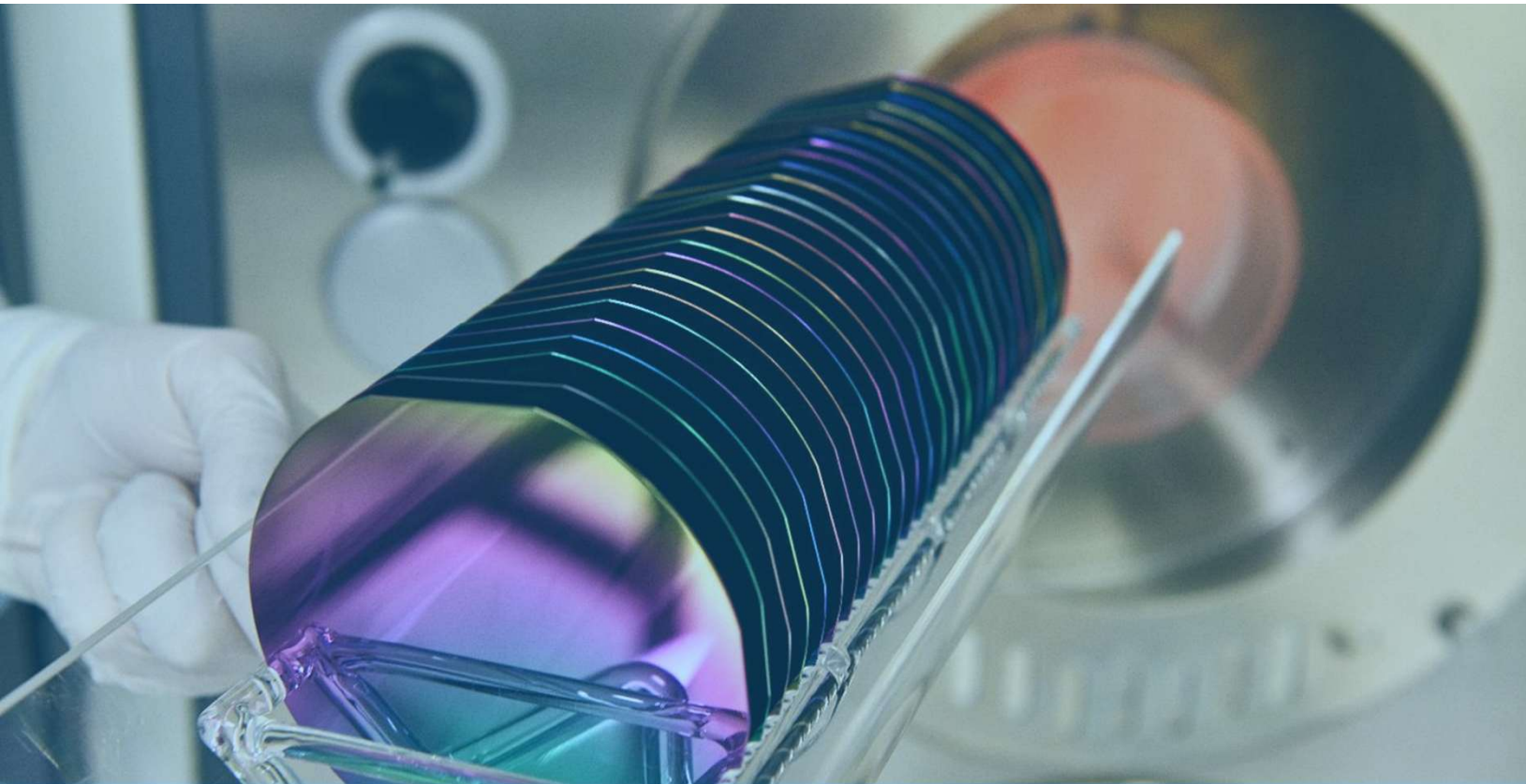




PITC – from R&D programs to pilot line to products

Ton van Mol, Managing Director PITC

Origins: Holst Centre

- Located at the High Tech Campus in the heart of Brainport area, home of Dutch high tech industry
- Aimed at fostering and orchestrating innovation with and between companies
- Successful implementation of open innovation model via Shared Research Programs over the last 20 years leading to commercialization of OLED displays, flexible electronics and health patch
- Expansion since 2023 towards integrated photonics via PITC

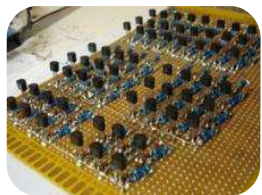
**Holst
Centre**
— by imec & TNO

PITC
Photonic Integration
Technology Center



The evolution of chip technology

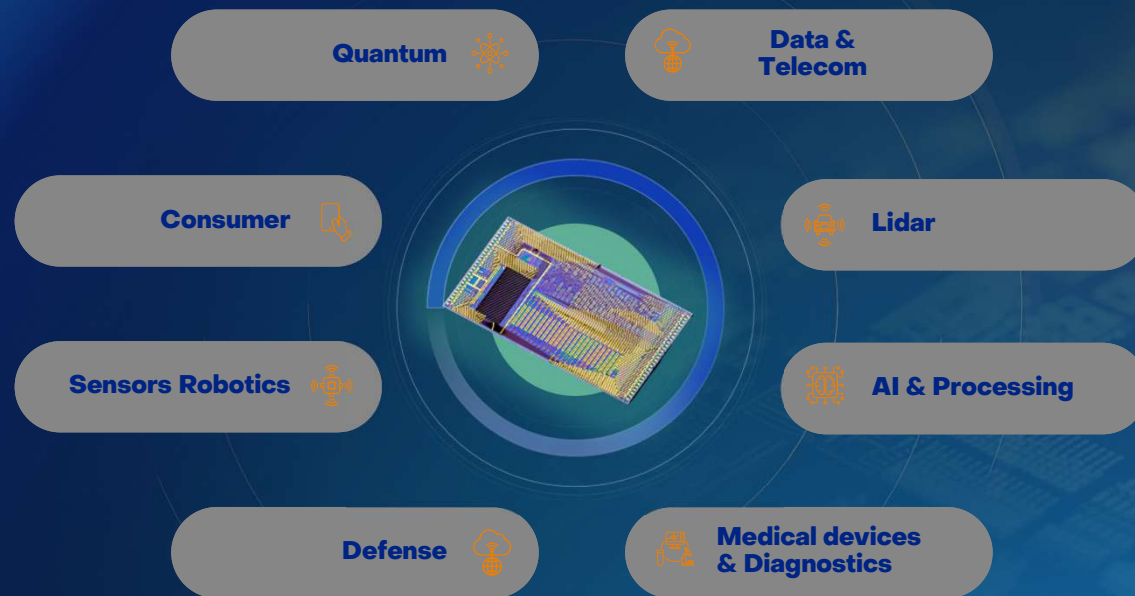
**Electronic Integration has changed
the world**



**Photonic Integration will change the
world again!**



Applications of photonic chips



Photonic Integration Technology Center



- PITC is set up to accelerate the industrial adoption of integrated photonics by offering R&D services from 3 institutes via one-stop shop.
- The PITC initiative brings together the photonic fundamentals (TU/e, UT) and industry driven research (TNO)



Shared R&D
technology programs

Pilot lines
(InP, SiN, packaging)

Foundries

InP
SiN
Metrology
Integration

Shared R&D
application programs

OWC
Biosensors

Bilateral (product)
development

Optical wireless communication (OWC)

Aim

- Develop base technologies for next-gen OWC, bridging research and scalable deployment

Applications

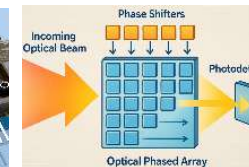
- Defense: secure, jam resistant, intercept free communication
- LiFi & drones / Vehicle-to-X

Key challenges addressed

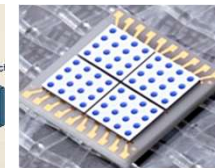
- Increasing sensor sensitivity
- Increasing transmission rate
- Increasing link robustness
- Reducing SWAP'C



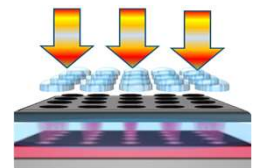
Packaged transmitter



OPA based receiver



2D PD array



Coherent PD array

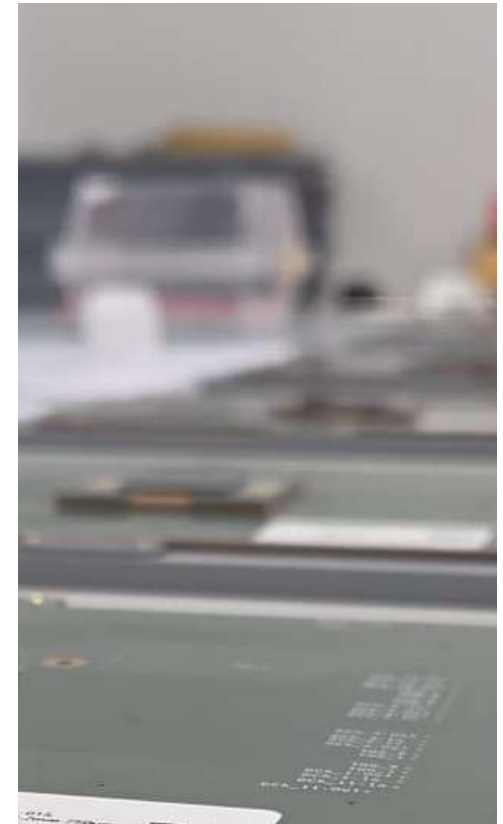
Scaling advanced packaging

➤ Development of AI datacenter PIC

- Fully functional assembly of a large integrated photonic tile (optical, electrical, and thermal interconnect)
- Copper pillar flip-chip bonding enabling >10,000 electrical I/Os on organic uHDI substrate
- Fiber array termination: 4 × 64 optical I/Os with 1–1.5 dB insertion loss
- Assembly process flow (~50 process steps) demonstrating consistent performance

➤ Project achievements

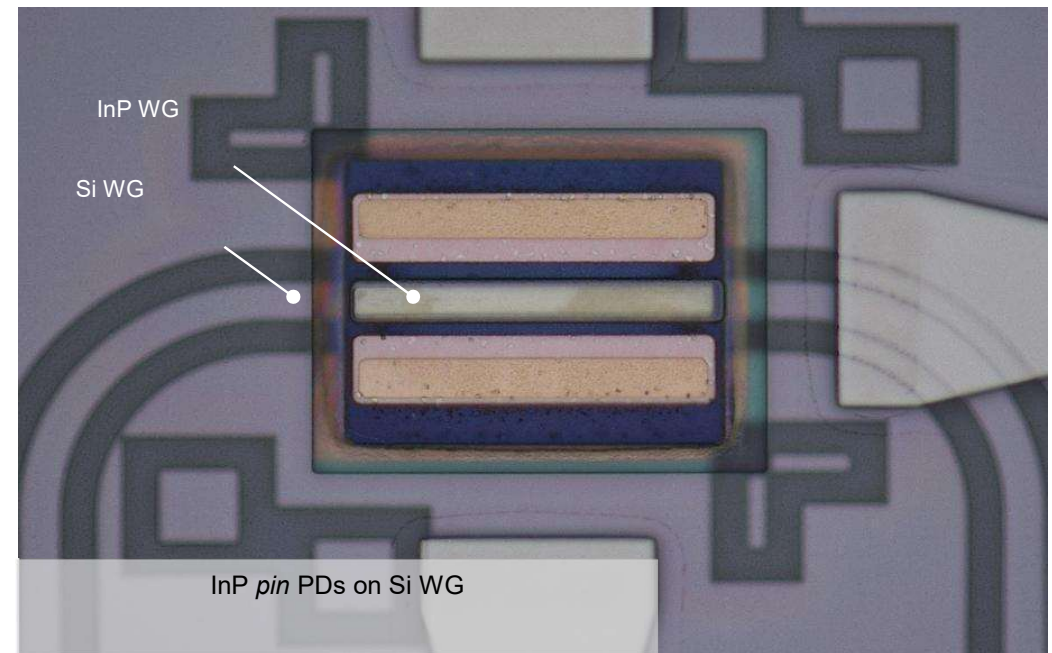
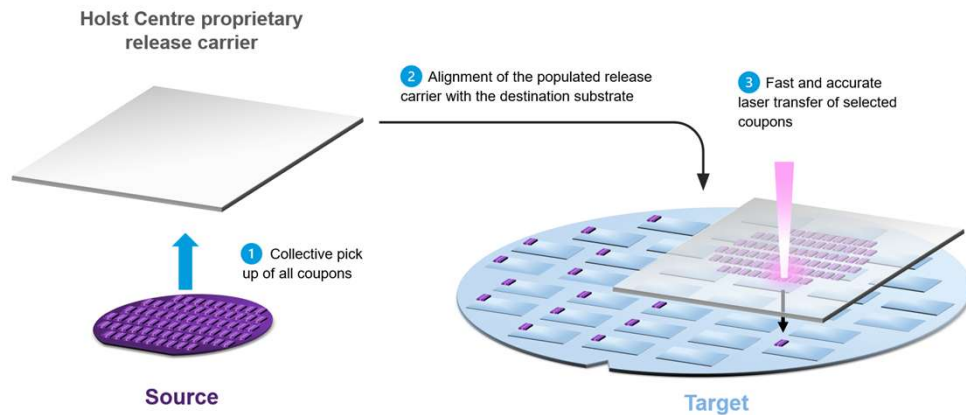
- Process baseline established in PITC lab for prototyping and low-volume sampling of functional products
- Successful process transfer to OSAT for high-volume manufacturing



Introducing new integration technologies

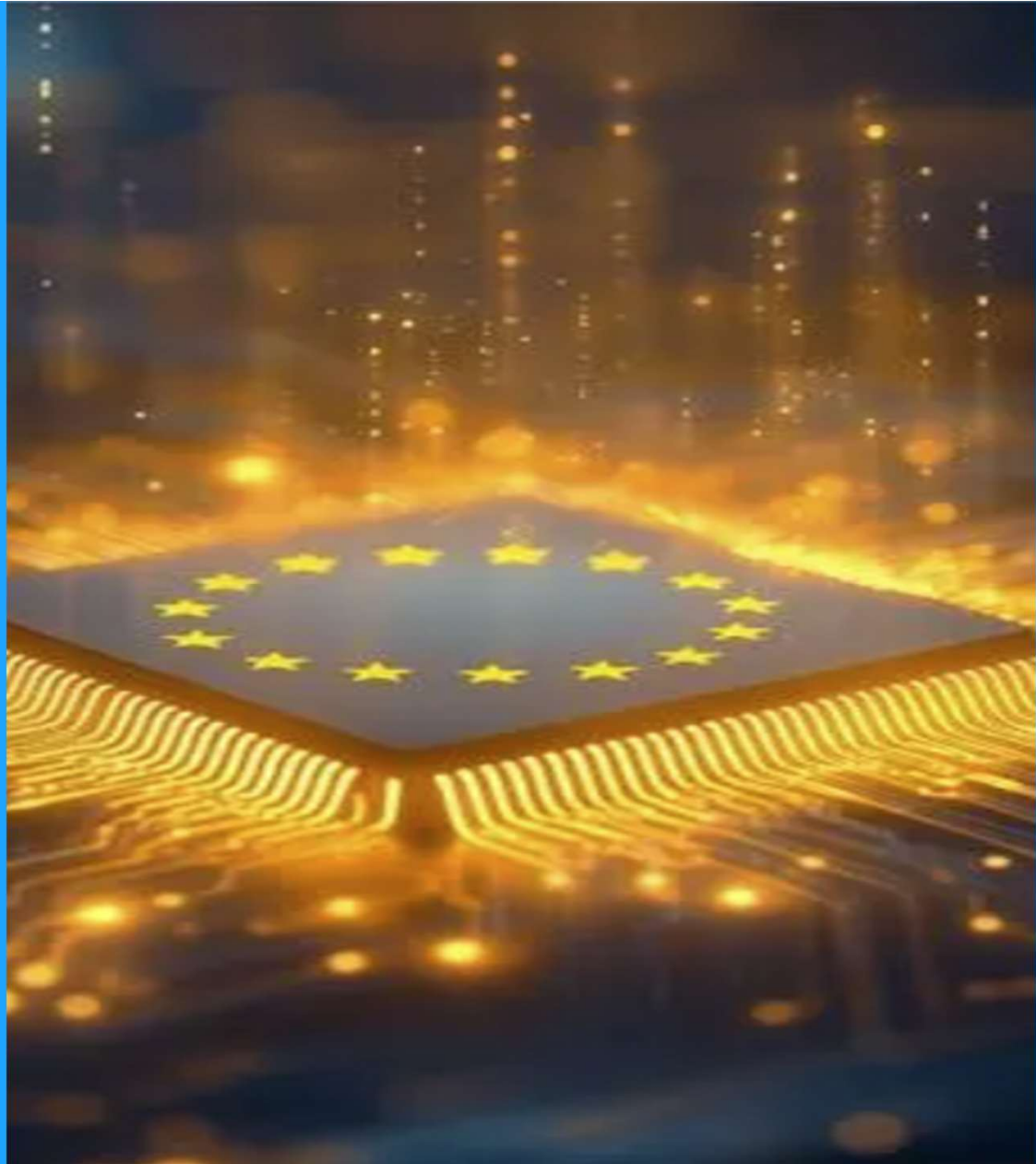
Laser die transfer

- ✓ Very versatile: actives, passives, microlenses
- ✓ Accuracy < 200nm
- ✓ Fast: 100x over SOTA (10k dies/min)



Pilot lines - PIXEurope

- Joint European project under Chips-JU (European Chips Act)
- European Pilot Line on Advanced Photonic Integrated Circuits (400M€)
- Collaboration of research institutes from 11 countries to create a network of pilot manufacturing lines



Unique European PIC ecosystem

- Open access PIC pilot line

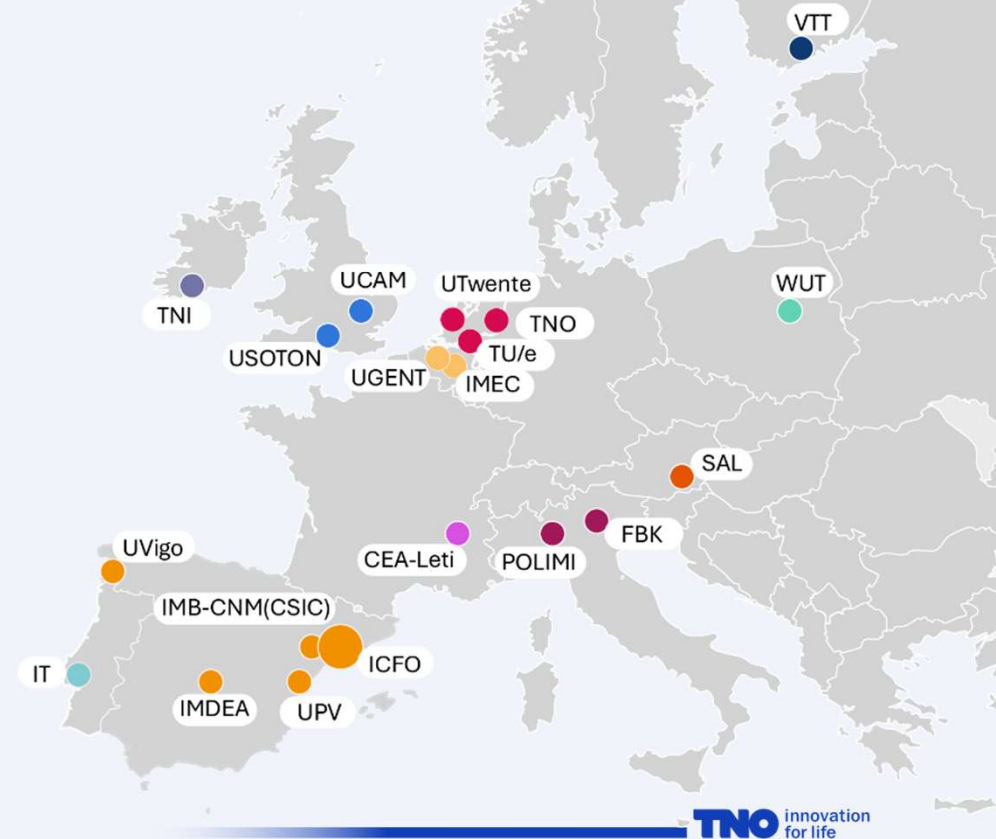
- PIC design
- Monolithic platforms
- Hybrid integration
- Packaging
- Test & Reliability

- InP
- Si
- SiN & AlO
- SiC
- Ge on Si

- 20 RTO partners, led by ICFO, Spain
- 11 countries
- ~€400M budget



PIX Europe



Our mission

- A new building on HTC Eindhoven
- Housing a new 1650 m² ISO 5 cleanroom
- Fully automated, state of the art toolset
- 10.000 wafers/year
 - 10 million complex photonic ICs/year
 - 500 million components/year
- Expandable to 20.000 wafers/year
- Total project cost: 220M€

Photonic Integration Technology Center



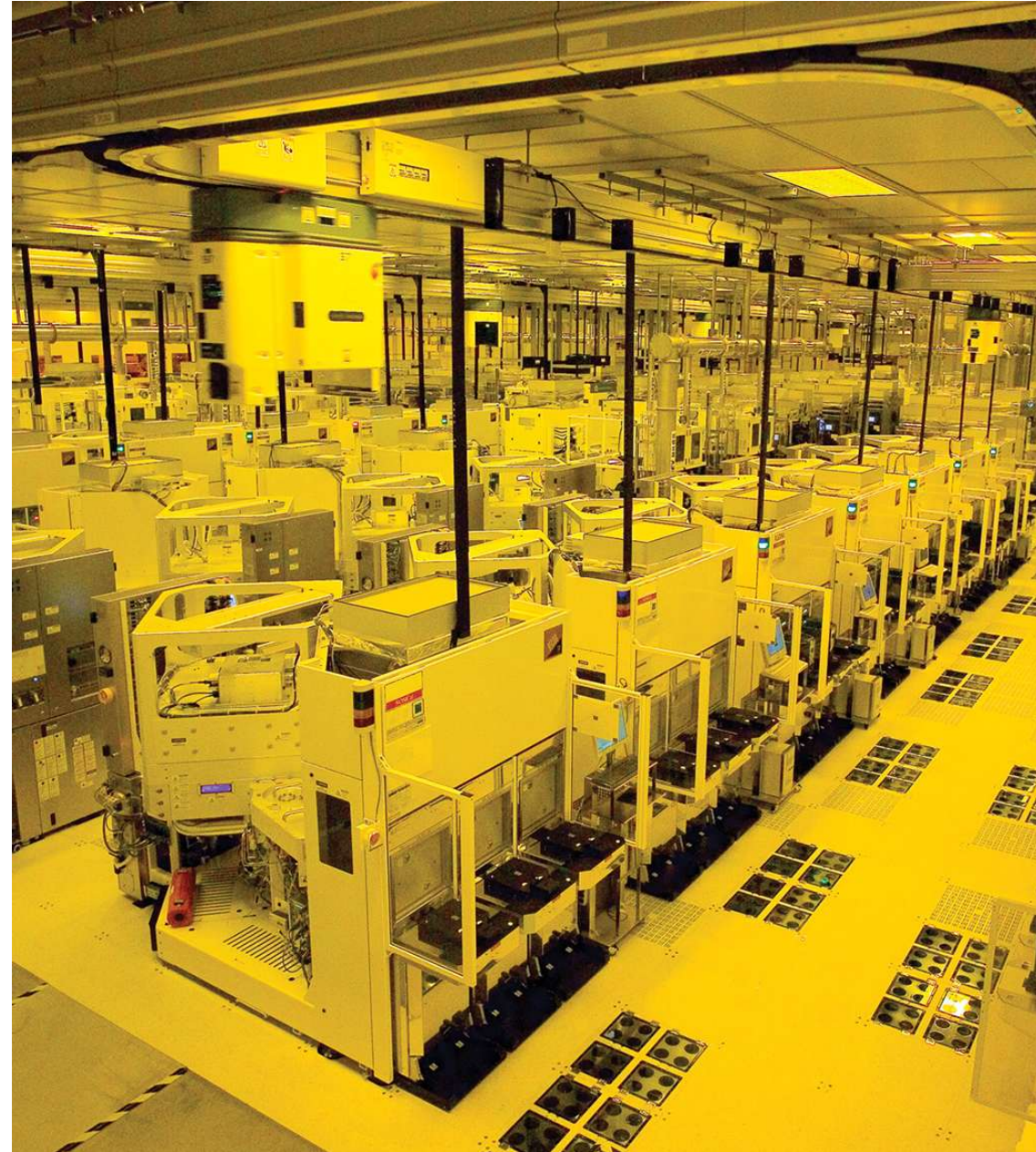
Our Ambition

- Bring InP-based photonic chip technology from 4" to 6" wafers
- Install fully automated equipment – cassette to cassette processing – with state of the art tools
- Prove process stability and reliability at industrial scale
- Become experts in photonics manufacturing technology to help companies realise their photonics ambitions

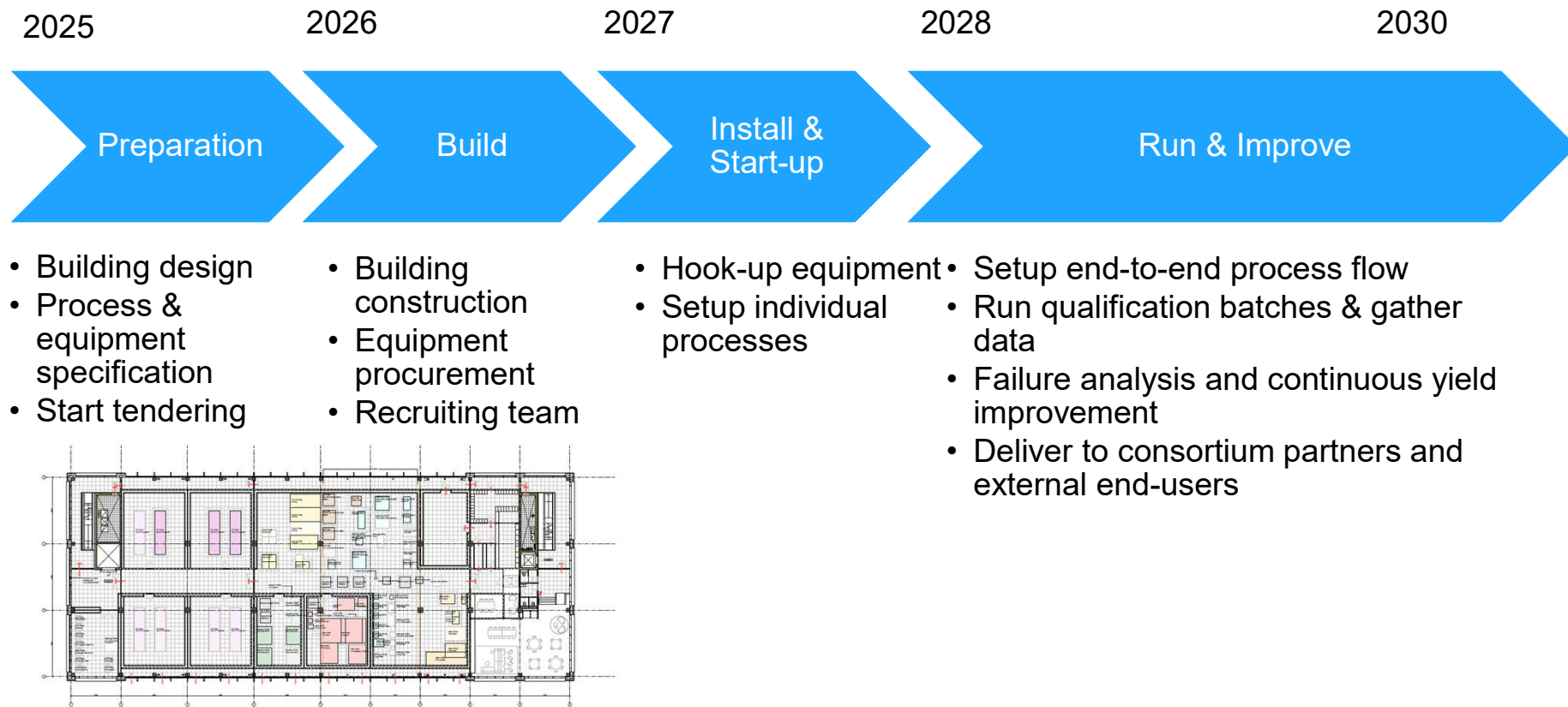


Why?

- Need for scalable, predictable production lines – demand is booming, driven by rise of AI datacentres
- Economies of scale: volume drives down cost - enables more applications, such as lidar, quantum and medical diagnostics



Timeline



Where are we?



Accelerate

- We want to help companies accelerate their scaling and innovation in integrated photonics in parallel.
- Together with you

