Key Results of International Cooperation on Semiconductors for European Economic Resilience

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EFECS 2025

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INTRODUCTION

- ICOS Project started in January 2023 for three years, it is funded by the Horizon Europe research program.

Coordinator

Technical co-Coordinator

- An ambitious project in the framework of the European strategy for semiconductors

PARTNERS & ADVISORY BOARDS

ACADEMICS

RTOS

INDUSTRIAL ADVISORY BOARD

- Paolo Azzoni — Secretary General, Current Coordinator of ECS-SRIA
- Laith Altimime — President
- Elisabeth Steimetz — Director
- Carlos Lee — Director
- Colin Willcock — Chairman of the Board

ASSOCIATIONS & CONSULTING COMPANIES

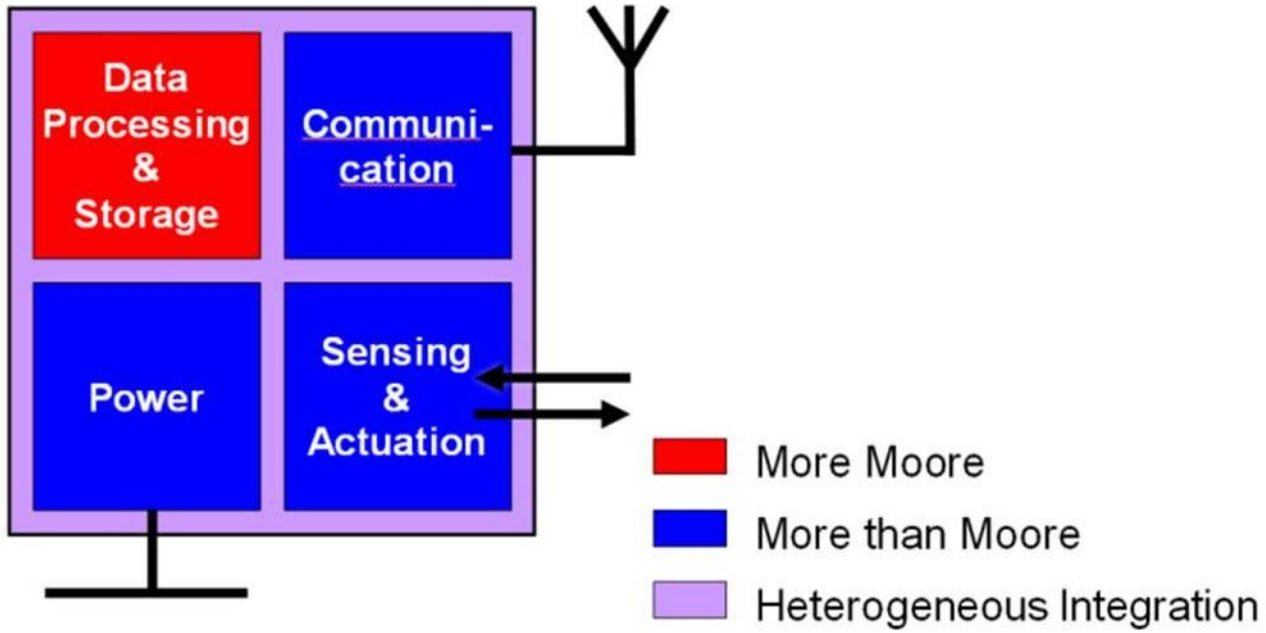
INDUSTRIALS

INTERNATIONAL ADVISORY BOARD

- Ray, Jui-Lin Yang — Head of Semiconductor Research Dep.
- Jose Pozo — Chief technology officer
- Hayashi Yoshihiro — Chairman
- Paolo Gargini — Chairman

Main Scientific Topics

- Advanced computing & Advanced functionalities: sensing, RF & optical communications, optical devices, energy harvesting, power devices, …



Motivation for I**nternational Cooperation in Semiconductor**

- **Semiconductors & Semiconductor-based photonics** are pivotal technologies for almost all existing industrial sectors, as demonstrated by the recent chips shortages

- **International cooperation** is key for:

-**knowledge** exchange

-speeding up technological innovation (e.g. ITRS/IRDS, IPSR-I, ECS-SRIA, NEREID): computing needs, energy efficiency, advanced functionalities, heterogeneous integration

-**reducing cost** by avoiding duplicated research

-**strengthening** complex **supply and value chains** (no region can cover the whole value chain)

-manage **risks** due to the turbulent geopolitical context

-is encouraged by the new **strategies** of leading semiconductor countries (**digital partnerships**…)

-overcoming **skill shortage**

-gaps in **standardisation**

Objectives of I**nternational Cooperation in Semiconductor**

- **To implement and strengthen the DPs & TTC in close cooperation with the EC**
- To build **balanced semiconductor partnerships** with like-minded countries
- To set out cooperative framework on **initiatives of mutual interest**
- To identify and support the establishment of the **most promising scientific international collaborations**
- **To consolidate sovereignty through skills**

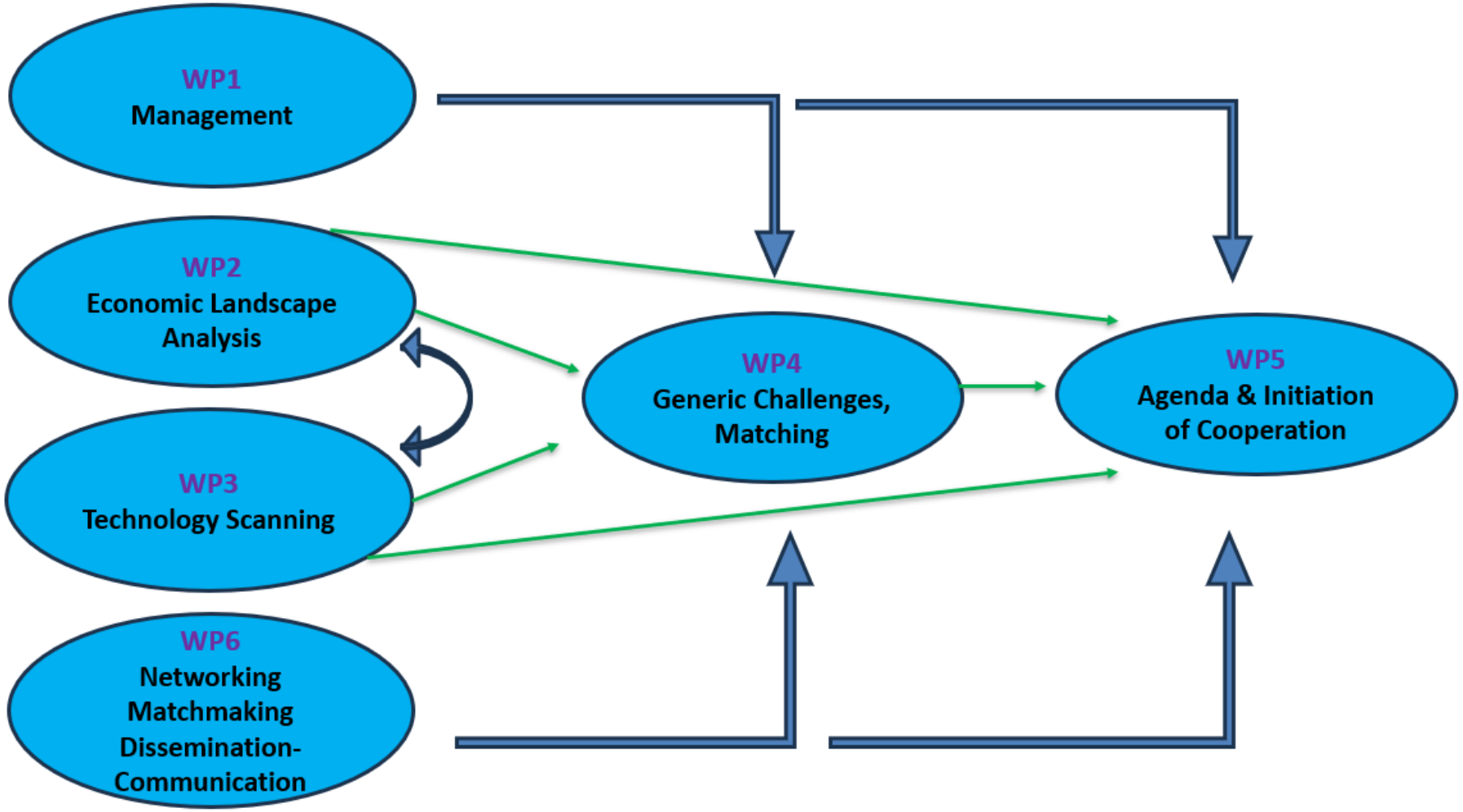
=>*Skill Roadmap* aligned with Research and Industrial Roadmaps, Strengthen *scientific and technological competences in Academia* through international cooperation, Develop *MS and PhD students skills*, Attract *international students*

- To organize **matchmaking bilateral and multilateral events**
- To support the growth of the Semiconductor industry in growing markets through **focused research alliances** based on awareness of advanced research activities
- To strengthen **Europe's position** in global value chains in this area and to contribute to the **EU Chips Act, Green deal and Digital Agenda**

Objectives


Canada
USA
China
Republic of Korea
Japan
India
Taiwan
Singapore
Investigated countries

ICOS Concept



Development of International Cooperation

Impact

Take into account the impact: Market growth, Production share, Disruptive Emerging Technology for new Markets

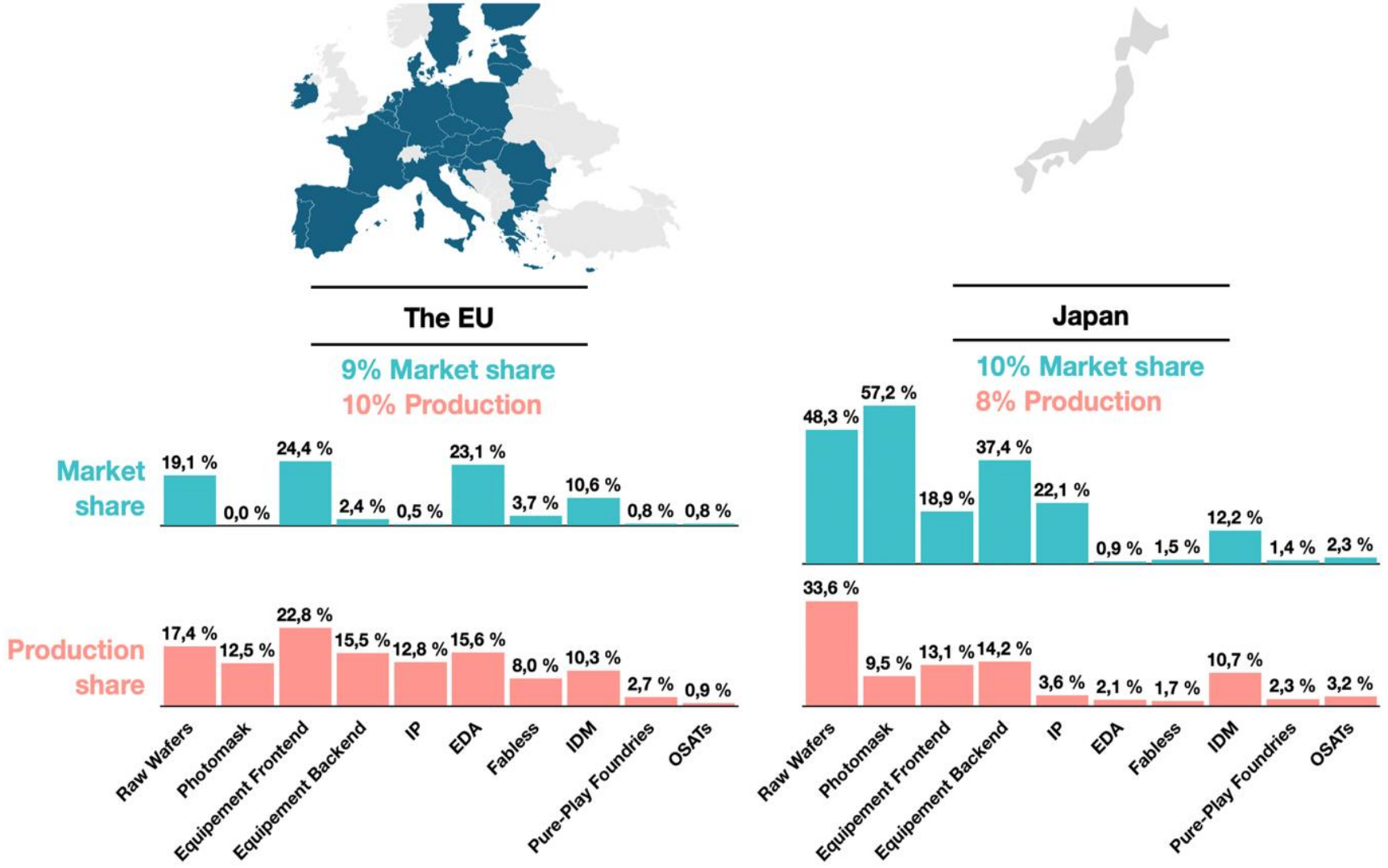
Strengths

Strengthen International Cooperation with countries having Strengths in the value chain (e.g. Materials, Equipments, etc.)
and/or
Strengthen International Cooperation with Countries and Institutions having Strengths in some Technologies useful for important EU Applications

Cooperation

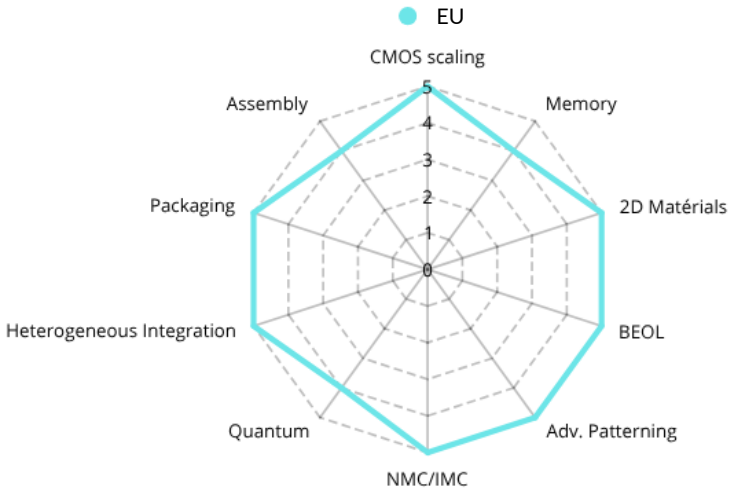
- New topics for DPs and TTCs, and/or
- New International Calls, and/or
- Bilateral Cooperation between Institutions

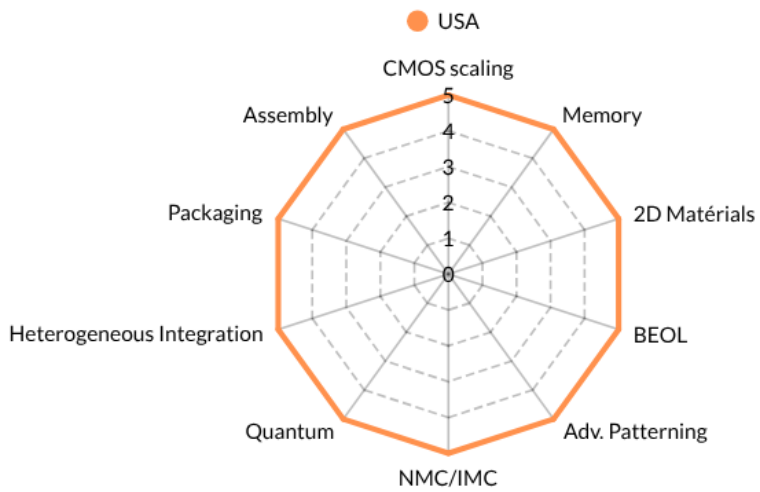
Market & Production shares in the value chain

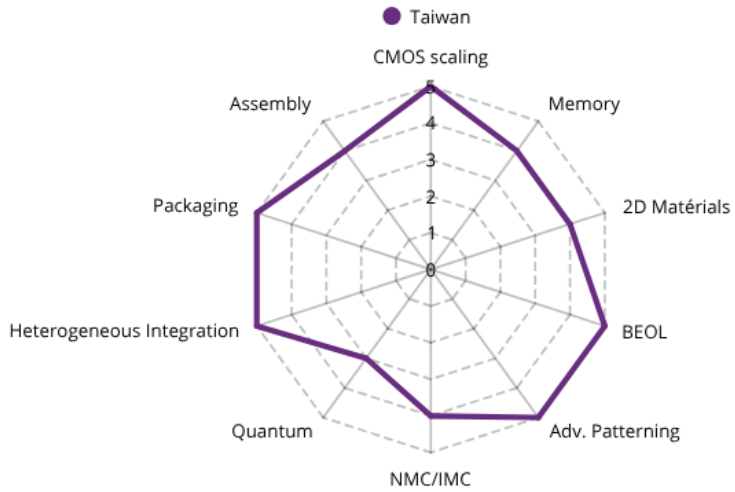


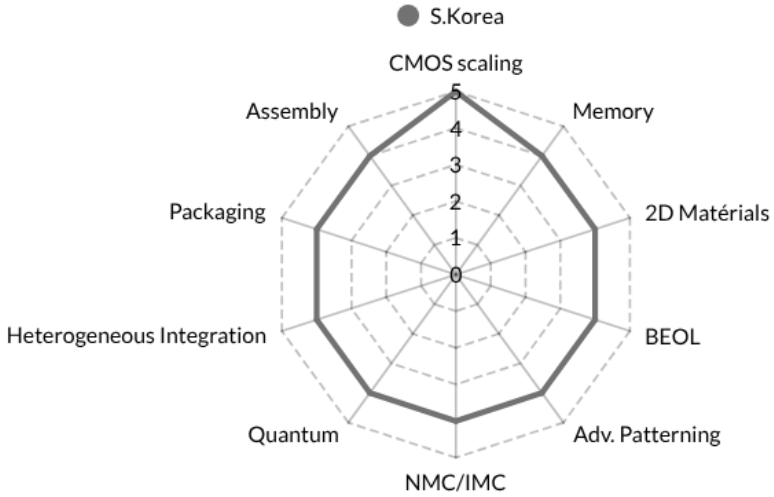
Source: DECISION Etudes & Conseil

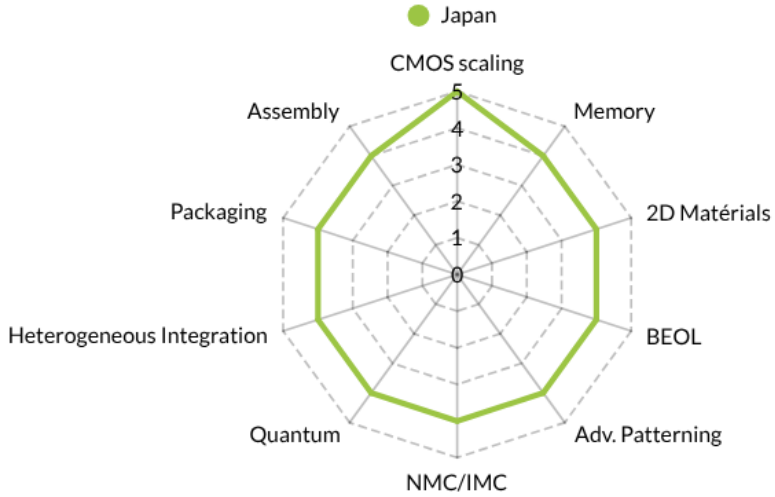
Strength matrix involving RTOs and Academia for Advanced Computing











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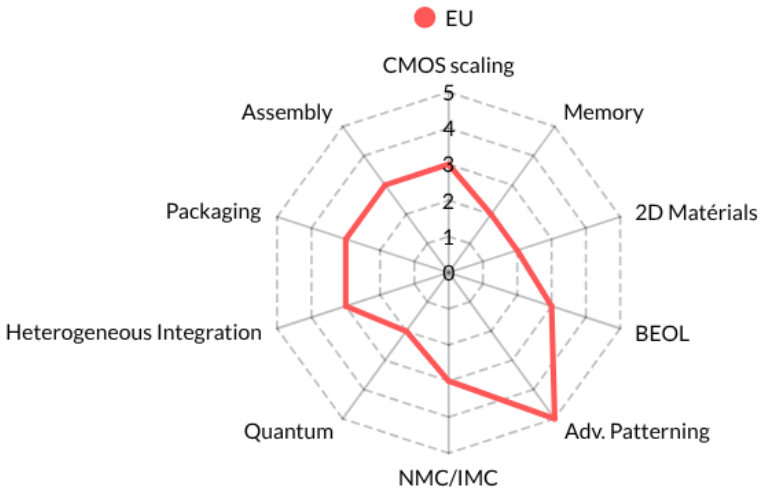
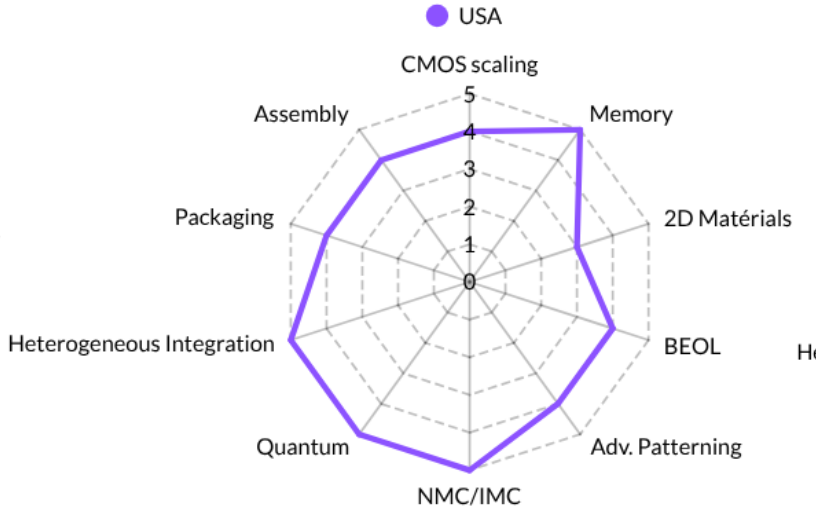
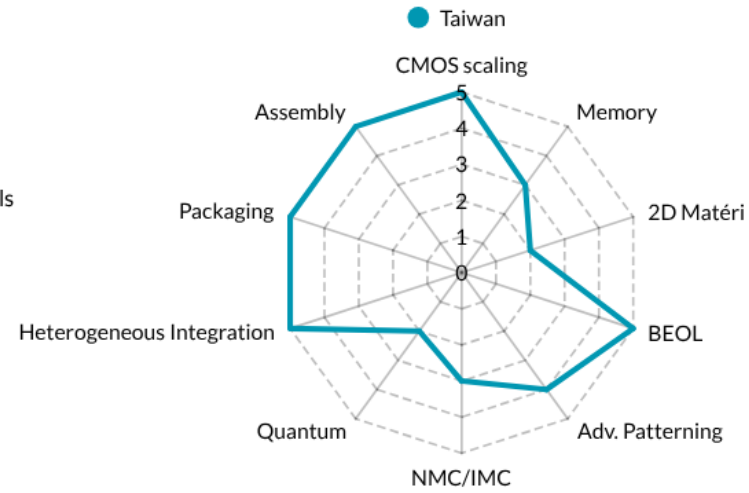
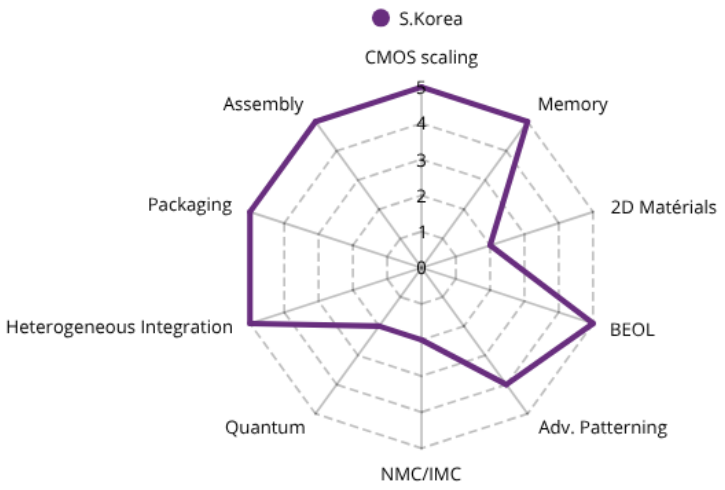
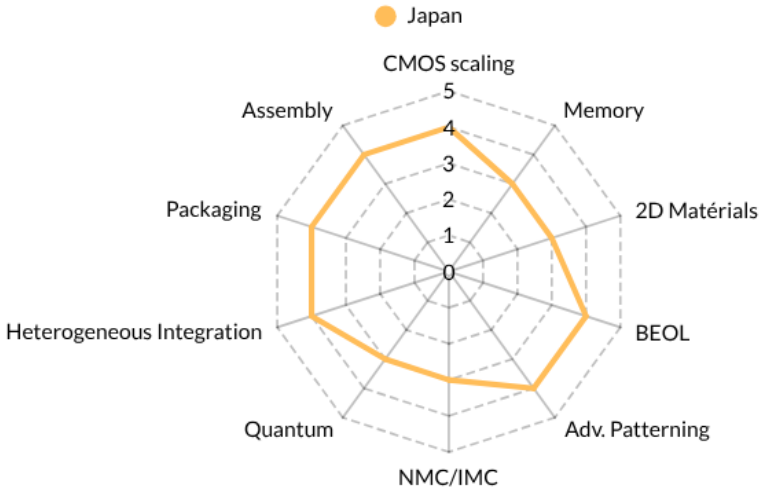
Strength matrix involving industry for advanced computing











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Countries for cooperation	Topics of mutual interests with EU	Main challenges in Roadmaps
• India • Japan • ROK • Singapore	Heterogeneous integration & Packaging	• 3D integration • Power efficient chiplets • Advanced Packaging with optical, electrical, mechanical, thermal, RF, bio requirements • 3D integration design
• India • Japan • ROK • Singapore	Cutting edge processing technologies Energy efficient computing & Memories	• Multigate & 3D devices • FDSOI • Advanced materials (2D…) • BEOL technologies • BEOL functionalities (oxide semiconductors, ferroics…) & NVM • Buried Power Rail • High-NA EUV • In-memory, neuromorphic computing • Cryoelectronics • Circuit and System Design (DTCO)

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Countries for cooperation	Topics of mutual interests with EU	Main challenges in Roadmaps
• India • Japan	Sustainable manufacturing	• Optimize use of resources (e.g. water, gases, chemicals, energy) and processes in production • LCA assessment • Recyclability, repair, reconfiguring, re-use
• India • Singapore	Advanced functionalities	• Wide & ultrawide band gap for power • Highly sensitive and more versatile sensors • Photonic chips for optical interconnects and quantum processing • Efficient energy harvesters • Flexible electronics • Advanced design tools, including multi-physics simulation

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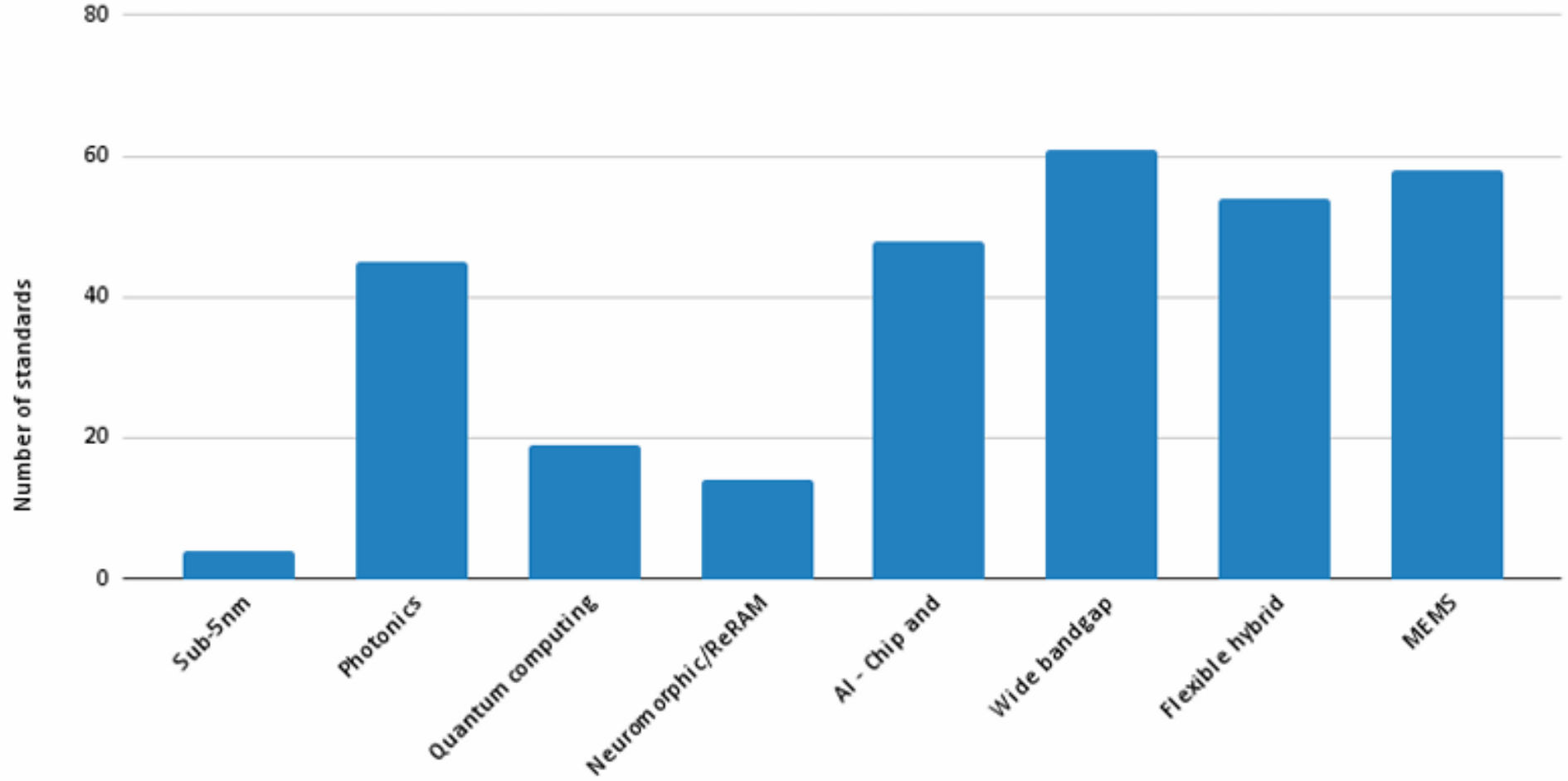
Number of standards vs Category modules or Components



Recent events (July 2024-November 2025)

- **Online Discussion** on **EU-Japan Semiconductor Research Cooperation** (July 5, 2024): Coordination and writing of the 1 page-paper per topic and selection of sub-**topics for EU-Japan cooperation**
- **ICOS Workshop** "Emerging technologies in Advanced Computation, Advanced Functionalities, Ground-breaking Technologies: Impact on International Cooperation", **ESSERC 2024, Bruges**, Sept 9, 2024
- **Joint EU-India semiconductors researchers Forum, Brussels,** (October 9, 2024)
- **ICOS talk** "EU and non-EU strengths, weaknesses, dependencies, opportunities for international collaboration, **Semicon Europa, Munich**, Nov. 12, 2024
- **ICOS talk «** Horizon Europe ICOS - International Cooperation on Semiconductors", **EFECS, Ghent**, Dec. 5, 2024
- **ICOS Workshop** "Key emerging technologies for future industrial applications", **EUROSOI-ULIS, Warsaw**, May 12-13, 2025
- **2nd Semiconductor joint EU-ROK Researcher Forum, Jeju**, South Korea, June 16, 2025
- **1st Joint EU-Singapore Researchers Workshop on Semiconductors, Brussels**, July 8-9, 2025
- **EU-Indo-Pacific Digital Partnership Conference 2025, Singapore,** October 29, 2025
  - **ICOS talk** "Horizon Europe ICOS: International Cooperation on Semiconductors for European Economic Resilience", **Semicon Europa, Munich**, Nov. 20, 2025

ICOS final event (February 3, 2026, Brussels)

- **Final ICOS Workshop organized** as a side event of ECS Brokerage on **Feb. 3, 2026, Brussels**
- The **last ICOS Deliverables** will be presented:
  - Monitoring semiconductor value chains
  - Updated technology scanning and foresight
  - Priorities for cooperation
  - Report on the engagement with stakeholders in international cooperation
  - Policy advice on international cooperation in semiconductors

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Thank you for your attention

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