ICOS
International Cooperation On Semiconductors

WORKSHOP: Key Results of International Cooperation on Semiconductors for European Economic Resilience

Path to the Future – Guidelines for International Cooperation on Semiconductor

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Introduction

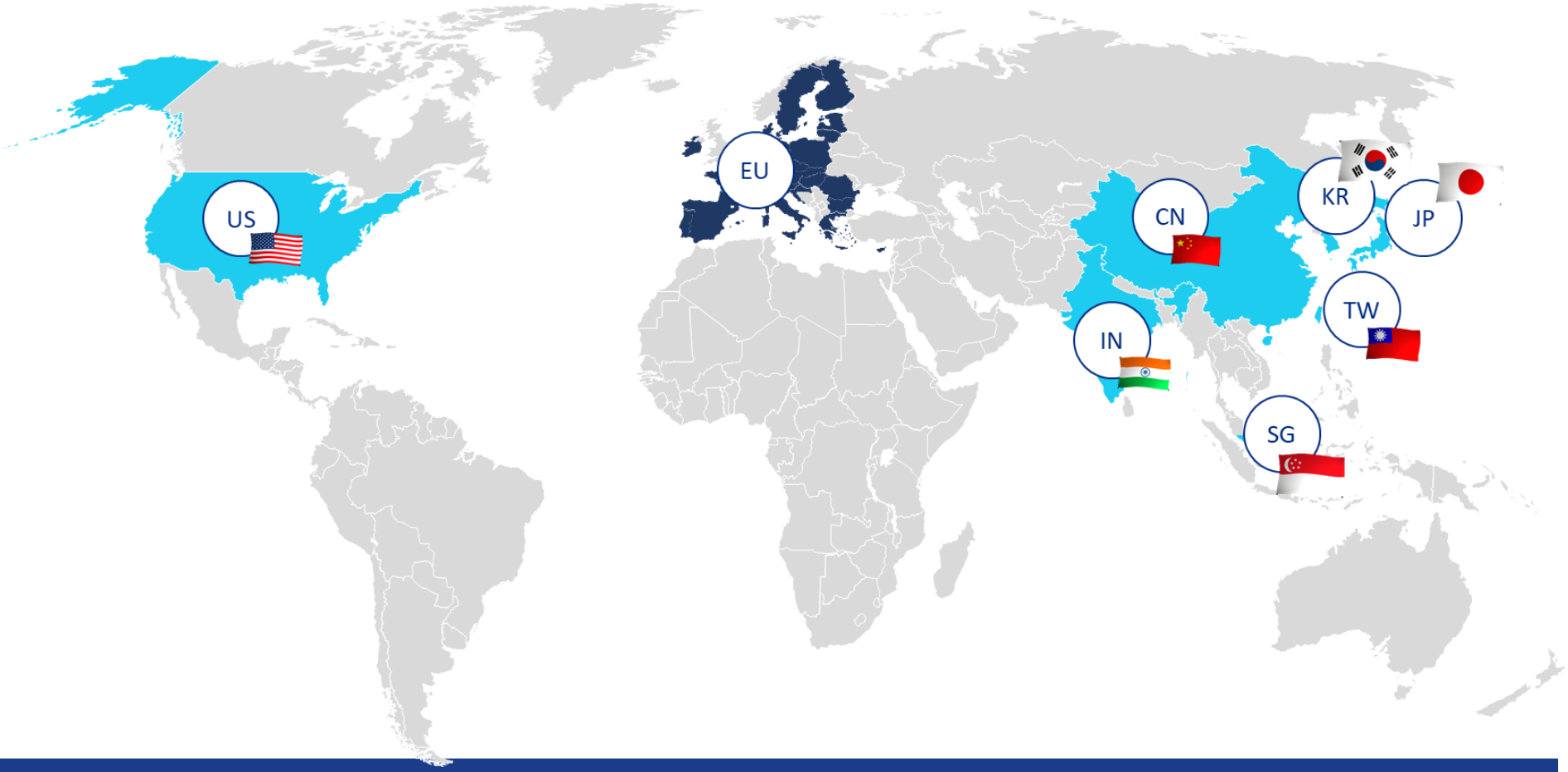
Simplified Global Value Chain Routes

1. Semiconductor Manufacturing Equipment
2. IP Development
3. Semiconductor Design
4. Production
   a) Silicon (CN)
   b) Silicon Wafers (JP)
   c) Front End (TW)
   d) Back End (MYS)
   e) Smartphone Manufacturing (CN)
5. Shipping and Sale of the Smartphone

Key message

For Europe, **global partnerships** are strategic and a **key to stability, resilience** and **innovation**.

Global Status



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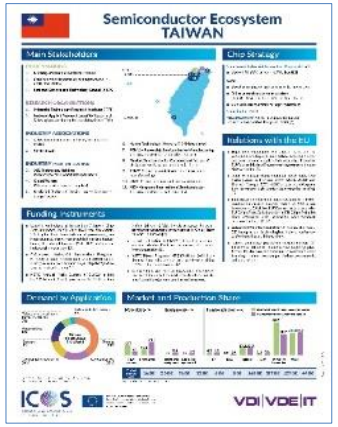
Objective:
Our goal is to establish cooperation frameworks that generate **shared benefits** and **long-term value** for all parties.

Factsheets - Global Semiconductor Ecosystem

- ✓ **Analysis** of semiconductor ecosystems in China, South Korea, Japan, India, Singapore, Taiwan, and the USA.
- ✓ Identification of **cooperation opportunities** to shape the European global semiconductor strategy.
- ✓ Insights compiled based on **key project outcomes** and **feedback from key players** in the respective countries.



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Key message:
We created **7 factsheets** benchmarking non-EU cooperation countries, designed as a **door opener** for further engagement.

ICOS
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Categories:

- ✓ Main Stakeholder
- ✓ Chip Strategy
- ✓ Funding Instruments
- ✓ Relations with EU
- ✓ Demand by Application
- ✓ Market and Production Share

Semiconductor Ecosystem SOUTH KOREA

Main Stakeholders

POLICYMAKING

1. National Research Foundation of Korea
2. Ministry of Science, ICT
3. Ministry of Trade, Industry and Energy (MOTIE)
4. Korean Ministry of SME and Startups
5. Korea Chamber of Commerce and Industry

RESEARCH ORGANISATIONS

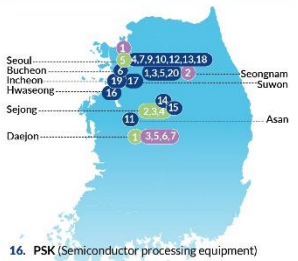
1. **Korea Institute of Science and Technology** (KIST)
2. **Korean Electronics Technology Institute** (KETI)
3. **Electronics and Telecommunications Research Institute** (ETRI)
4. **Semiconductor Fabrication Supports**
5. **National NanoFab Center** (NNFC)
6. **Korea Advanced Nano Fab Center** (KANC)
7. **Korea Institute of Machinery & Materials** (KIMM)

INDUSTRY ASSOCIATIONS

1. **Korea Semiconductor Industry Association** (KSIA)
2. **Korea Electronics Association** (KEA)

INDUSTRY (NON-EXHAUSTIVE)

3. **ADTechnology** (Design Services for SoC solutions)
4. **Anapass** (Display driver ICS, High-Speed interface solutions)
5. **BOS Semiconductors** (Fabless, Automotive chiplets for autonomous driving)
6. **DB Hitek** (Foundry services, specialized in automotive and power management ICs)
7. **DI Corporation** (Test systems for memory and logic devices)
8. **DOOSAN Group** (Electronic materials, CCL, OLEDs, semiconductor materials)
9. **DONGJIN SEMICHEM** (Photoresists, CMP slurries)
10. **Hanwha Group** (Semiconductor equipment, automation, defense)
11. **Hana Micron** (Assembly, packaging, testing services)
12. **Hyundai Motor Group** (Autonomous driving chips, partnerships with Samsung and KIA)
13. **LG Corp.** with **LG Electronics** and **LG Innotek** (Consumer electronics, IoT, semiconductors, robotics)
14. **Magnachip Semiconductor** (Analog and mixed-signal Semiconductors)
15. **NEPES** (Semiconductor packaging and testing services)



16. **PSK** (Semiconductor processing equipment)
17. **Samsung Corp.** with **Samsung Foundry** (Semiconductor manufacturing, displays, 5G, consumer electronics, HPC Chips, automotive)
18. **Silicon Works (LX Semicon)** (Design, display driver ICs for TVs and mobile devices)
19. **SK Group** with **SK Hynix** and **SK Siltron** (DRAM, NAND flash memory, silicon wafers, AI and HPC memory Solution, Packaging/Testing)
20. **Telechips** (System-on-a-chip, automotive)

Chip Strategy

K-semiconductor belt with the K-Chips Act passed first on March 30, 2023 and renewed in Feb. 27, 2025

- **Objective:** approx. € 62 bln. (100 trn. Won) in semiconductor & AI supported by Korean Development Bank for 3 years [1], [2], [3]
- Doubling the Workforce [4]
- Attract a cumulative investments of 622 trn. Won (approx. €430 bln.) for a semiconductor megacluster by 2047, with Samsung and SK Hynix are the biggest investors [5]

- **Self-Sufficiency:** Goal to achieve 50% self-sufficiency in key materials, parts, and equipment by 2030 [6]
- **Energy Laws:** Focus on expanding the power grid, managing radioactive waste, and promoting offshore wind power to ensure stable energy for the semiconductor sector [7]
- **Focus on Non-Memory:** Expanding into logic semiconductors and Fabless firms, diversifying from flash memories.
- **Fabs & Complexes:** New fabs and national advanced industry complexes under development [8], [9]
- **Semiconductor Capacity:** Half of South Korea's capacity is focused on the 10-20nm range. Samsung is one of the few producing below 6nm.
- **Samsung Foundry:** Unveiled automotive process solutions under the Chips-Act, ranging from 2nm to advancements in the 8-inch wafer technology legacy.
- **Special Act:** Measures and regulations to protect and foster the national high-tech industry [10]
- **Future Goals:** 1.4nm technology by 2027 [11]

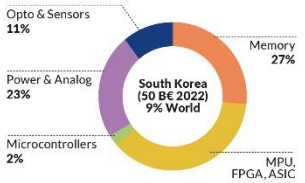
Funding Instruments

- **The K-Chips Act** raises facility investment tax credits for semiconductor firms to 20% for large/medium and 30% for small enterprises. It also extends R&D tax credit eligibility by five years (to 2029) for key technologies, and by seven years (to 2031) for semiconductor R&D. [12].
- Up to 50% in R&D Tax Credits
- Boosting prototype production, Korea aims to grow 10 fabless firms with KRW 1 trn. ($730 million) in sales. [13], [14].
- Investment Tax Credits for manufacturing investments [15]
- Provision for training high-tech professionals and potential discharge of mandatory military service for research personnel in the field [16]
- Support for start-ups of KRW 3.294 trn. (approx. $2.23 bln.), by the government and local governments in 2025 [17], [18]

Relations with the EU

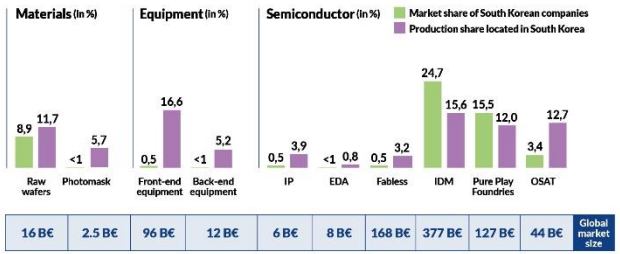
- The Republic of Korea – EU Digital Partnership was announced jointly by President von der Leyen and President Yoon on 28 November 2022 [19]
- Since 2025 South Korea is partner of the Horizon Europe programme [20]
- Strategic project funds with national EU partners [21]
- Republic of Korea-EU Joint Scientific and Technological Cooperation Committee meeting [22]
- Approx. €6 million (approx. 9.8 bn. Won) from the Chips JU for collaborations and a similar amount from the National Research Foundation of Korea [23]

Demand by application



Source: DECISION Etudes & Conseil

Market and Production Share



Source: DECISION Etudes & Conseil

Effective: June, 2025

ICOS International Cooperation On Semiconductors

ICOS has received funding (2023–2025) from the European Union's Horizon Europe research and innovation programme under GA No 101092562.

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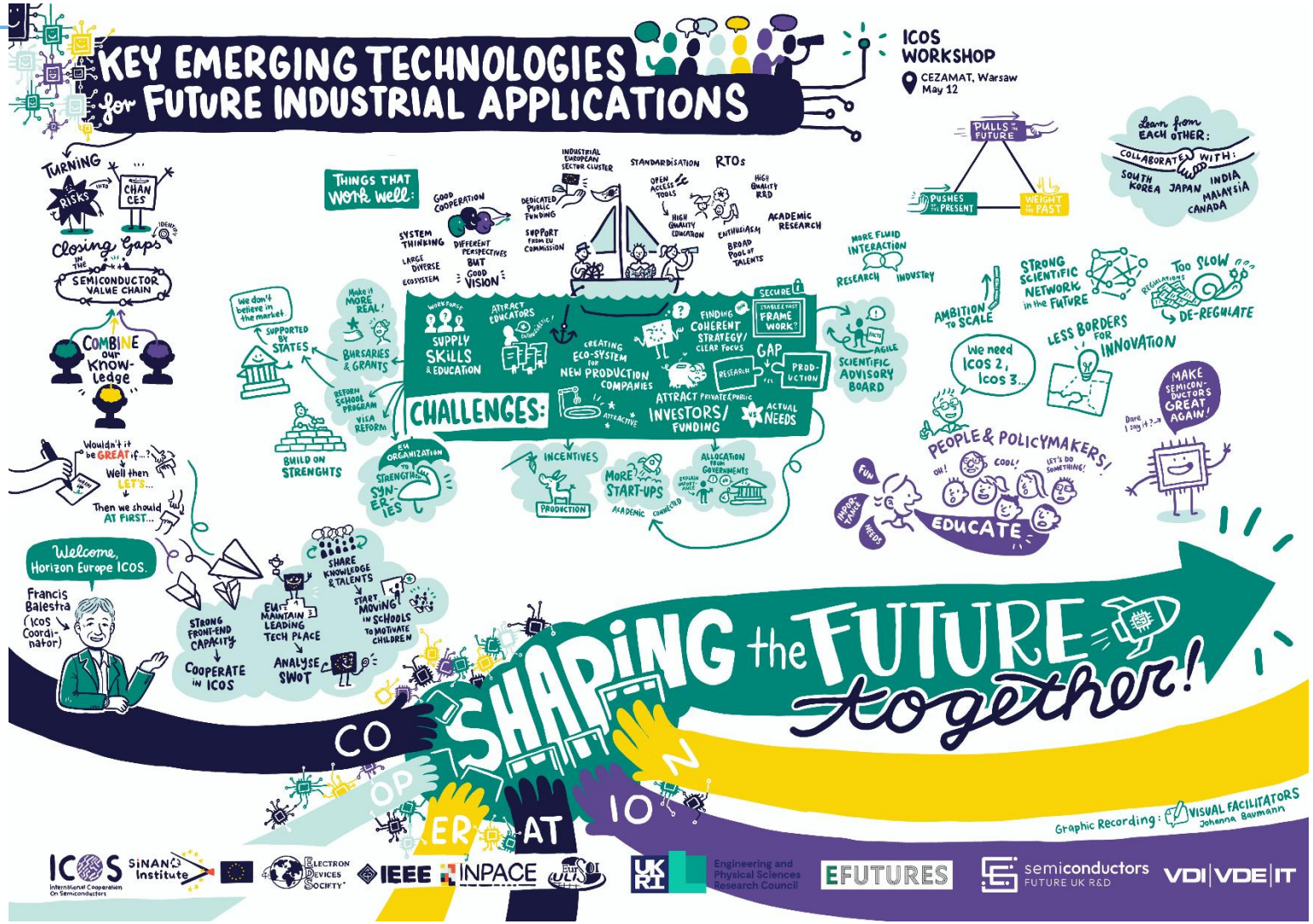
Workshop - Challenges and Gaps



Thematic Focus:

- Identification of key challenges
- Prioritisation of ideas to enhance European competitiveness
- Co-development of feasible solutions for a sustainable future

Methods:

- „Boat Experience“ - Brainstorming
- How might we…? - finding solutions
- Impact/Effort Matrix - priorisation
- SWOT - finding opportunities

Workshop – Challenges

Key Challenges

- Lack of **skilled workforce**
- **Regulatory inefficiencies**
- Weak **start-up culture** and lack of **early-stage investment and support**

High Impact Solutions

Low effort

- Scientific Advisory Board small/agile decision for a long-term strategy
- More PR for sustainability
- A “Best European Invention” competition to boost visibility

High effort

- Higher financial support and easy access for start ups
- Define budget gov/industry
- Influence policy makers
- Build on strengths

Key message
The identified challenges come as no surprise. Together, we can turn them into opportunities.

Risks and Chances - SWOT

Strengths

- Strong R&D landscape
- Institutional and political support and regulation
- Educational offerings and talent development
- Key enabling technologies and industries
- Diverse ecosystem

Weaknesses

- Talent shortage, particularly young professionals
- Complex, slow funding structures
- Outdated industrial and educational policy frameworks
- Lack of marketing orientation
- Slow decision-making processes

S W O T

Opportunities

- Sustainable technologies
- Leadership in "emerging technologies" (e.g. quantum)
- International cooperation with “like-minded” countries
- Political momentum and programmes (e.g. EU Chips Act)

Threats

- Geopolitical tensions, dependencies, export restrictions
- Fierce competition
- General lack of interest in technical disciplines
- Lack of strategic unity (EU vs. national)
- Environmental regulations, (e.g. Green Compliance)

Key message
Europe should build on its strengths and use the opportunities.

Guideline – Path to Cooperation

Results from ICOS

Topic decision

Main Topics	Subtopics
Front-End technologies	leading edge manufacturing, FDSOI, EUV, Silicon Photonics….
Advanced Packaging	3D integration, heterogeneous integration, ….
New Materials	2D materials, BEOL materials, (ultra) wide band gap, PFAS alternatives, …
High Performance Computing	NVM, neuromorphic computing, AI, Quantum Computing …
Sustainability	„green electronics“, PFAS alternatives, sustainable manufacturing processes
Design	IC design, EDA design tools, RISC-V
Resilience	Rapid Prototyping, lab-to-fab, Supply Chain Resilience, Skills

Country specific

Strategic rating

Cooperation:
- Yes/No
- Why

Used Results:
- ICOS Deliverables
- Workshops
- Interviews

High level policy advice

Recommendation

Criterias:
- Cooperation format
- Timeline
  - Short term
  - Middle term
  - Long term
- Dimension of needed money
- Others

Key message
Collection, analysis, **filtering** and **prioritisation** of data are key steps to identify the **most promising path(s)** from research to policy maker.

Guideline – Coordination Action

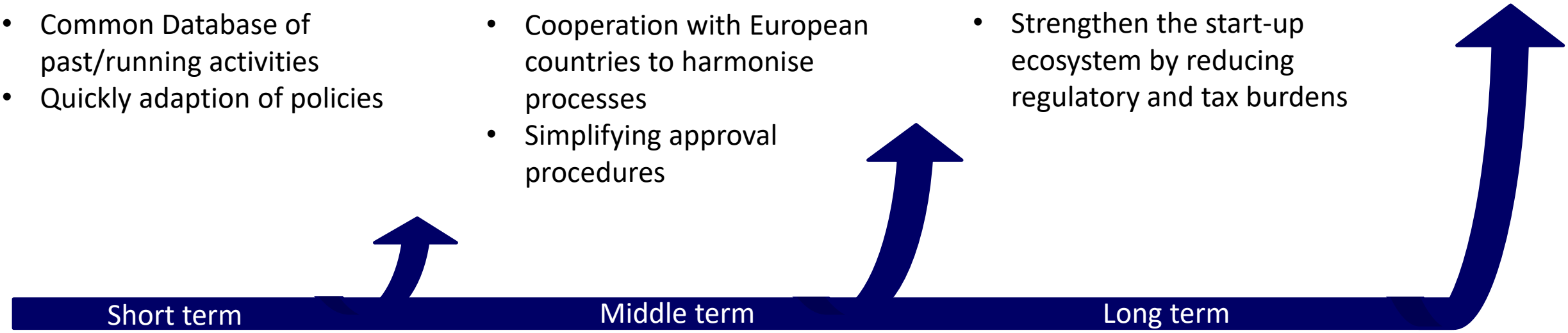
What do we need to be agile in a rapidly evolving world?

Unified European steering body

- Common Database of past/running activities
- Quickly adaption of policies

- Cooperation with European countries to harmonise processes
- Simplifying approval procedures

- Strengthen the start-up ecosystem by reducing regulatory and tax burdens



Guideline – Strategic Investment

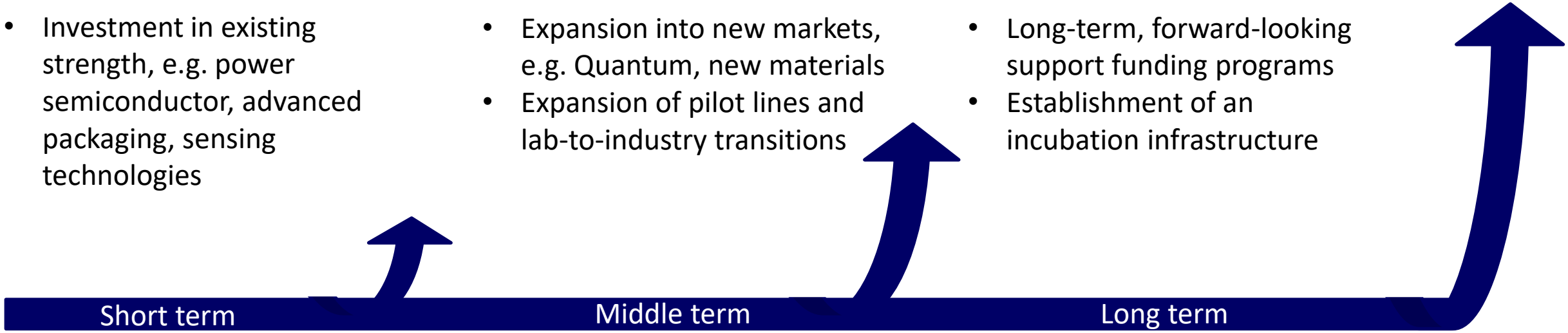
What do we need to strengthen our strength?

European investment strategy

- Investment in existing strength, e.g. power semiconductor, advanced packaging, sensing technologies

- Expansion into new markets, e.g. Quantum, new materials
- Expansion of pilot lines and lab-to-industry transitions

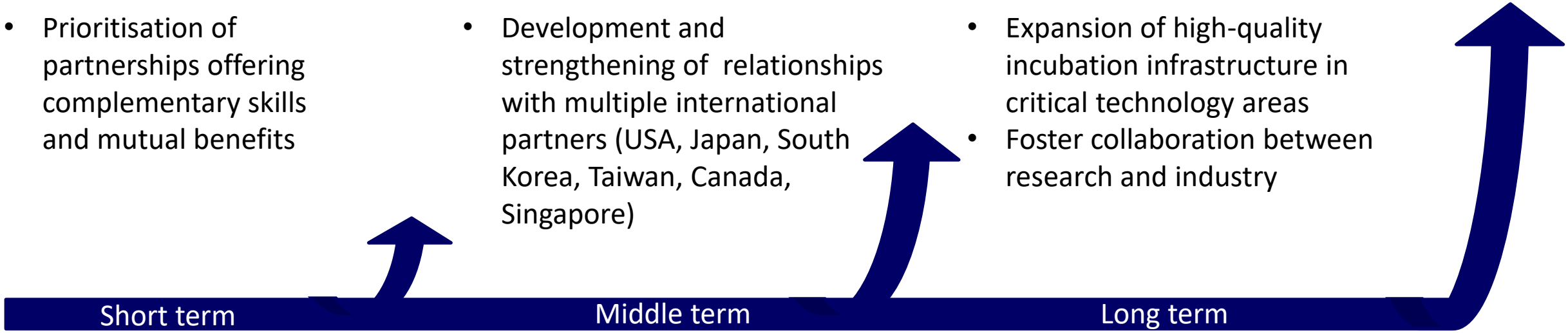
- Long-term, forward-looking support funding programs
- Establishment of an incubation infrastructure



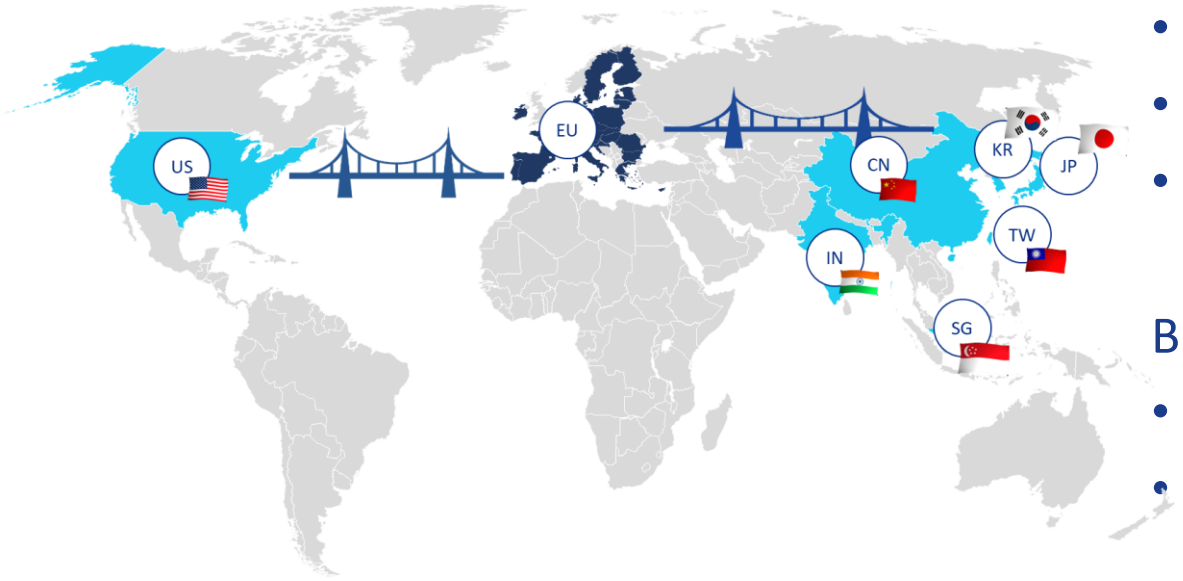
Guideline – Fostering Innovation

How can we build on and improve our strength?

Forstering Innovations



Conclusion



Europe's position in the semiconductor value chain can be strengthen by:

- **coordinated actions**
- **strategic investments**
- commitment to **fostering innovation**

Building cooperation is like constructing a bridge:

- Start with **dialogue** as the pillars
- **Connect** complementary strengths and partners
- Enable a **win-win pathway** forward

Key Message:
In the semiconductor world of the 21st century, **no one** will be the sole leader **– but together we can remain so.**

This project has received funding from the European Union's Horizon Europe research and innovation programme under GA Nº 101092562

You would like to find out more …?

www.icos-semiconductors.eu