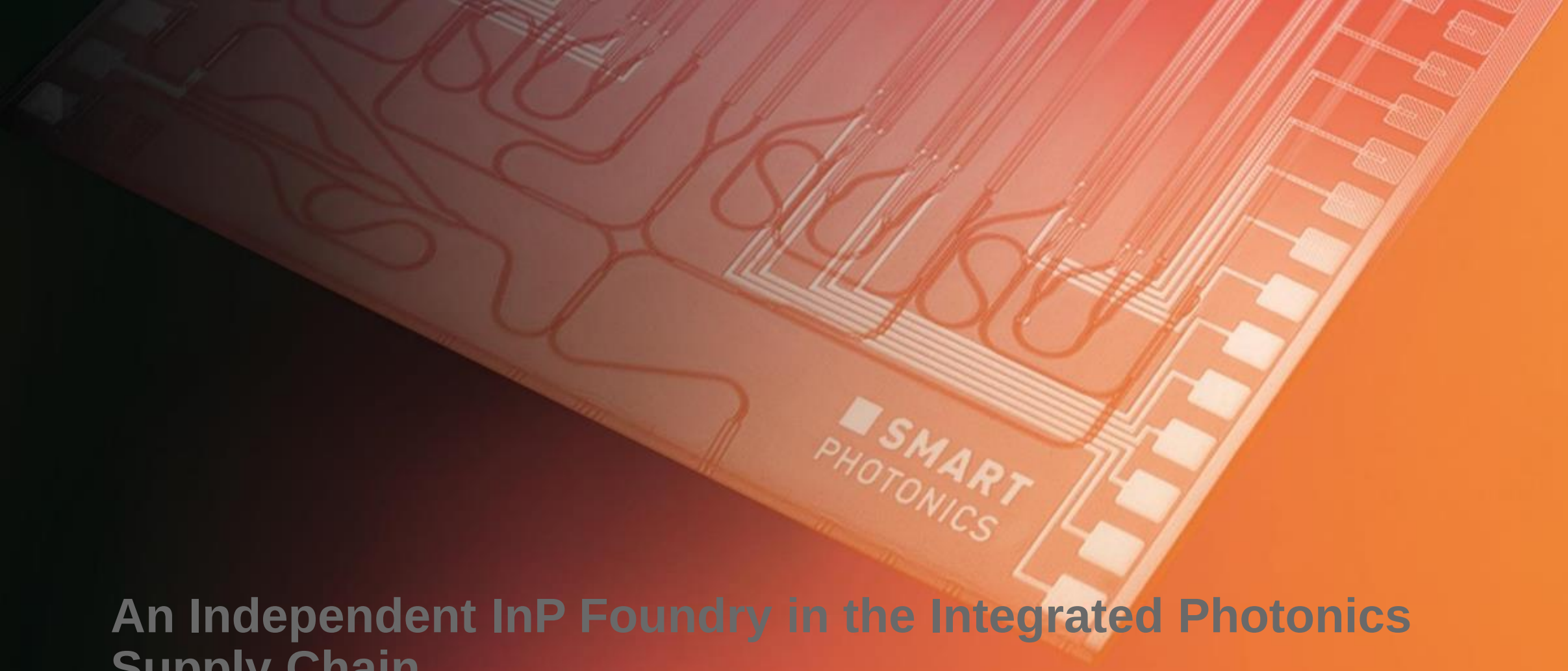
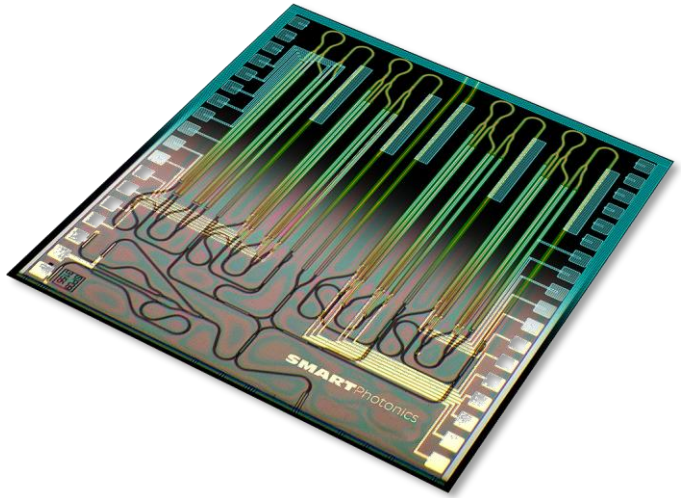


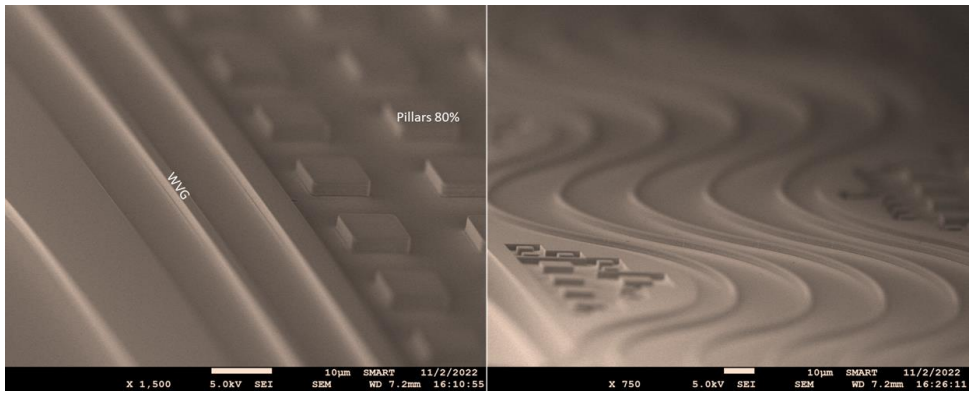
An Independent InP Foundry in the Integrated Photonics Supply Chain

Peter Maat

Integrated Photonics

PICs



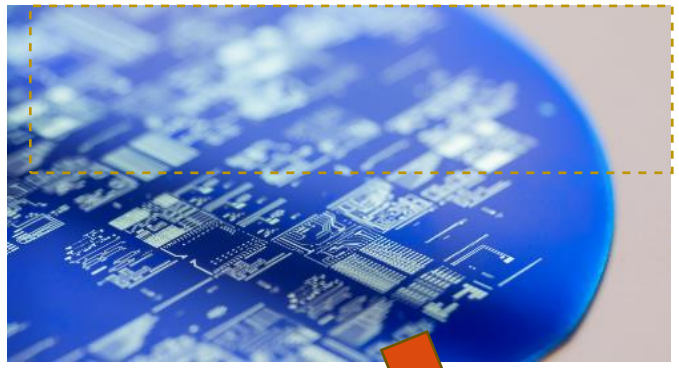


Products



From PICs to Products

PICS | PACKAGING | MODULE | SYSTEM | END USERS



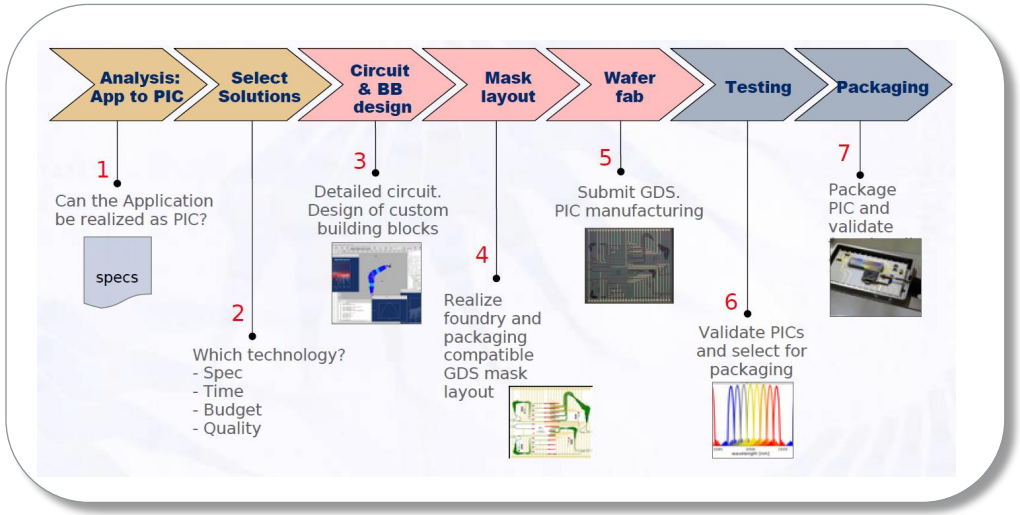
OEMs

Data &Telecom, Sensors (Automotive, Healthcare, Infrastructure)



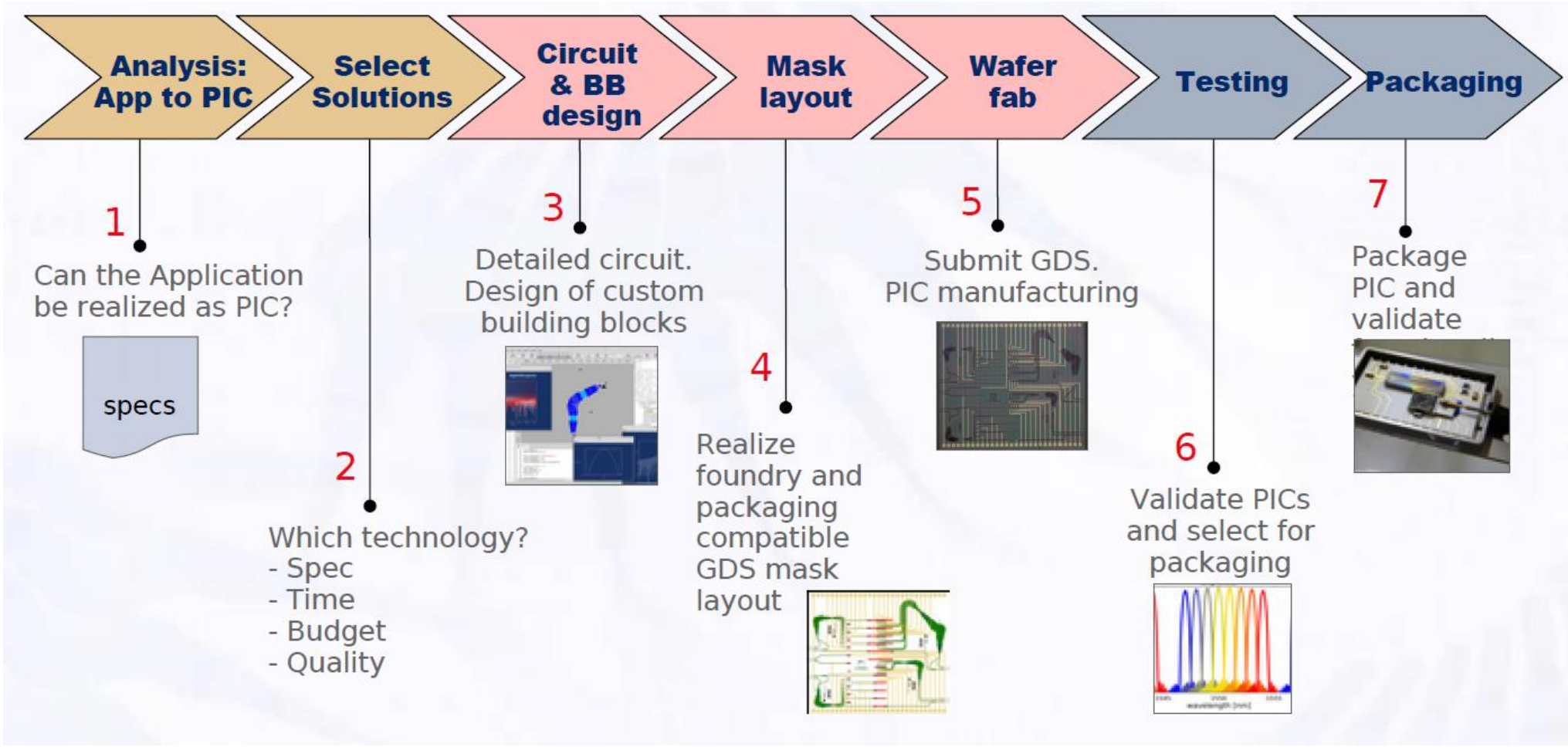






SMART PHOTONICS

From PICs to Products



Multiple platforms with different strengths

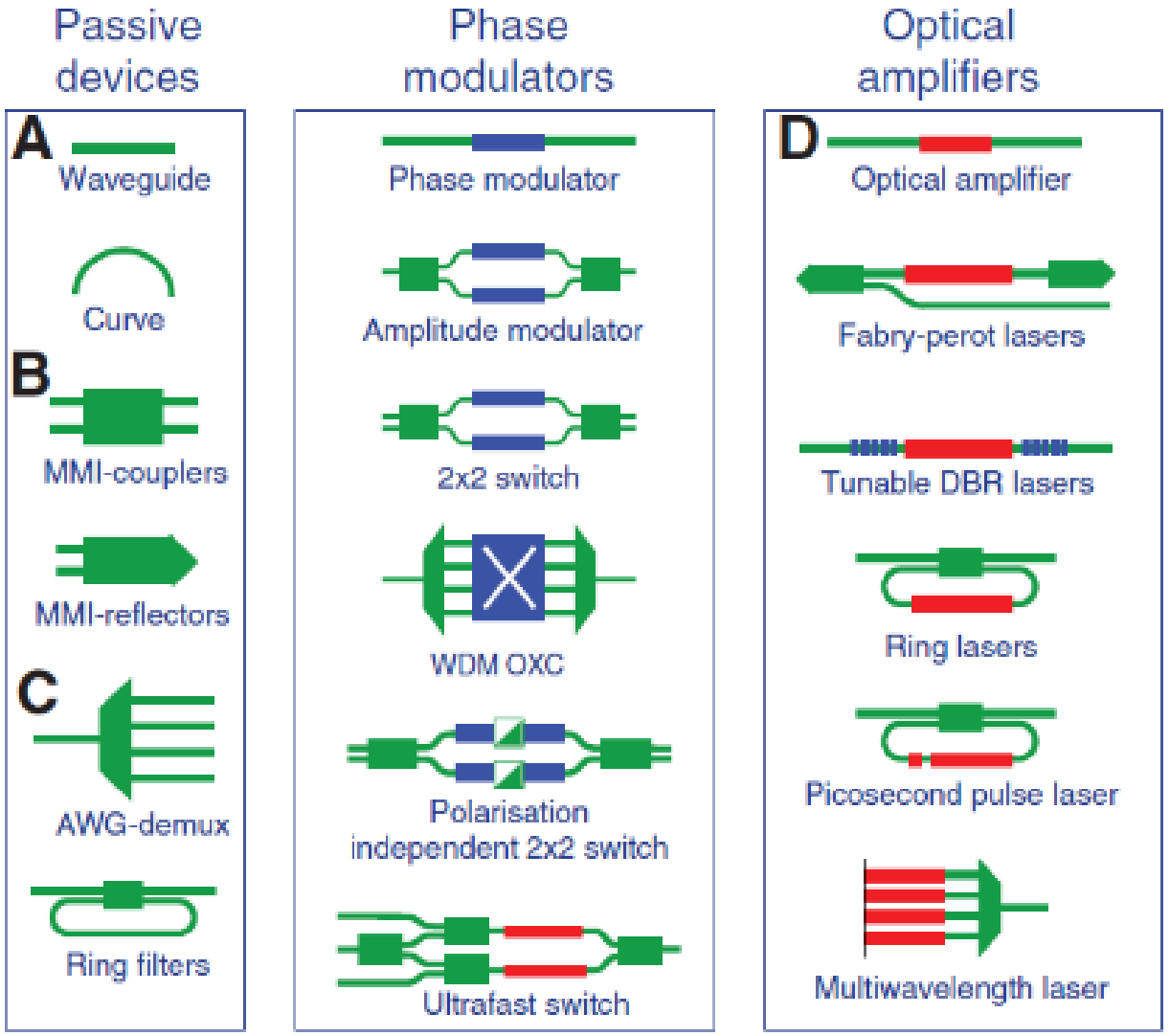
CRITERIA	InP	Si	SiN
Passive components	■■	■■	■■■
Active components	■■■	×	×
Modulator speed	■■■	■■	■■
Industrial infrastructure	■	■■■	■■
Current wafer size	3-4”	8”	4-8”
Standard equipment	■■■	■■■	■■■

PERFORMANCE

- ■■■ Very good
- ■■ Good
- ■ Modest
- × Not possible

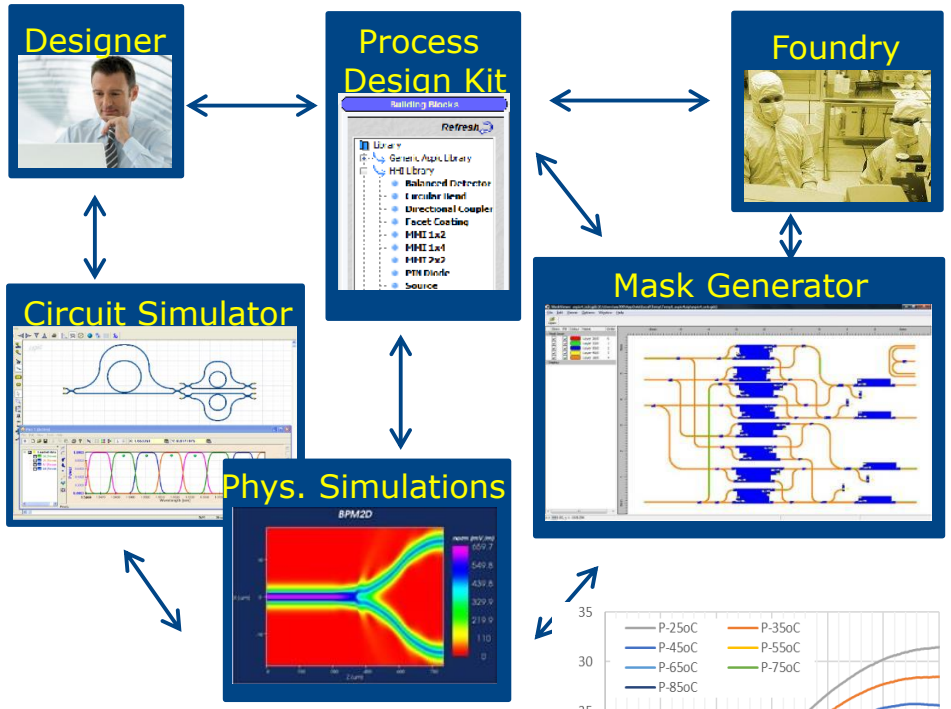
SMART PHOTONICS

PIC Building Blocks

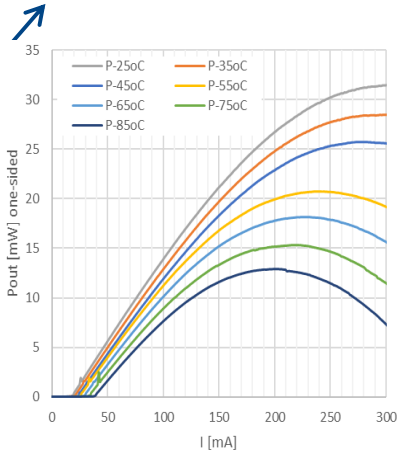


SMART PHOTONICS

PDK: a library of building blocks and data



The PDK contains all info and tools for simulating and designing in our technology.
E.g. Temp-dependence, length, width, etc.

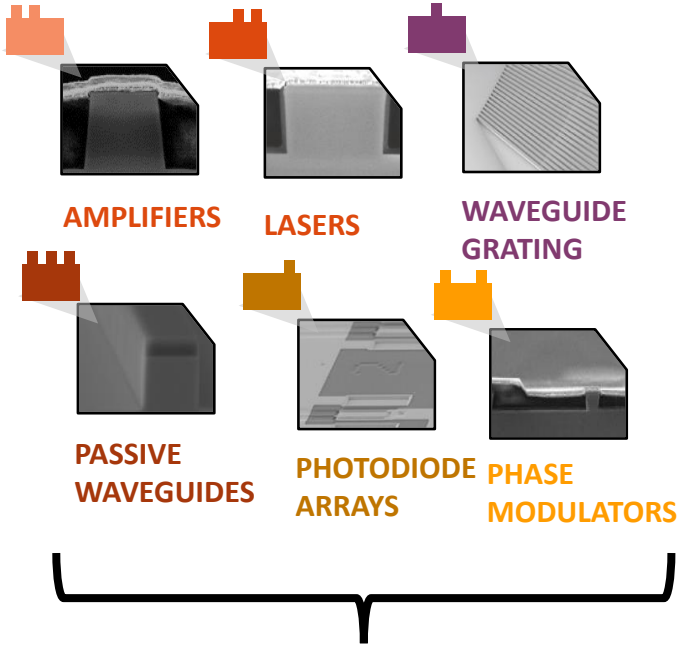


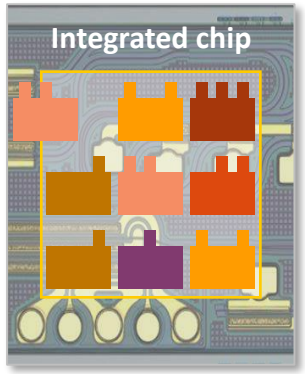
PDK HELPs CUSTOMERS:

- Customise designs
- Leverage experience
- Reduce time to market
- Leverage infrastructure

FOUNDRY PDK RESPONSIBILITY:

- Have stable manufacturing line ensuring stable PDK components
- Available Platforms standardized and well characterized





SMART PHOTONICS

One stop shop wafer processing

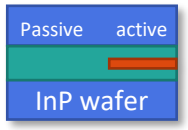


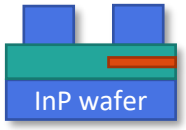


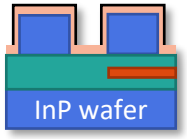


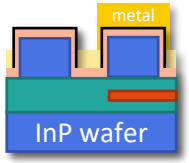


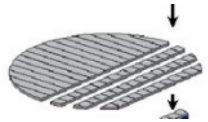












EPITAXY
Growth active / passive materials

LITHOGRAPHY of (waveguide) structures

Isolation & passivation

Planarization & metallization

Final process steps

Key Expertise

- Epitaxial deposition of various materials
- Growing and re-growing active and passive materials without trade-offs

- High-resolution, high-volume lithography
- Smooth etching
- Complex structures, multiple etch levels

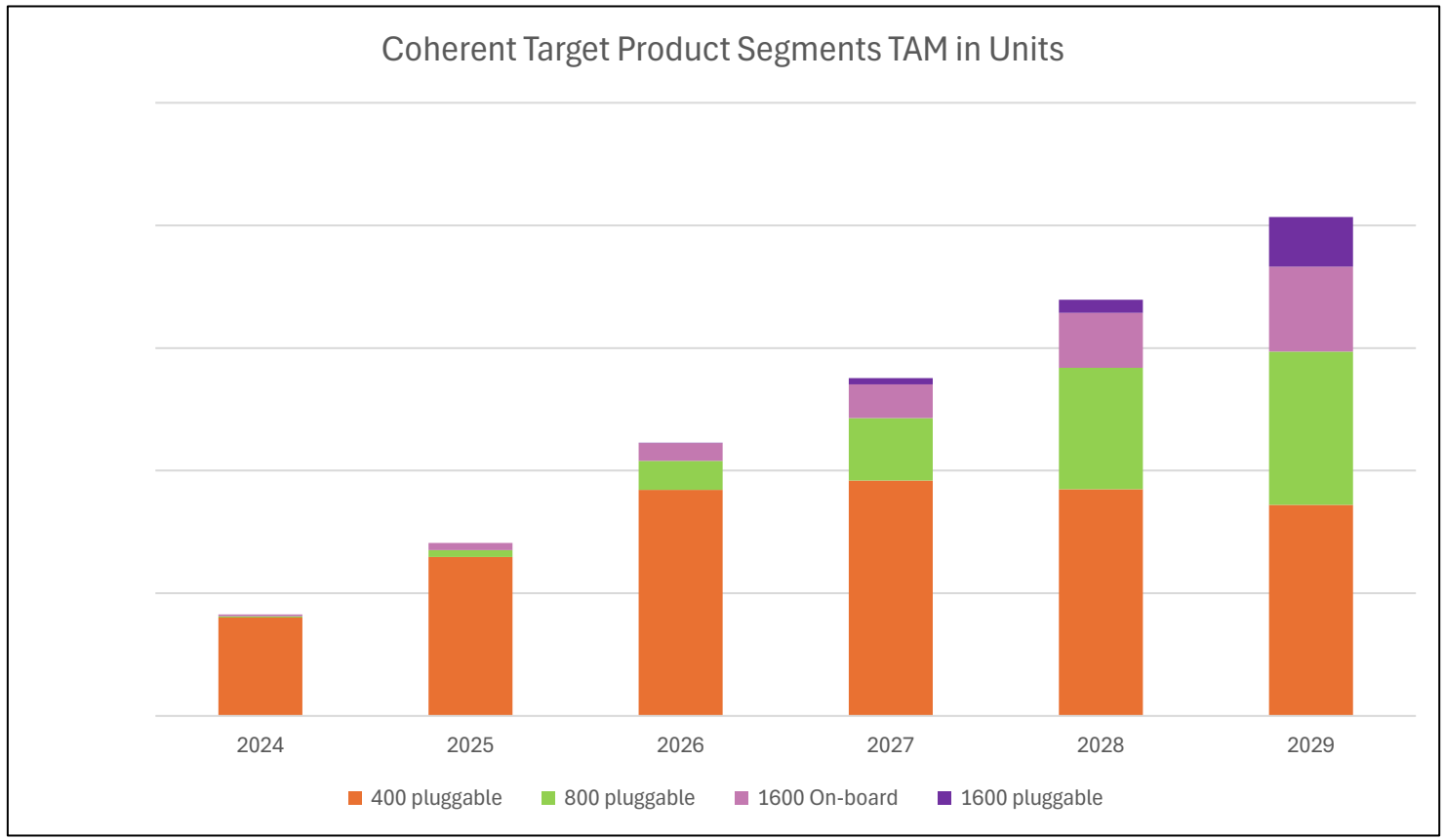
- Deposition and etching of high reliability layers

- Planarization for 100GHz RF performance
- Metallization on complex geometries

- Grinding & Polishing
- Dicing & Antireflection coating
- Cleaving into single IC's
- Test and Measurement

SMART PHOTONICS

Example: Coherent Optics market



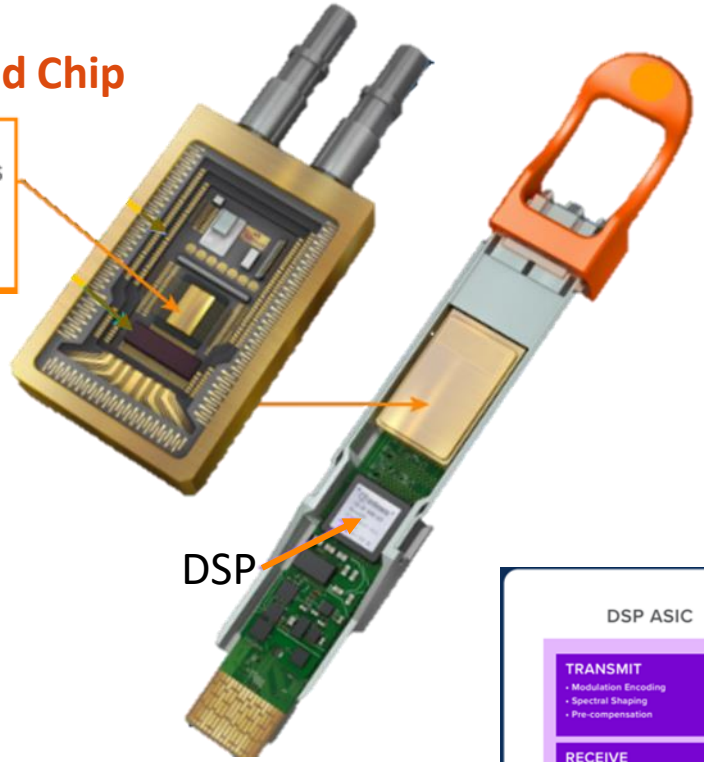
- **Huge market growth**
  - Metro DCI, < 120km, Pt to Pt
  - Metro/Regional/Euro national ROADM networks, <500km
  - Regional/Long Haul DCI networks, <1000km
  - Transcontinental/Transoceanic networks, 2000km+
- **SMART technology roadmap on basis of Coherent Optics evolution**
  - Low linewidth laser
  - Modulator
  - Photodetector

SMART PHOTONICS

Anatomy of coherent pluggable

InP Photonic Integrated Chip

- LASER
- Rx PASSIVE PHOTONICS
- PHOTODETECTOR
- MODULATOR
- OPTICAL AMPLIFIER*



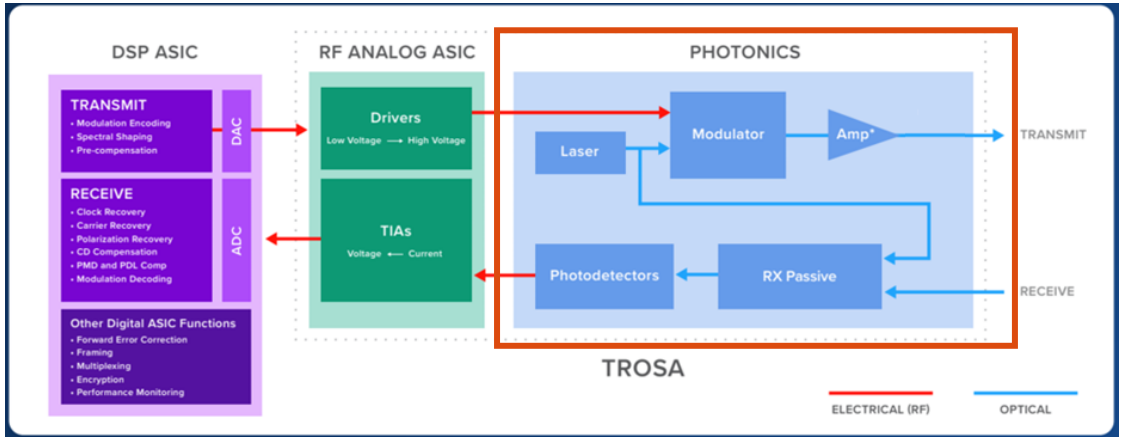


SMART Photonics gives you the power to enhance your pluggable solution

- You can design your own PIC on our easy-to-use PDK
- As pure-play-foundry SMART Photonics manufactures your InP PIC, you get the PIC, you own the design, you build the pluggable

InP Photonic Integrated Chip

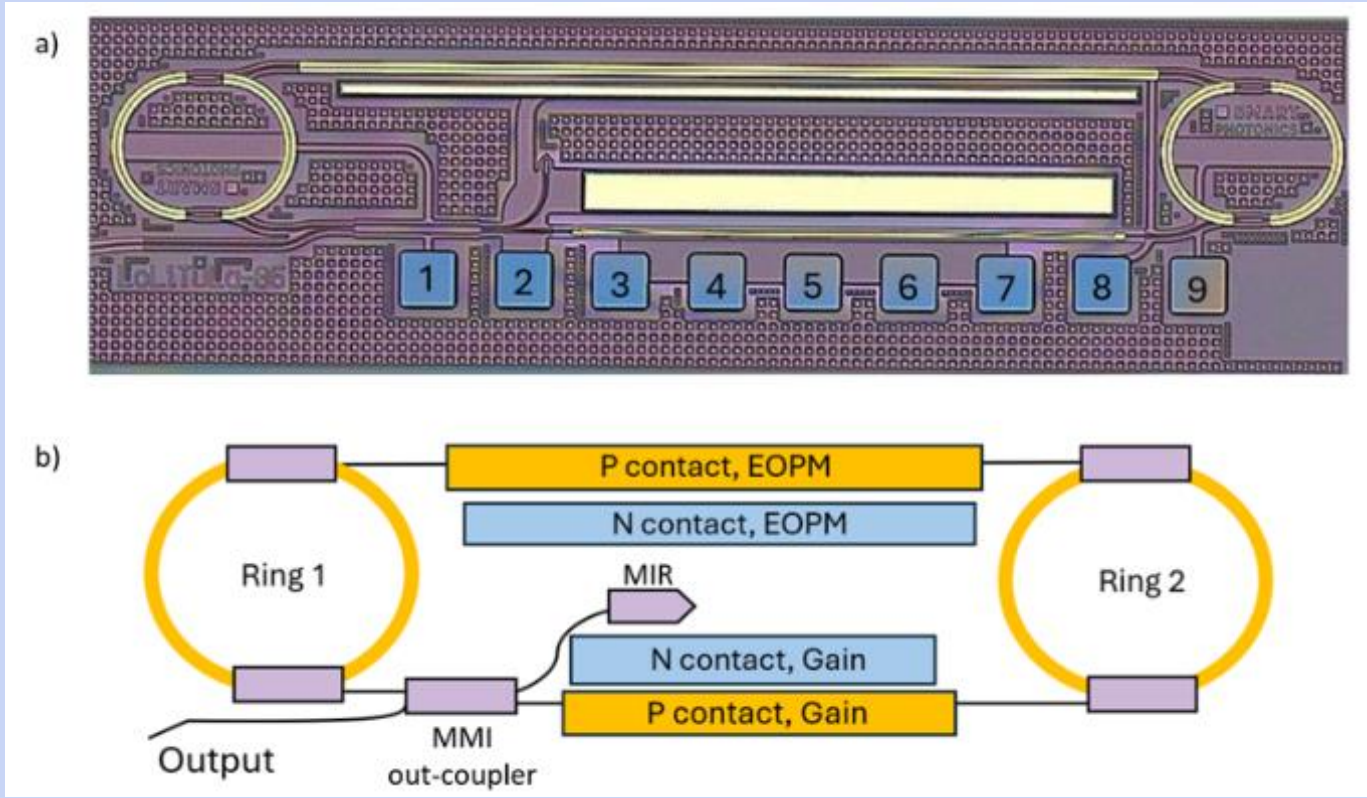
- Design by customer using SMART PDK to accelerate the design process
- Fabricated by SMART Photonics



SMART PHOTONICS

SMART building blocks for Coherent Optics

Low linewidth tuneable laser



SMART building blocks for Coherent Optics

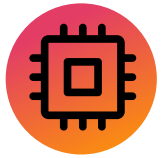
High speed modulator



Patent pending: PCT/EP2021/075258

SMART PHOTONICS

CONCLUSIONS



Integrated photonics: helps solving major worldwide challenges in large and high-growth markets



The industry is moving towards a horizontal value chain



SMART Photonics plays a key role in integrated photonics value chain

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