Key Results of International Cooperation on Semiconductors for European Economic Resilience

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The Faculty, Brussels

INTRODUCTION

- ICOS Project started in January 2023, 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

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UNIVERSITEIT GENT

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Delft University of Technology

U.NET

RTOS

leti cea tech

Tyndall National Institute

imec

VTT

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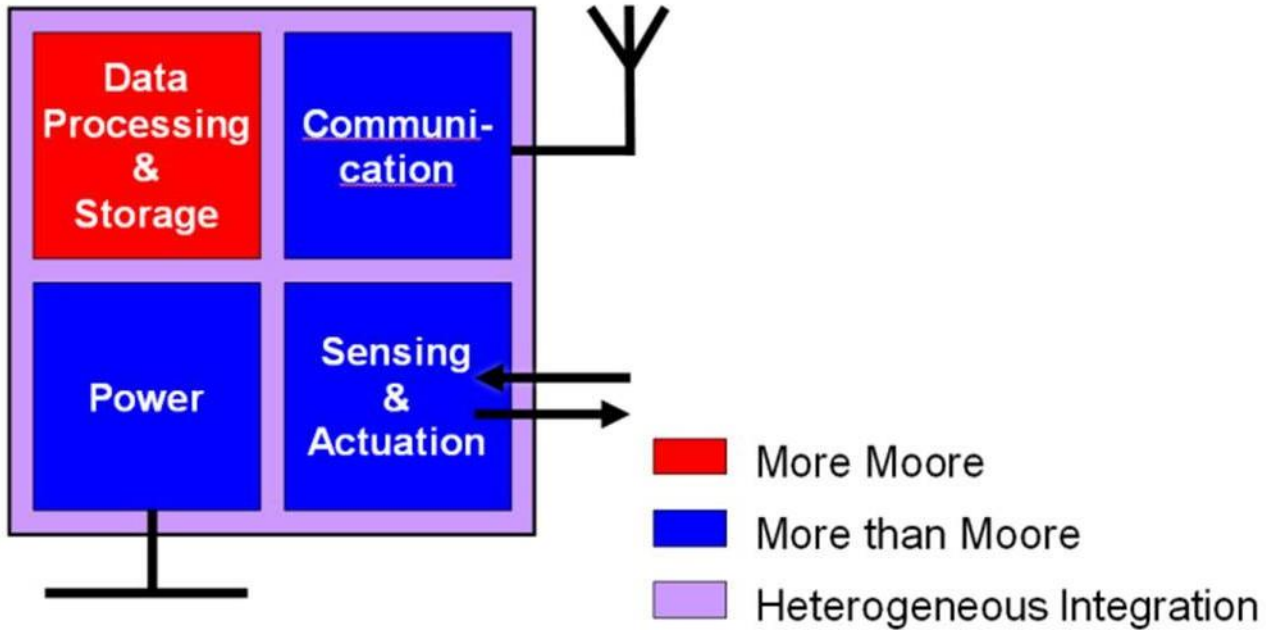
Main Scientific Topics

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



Motivation for International 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

  -**addressing the EU's technological gaps**

  -**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 International Cooperation in Semiconductor

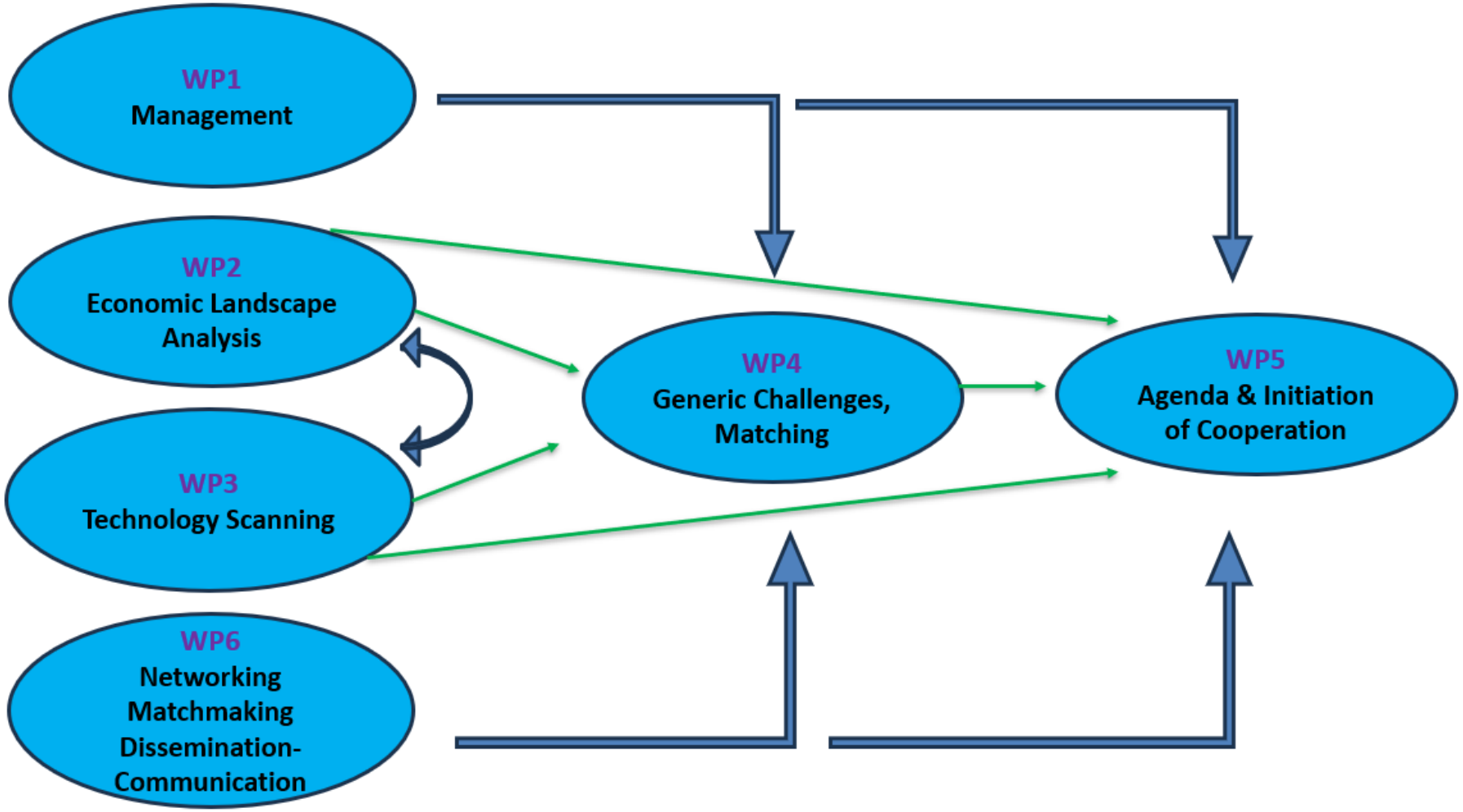
- **To implement and strengthen the DPs & TTC in close cooperation with the EC**
- To build **balanced semiconductor partnerships** with like-minded countries
- To set out cooperative framework on **initiatives of mutual interest**
- To identify and support the establishment of the **most promising scientific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

  =>*Skill Roadmap* aligned with Research and Industrial Roadmaps, Strengthen *scientific and technological competences* through international cooperation, Develop *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 emerging **technologies** and 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



Current cooperation topics in the DPs/TTCs following bilateral events

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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Current cooperation topics in the DPs/TTCs following bilateral events

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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Development of International Cooperation

Impact

Take into account the impact: Market growth, Production share, Emerging Technology for new Markets, New knowledge for disruptive technology, Environmental, Societal

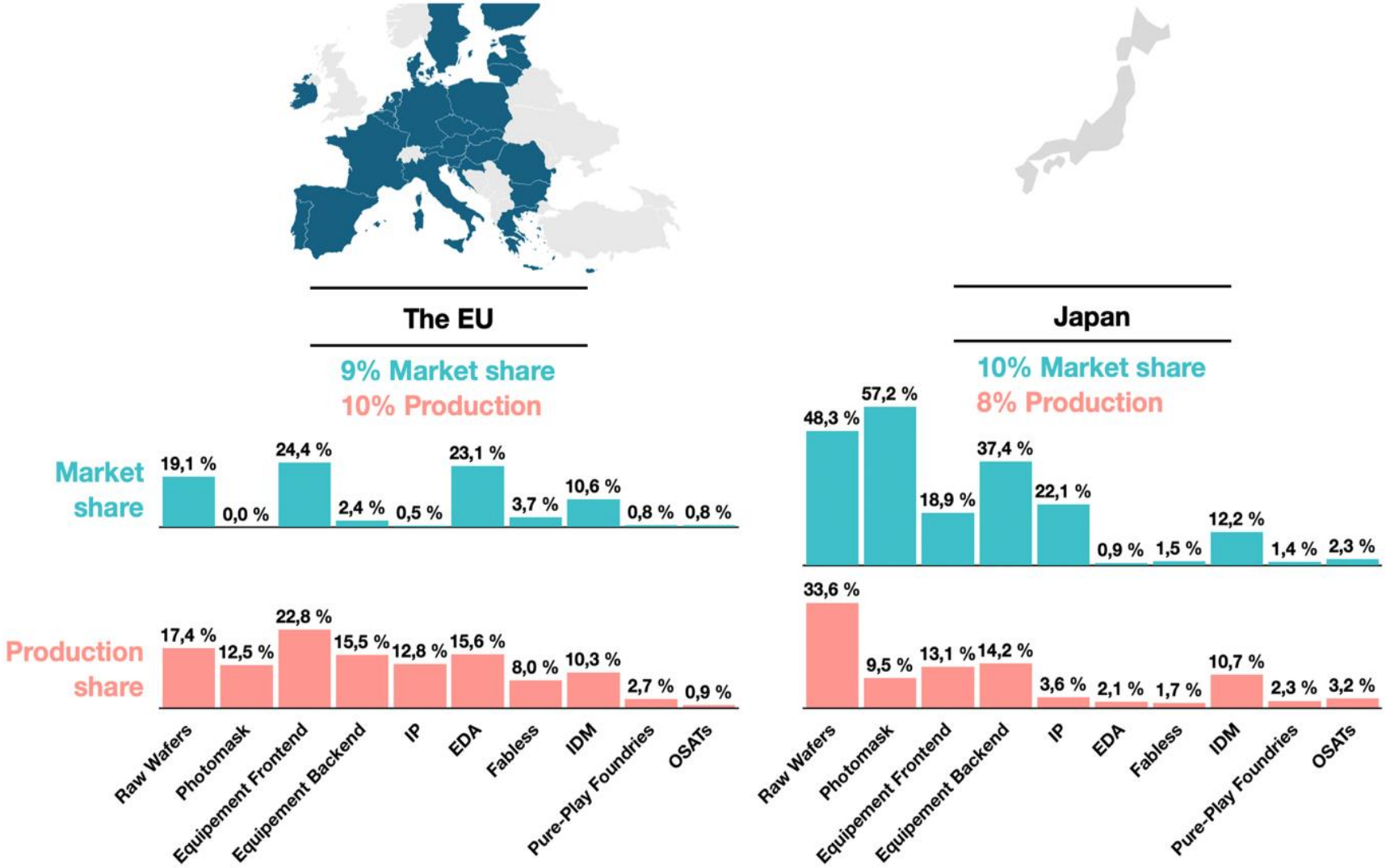
Strengths

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

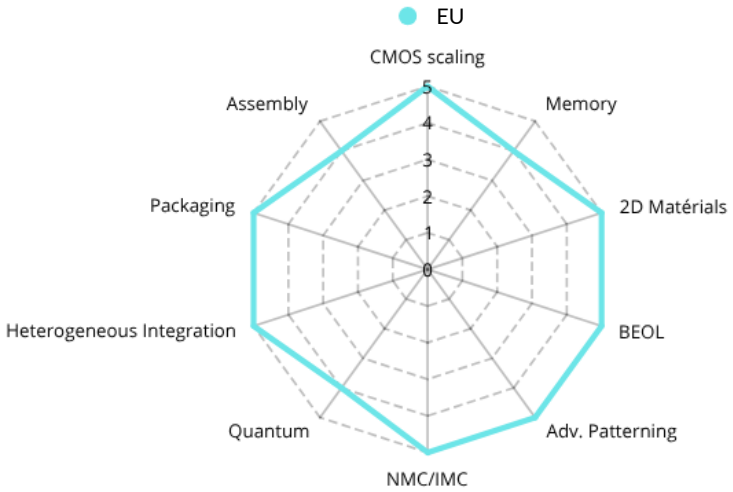
- New topics for DPs and TTCs
- New International Calls
- Bilateral Cooperation between Institutions
- Exchange of Researchers/PhDs

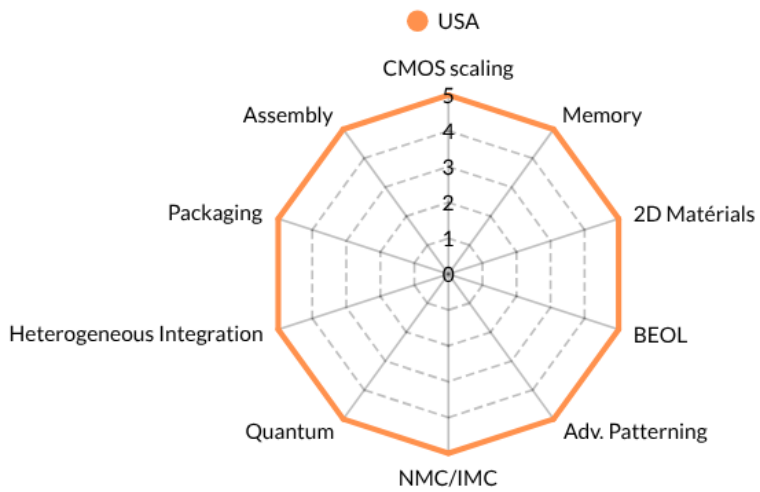
Market & Production shares in the value chain
=> Possible future cooperation topics in the value chain

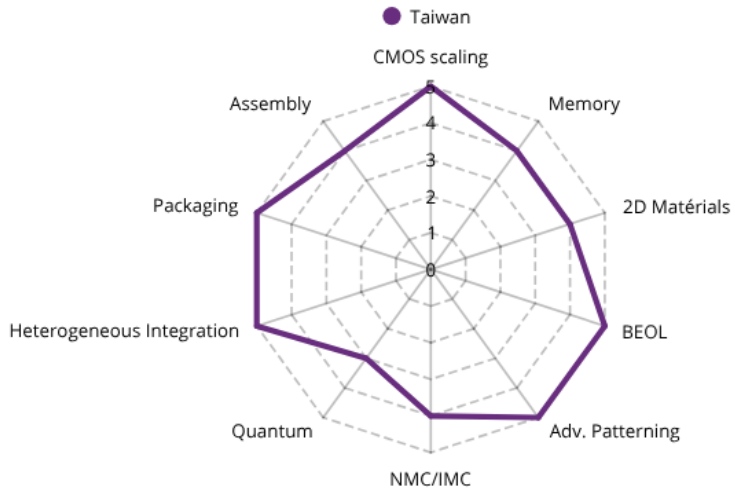


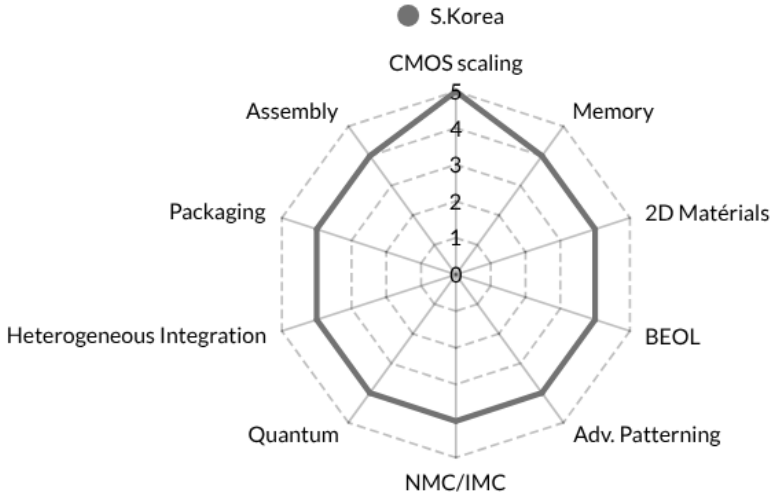
Source: DECISION Etudes & Conseil

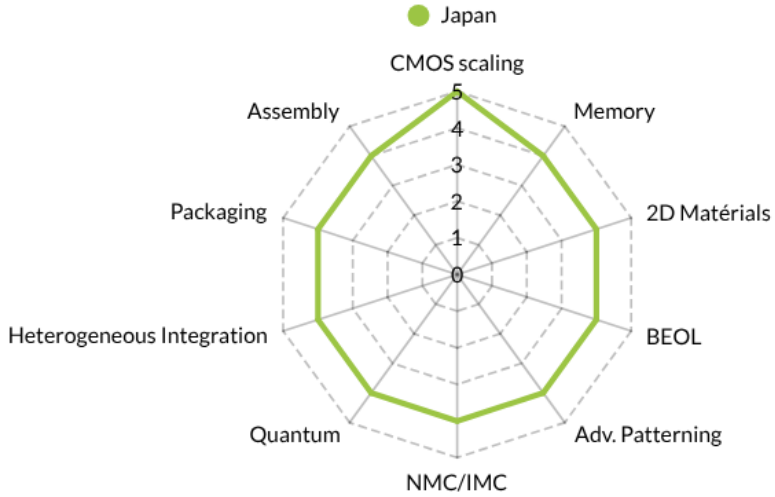
Strength matrix involving RTOs and Academia for Advanced Computing => Possible future technological cooperation topics for Academia/RTO



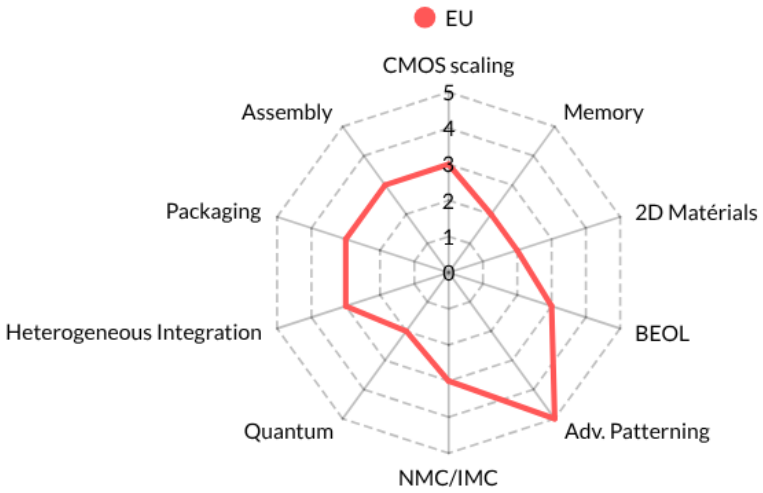


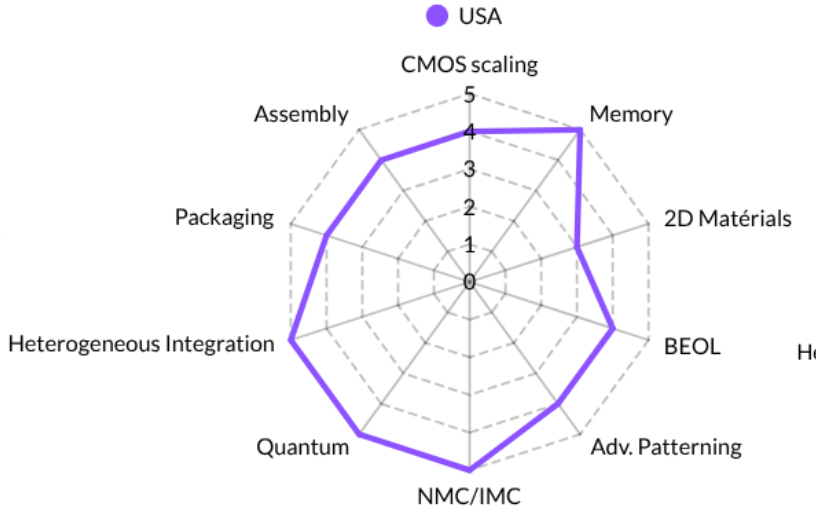


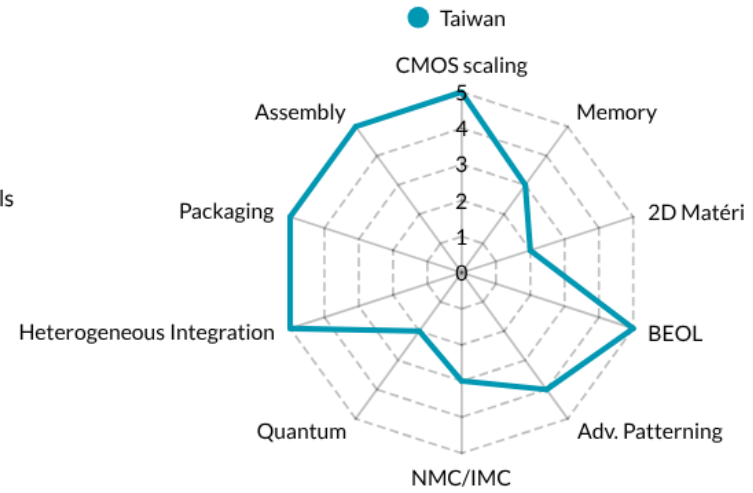


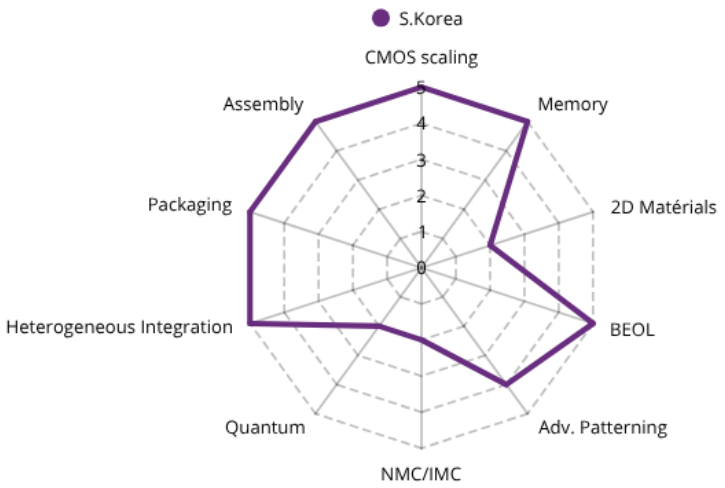


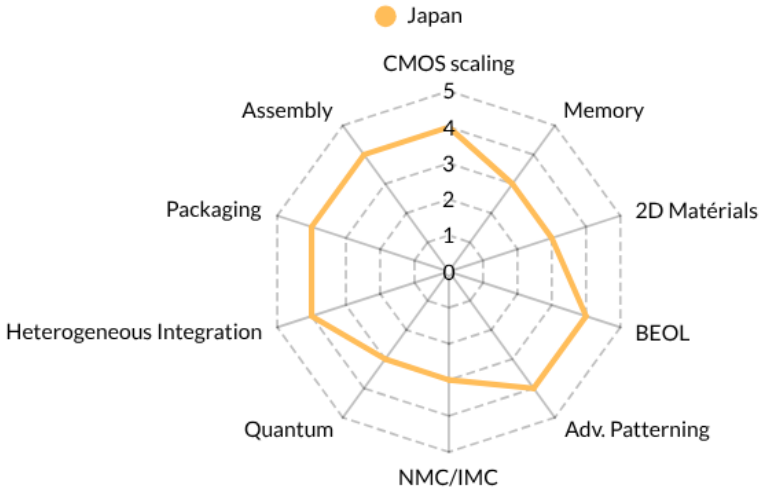
Strength matrix involving Industry for Advanced Computing
=> Technological cooperation topics for Industry (with Industry/Academia)



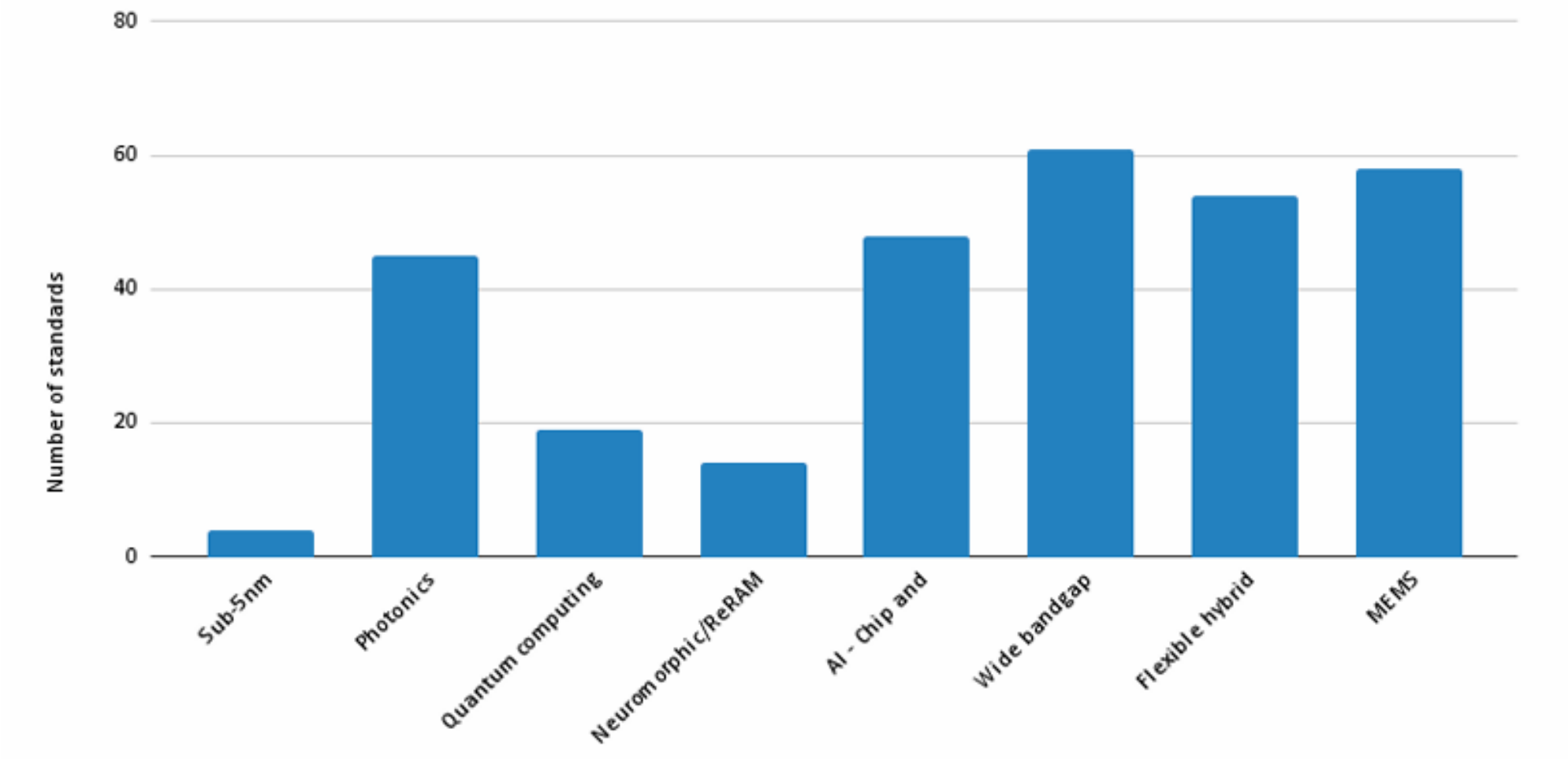








Number of standards vs Category modules or Components => Multilateral cooperation



Recent events (July 2024-December 2025)

=> Overall, 24 Multilateral and Bilateral Workshops with European Industrial & Academic communities and leading semiconductor countries have been organized by ICOS.

- **Online Workshop** 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**
- **Joint EU-India semiconductors researchers Forum, Brussels,** (October 9, 2024)
- **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

Recent events (July 2024-December 2025)

- **ICOS Workshop** “Emerging technologies in Advanced Computation, Advanced Functionalities, Ground-breaking Technologies: Impact on International Cooperation”, **ESSERC 2024, Bruges**, Sept 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
- **ICOS talk** “Horizon Europe ICOS: International Cooperation on Semiconductors for European Economic Resilience”, **Semicon Europa, Munich**, Nov. 20, 2025
- **ICOS Workshop** “Key Results of International Cooperation on Semiconductors for European Economic Resilience” **EFECS, Malta**, Dec. 4, 2025

ICOS last results

- The **last ICOS results** presented at this ECS side event:
  - Monitoring semiconductor value chains
  - Updated technology scanning and foresight
  - Priorities for cooperation
  - Engagement with stakeholders in international cooperation
  - Policy advice on international cooperation in semiconductors

ICOS key outcome

- During its three years of operation, ICOS has implemented, strengthened and developed partnerships with leading semiconductor countries for European economic resilience, in close cooperation with the European Commission

THANK YOU

ICOS International Cooperation On Semiconductors

European Commission

This Event is associated with INPACE Indo-Pacific-European Hub for Digital Partnerships

And is a side event of the ECS BROKERAGE EVENT 2026

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