Photonics Partnership Annual Meeting 2025

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Brussels, 16 May 2025

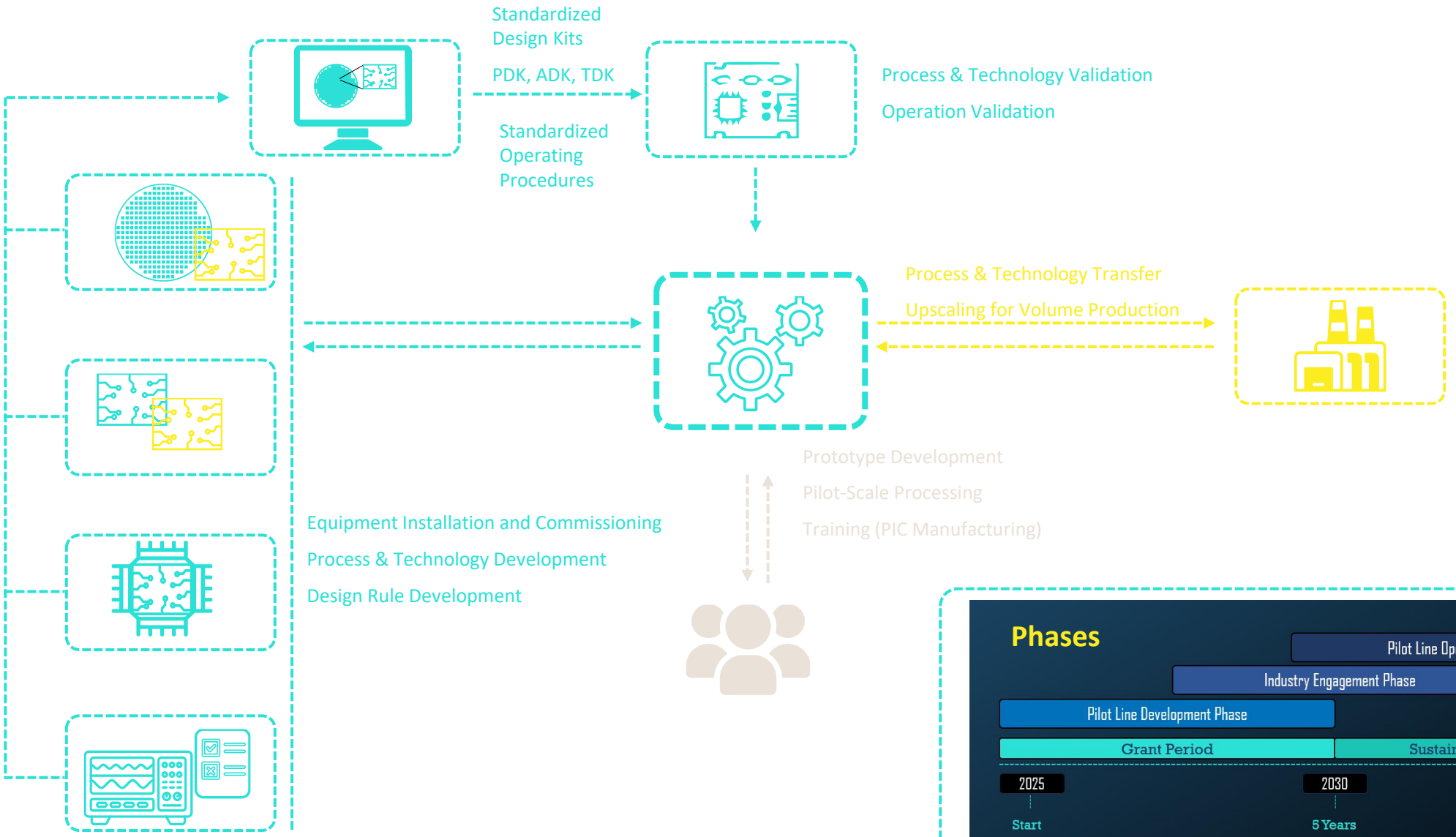
EUROPEAN PARTNERSHIP

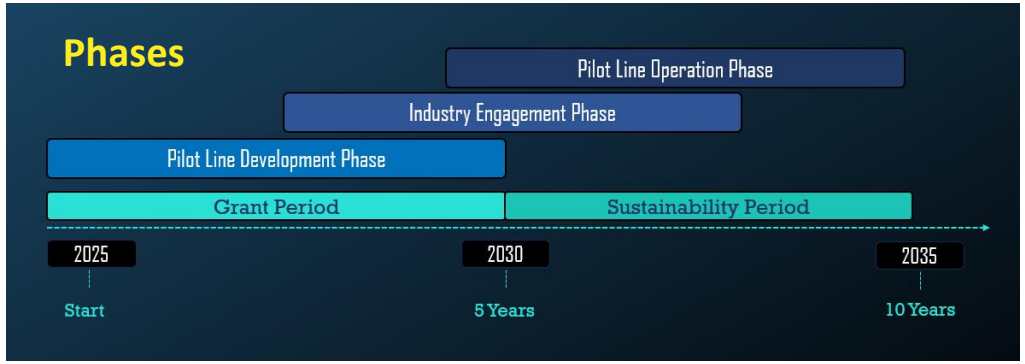
Intro

- Presentation one year ago
  - Chips JU had just launched the first pilot lines, including some activities interesting for photonics
  - Present of some projects in photonics
- What happened in this year of interest to the photonics community?
  - Fifth pilot line on photonics PIXEurope
  - Competence centers
  - photonixFAB
  - more projects selected, also in cooperation with Korea

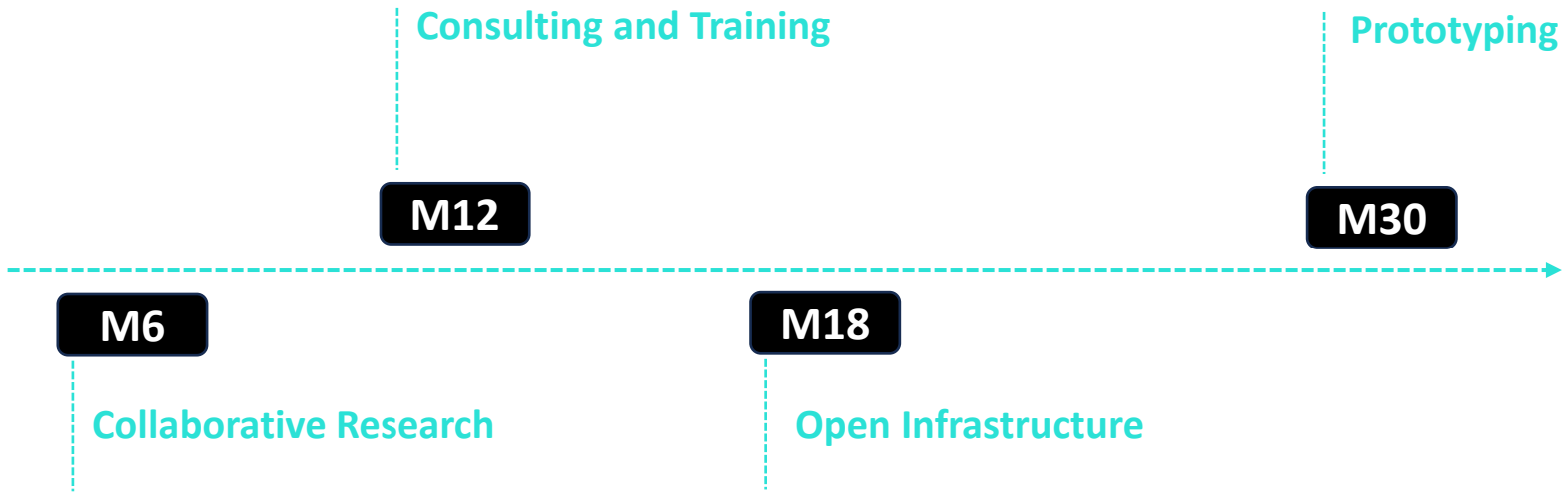
PIXEurope

PIXEurope Development, Operations & Phases





PIXEurope Open Access



Si, SiN, InP, SiC, SiGe, AlO

InP, TFLN, AlN, Quantum Dots, Glass, Graphene, 2-D, Phase Change Materials

- DESIGNERS
- SUPPLIERS
- MANUFACTURERS
- VERTICAL INTEGRATORS

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Competence Centers

AUSTRIA	AT-C3	Specialisation: advanced materials, thin film technologies and quantum and photonics The AT-C³ plans to build a community of practice for sustainable exchange, roughly 60 expertise projects, more than 70 support measures and an open access to relevant education and training programs primarely for SMEs and start-ups in the focus areas. It is expected that by providing access to pilot lines, design platform and expertise, as well as training and education programs, the gap in qualified professionals will be closed and the development of new technologies and products will be accelerated
FINLAND	FICCC	Specialisation: high perf energy efficient and complex SOC design, Specialized manuf & integration process, including Quantum-MEMS-RF-Opto, & WBG-ALD-MBE technologies
FLANDERS	FC3	Specialisation: analog, mixed-signal and digital chip design and development, photonic components, chips and technology, and electronic and photonic system integration The Flanders Chips Competence Centre (FC3) will deploy five major activities: (1) providing skill development, (2) offering chip development and system integration services, (3) creating pathfinding demonstrators, (4) acting as a central contact point, functioning as a proactive front office towards all the stakeholders and potential clients of the center, and (5) outreach and dissemination. The focus area of the FC3 is the broad domain of analog, mixed-signal and digital chip design and development, photonic components, chips and technology, and electronic and photonic system integration.
FRANCE	ASTEERICS	The ASTEERICS is being led by the Minalogic cluster in association with 5 other microelectronics-related clusters and the Jessica France association. Academic training will be provided by the CNFM. CIME-P provides Multi-Project Wafer (MPW) services in ICs, Si-Photonics, 3D-ICs, MEMS and NVM for prototyping for R&D projects.
GREECE	HCCC	Specialisation: Analog-Mix-Signal/RF, PIC (Photonics), Sensors, AI, LPµP (Low power microprocessor)
IRELAND	I-C3	Specialisation: Deep-tech semiconductor materials and processes and dense implementation of multiple functions in super-heterogeneous integration Skills: integrated training courses, participation in venture ready programmes (incl. from PhotonHUB, Photonics21), leveraged training services from the consortium's network (incl. EUROPRACTICE)
LATVIA	LMCC	Specialisation: microchip technologies, photonics, microelectronics, quantum science (quantum computing, AI, Cybersecurity); activities covering measurements and characterization, analog, digital and mixed signal IC design, verification, simulation, process technology and material growth;
LITHUANIA	CHIPSC2-LT	Specialisation: chips design, hetereogenous integration, power electronics, and photonic integrated circuits for e-mobility, security and communication sectors

NETHERLANDS	ChipNL CC	Specialisation: primarly Semiconductor Manufacturing Equipment, Chip Design, and Heterogenous Integration; secondarily, photonics and quantum. The ChipNL Competence Centre (ChipNL CC) has the objective to be a (inter)nationally recognised entry point for companies, particularly SMEs, startups and scale-ups, seeking expertise and support in the semiconductor industry whilst strengthening expertise and capacities in Semiconductor Manufacturing Equipment, Chip Design, Photonics, Quantum technologies and Heterogeneous Integration through the provision of services which facilitate access to knowledge and foster innovation.
NORWAY	CC-NORCHIP	Specialisation: Inclusion of pilot line on piezoMEMS (was elaborated in the LabsforMEMS project) CC-NorChip consortium builds on NorFab – the Norwegian Infrastructure for Micro- and Nanofabrication, however, expanded with integrated circuit design expertise from the university partners, NTNU and UiO as well as additional competence in photonics. CC-NorChip is thus in a perfect position to expand on this activity and build networks from both existing and future pilot lines to Norwegian industry.
POLAND	InnoSemi	Specialisation: 12 specialization domains: ASIC, design for low volume, HI, characterization, PIC, WBG, Quantum, MEMS, etc.
PORTUGAL	POEMS	Specialisation: 3 large domains “chips design”, “advanced packaging”, and “emerging semiconductor areas (integrated photonics circuits, flexible and sustainable electronics and sensors)”
SLOVENIA	CC Chip.si	Specialisation: Niche electronic chips (ASICs), Photonic and Quantum chips & components The Center’s area of expertise will be niche electronic chips (ASICs), photonic and quantum chips and components. We will provide access to a wide range of high-tech expertise in chips and semiconductor technologies also within a network of other European Chip Centres.
SPAIN	PIXSpain CC	Specialisation: photonic integration technologies The Photonic Chips Spain Competence Center (PIXSpain CC) aims to become the premier hub for training, capacity-building, and technological support in photonic integration technologies, primarily serving SMEs and startups at both national and European levels. Our center will play a pivotal role within the Chips for Europe Initiative, fostering innovation and competitiveness in the semiconductor ecosystem. Our objectives include facilitating access to the design platform and pilot lines, providing access to specialized training programs, and supporting technology transfer to accelerate the development of photonic integration solutions. By leveraging a robust consortium of leading institutions we will offer a comprehensive range of services, including workshops, technological guidance, and matchmaking opportunities with industry partners. The PIXSpain CC will also actively promote the Chips Fund, enabling SMEs and startups to secure venture capital and scale their innovations. Additionally, the center will integrate into the European Network of Chips Competence Centres, facilitating cross-border collaborations and knowledge sharing. Our strategy includes rigorous monitoring and continuous improvement processes to ensure the highest impact and alignment with European semiconductor goals. Through targeted dissemination and communication efforts, we will raise awareness of photonic integration technologies and showcase the success stories of our stakeholders. By driving the adoption of photonic integration technologies across various verticals, the PIXSpain CC will contribute significantly to the resilience and growth of Europe’s semiconductor industry.

aCCCess

alliance of Chips Competence Centers for enhanced semiconductor services

- The aCCCess project unites a consortium of 7 experienced partners from cluster organisations and consultancies and 10 associated partners, including candidates applying for the Chips Competence Centers call, all working to establish the European Network of Chips Competence Centers (ENCCC).
- The project is designed to guide the CCCs and create maximum synergies during the set-up and it aims to amplify the European semiconductor ecosystem's impact through coordinated and federated actions of the CCCs with the CPLs and the DP.
- To simplify access to CCC services, training and technology offers, aCCCess will create a **common on-line marketplace** showcasing the CCCs service catalogues, with AI aided maintenance and matchmaking opportunities.

Projects selected

Selected projects under Chips JU

Year	Type	Acronym	Title	Cost	Full Photonics	Partners
2021	RIA	BRIGHTER	Breakthrough in micro-bolometer imaging	18,049,600	Y	16
2022	RIA	SUSTRONICS	Sustainable and green electronics for circular economy	29,985,133	N	43
2023	RIA	PhotonMed	Pilot Line for Photonics-Based Medical Devices	32,313,656	Y	35
2023	RIA	Move2THz	Sustainable Indium Phosphide (InP) platform and ecosystem upscaling, enabling future mass market (sub-)THz applications	38,820,454	N	25
2023	RIA	ATHENA	Advanced Technologies for High value imagiNg Applications	39,499,961	Y	20
2023	RIA	VIVA	Vision optics with Integrated VCSELs and Autofocal Lenses	19,963,928	Y	14
2024	RIA	NEHIL (*)	Neuromorphic-Enhanced Heterogeneously-Integrated FMCW LiDAR	1,499,968	Y	4
2024	RIA	ViTFOX (*)	Vision transformers with ferroelectric oxides	1,489,199	Y	3
2024	RIA	HAETAE (*)	Heterogeneously integrated Multi- material Photonic Chiplets for Neuromorphic Photonic Transfer Learning AI Engines	1,499,956	Y	3
2024	RIA	ENERGIZE (*)	Energy-efficient Neuromorphic 2D Devices and Circuits for Edge AI Computing	1,499,791	Y	3
2021	IA	HICONNECTS	Heterogeneous Integration for Connectivity and Sustainability	101,040,226	N	62
2023	IA	UNLOOC	Unlocking data content of Organ-On-Chips	49,831,048	N	45
2024	IA	STARLight	300mm Silicon Technology for Applications Relying on Light with Photonics Devices	101,369,224	Y	27

(*) international cooperation with Korea

Some observations

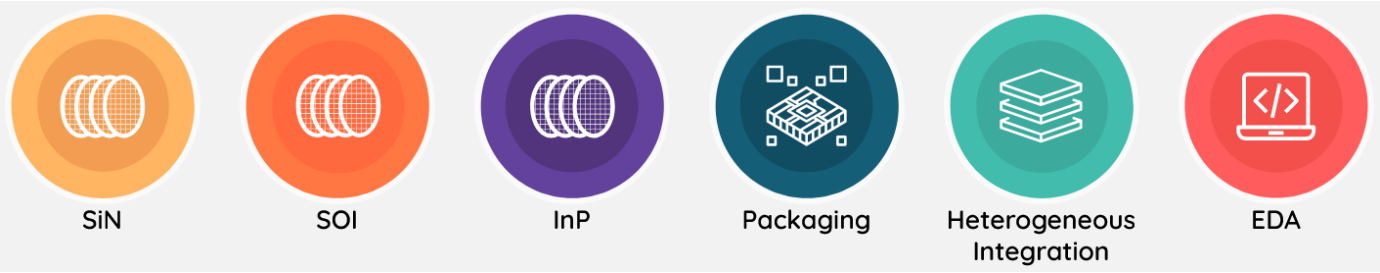
- Under Chips JU, there is a clearer trend to address integrated photonics, i.e. PIC.
- The photonics projects have an increased overall funding level, i.e. the budget dedicated to (integrated) photonics in the JU funded projects has more than tripled over the 4 years as compared to the total ECSEL funding to this topic. Of course this is in part due to the pilot line.

photonixFAB update

photonixFAB

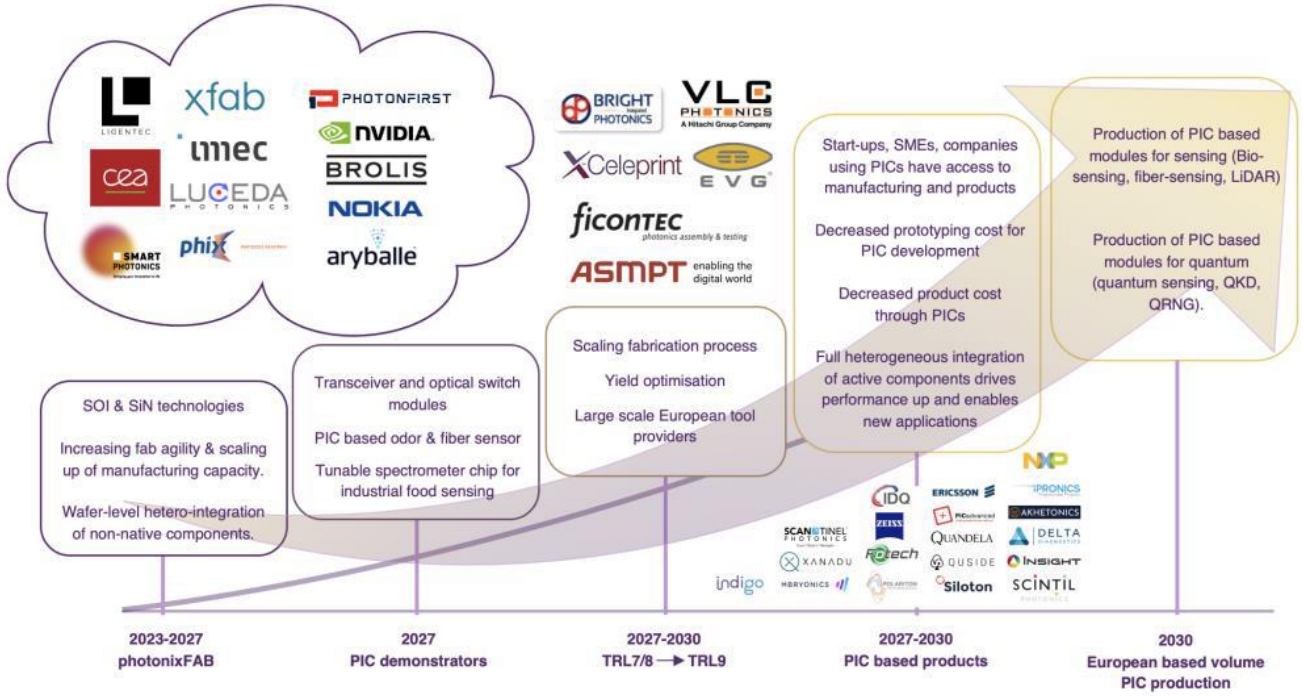
https://www.photonixfab.eu/

- Foundry-driven project ➲ X-FAB
- Building a European industrial supply chain for SOI- and SiN-based silicon photonics, including heterogeneous integration to support emerging markets
- 14 partners, 42Mio € , Ends in 2026
- Main objective
  - establish an industrially based pilot line for a silicon photonics manufacturing platform that covers the full process for silicon photonics circuits including
  - front- and back-end
  - integration and packaging (SiP)
  - wafer-level-test, chip testing, device testing to industrial standards
  - with special attention to the scalability of the back-end packaging and testing
- Specific objectives
  - Develop associated photonic process design kits (PDKs) of industrial grade and make a start to automated photonics ICs design tools
  - Service-offer that will allow SMEs and other interested organizations to prototype and manufacture PICs
  - Community building



Examples of planned demonstrators

- Datacom demonstrator
  - Intensity Modulation Direct Detect (IMDD) transceiver to support datacentre optical interconnects
  - based on low-reflection grating couplers to SMF, >50GHz silicon modulators and >50GHz Germanium photodetectors
- Data centre demonstrator
  - Optical switch with multiple optical input and output ports
  - Switch elements based on thermo-optic phase shifter to minimize insertion loss
- Telecom demonstrator
  - Coherent transceiver targeting, reaching specified Tbps
  - Primarily aiming at C-band



Examples of planned demonstrators

- Environmental-Sensing demonstrator
  - Design, package and test olfaction sensors for measuring different smells
  - Market = health-care, consumer markets and industrial environments for quality control
  - Novel developed PIC-environmental interfaces, using SiN technology in the NIR wavelength
- Industrial-Sensing demonstrator
  - Design, package and test novel industrial interrogator sensors
  - Use in various industrial settings for structural health monitoring
  - Further enable a wide market penetration
- Further results - SOI and SiN Platforms
- Demonstrate that the selected SOI and SiN photonics platforms address the future needs of any and all relevant applications that will drive the supply chain from 2025 to 2030
- Device specifications defined for circuits that will need manufacturing maturity by the end of the project, and for those outside photonixFAB as well
- Heterogeneous integration will be made open-access as soon as it is ready, with some demonstrators starting on the first runs, followed by other demonstrators in subsequent runs as soon as the partners and technology are ready

CONTACT X-FAB FOR YOUR QUESTIONS ON FUTURE PRODUCTS

Future actions

Future calls of interest

- Quantum pilot lines
- Work plan 2026

Other actions

- Encourage to work the pilot line PIXEurope
- Design Platform is being set up
- Competence centers

QUESTIONS?