



## **Training & Interoperability**

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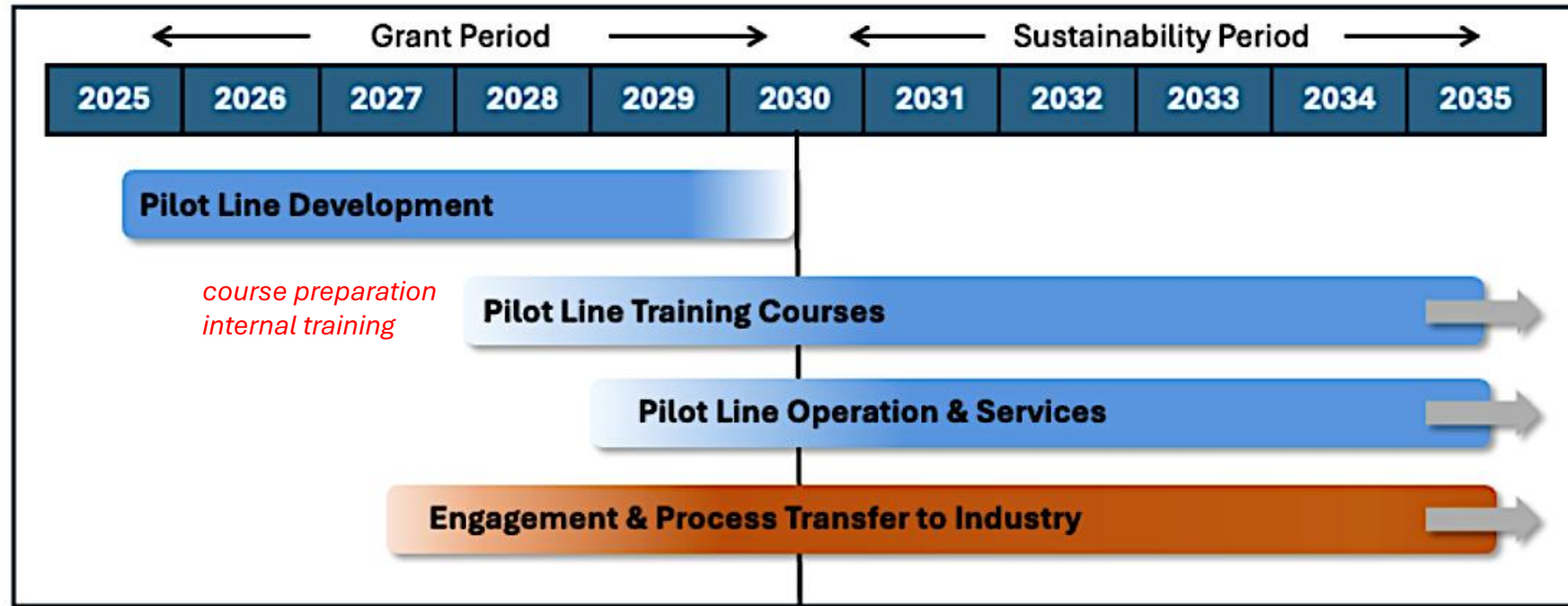
**September 10<sup>th</sup>, 2025**

**Objective 6: Establish highly visible and well-coordinated training and dissemination programmes.** These activities will be managed by partners who have led-the-way in providing pioneering PIC training and dissemination programmes.

- A. Prepare comprehensive training courses on advanced PIC manufacturing, including online and hands-on courses. PIXEurope will prepare and deliver 28 online, 18 hands-on and specialised one-to-one training courses targeting 1000 attendees per year.
- B. Collaborate with the European Competence Centres to roll-out PIXEurope's training courses.
- C. Roll-out PIXEurope's training courses during the third year of the project.
- D. Organise Open House events, giving users an opportunity to view and evaluate Pilot Line facilities. Dedicated one-to-one visits for more detailed on-site training and consultation will also be provided.
- E. Prepare internal training courses so all Pilot Line partners are fully competent in all aspects and technical capabilities of the Pilot Line, especially for new Pilot Line hires.

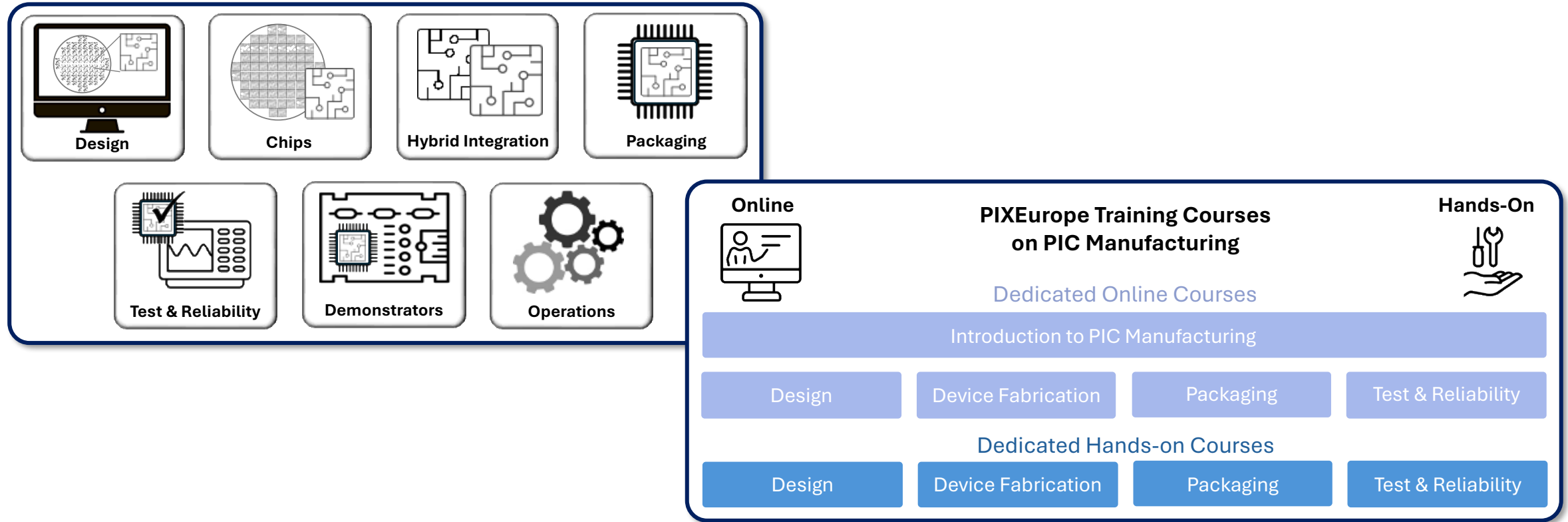


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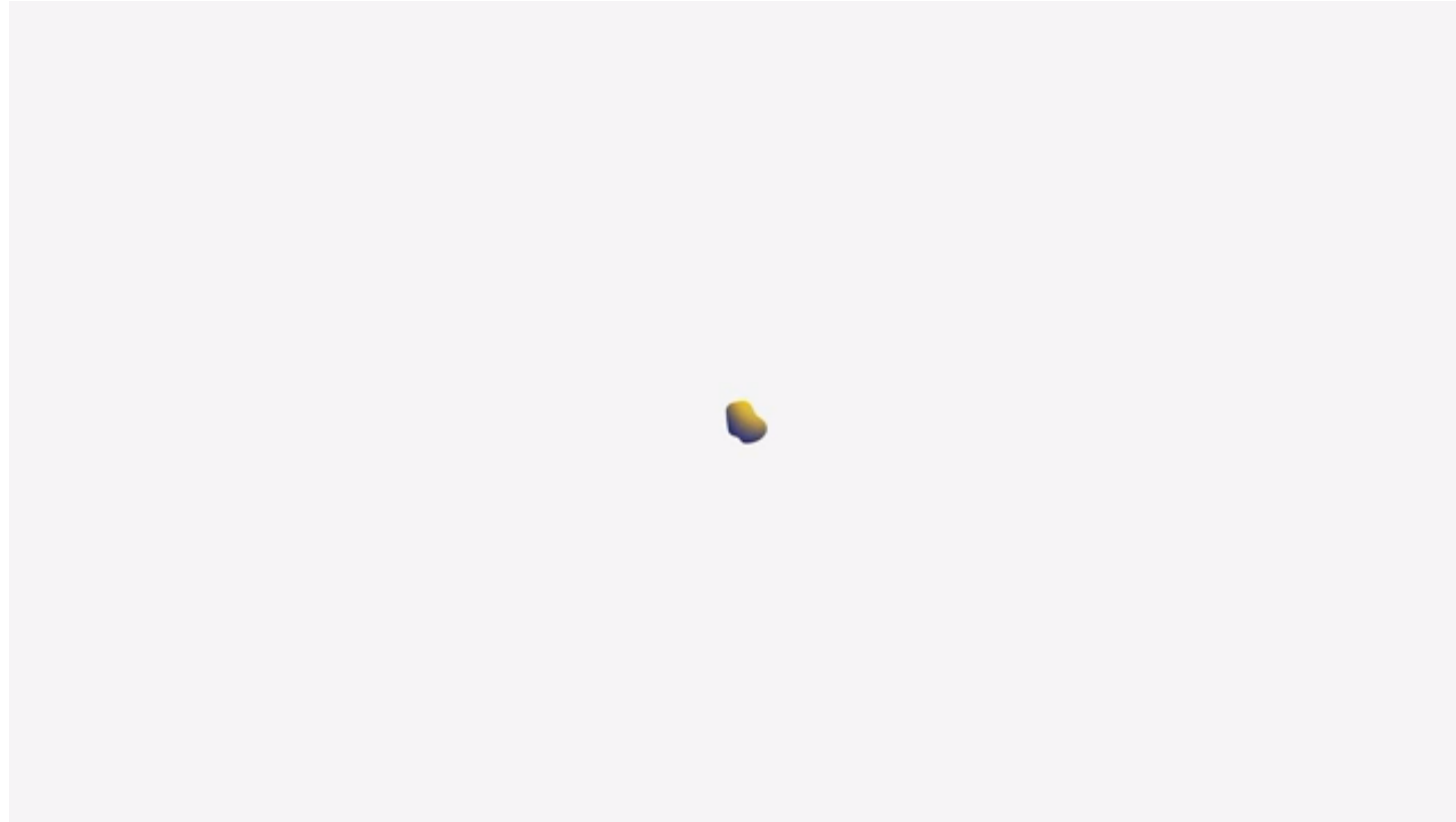


**Figure 2:** Timeline of PIXEurope Pilot Line from the project grant period to operations and sustainability. Pilot Line services, including delivery of training courses, will be ramped up over time, starting in year 3 and fully operational during the final year of the project grant period.

# PIXEurope Training Timeline



- ❑ Training courses for internal & external users on integrated photonic technologies
- ❑ Strong focus on production aspects of the technology
- ❑ Online & hands-on courses, as well as user-dedicated courses
- ❑ Complement existing research-focused training (fully address research-to-production)



# Tyndall MTP Training Course

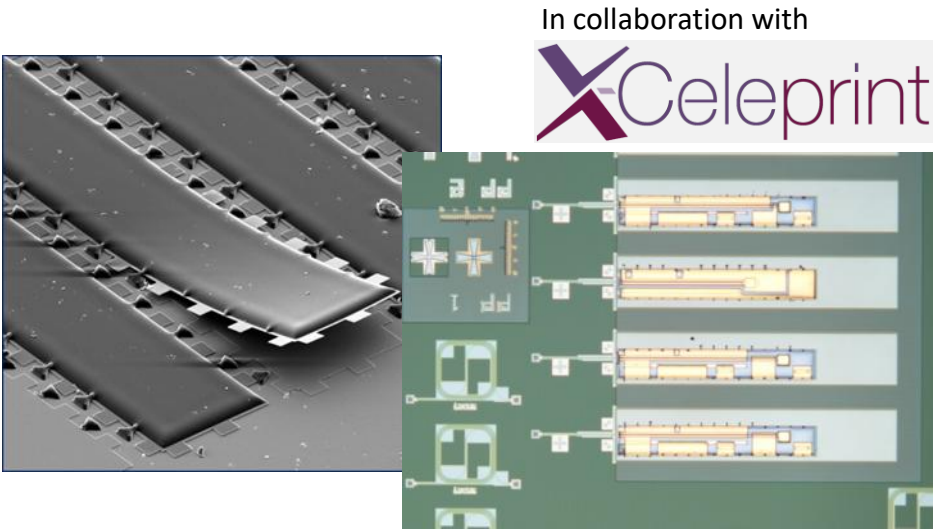
## Micro-transfer Printing Training Course

Access unique training infrastructure

Introduction to machinery, mechanisms, and software exclusively designed for micro-transfer printing.

**Course components:**

- ✓ MTP machine and mechanisms
- ✓ Alignment guidelines
- ✓ Coupon and print
- ✓ Lab demo and fabrication visit
- ✓ InP, GaAs, GaN and Si based MTP technology



MTP course in a nutshell	
Mode of delivery	In-person lectures and lab sessions
Level/ pre-requisites	Introductory/ None; but fundamental understanding of semiconductor technology beneficial
Length	2 days
No of attendees	8



[Ecosystem](#)
[Website](#)

Training Catalogue
[Organization registry](#)

Filters

FULLTEXT:

TRAINING TYPE ?

☐ PhotonHub Online training (2)
   
☒ PhotonHub Demo centre (30)
   
☒ PhotonHub Experience centre (9)

TECHNOLOGY PLATFORM ?

☐ Free-Space Photonic Components and Systems (18)
   
☐ Glass and Polymer Specialty Fibres and Fibre Devices (9)
   
☐ Polymer-based photonic components and large-area organic-photonics (5)
   
☐ Micro-Opto-Electro-Mechanical Systems (MOEMS) and Hybrid Photonics Systems (6)
   
☐ Silicon-based photonic integrated

APPLICATION ?

☐ Mobility & energy (22)
   
☐ Digital infrastructure (21)
   
☐ Agro & food (19)

Listed items: 14
Sort by: AZ - Training title
Items/page: 25
Show as: Grid

PHOTONICS FOR

PHOTONICS

PHOTOVOLTAICS:

PIC PRODUCT

QUANTITATIVE PHASE

QUANTUM

SILICON PHOTONICS

SILICON PHOTONICS:

SPECIALTY OPTICAL

SPECTRAL IMAGING

SUPER RESOLUTION

SURFACE

TERAHERTZ

THICK-SOI PHOTONICS



# PIXEurope Training Centres



Partner	Country	Title
JR	AT	Nano goes macro: Large-area micro- and nanostructuring
IMEC	BE	Silicon Photonics for Sensing Applications
VUB	BE	Photonics and Food
VUB	BE	Optical Fibre Sensing Applications
FHG_FEP	DE	OLED for Lighting and Signage Applications
FHG_ILT	DE	Photonics in Manufacturing
FORTH	EL	Optical Fibre Sensors for Industrial Application
FORTH	EL	Laser-based additive micro-manufacturing for Industrial Applications
ICCS	EL	Photonics for Telecom & Datacom applications
AIMEN	ES	Advanced laser welding
AIMEN	ES	Surface functionalization by laser patterning
CARTIF	ES	Operating and digitalization of laser manufacturing cells for beginners
ICFO	ES	Super resolution and advance microscopy Imaging techniques
Photonics Finland	FI	Spectral Imaging and its Applications
VTT	FI	Thick-SOI photonics for sensing and imaging
CNRS_FEMTO	FR	Fabrication and characterization of an Integrated Electro-Optic modulator
CNRS_IEMN	FR	TeraHertz spectroscopy application to solid, liquid and gaseous samples.
CNRS_IEMN	FR	CNRS-IEMN/Photovoltaics
CNRS_IF	FR	Institut Fresnel / Espace Photonique optical thin film platform
CNRS_L2n	FR	Photonics for Quantum Technologies
CNRS_LCF	FR	Optical Fibers and telecommunications
CNRS_LP3	FR	Handle and use pulsed Lasers for additive fabrication
Tyndall-UCC	IE	Photonics for Biomedical Applications
CNIT	IT	mmWave Generation and Transmission Demo Center/ Title:Graphene photonics for mm-wave wireless links
CNR_IFN	IT	Optical gas sensors for industrial applications
CNR_INO	IT	Quantum Communication applications
TUE	NL	PIC Product
WUT	PL	Quantitative Phase Imaging at Cellular Level
WUT	PL	Fiber-Optic Sensors for Structural Health and Biomedical Monitoring
RISE	SE	Specialty Optical Fibres for sensing applications in Industry
ORC	UK	Build your own Silicon Photonics Chip

# PIXEurope Training Centres

**Online Introductory Course** 

**Register now**  
[photonhub.eu/trainings-list](https://photonhub.eu/trainings-list)

## Advanced Photonics Packaging

 **24 October 2023**  
 **Online Training**  
 **TYNDAL-UCC**



   
PHOTONICS PUBLIC PRIVATE PARTNERSHIP

 **PhotonHub Europe**  
National Institute  
Institioid Näisiühta

 **Tyndall**  
National Institute  
Institioid Näisiühta

**3-day Experience Centre** 

**Register now**  
[photonhub.eu/centres](https://photonhub.eu/centres)

## Photonics Packaging & Integration Technologies

 **04-06/06/2024**  
 **Cork, Ireland**  
 **TYNDALL-UCC**



   
PHOTONICS PUBLIC PRIVATE PARTNERSHIP

 **PhotonHub Europe**  
National Institute  
Institioid Näisiühta

 **Tyndall**  
National Institute  
Institioid Näisiühta



# PIXEurope Training Centres



**New European Academy to boost the skills and know-how of industry in exploiting opportunities in the €615B global photonics sector**

## PowerPoint & Word Proposal Documents

**PhotonHub Demo Centre**  
**Course 01**  
**Photonics for Biomedical Applications**

**Course Provider**  
**Tyndall Institute,**  
**University College Cork,**  
**Ireland**



European Photonics Innovation Academy



**PhotonHub Demo & Experience Centre Proposal Form**  
(to be submitted with PowerPoint Proposal Template slides)

**Proposed Centre Type (Demo or Experience Centre):**

**Proposed Centre Name/Title:**

**PhotonHub Partner Name:**

**Contact Person Name:**

**Contact Person Email:**

- 1) Provide details about your proposed Demo or Experience centre, making reference to PhotonHub's technology and application platforms (250 Words Max).
- 2) Provide details about the level of hands on training during the proposed course, including attendee access to laboratories and equipment. Also describe the maximum number of attendees who can participate in a training course. (250 Words Max).
- 3) Provide details about the existing level of maturity of your proposed Demo or Experience centre. This should reference the following topics - 1) if the training course or parts of the training course have already been given, 2) if training course materials, hand-out notes and promotional documents already exist (250 Words Max).
- 4) Provide details about the type of support required from PhotonHub to establish your proposed Demo or Experience centre and when will the first course be given (250 Words Max).
- 5) Provide details about options to give virtual training with your proposed centre - this may be beneficial if travel restriction limit course attendees visiting your centre (250 Words Max).
- 6) Provide details about the potential for informal user visits to your proposed training centre - this would not be the regular training activities but to support additional users visits (250 Words Max).

Call for Proposals - PhotonHub Demo & Experience Centres - March 2021



# Training Proposal Documents



PhotonHub Experience Centre

Course 01

Photonics Packaging & Integration Technologies

Course Provider

Tyndall Institute

University College Cork

Ireland

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Course Overview

Photonic device packaging can account for over 50% of the photonic product manufacturing cost. Therefore, it is vital that industries developing photonic-based products have an understanding of the materials, technologies and processes required to package their photonic devices.

This 3-day training course provides industry, especially those involved in photonic product development, with the fundamental technical skills in package design, assembly and reliability

Target Audience

It is desirable but not essential that course attendees have a basic understanding of photonics. The course is ideally suited to those planning to develop new photonic products, establish in-house or outsource packaging development and manufacturing.

Expected Outcomes

Course Equipment & Infrastructure

fiber packaging

flipchip packaging

electrical packaging

micro optic packaging

package design

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Course Schedule

Day & Time	Training Activity
Day 1 (09:00 – 12:00)	Tyndall Orientation, Course Introduction & Packaging Tutorials (lectures)
Day 1 (14:00 – 17:00)	Laser Welding of Optical Fiber to InP Laser in 14-Pin Butterfly Package (hands-on)
Day 2 (09:00 – 12:00)	Electronic Packaging Technologies (hands-on)
Day 2 (14:00 – 17:00)	Fiber Array Packaging to Photonic Integrated Circuit (hands-on)
Day 3 (09:00 – 12:00)	Micro Optics Packaging (hands-on)
Day 3 (14:00 – 17:00)	Reliability & Failure Analysis of Photonic Devices (hands-on)

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Course Details (Day 3)

Micro Optics Packaging (hands-on)

Use & Location: Finetech & fscnTEC Flipchip Systems, Pactech Solder Jetting System, Ball & Ribbon Wirebonders, Flipchip silicon test structures on electronic substrates, solder jetting of micro solder spheres and electrical wirebonding

Duration: 3 Hours

Reliability & Failure Analysis of Photonic Devices (lecture & hands-on)

Use: X-Ray & Acoustic Microscope Imaging, Die Shear Testing, Environmental Testing (e.g. humidity, thermal shock, vibration)

lecture on reliability and failure modes of photonic devices, with laboratory demonstrations of reliability analysis

Duration: 3 Hours

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Course Trainers

Course Director: Prof. Peter O'Brien

Course Manager: Guillaume Le Palud

Packaging Tutorials: Dr. Padraic Morrissey

Optical Packaging: Dr. Kamel Gradkowski & Dr. Jun Lee

Electrical Packaging: Dr. Jun Su Lee, Marc Rensing, Noreen Nudds

Packaging Reliability: Marc Rensing

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Keywords

Technologies: Packaging, Assembly, Optical Fiber, Micro Optics, Laser, PICs, Integrated Photonics, Thermal, Electrical, Testing, Reliability, Failure Analysis, Design Rules

Applications: Manufacturing, Pilot Line, Ecosystem, Equipment, Automation

Applications: Communications, Biomedical, Sensors, Agri-Food...

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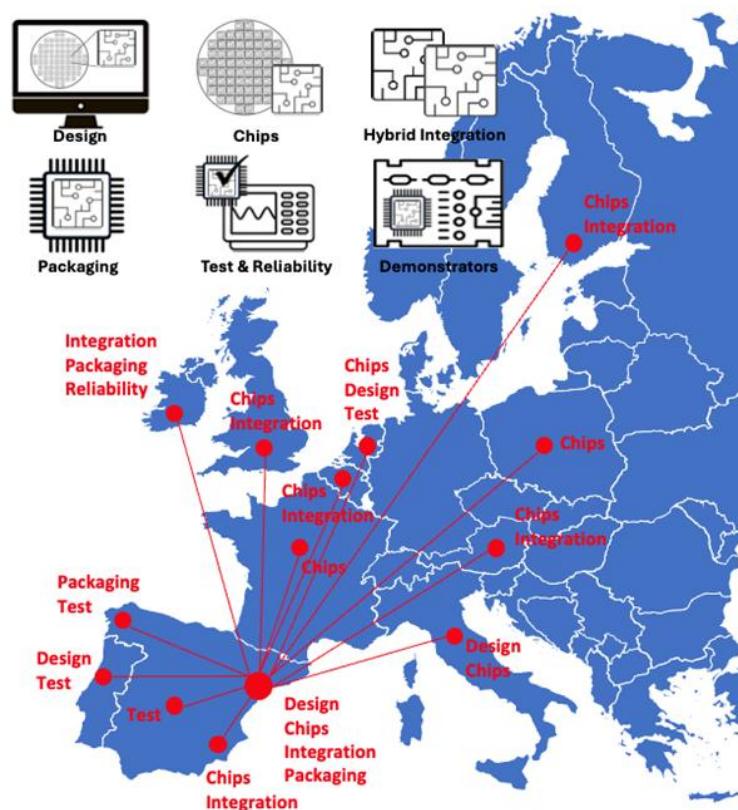
- 1. Liz to make contact with PIXEurope partner training person**
- 2. Evaluate training activity, capabilities and plan of each PIXEurope partner**
- 3. Select first partners who will develop training courses (online & hands-on)**
- 4. Selection based on template course structure**
- 5. Roll-out of first training courses**
- 6. Additional partners to follow over reasonable timescale**

# Interoperability (the motivation)

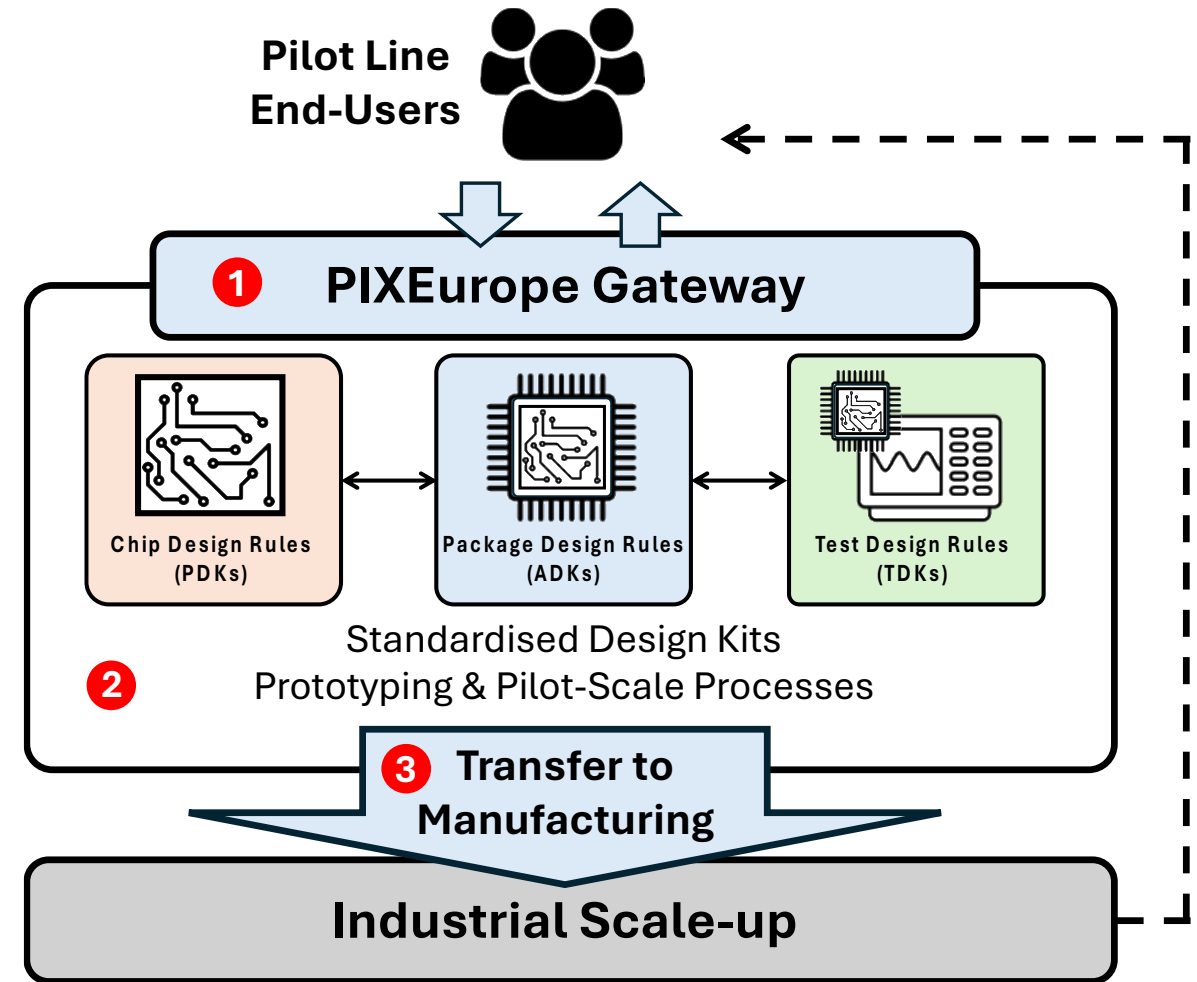
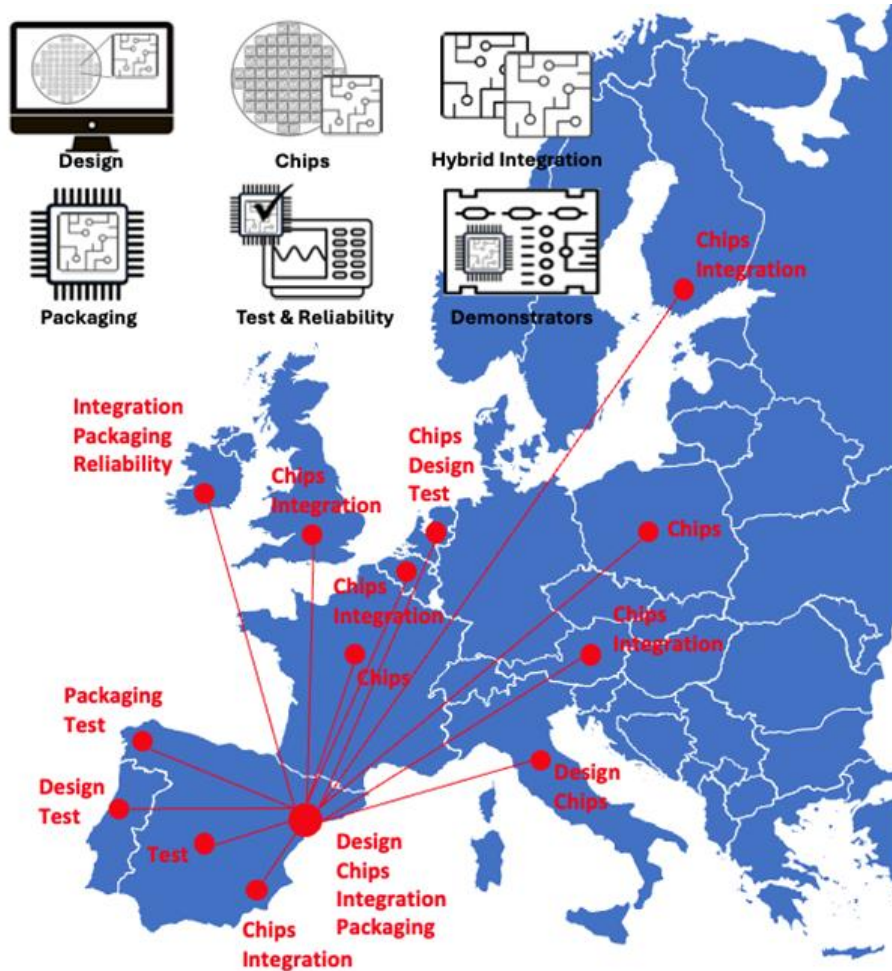


**Interoperability** activities focus on establishing and optimising the operation of the distributed Pilot Line between partners. In the project, interoperability is strongly linked with WP4 & WP9. In WP9, demonstrators to be developed between the partners in WP9 to evaluate and optimise overall operational efficiency.

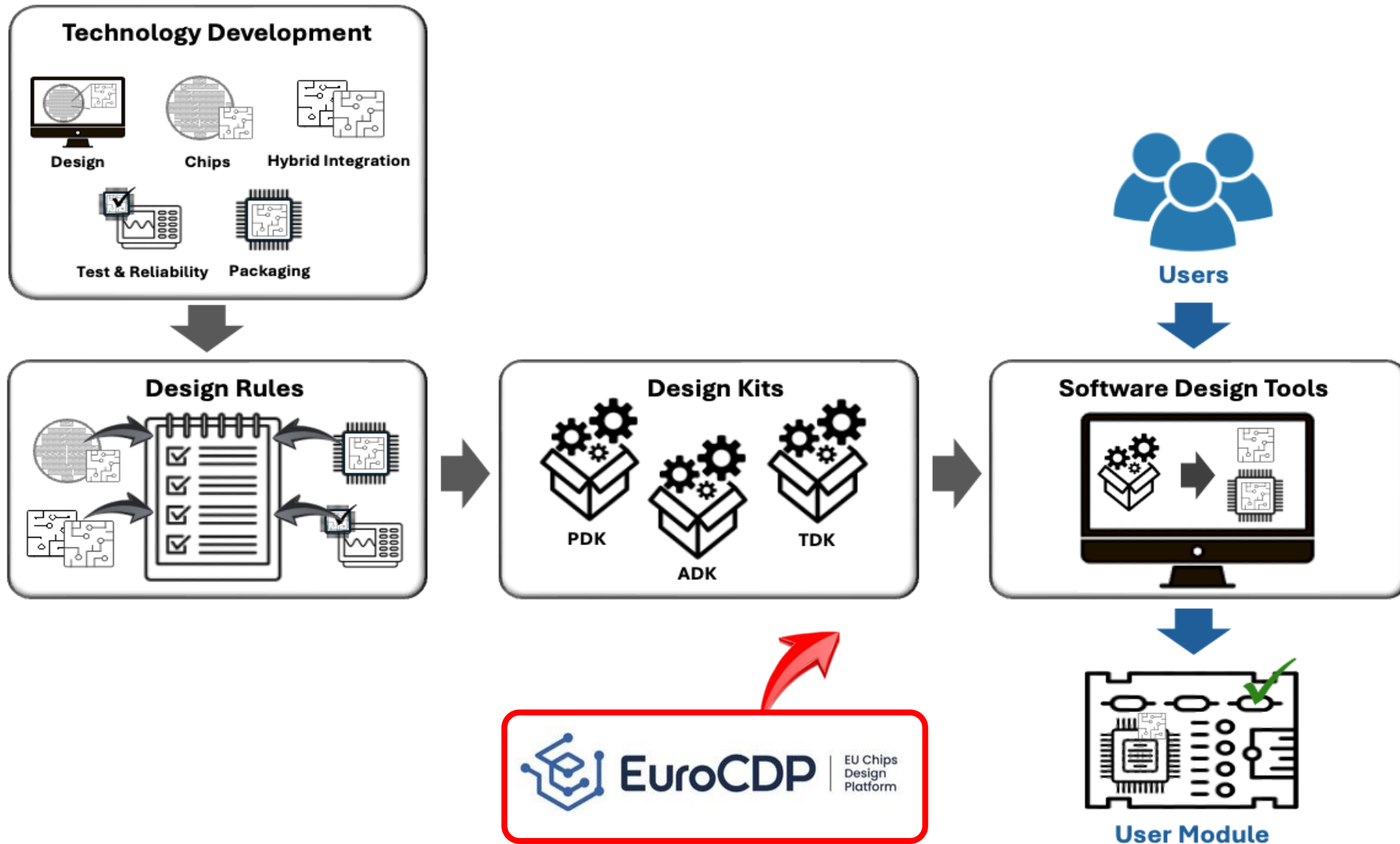
## Distributed Pilot Line



# Interoperability (user access)



# Interoperability (European Design Platform)



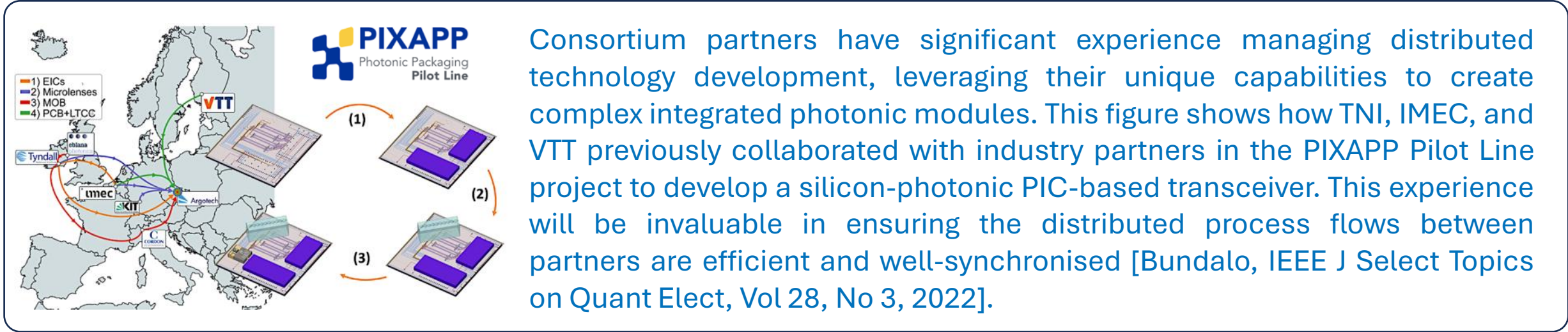
# Next Steps (Interoperability)



- 1. Review project demonstrator details** (follow-up with relevant partners)
- 2. Prepare process flow & partner roles** (draft)
- 3. Prepare Gantt chart and timelines** (draft)
- 4. Identify inconsistencies in process flow/interoperability**
- 5. Close collaboration with PIXEurope Gateway**

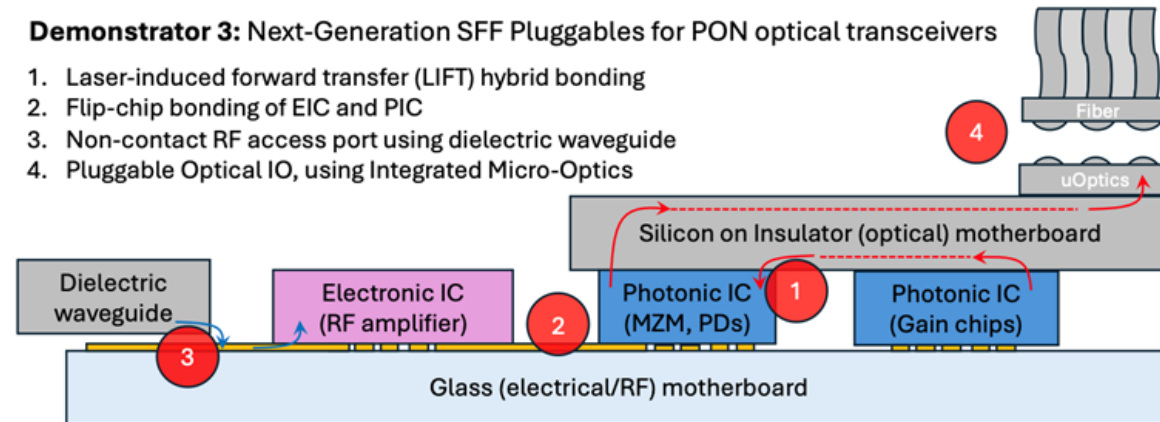


# Interoperability (PIXEurope project demonstrators)

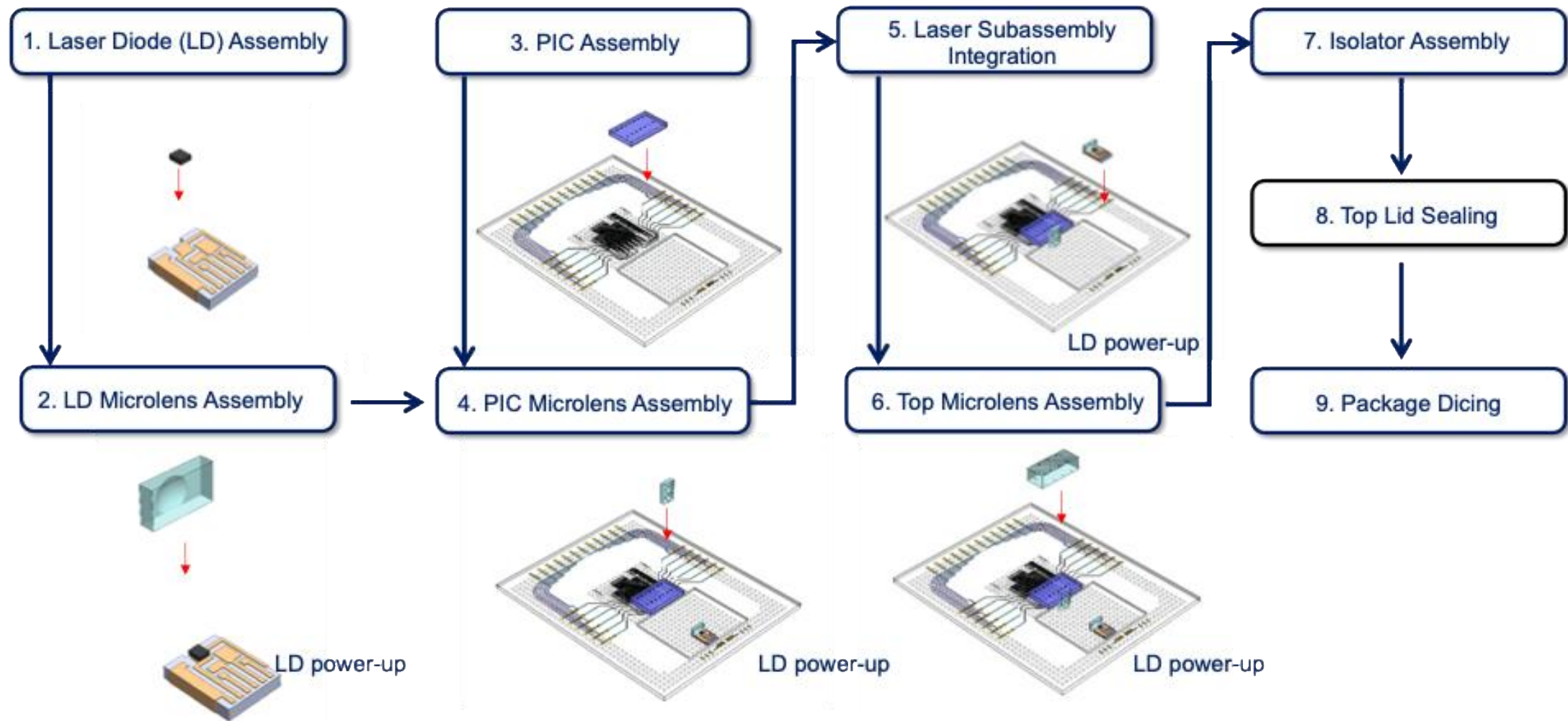


## Demonstrator 3: Next-Generation SFF Pluggables for PON optical transceivers

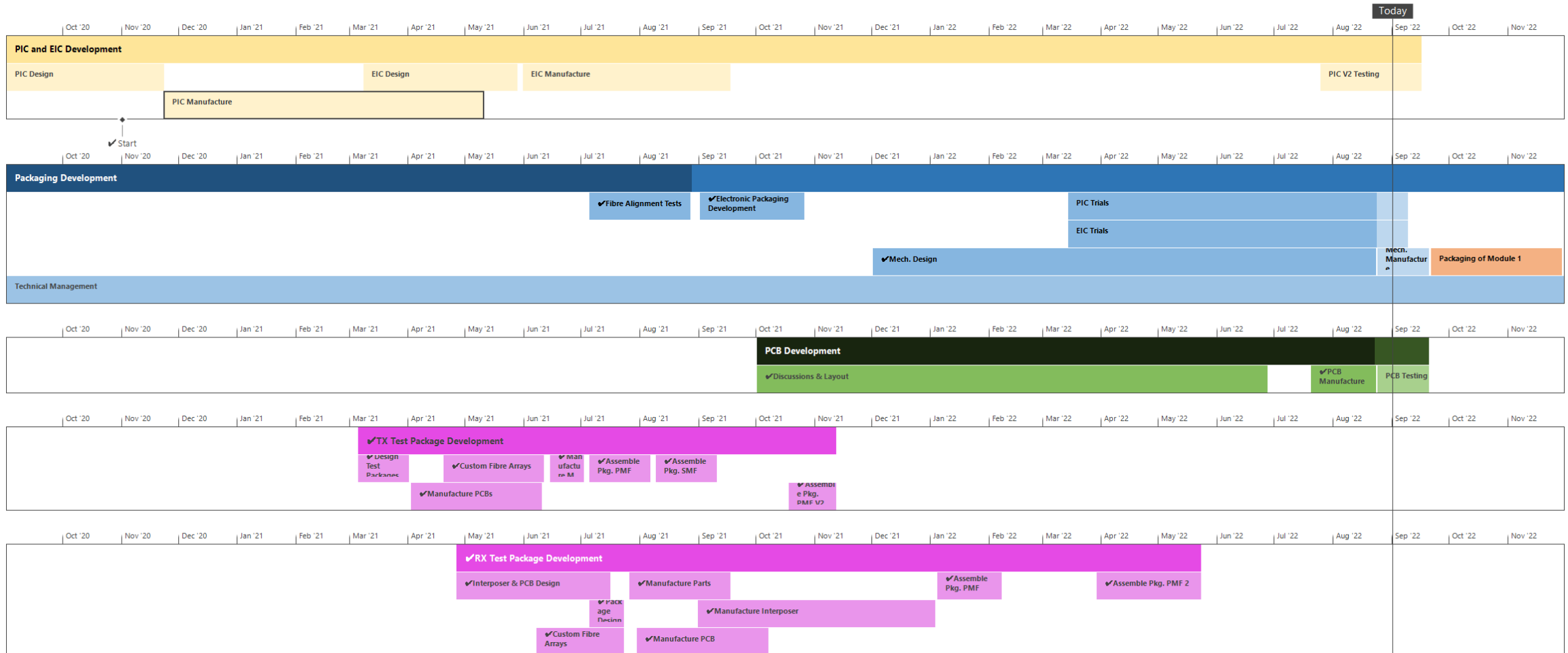
1. Laser-induced forward transfer (LIFT) hybrid bonding
2. Flip-chip bonding of EIC and PIC
3. Non-contact RF access port using dielectric waveguide
4. Pluggable Optical IO, using Integrated Micro-Optics



# Interoperability (demonstrator process flow)



# Interoperability (demonstrator Gantt chart & timeline)



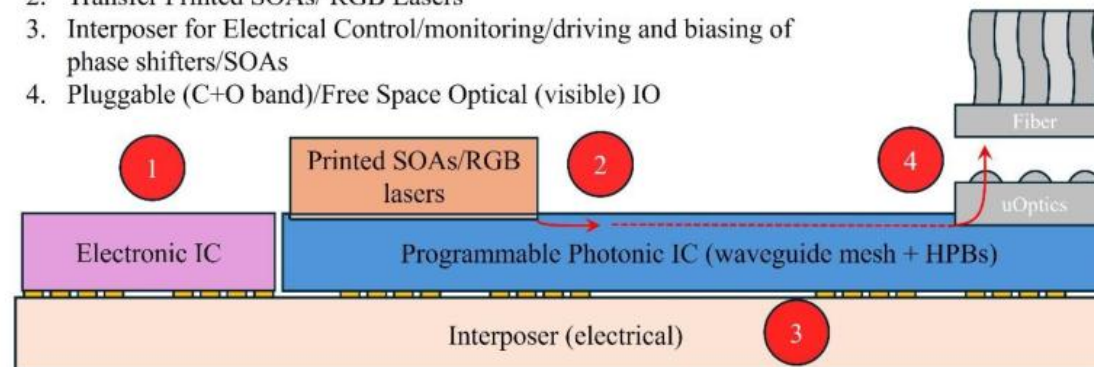
# Interoperability (demonstrator details)



Demo	Name	Coordinator	Design	Monolithic chips	Hybrid Integration	Packaging	Test
1	Optical Space Switch	ICFO	ICFO	UTWENTE	SAL	TNI	ICFO
2	Ultra High-Speed Coherent Transmitter	IMEC	IMEC	IMEC	IMEC	-	IMEC
3	Next-Generation SFP for PON Optical Transceivers	UC3M	UC3M	TNO, VTT, IT	TNO, IT	TNI, ICFO	UC3M, TU/e, IT
4	Visible Light Engine for Displays	TNI	ICFO	CSIC, TNI, UGENT	TNI	TNI, ICFO	ICFO
5	MIR Photonic Sensing Blocks	WUT	WUT, POLIMI, FBK, USOTON, SAL	UTWENTE, FBK, USOTON, SAL, WUT	UCAM	-	WUT
6	LiDAR Transmitter for Multi-Modal Sensing	TU/e	TU/e	TU/e	-	TNI, ICFO	TU/e
7	Programmable Photonic Processor	UPV	UPV	CSIC, CEA-LETI	UPV	TNI	UPV
8	Co-Packaged Optics & Electronics for AI	IMEC	IMEC	IMEC	IMEC, TNI	TNI, ICFO	IMEC

## Demonstrator 7: Photonic Processor

1. Hybrid Bonding of EIC
2. Transfer Printed SOAs/ RGB Lasers
3. Interposer for Electrical Control/monitoring/driving and biasing of phase shifters/SOAs
4. Pluggable (C+O band)/Free Space Optical (visible) IO

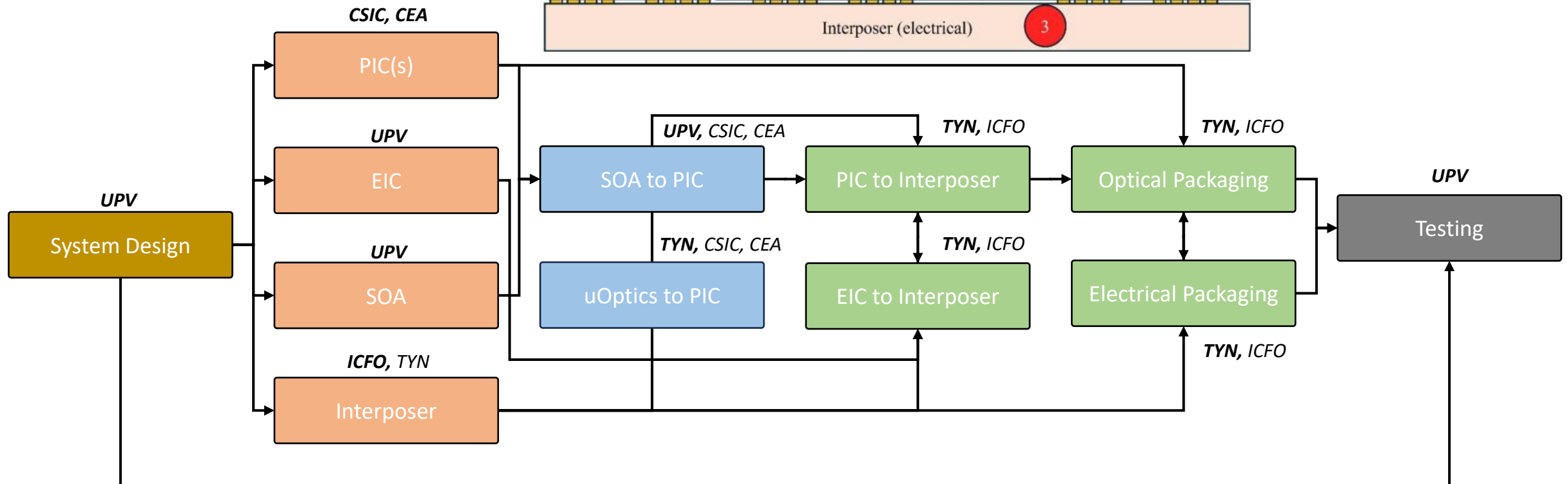
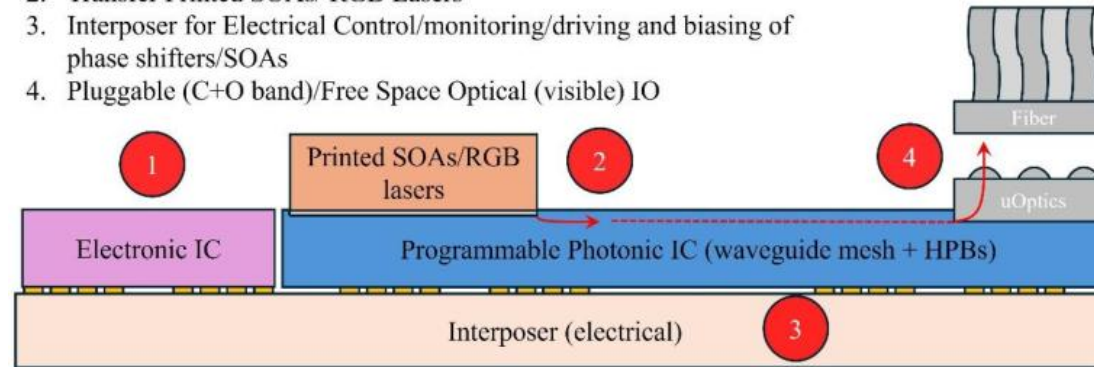


# Interoperability (demonstrator details)



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## Training



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## Interoperability



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