ICN2
Institut Català de Nanociència i Nanotecnologia

Accelerating Semiconductor Innovation – The InnoFAB Model for Bridging Research and Manufacturing

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WORKSHOP

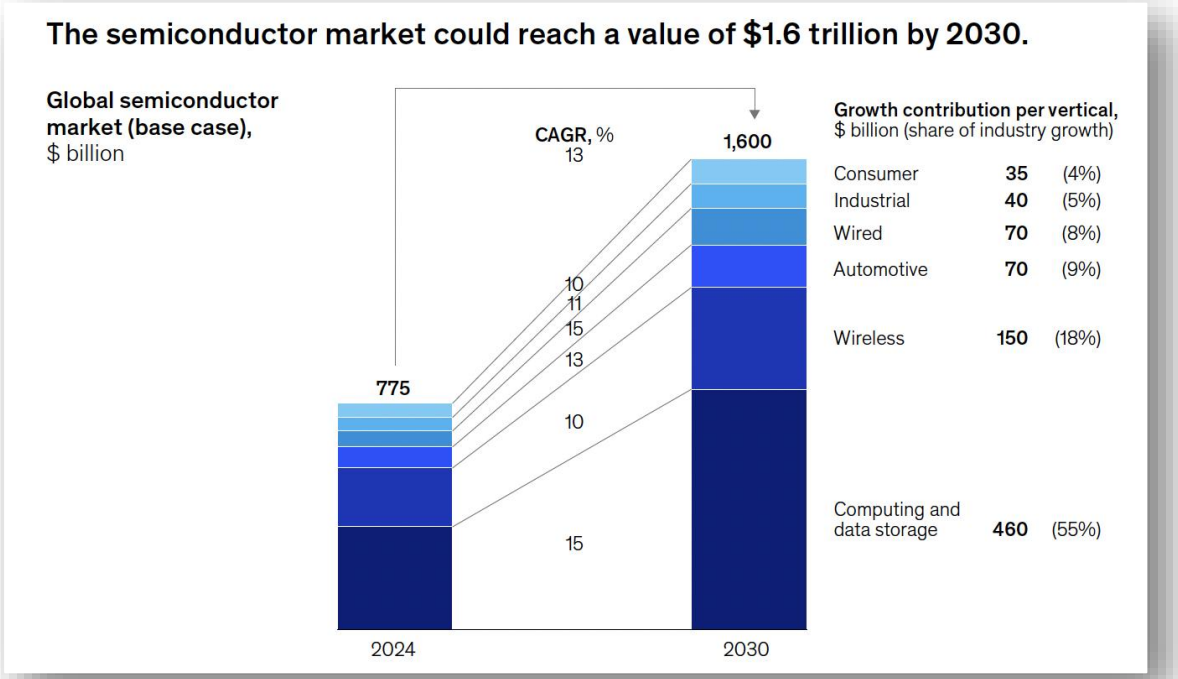
Advanced characterisation and technology services for semiconductor industries and quantum technologies

June 11, 2026
ALBA Synchrotron

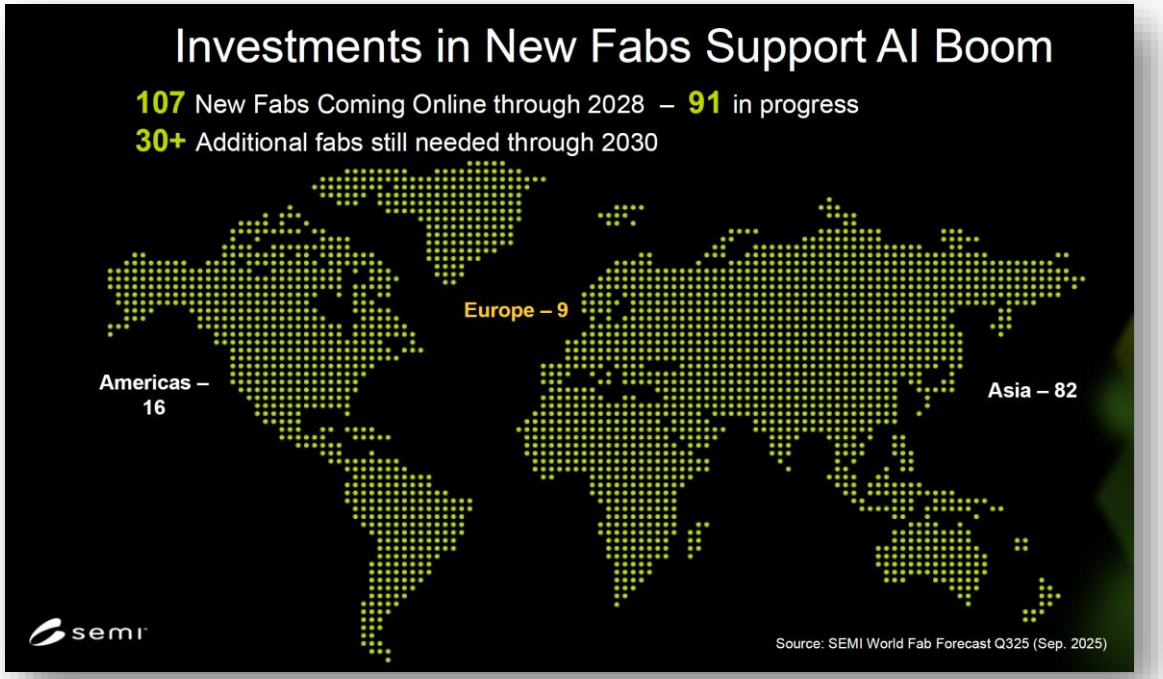
Generalitat de Catalunya

/ The semiconductor global race

Source: *Hiding in plain sight: The underestimated size of the semiconductor industry*, McKinsey (2026)

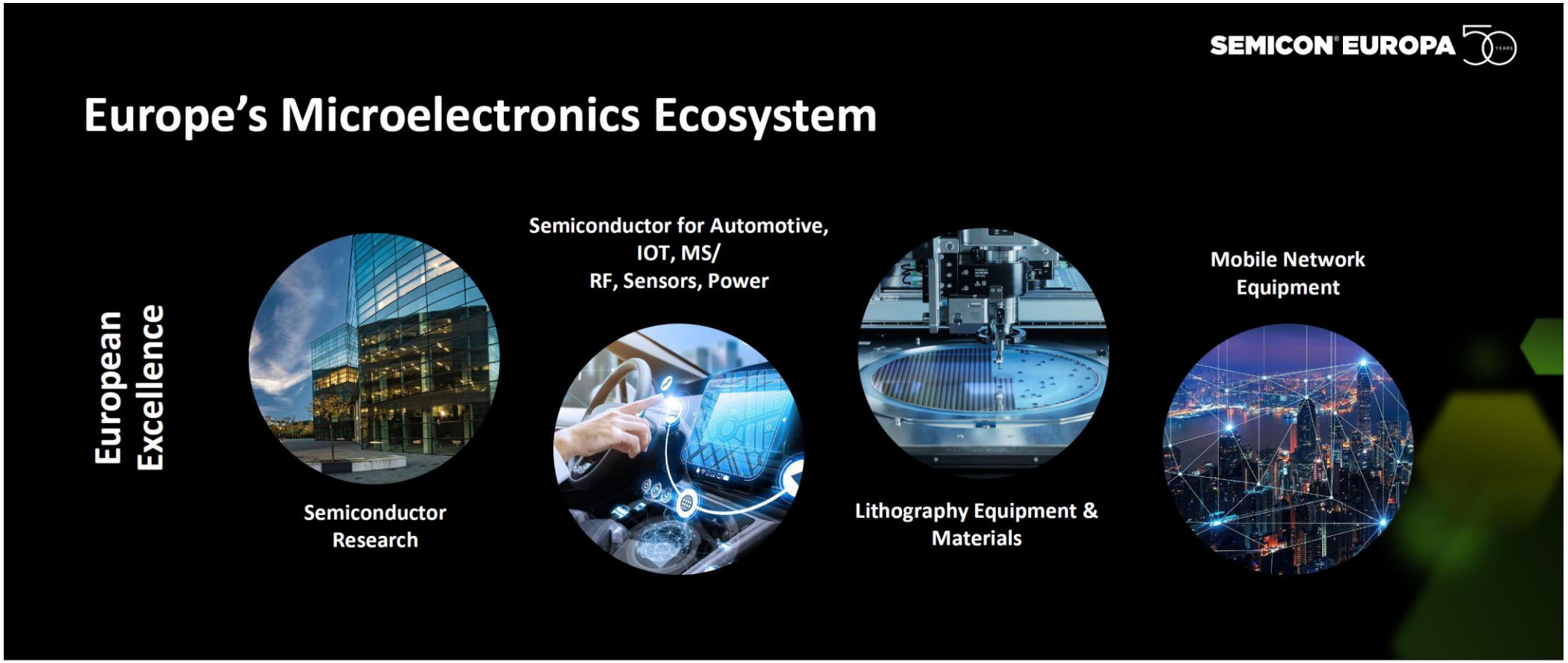


Source: SEMI World Fab Forecast Q3 -25



· Europe needs to find its own pace in the race, balancing short-term urgencies and long-term strategic decisions

/ Europe's reality



Source: SEMI (2025)

RTOS

imec cea leti

Fraunhofer VTT

SUPPLIERS

AEM AFORE Air Liquide RIXTRON ASM ASML BASF BenQ mks Atotech Merck

Besi comet DAS Environmental Experts. EDWARDS EVG evatec OKMETIC OVIVO GW INFICON

RECIF SEMILAB SYNOPSYS Schneider Electric siltronic suitec SPTS SUSS TRUMPF VAT ZEISS

DESIGN & MANUFACTURING

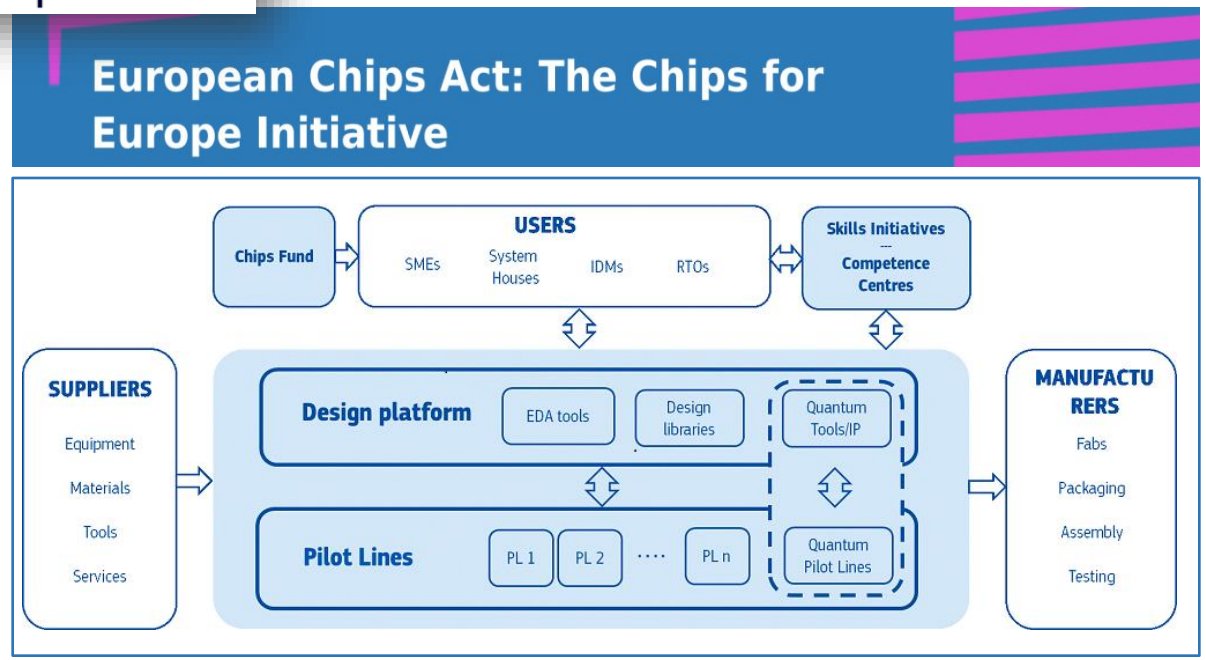
ams OSRAM arm BOSCH cadence GlobalFoundries

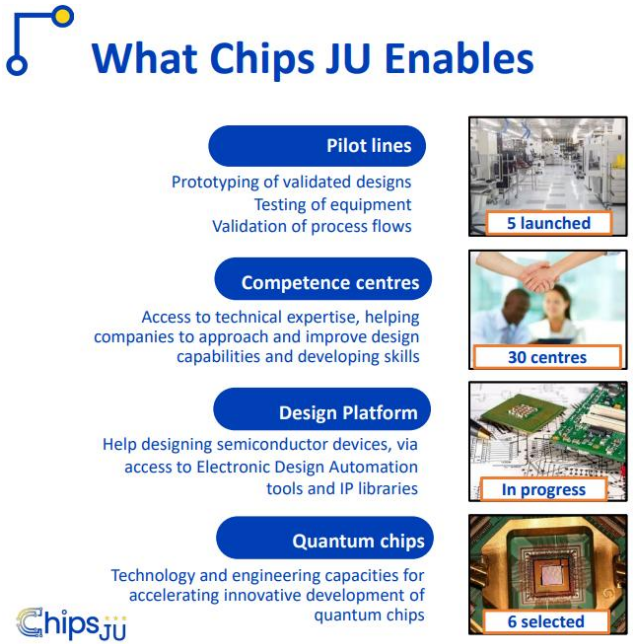
Infineon intel Melexis nexperia NXP

tsmc SIEMENS Mentor Graphics IVI xfab

/ Europe's strategy

Chips Act



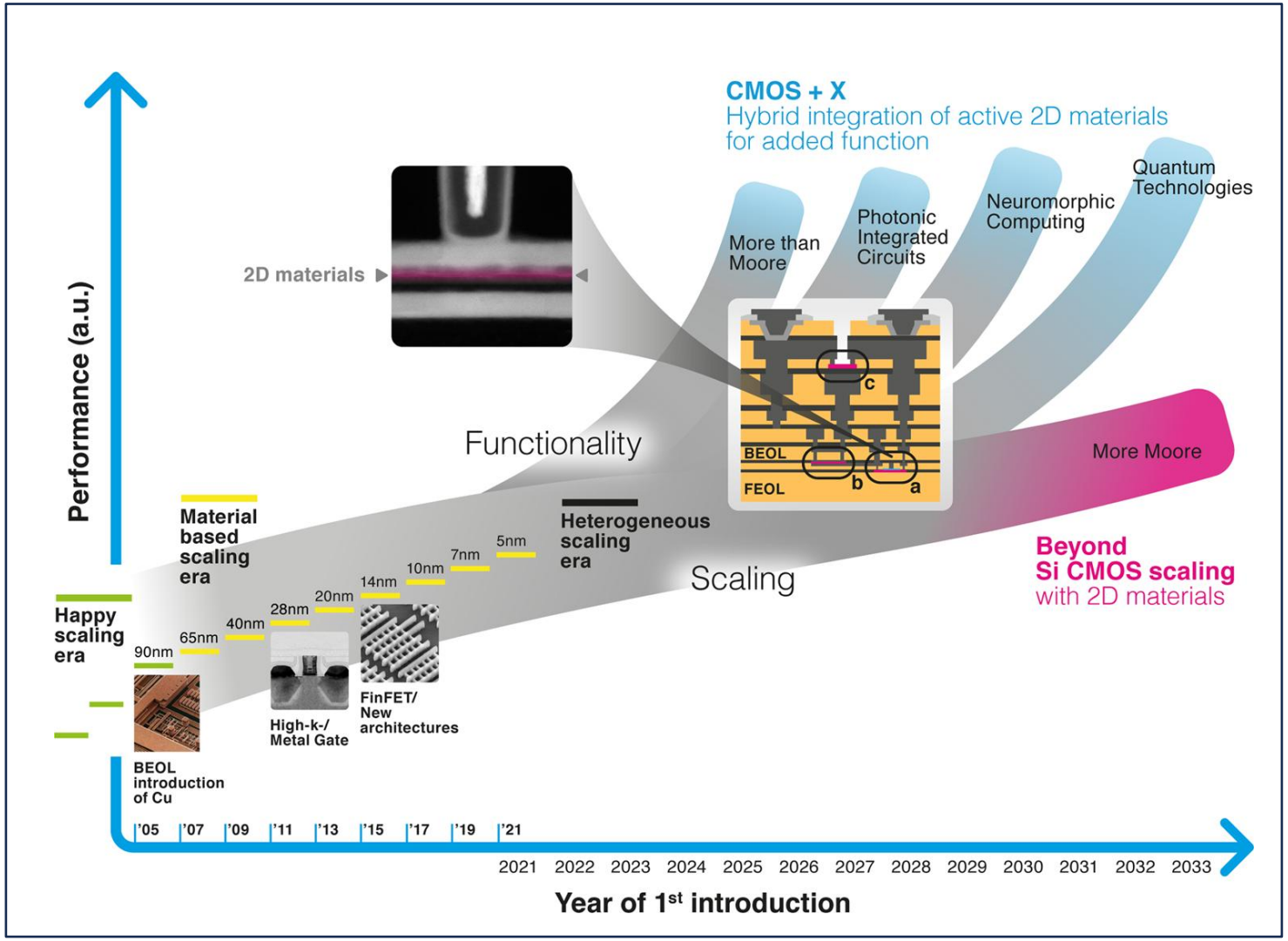


Chips Act 2.0

3. RESULTS OF EX-POST EVALUATIONS, STAKEHOLDER CONSULTATIONS AND IMPACT ASSESSMENTS

"Across the evaluation criteria, **the lab-to-fab gap emerges as a major challenge"**

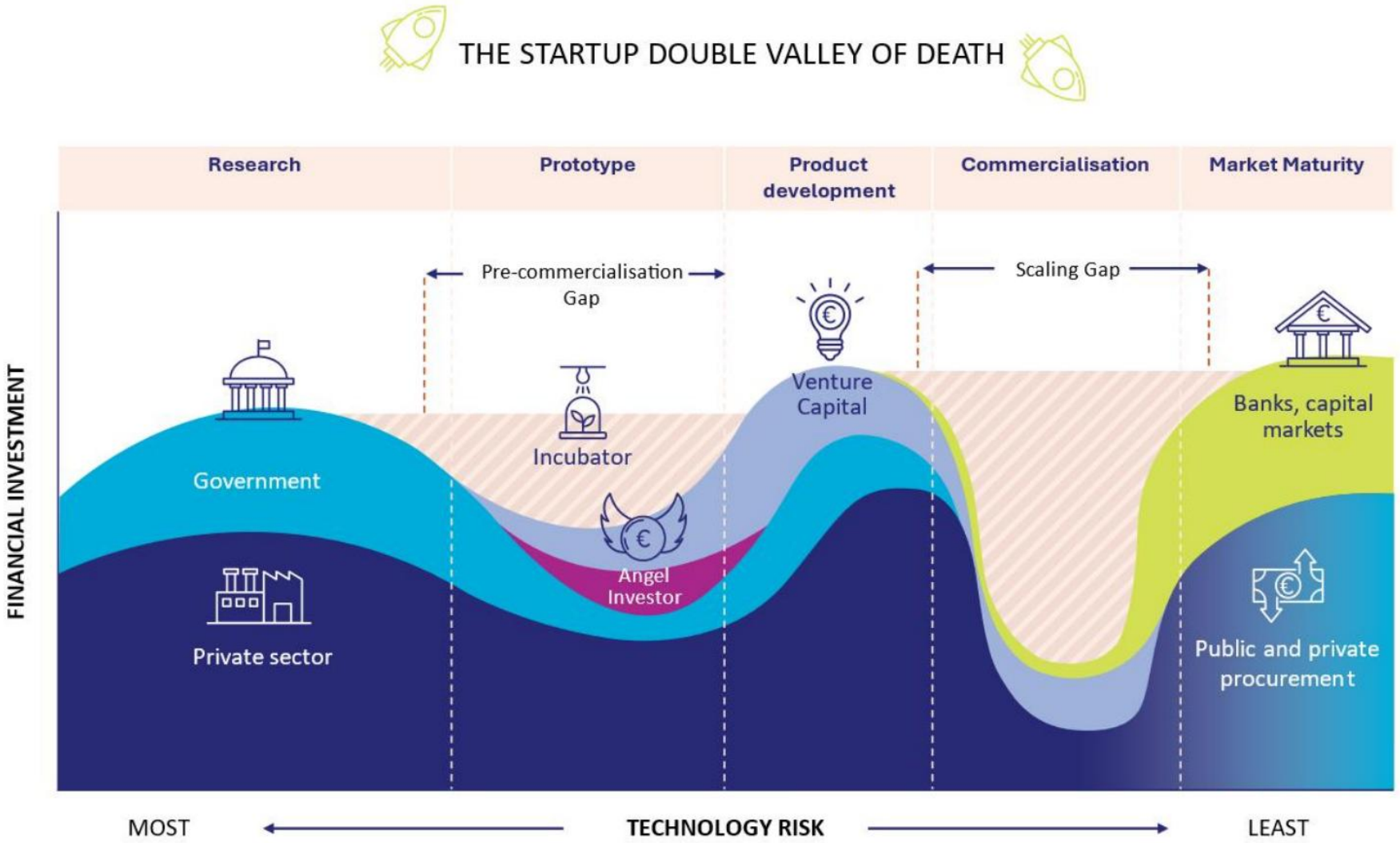
/ Disruptive (semiconductor) innovation “made in Europe”



- Disruptive technologies can unlock unexpected capabilities and create entirely new markets.
- They offer Europe a strategic opportunity beyond the conventional More Moore industrial race.
- Europe’s strength in knowledge creation can become a competitive advantage if translated into scalable technologies.

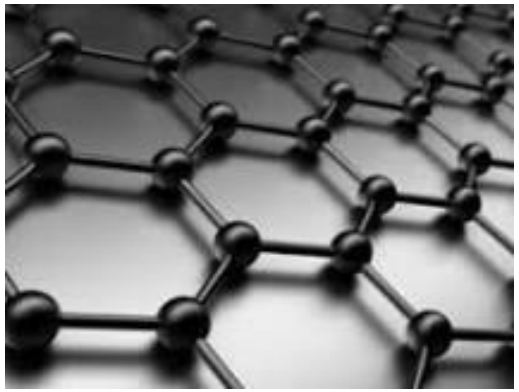
Source: M.C. Lemme et al, *2D materials for future heterogeneous electronics*, Nature Communications 2022

/ Disruptive technologies' double valley of death



Source: *European Commission, The EU Startup and Scaleup Strategy, COM(2025) 270 final*

/ The gap for semiconductor start-ups



Cleanrooms enabling breakthrough innovation in **advanced materials**

Facilities bridging the gap from research to development through **industrialization capabilities**

Incorporating **new business models** supporting start-ups

Cleanroom infrastructure is needed to support prototyping, scaling, and small/medium-series manufacturing, bridging early industrialization before large-foundry access.

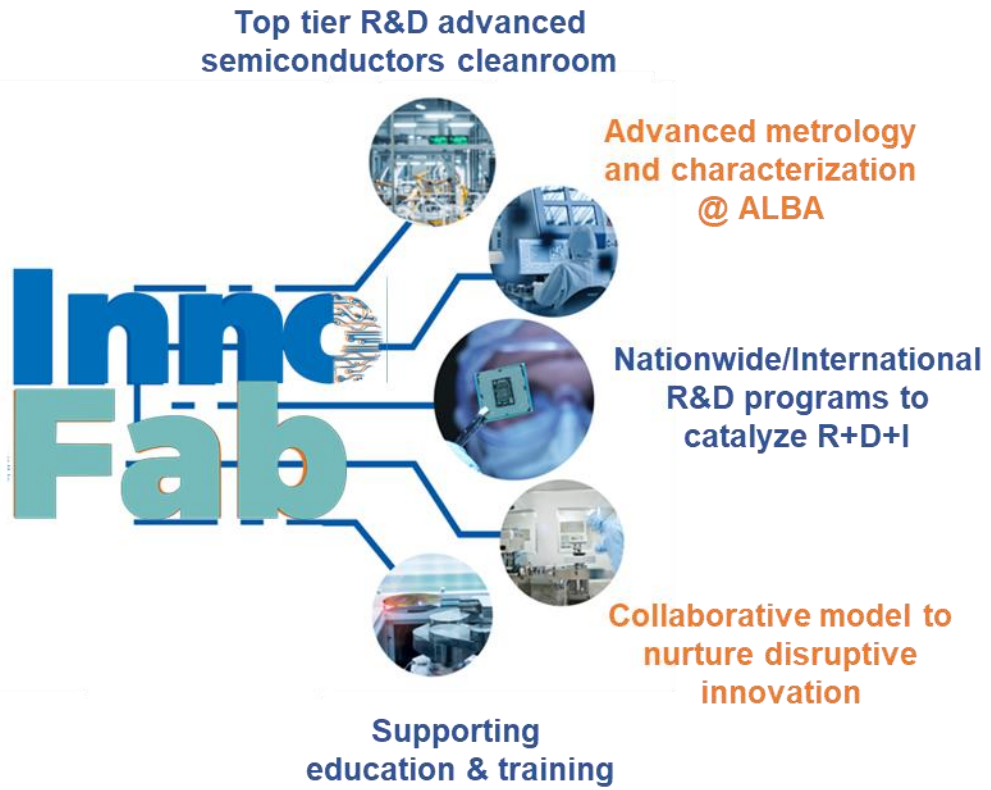
/ InnoFAB's value proposition: *bridging the Lab-to-Fab gap*

A **R&D center (public foundation) for research and disruptive innovation** in next-generation semiconductor technologies

Generalitat de Catalunya

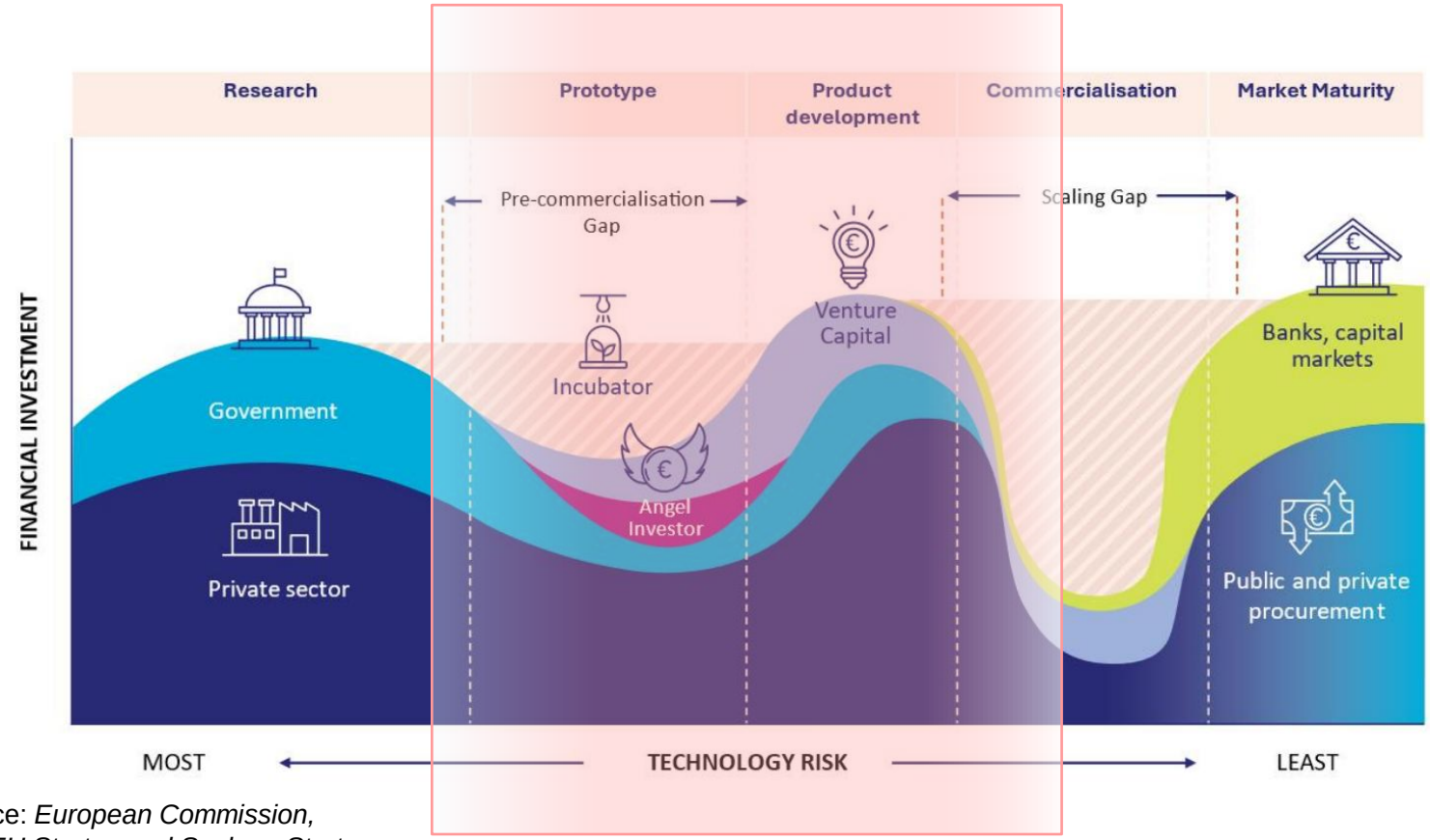
Strategic objectives:

- **Boost R+D+I** semiconductors ecosystem with **state-of-the-art R&D cleanroom** for innovative technologies & **advanced semiconductors** in **industry-relevant environment**
- Facilitate ***Lab-to-Fab*** **transition** and **industrialization** with flexible collaboration models for academia, start-ups, scale-ups, and industry.
- Support **education and training** for all professionals in the business, creating **highly qualified talent at all levels**.



/ InnoFAB will accelerate technology maturation

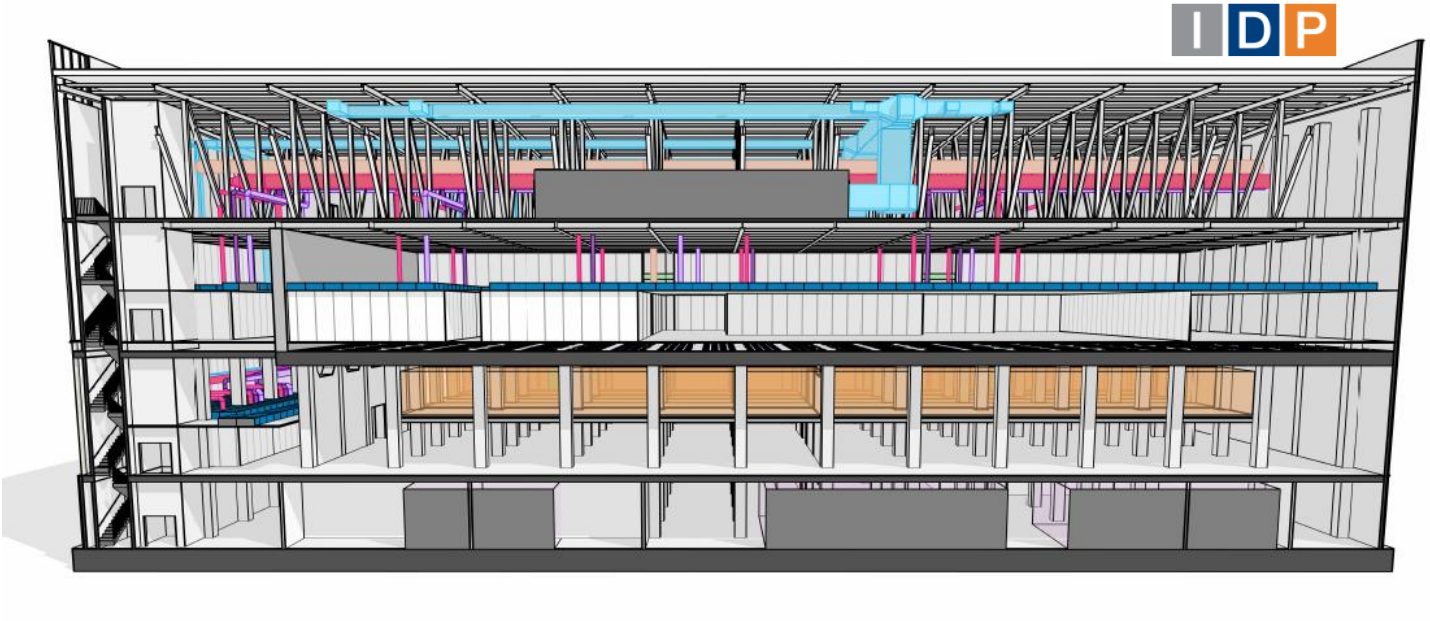
Support provided by InnoFAB



Source: *European Commission, The EU Startup and Scaleup Strategy, COM(2025) 270 final*

- Industrial fab infrastructure enables start-ups to mature technologies from lab demonstrators to scalable, high-yield processes.
- Shared access reduces prohibitive early-stage CAPEX and provides an economically efficient pathway for technology maturation & scale-up.
- Validated prototypes can transition toward high-volume manufacturing in existing or newly created foundries and IDMs.

/ Infrastructure's guiding principles



Concept for **InnoFAb** cleanroom:

4-levels *FAB* building

- **HVM-ready 200mm infrastructure,** with three main areas:
  i) **Low TRL** (R&D equipment), ii) **High TRL** (HVM equipment), and iii) **Incubator** for external partners.

- **300 mm-ready-building**. Cleanroom building and HVM equipment will be "300-mm ready", in a state-of-the-art 4-level fab-building.

- **Synergy with ALBA's advanced characterization facility**. Colocalization of **InnoFAB** and ALBA will facilitate access to metrology, accelerating innovation cycle of next generation semiconductors technology.

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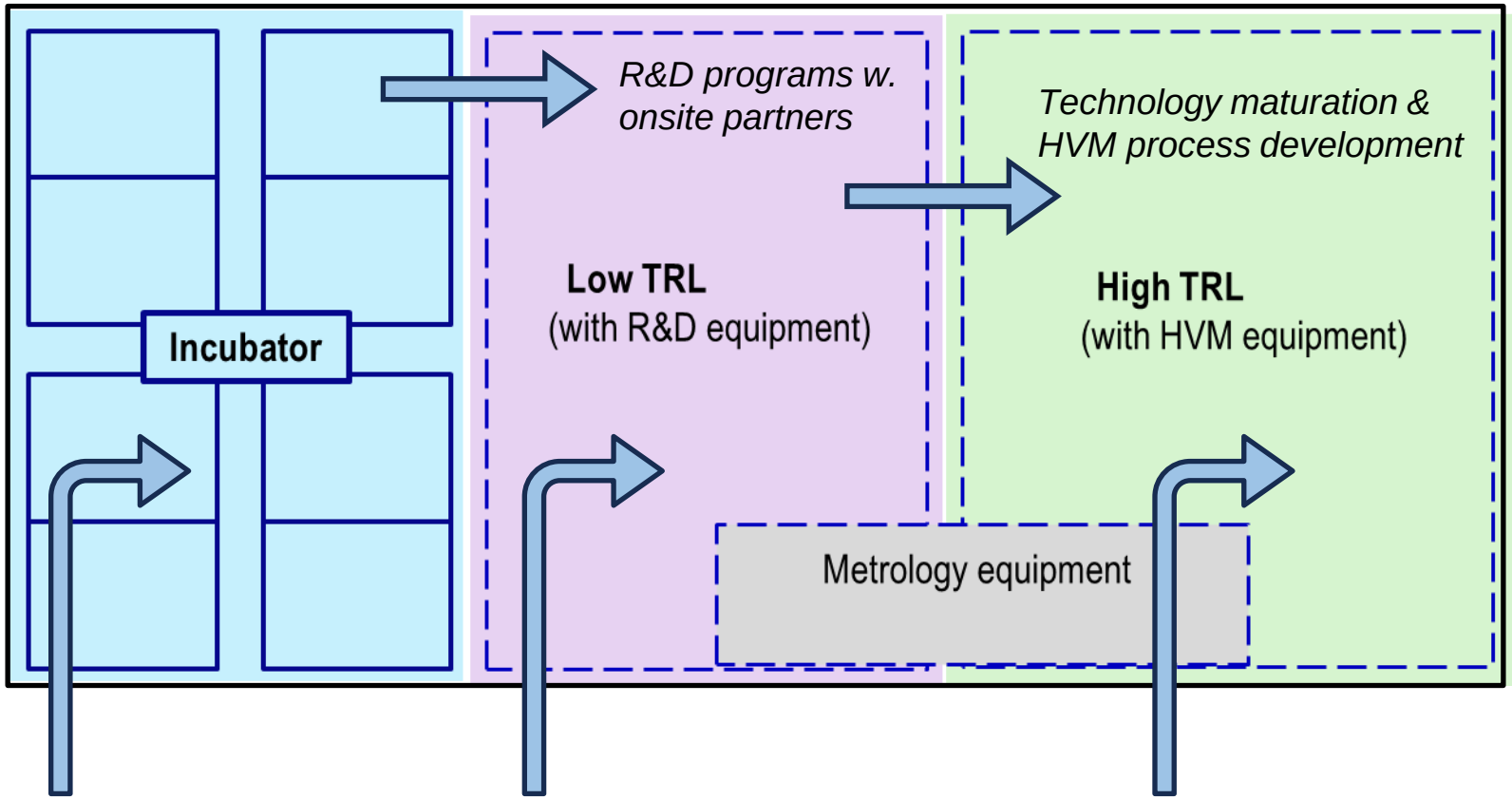
/ Top-tier R&D advanced semiconductor cleanroom > 2500 m² total area

Cleanroom area of 2,500 m² integrated in >16,000 m² *FAB* building

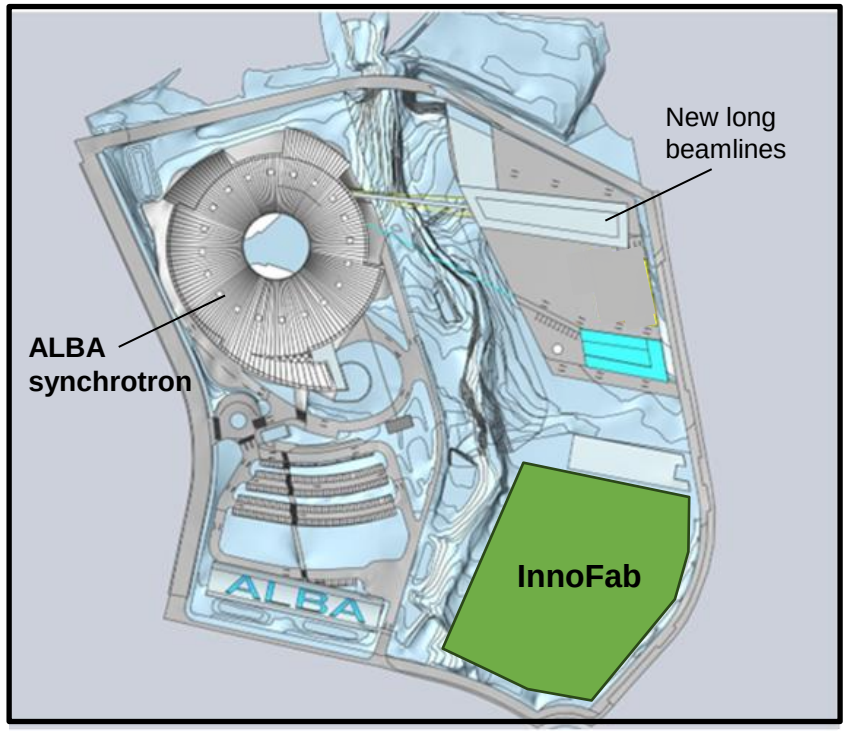


Dedicated access for onsite partners

R&D programs w. external partners

Low volume prototyping

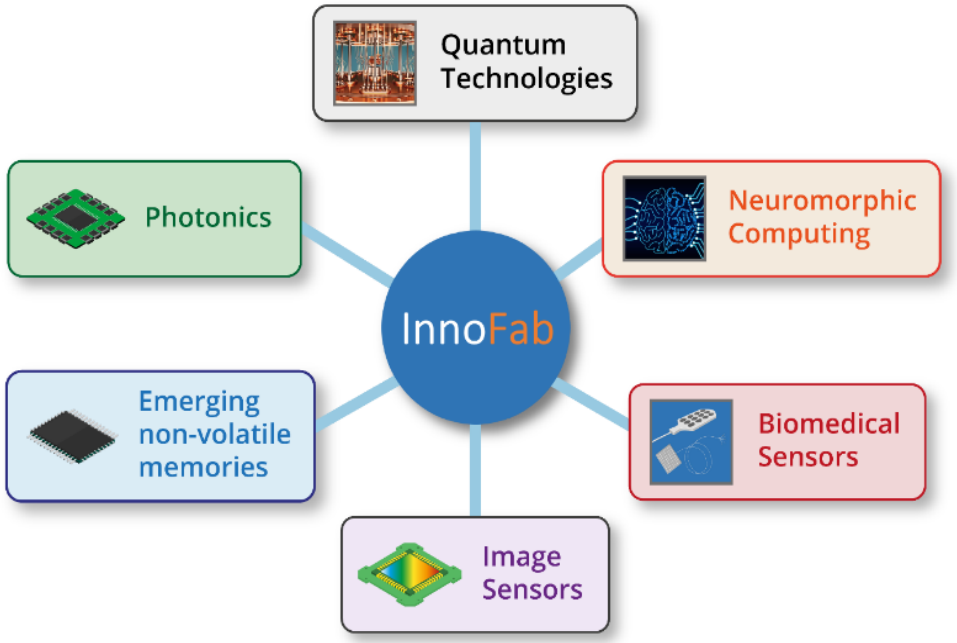
Unique synergies with ALBA synchrotron



Premium access to leading-edge materials & devices metrology/characterization

/ Technology and Applications focus

InnoFAB will support development and innovation in technologies with expected market entry > 5 - 10 years



- **Beyond-CMOS application areas**

  Neuromorphic computing, quantum technology, advanced photonics, emerging non-volatile memories, sensors, etc.

- **Leading-edge / advanced semiconductors and materials**

  2D layered materials (graphene, TMDs), thin film oxides (metal oxides, ferroelectric oxides), thin film superconducting materials

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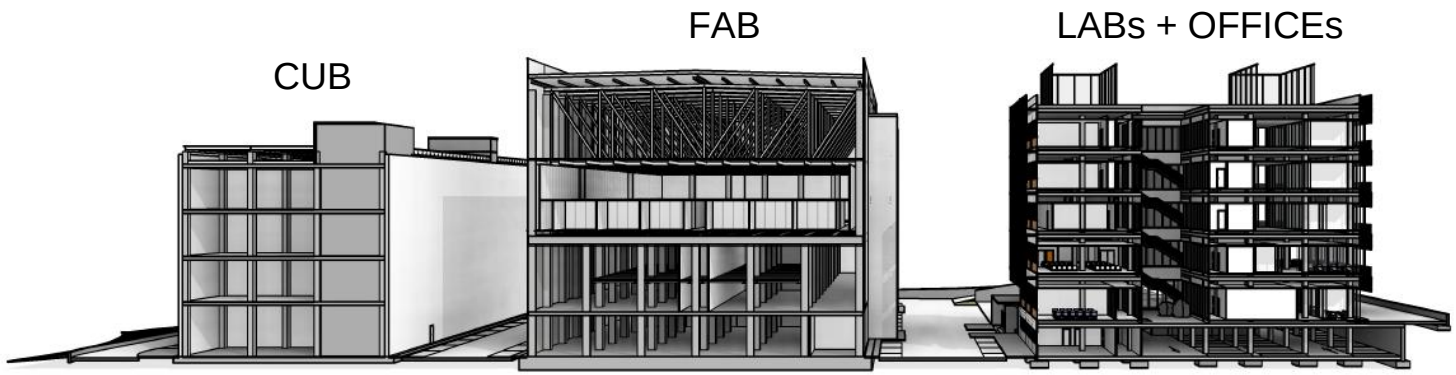
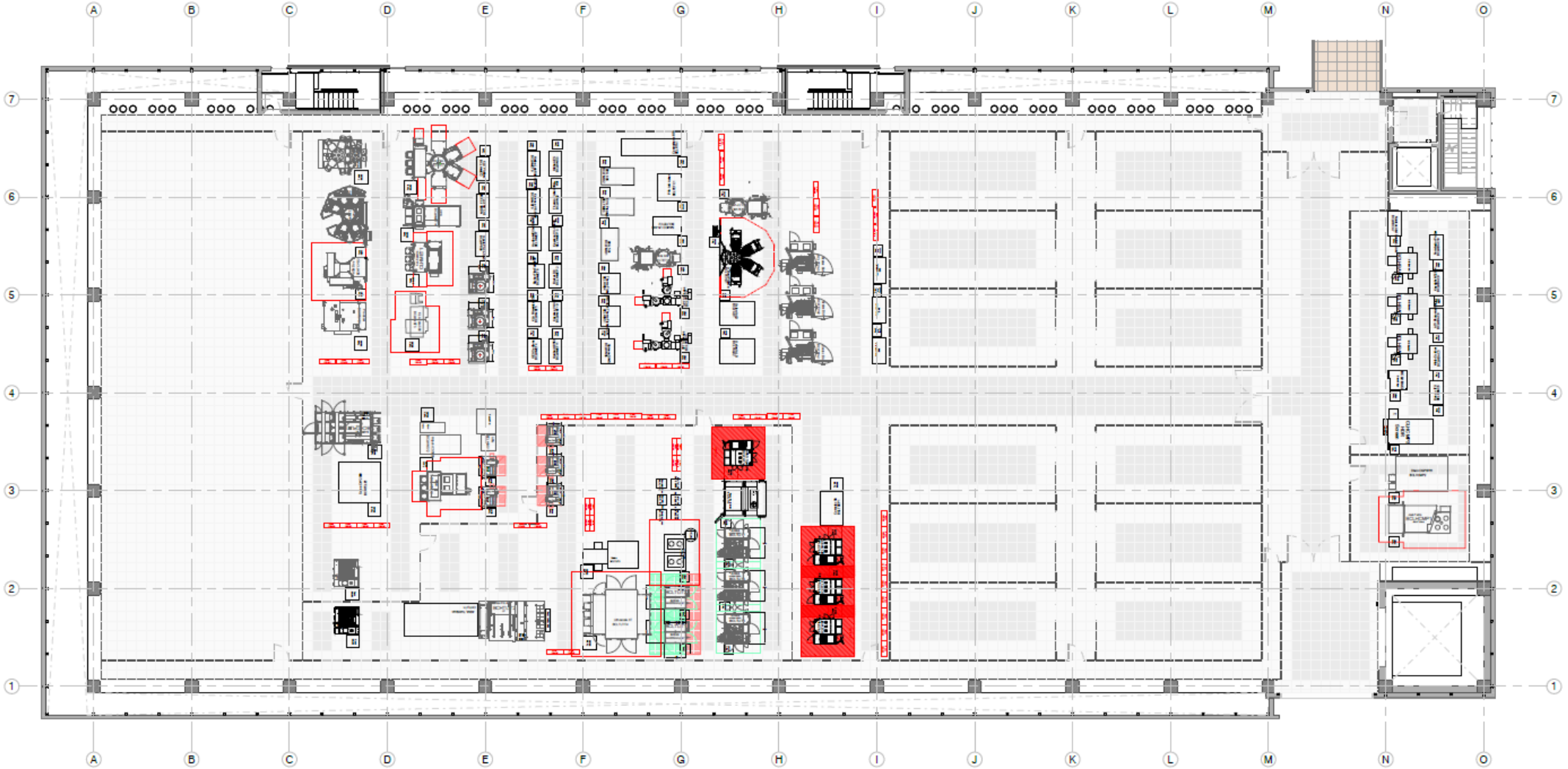
/ Basic engineering project concluded

IDP



/ **Basic engineering project concluded:** cleanroom design (with tools) available



Nivel Sala Blanca / Clean Room Level

1 : 150

/ Economics' summary & timelines

- Total investment is **~400 M€**
  (incl. cleanroom tools)

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Sociedad Española para la Transformación Tecnológica

- ~ **200 FTEs** at full operations

- **Timelines:**
  - **User and partner agreements** from **Q4 2026**
  - **Construction** starts **Q1 2027**
  - **Initial operations** in **2029**

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/ A Network of **National** & International **Chapters**

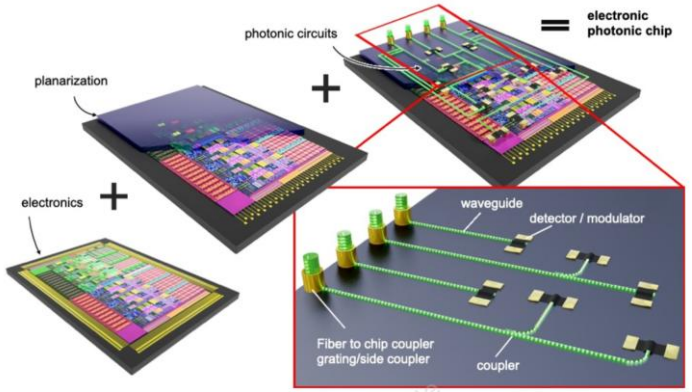
- Chapters are key stakeholders of InnoFab, all **will contribute to the technology and innovation pipeline of InnoFab**.
- Chapters will have synergistic and/or complementary capacities to those of InnoFab, **mostly working in lower TRLs,** requiring the services of InnoFab to advance in their research
- Collaboration will be in the form of preestablished, **long-term collaborative research programs.**

/ InnoFab Ecosystem

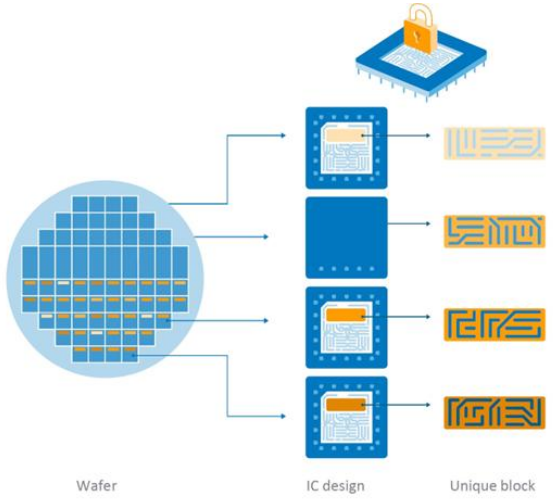
Additional supporters are being engaged

/ InnoFab's technology roadmap: "Beyond-CMOS" & BEOL integration of advanced materials

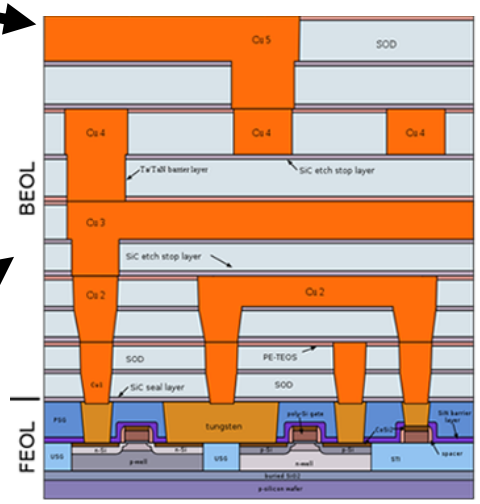
Advanced Photonics (graphene, SiN, etc)



Personalized IC's with unique IP blocks

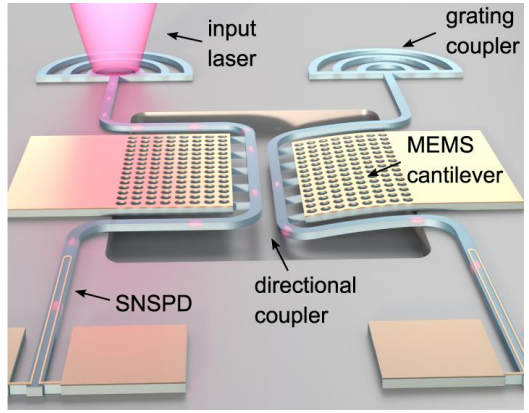


Examples of BEOL integrated devices



Cross-section of CMOS chip

Single Photon Detector for Quantum Computers



Innovative Non-Volatile Memories