Advanced Manufacturing
Technology Transfer Centers

Swiss Photonics Integration Technology Center* (Swiss PITC)

*name subject to change

LIGENTEC PAUL SCHERRER INSTITUT PSI EPFL SWISS PHOTONICS POLARITON TECHNOLOGIES OST

Schweizerische Eidgenossenschaft
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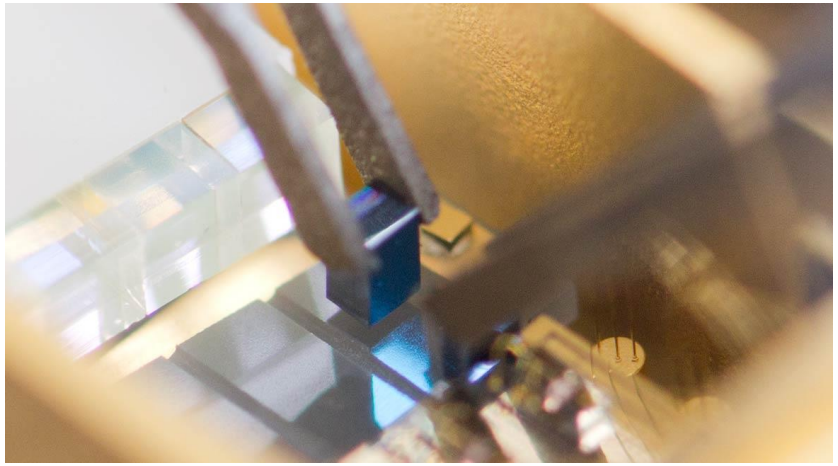
ETH BOARD

Motivation 1 – Micro-Optics



Need for advanced, high precision assembly solutions of micro-optical systems

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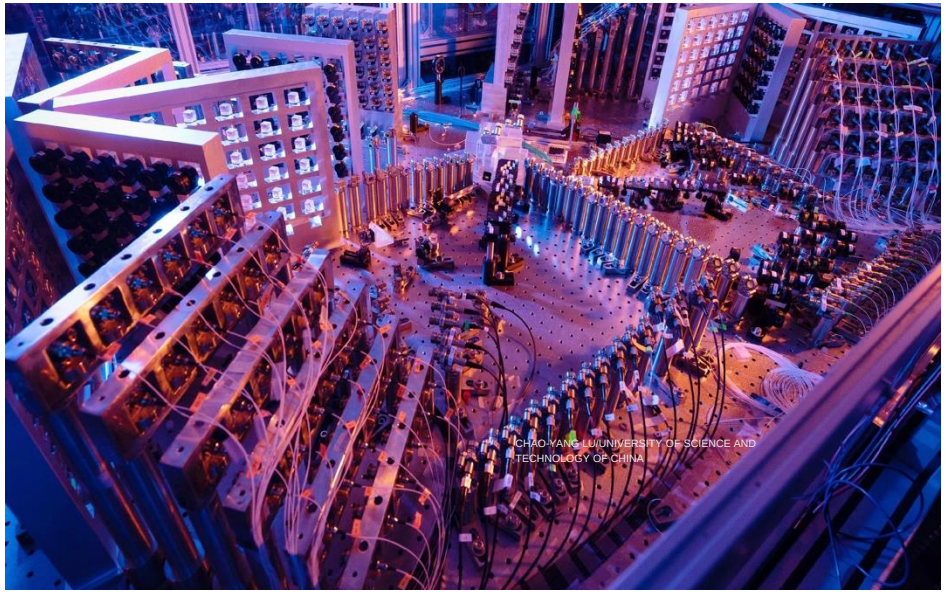
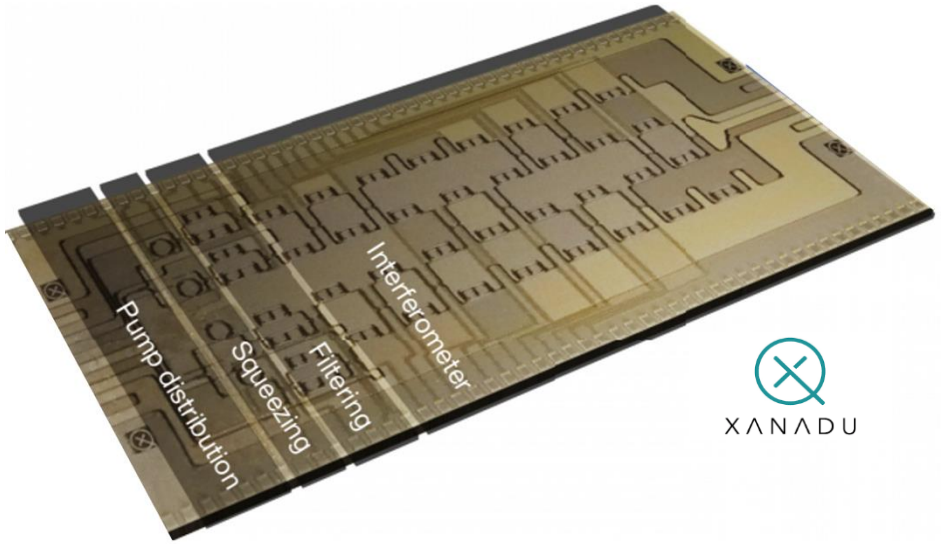
Photonic Integrated Circuits (PICs)





Disruptive PICs:

Size: 100x smaller

Weight: 100x lighter

Power: 1/10th of energy consumption

Cost: 1/100th of cost

PICs to repeat the electronic IC revolution?

Integrate free space / fiber optical systems with semiconductor manufacturing technologies

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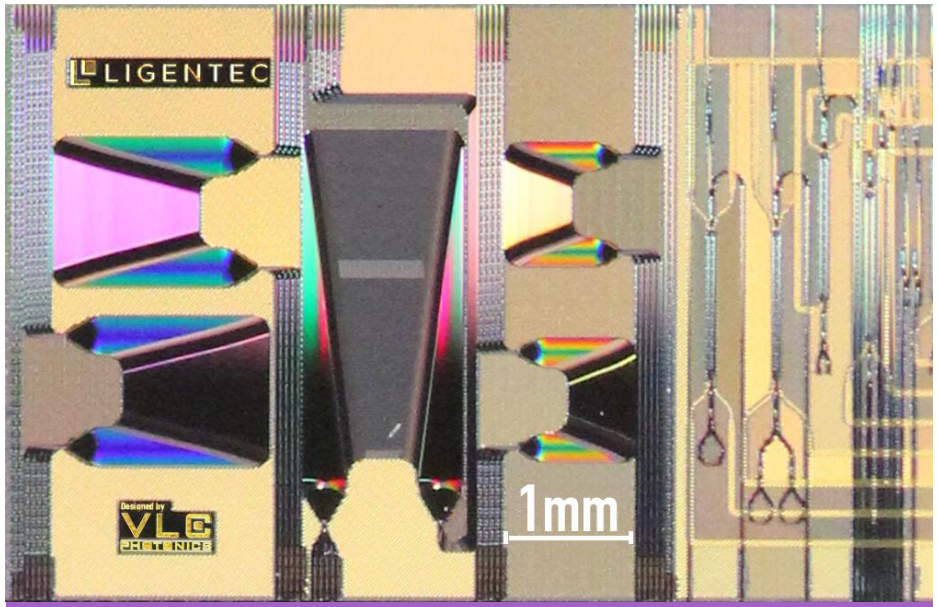
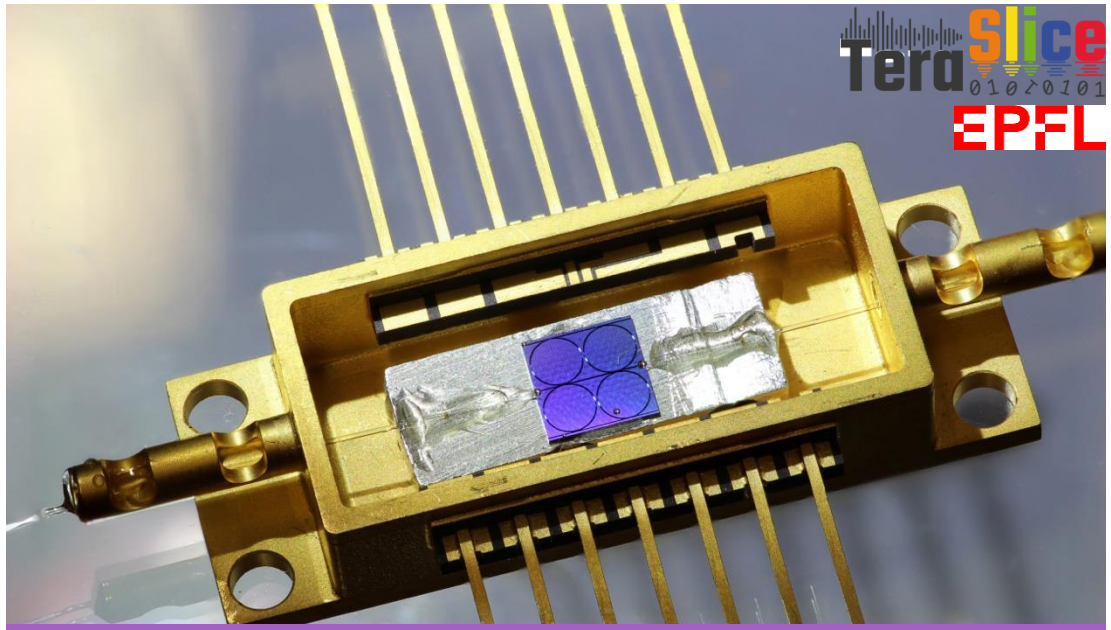
Motivation 2 – PIC packaging



PICs are useless,



unless they are packaged!

Need for Photonic Integrated Circuit Packaging

Motivation 3 - Collaboration

- Photonics has a **bright future**.
  - Key for technical and digital sovereignty
  - Key to solve societal problems
  - Key to improve prosperity and equality
- Switzerland has **strong actors**
- **Fragmented** Swiss Ecosystem

- Lot of supporting and **funding activities** in Europe and WW

Photonics plays a crucial role for the digital and technology sovereignty of Europe.

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Motivation 3 - Around Switzerland

PsiQuantum Closes $450 Million Funding Round to Build the World's First Commercially Viable Quantum Computer

Company on track to build a fault-tolerant quantum computer ready to tackle breakthrough applications in climate, energy, life sciences and beyond

July 27, 2021 09:01 AM Eastern Daylight Time

QUANTUM DELTA NL AWARDED 615 MILLION EURO FROM NETHERLANDS' NATIONAL GROWTH FUND TO ACCELERATE QUANTUM TECHNOLOGY

APRIL 9, 2021

Xanadu closes $100M USD Series B to build a fault-tolerant photonic quantum computer

Photonic chip organisation PhotonDelta secures €1.1 billion investment

Quandela, a world leader in quantum photonics, raises €15M to bring the first photonic quantum computer online in 2022

Germany to invest €2B in quantum technologies

11 May 2021 | News

BUSINESS

AIM Photonics in Albany gets $321 million in funding

Larry Rulison

Oct. 26, 2021 | Updated: Oct. 26, 2021 3:37 p.m.

Motivation 3 – Common Challenges

How to support Swiss Industry not be left behind?

Common challenges

for Swiss Industry, especially start-ups

- Assembly & packaging
- Testing
- Qualification

=> Supporting Technologies

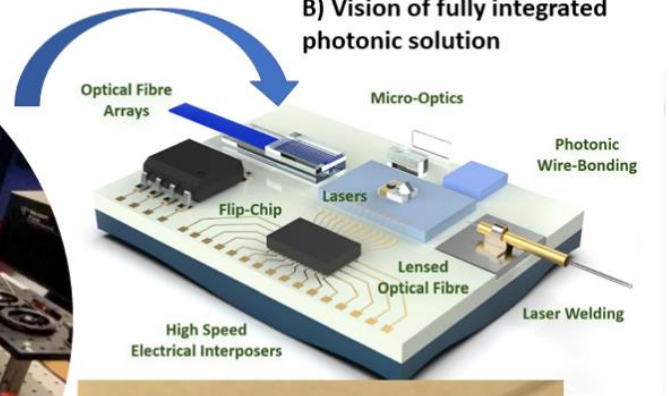
Issues / Hurdles

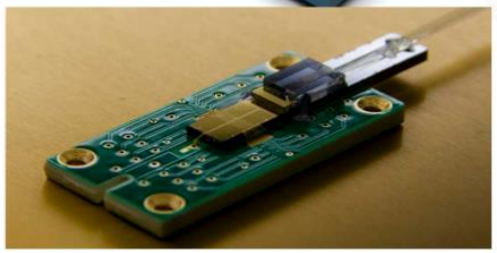
- ***Supporting Technologies*** are not core enough to invest internally, => dependency on external provides
- Ecosystem is immature (compared to semicon industry), hard to navigate
- Technology providers are fully booked and focus on big potentials.

Offering in a nutshell

A) Part of current ion-trap quantum computing set-up at PSI

B) Vision of fully integrated photonic solution





C) Qubit control through a waveguide array coupled to a fiber bundle

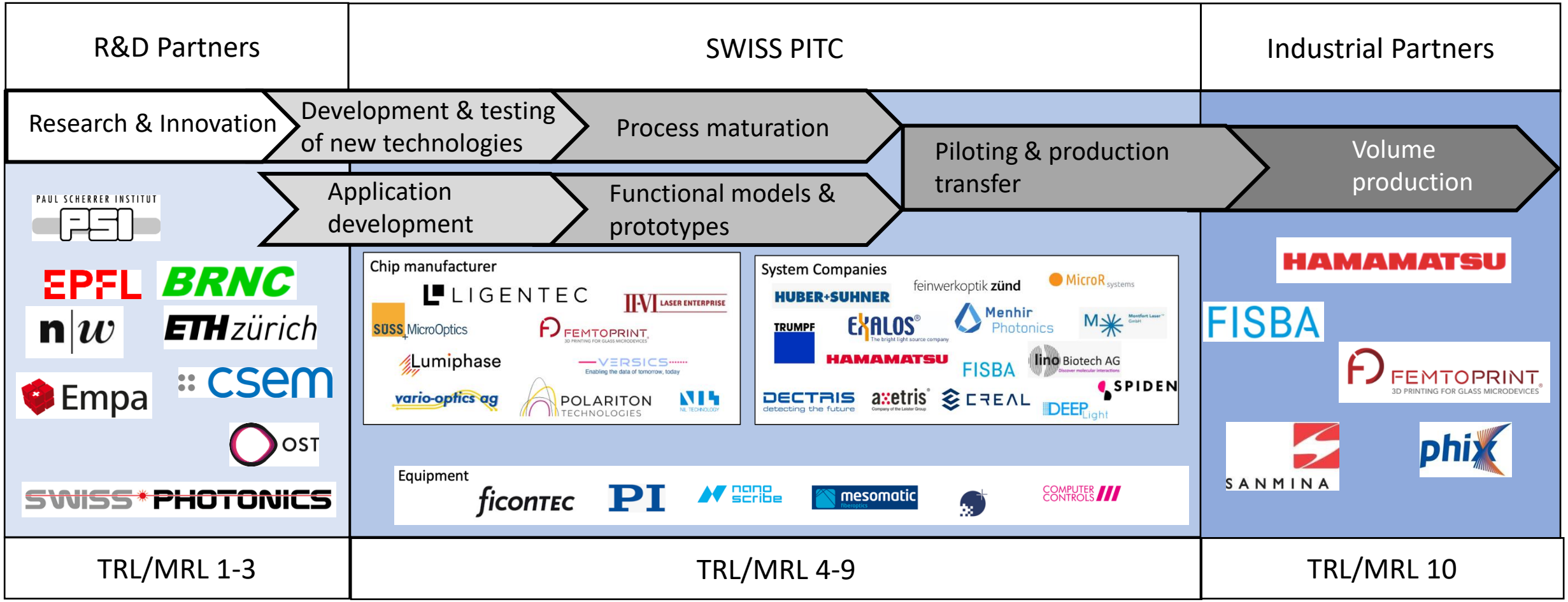
PIC schematic taken from: "Bundalo et al. IEEE J. Select Top. Quant. Electron, vol. 28, 2022"

Support the integration

Be the go-to partner for photonics packaging associated services in Switzerland:

- **Feasibility** studies
- Package **design** support (thermal, RF, etc.)
- Environmental **testing and qualification**
- **Development** and testing of new packaging technologies
- Rapid **prototyping** to small volume manufacturing
- Seamless **transfer** to in-house or contract manufacturers

Value Chain - Center's partners



Leading organisations => strong fundament to build on

Goals and Benefits

Users

- Local, low barrier access to supporting technology
- Focus on core technology
- Seamless transfer to production

Switzerland

- Networking effects among users & provides
- Reduced innovation barriers
- Strengthened photonic industry

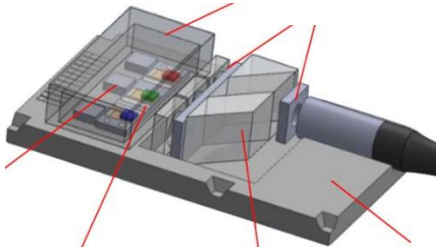
Equipment & Technology providers

- Release pressure on application lab
- Window to showcase technology
- Developments are in-line with their offerings
- Equipment sale / production transfer

Technology competences

Precision assembly and encapsulation solutions for photonics systems focusing on

Micro-Optical Hybrid Photonic Systems (MOHPS)



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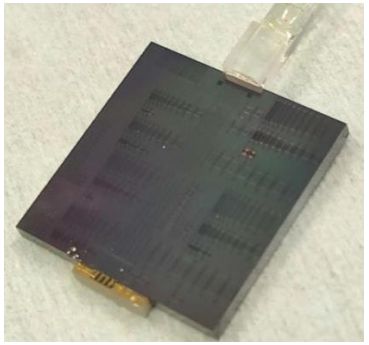
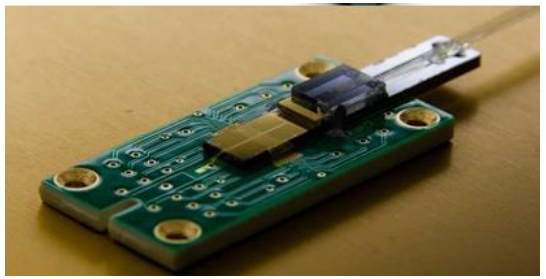


Quantum Photonics Packaging (QuPho)



Access to technology infrastructure –
cleanroom, packaging and testing capability

Target: high TRLs and MRLs

Status & next steps

Funding decision

- Proposed for funding by AM-TTC alliance
- SERI decision in process
- Final go expected Dec 22

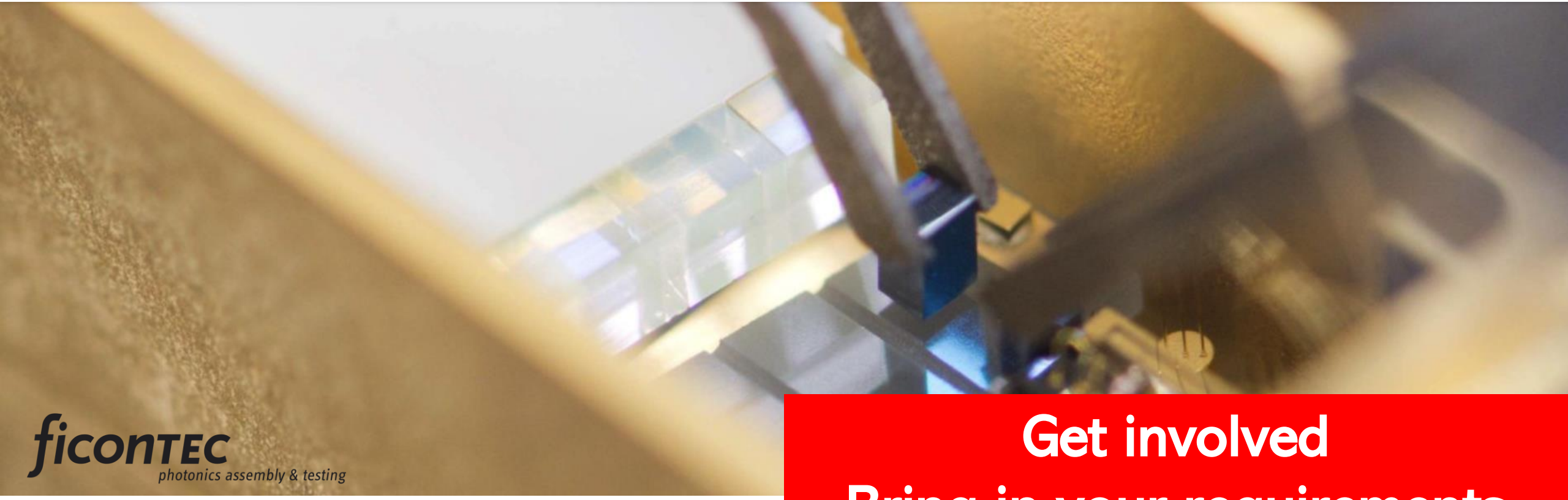
Timeline

- Start in 2023, distributed infrastructure
- Cleanroom in Villigen ’24 onwards
- Start with hybrid assembly

Status

- CEO search in progress
- Next build key technical team

Call for action



Get involved

Bring in your requirements

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