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ESSCIRC/ESSDERC 2023

SiNANO-ICOS Workshop

*"European Strengths and Gaps in Emerging Semiconductor Technologies"*

# **Review of the EU and main non-EU semiconductor ecosystems**

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Lisbon, September 11, 2023

## 1) Presentation of the study within ICOS

- **The ICOS project**
- The economic study
- Our approach to propose areas for cooperation

2) Interested in sharing your views on the topic?

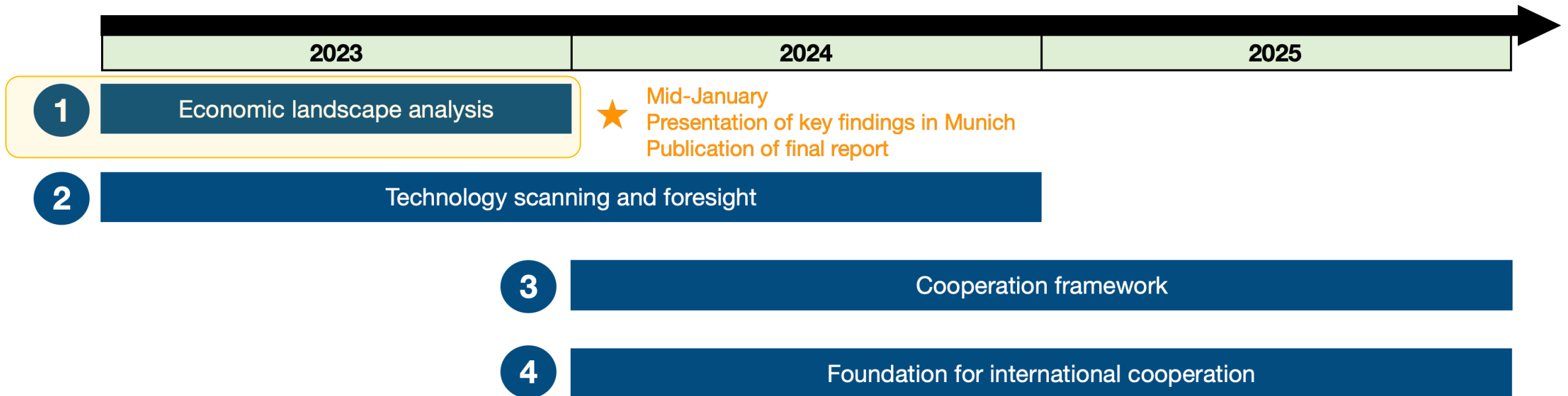
3) Preliminary key findings

- Global semiconductor outlook
- Positioning of the EU
- Some interesting results

# The ICOS project

## Goal

Identifying topics of research cooperation between the EU and leading semiconductor countries



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Report published in early 2024

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## Goals

### **Economic analysis of the EU semiconductor ecosystem**

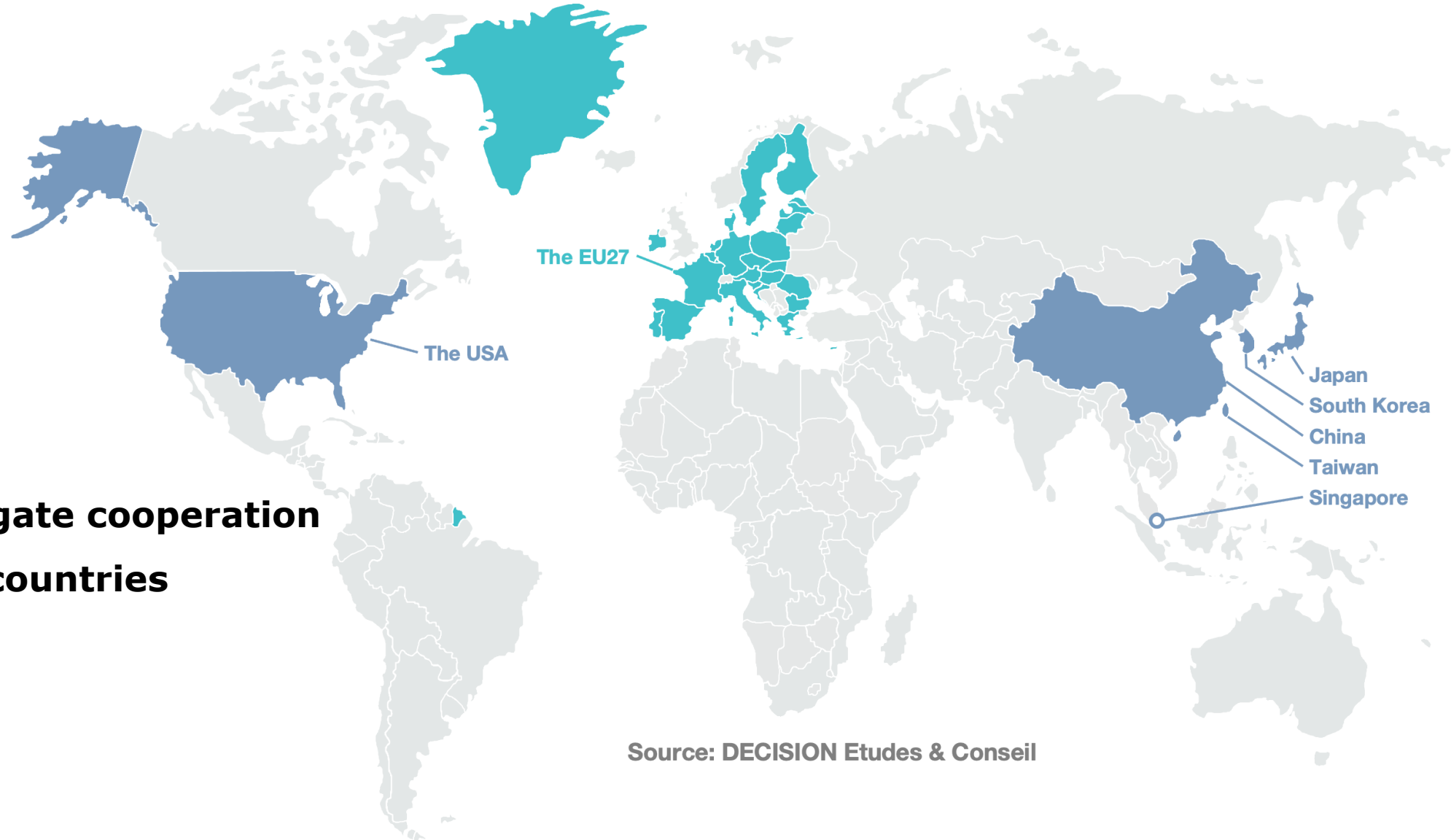
- Economic / industrial strengths & weaknesses
- Strategic dependencies
- Evolution over the past 5 years

### **Benchmark past and existing EU-international cooperation**

**=> Identify opportunities for cooperation with 6 countries:**

The USA, China, Japan, South Korea, Taiwan and Singapore

# Geographic scope of the analysis



**Investigate cooperation with 6 countries**

Source: DECISION Etudes & Conseil

# Content of the report

## I. Global semiconductor outlook

1. Market
2. Value chain
3. Technologies

## II. The EU semiconductor ecosystem

## III. Analysis of tier countries



### Country fact sheet (summary, 4 pages)

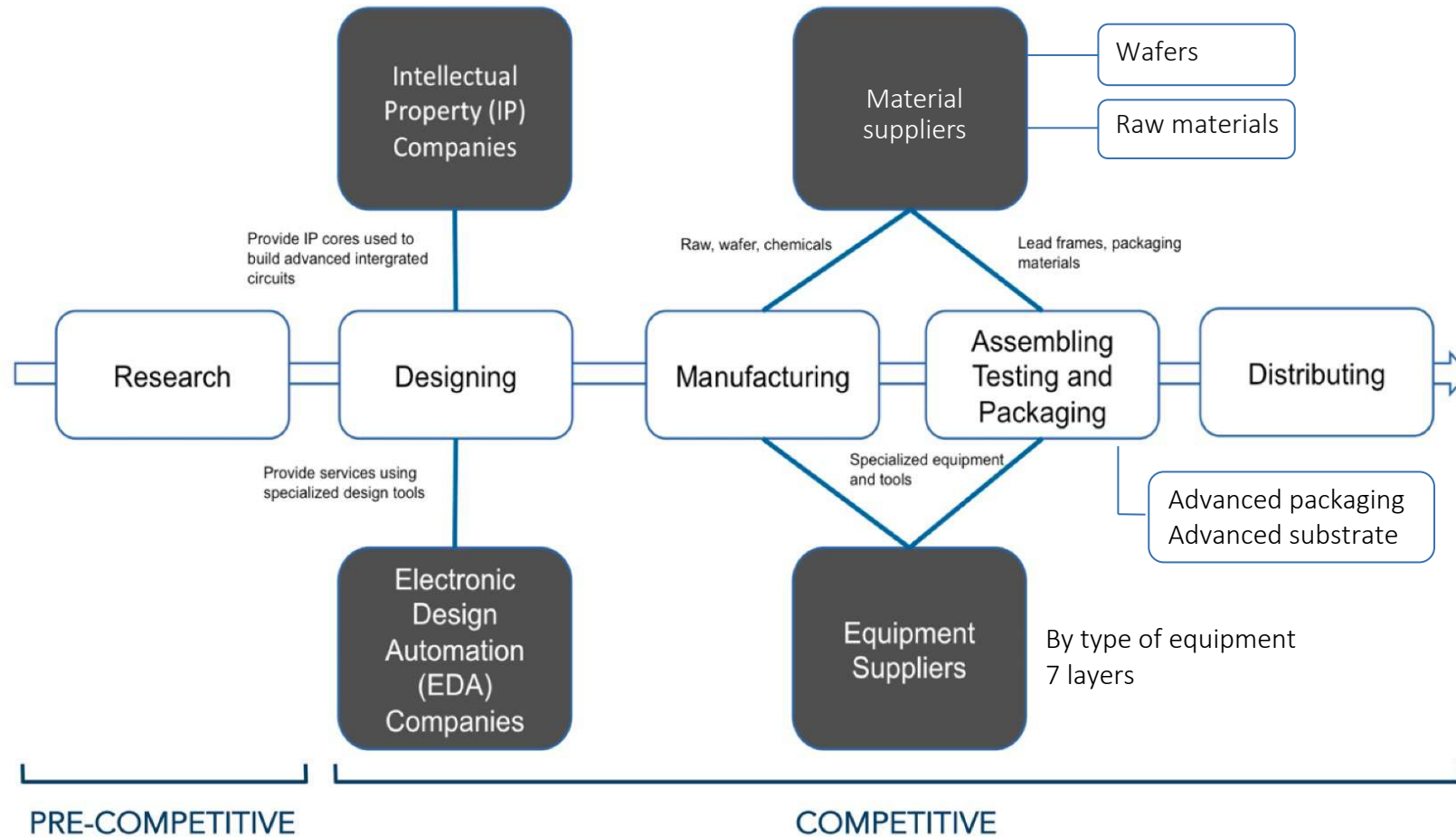
#### I. Country semiconductor landscape

1. **Supply:** Industry players across the value-chain, products and applications
2. **Demand:** Market across the value-chain, products and applications
3. **Trades:** Semiconductor trade balance with the EU...
4. **Research and education capacities**
5. **Investment & government policies**

#### II. Opportunities of cooperation with the EU

Other countries: Malaysia...

# Analysis across the value-chain



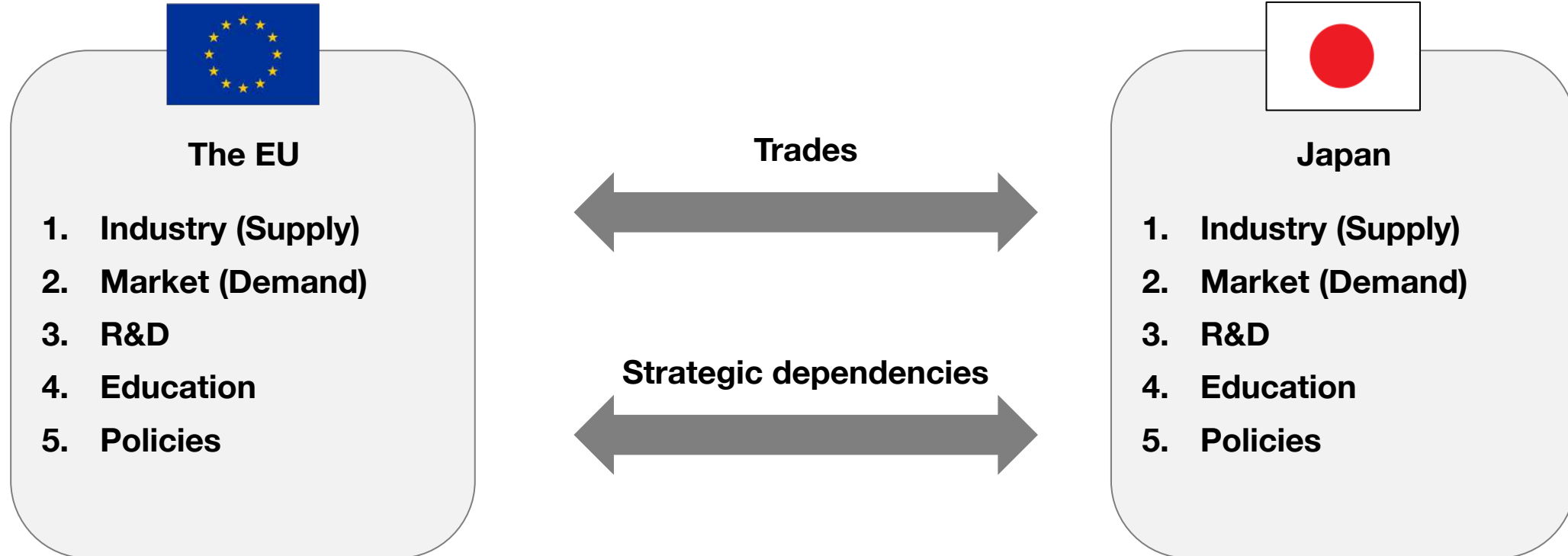
Source: DECISION Etudes & Conseil, ESIA

## Country positioning on 2 criteria

- ❑ Market shares of players by nationality
- ❑ Production share by production location (employees / factories)



# Model of the economic situation Between the EU and each tier country



Across value chain



Across products



Across applications

# Strategic dependency Definition

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## EU Strategic dependencies

- ❑ Absence of minimum capacities for internal production to substitute imports
- ❑ Reliance on a limited number of countries
- ❑ "Critical" importance = Affecting security, safety or health of Europeans, or the green and digital transition

# Example of strategic dependency

The EU is dependent towards China for **PCB manufacturing**

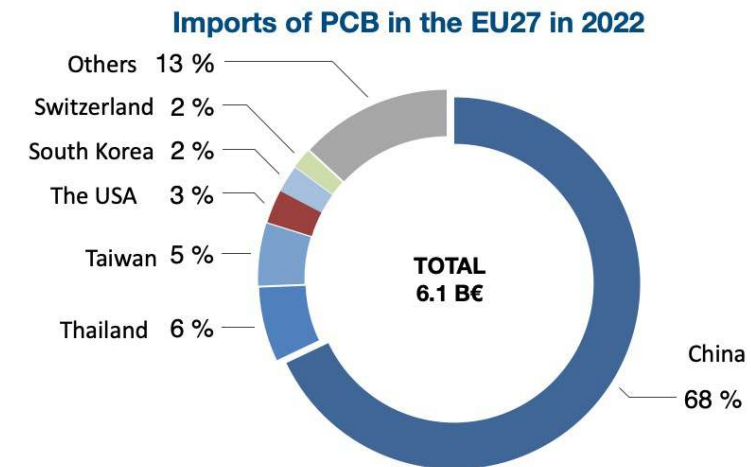
## Absence of minimum capacities for internal production to substitute imports

❑ 4% of the global production of PCB on the EU territory.

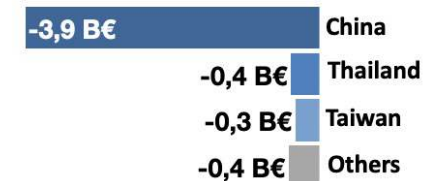
❑ Only one large EU company



## Reliance on a limited number of countries



**PCB**  
Ranking of countries towards which the EU27 has a negative trade balance in 2022



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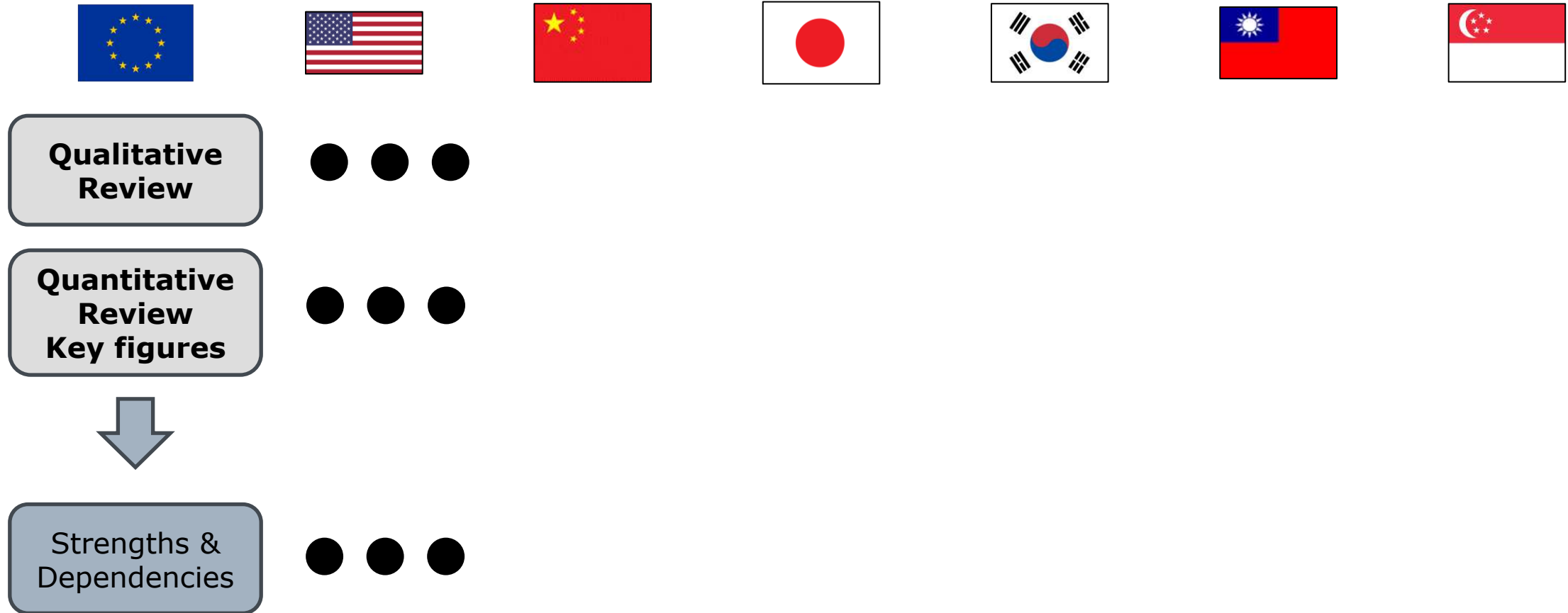
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## Key question

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**Which criteria use to identify areas for bilateral R&D cooperation?**

# Baseline Review per country & region



# Approach

## Criterion 1: Leverage mutual strengths



### Strengths

- ❑ High end lithography equipment
- ❑ Leadership in sensors, power electronics, nano optics, and imaging
- ❑ SOI wafer materials
- ❑ ...

Leveraging mutual strengths

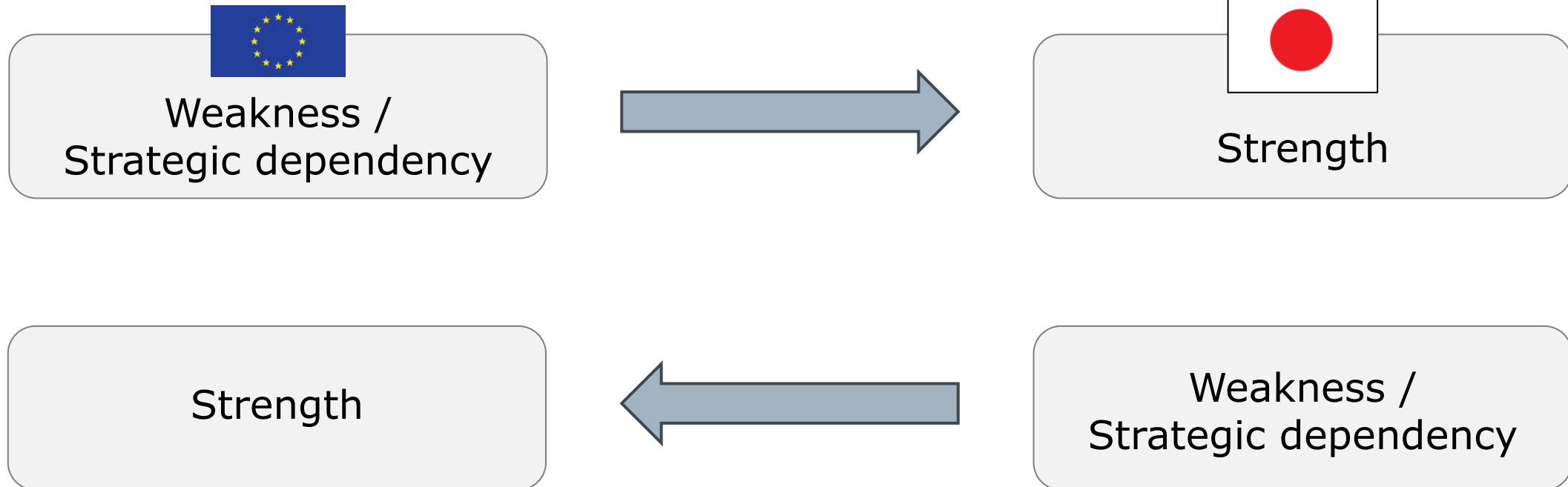


	Strengths
	Strengths
	Strengths
	Strengths
	Strengths
	Strengths

- Which region/which country ?
- Which part of the value chain ?
- Which product/technologies ?

# Approach

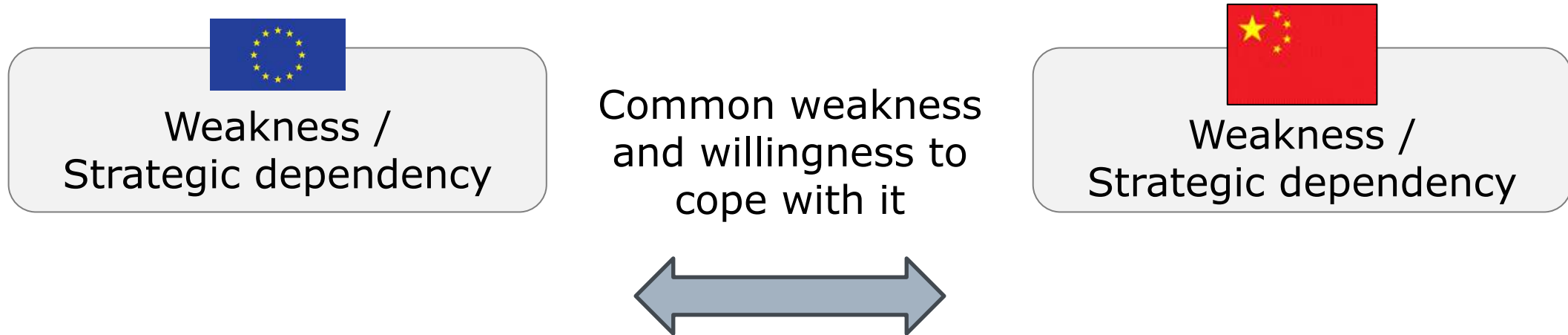
## Criterion 2: Crossed cooperation





# Approach

## Criterion 3: Bridge mutual weaknesses



Example:

- ❑ EU and China on advanced semiconductor manufacturing
- ❑ ...

# Review of the EU and main non-EU semiconductor ecosystems

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# Stakeholders' consultation launched since March 2023

## Key questions

1. EU industrial strengths & weaknesses?
2. EU industrial weaknesses & strategic dependencies?
3. EU limiting factors (workforce...)?
4. Main market opportunities for the EU?
5. On-going investment projects in the EU?
6. Proposals of topics and partners for EU R&D collaborations?

## 28 answers (to date)

### Large companies



RTO



### Startups



### Government



## Link to the online survey

<https://fr.surveymonkey.com/r/8YPFB8R>



# Review of the EU and main non-EU semiconductor ecosystems

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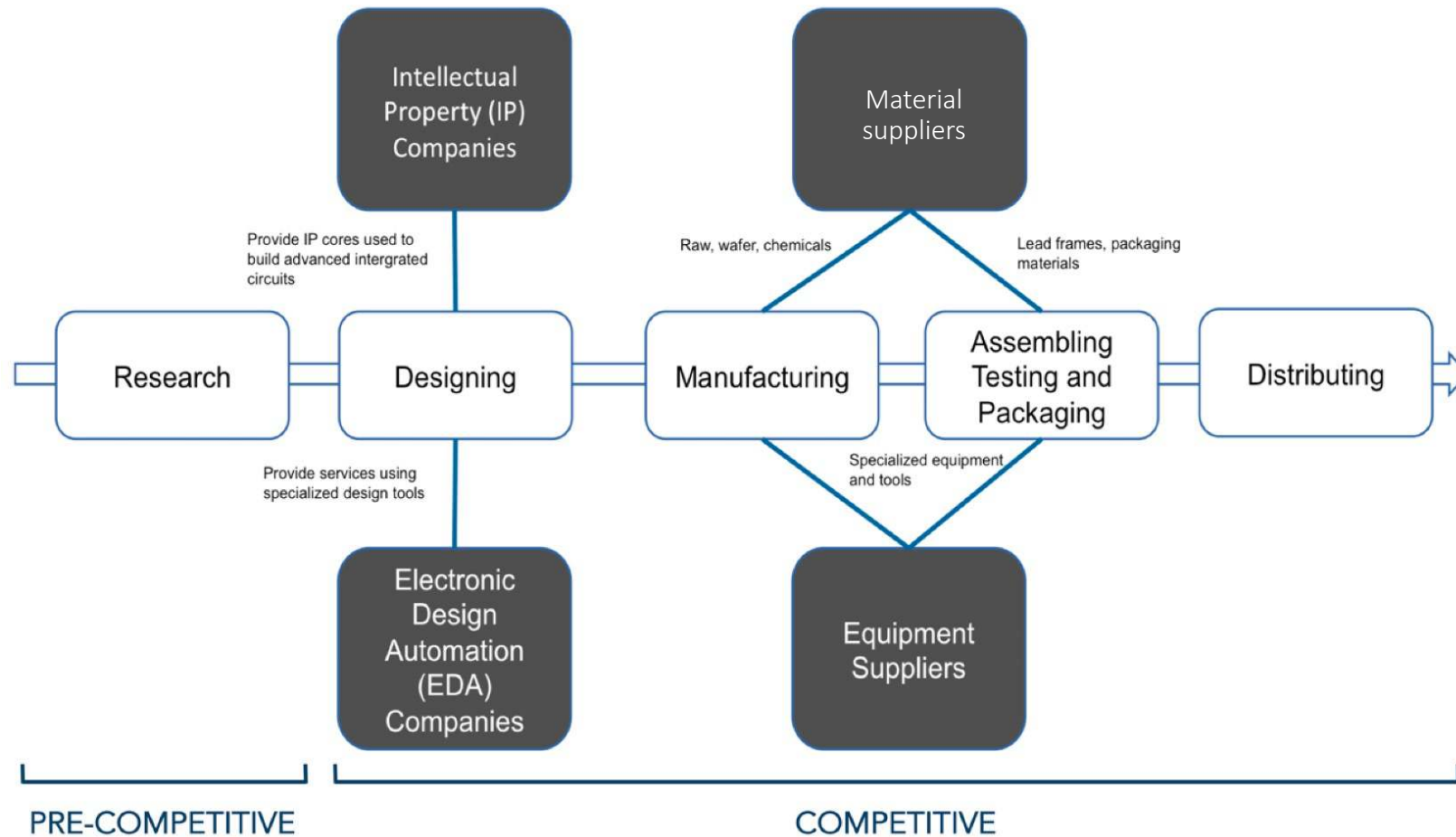
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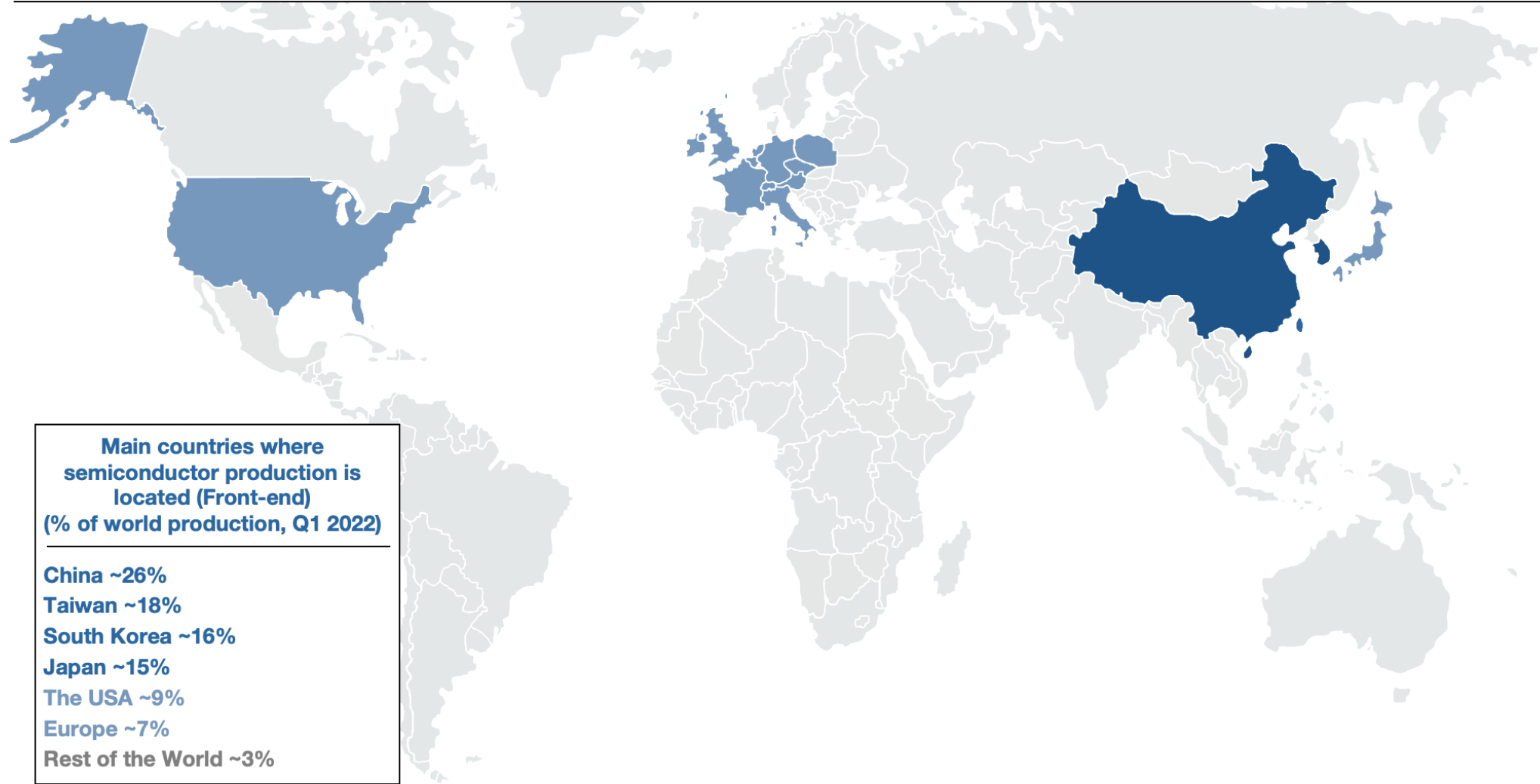
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# The semiconductor value chain

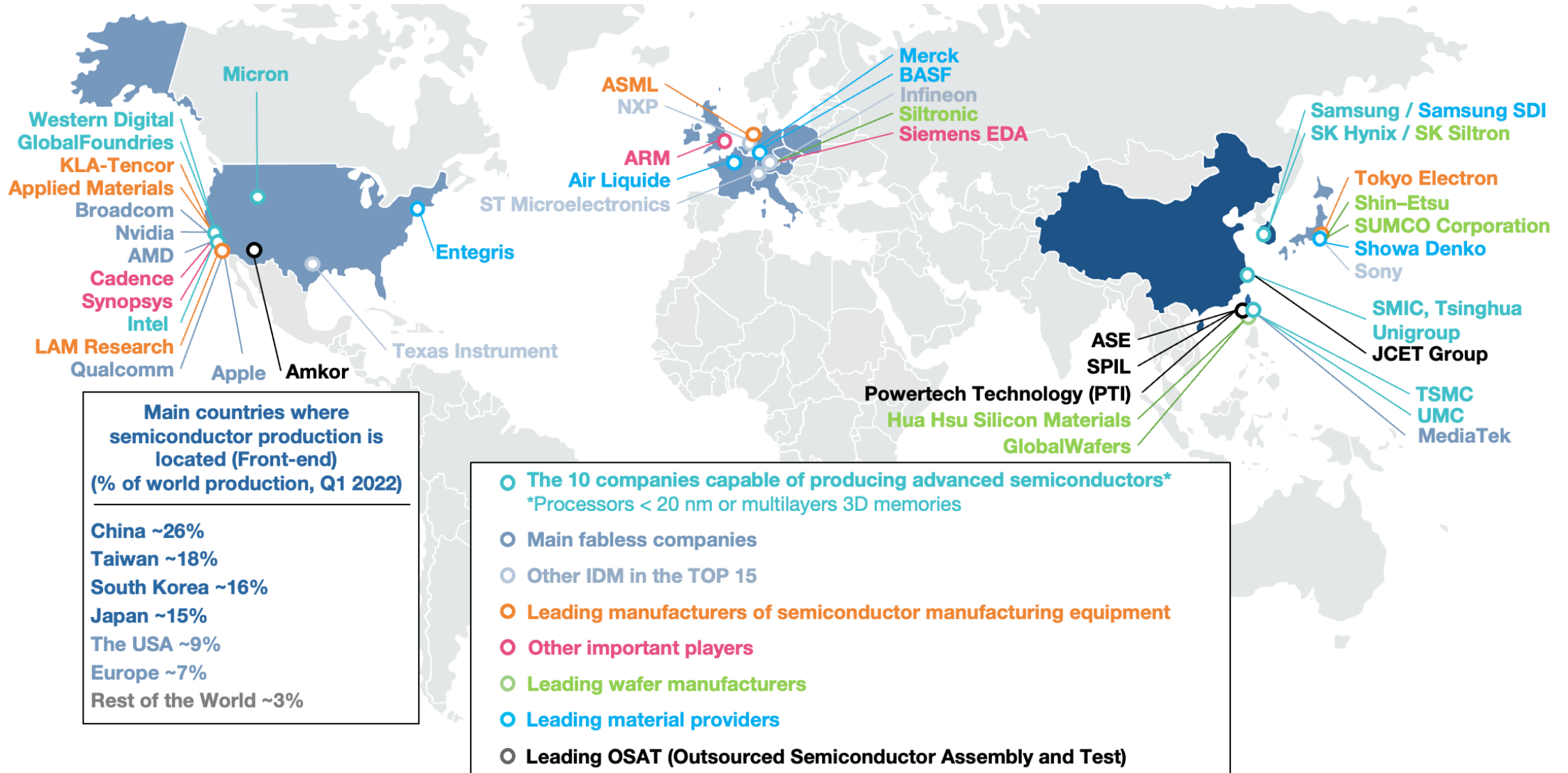


Source: DECISION Etudes & Conseil, ESIA

# Global Semiconductor landscape



# Global Semiconductor landscape



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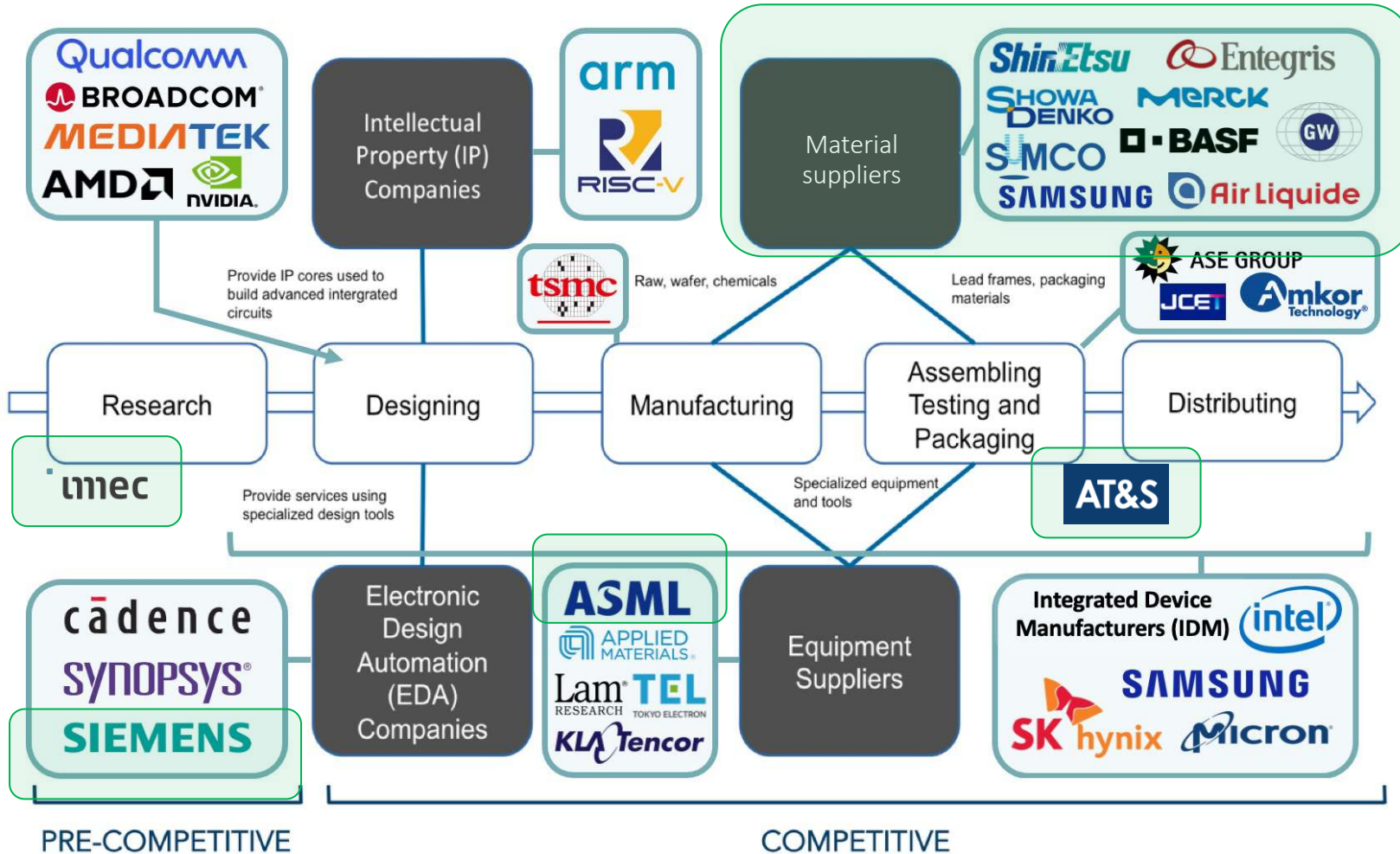
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# Main EU strengths

## Key EU players



Source: DECISION Etudes & Conseil, ESIA

## Strengths in applications

- Automotive
- Industrial & robotics
- Security
- Health & Care

## Strengths in products

- MCU
- Sensors & MEMS
- Power
- Analog / RF
- Thin edge computing
- Security IC

## EU IDMs



# Main EU market opportunities by 2030

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## Work in progress

### **Thick edge computing / thick edge AI**

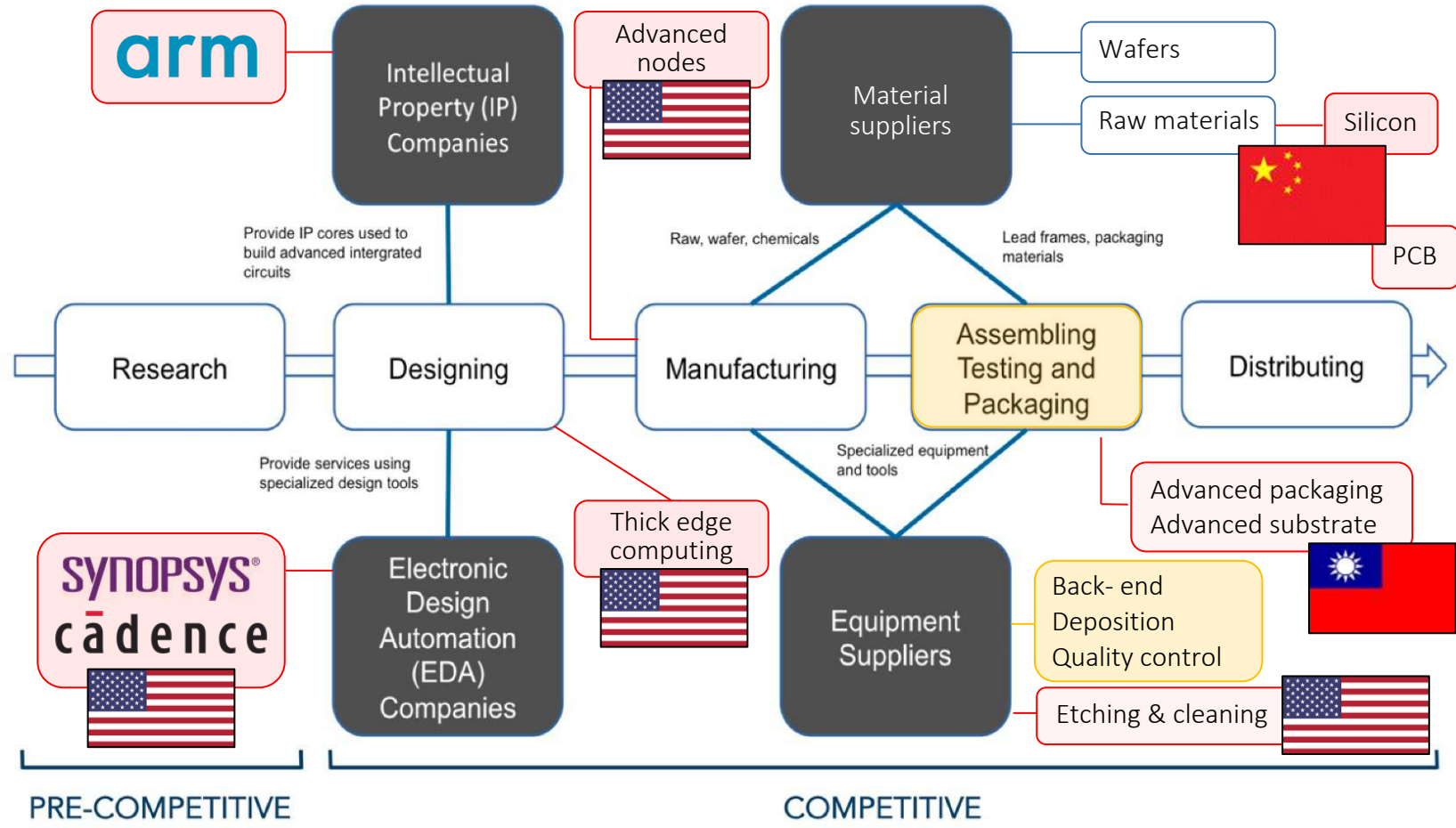
- Thick edge computing= Embedded IC for high-rate data processing
- The demand driven by the EU embedded markets (automotive...) is estimated to exceed **30 B€ by 2030**

### **Power IC**

### **Smart sensors**

### ...

# EU weaknesses & strategic dependencies



Source: DECISION Etudes & Conseil, ESIA

## Weaknesses

## Strategic dependencies

### + Talent shortage

- ❑ India, Pakistan
- ❑ Asia

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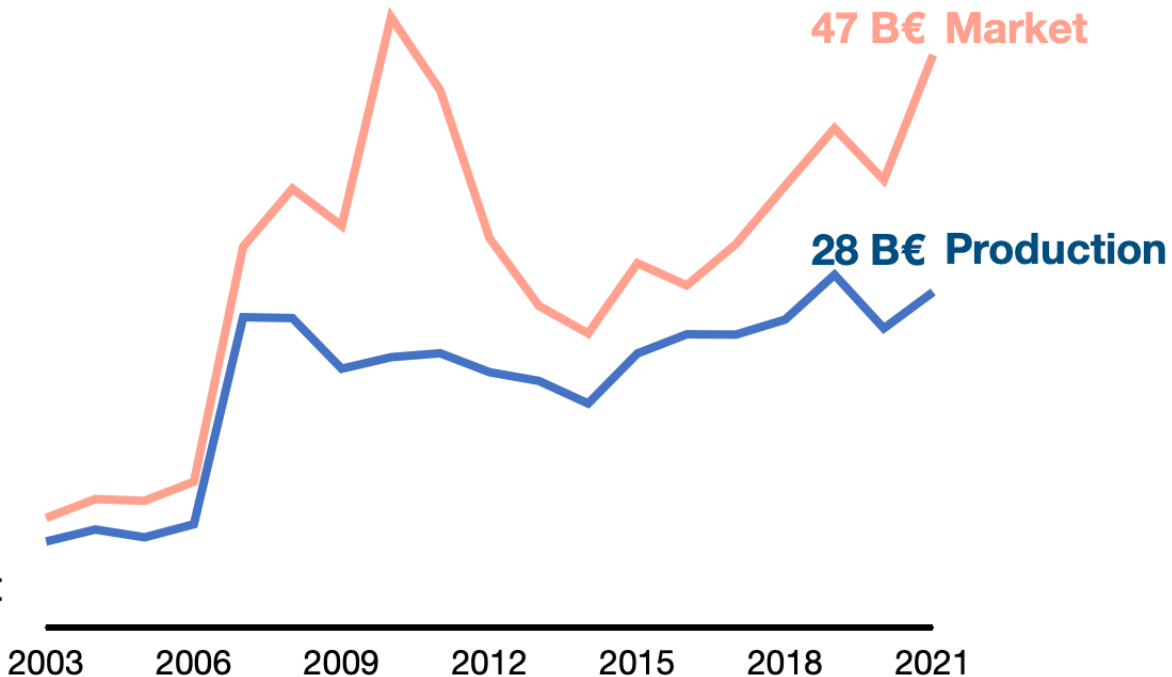
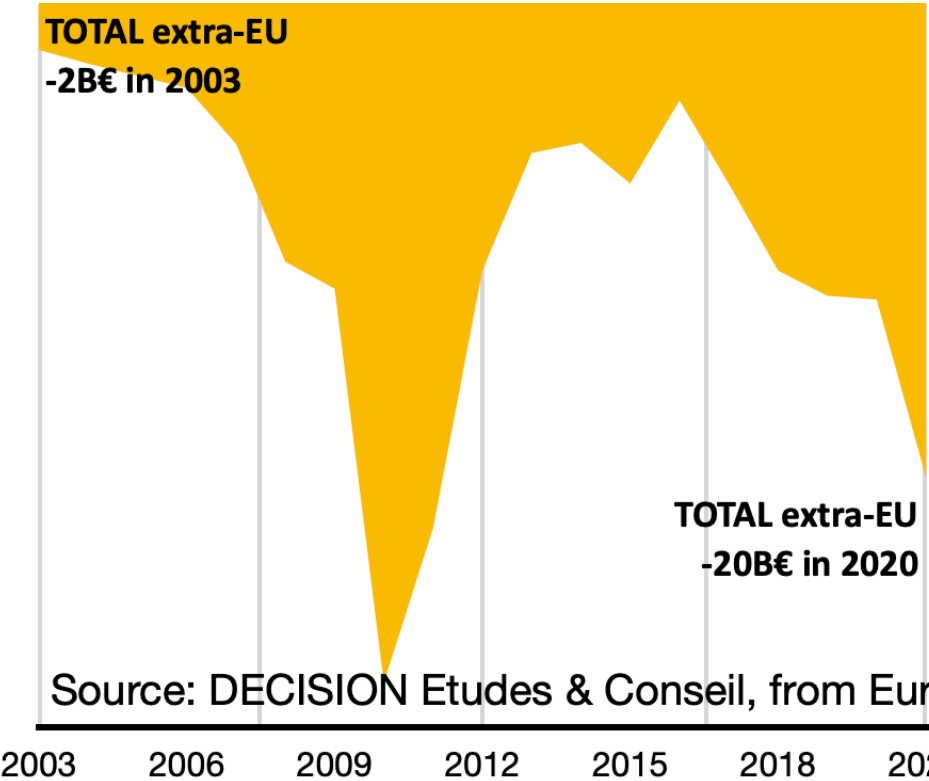
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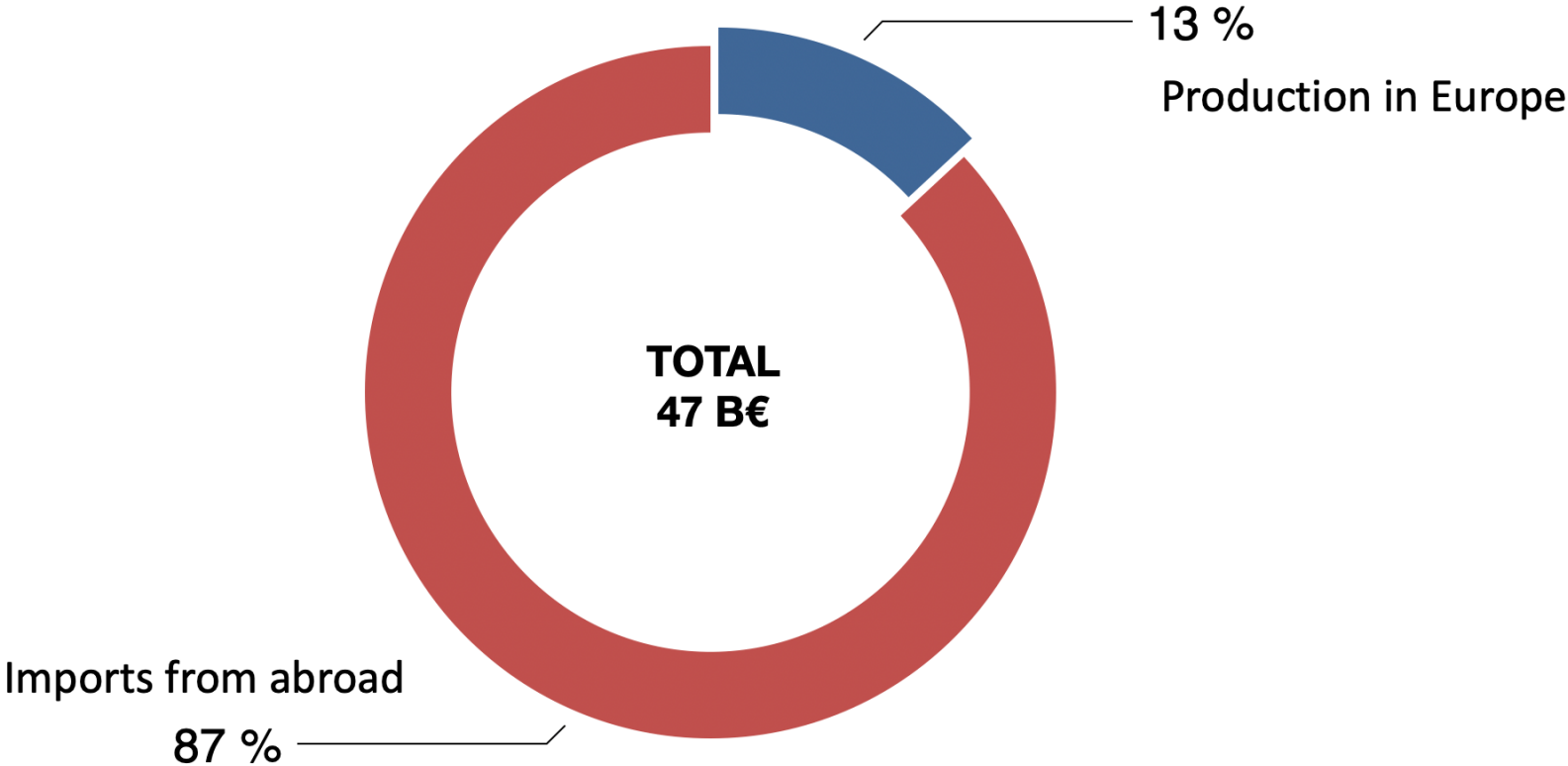
# The EU semiconductor trade balance

EU27 trade balance from 2003 to 2021



# The EU Semiconductor production covers 13% of our demand

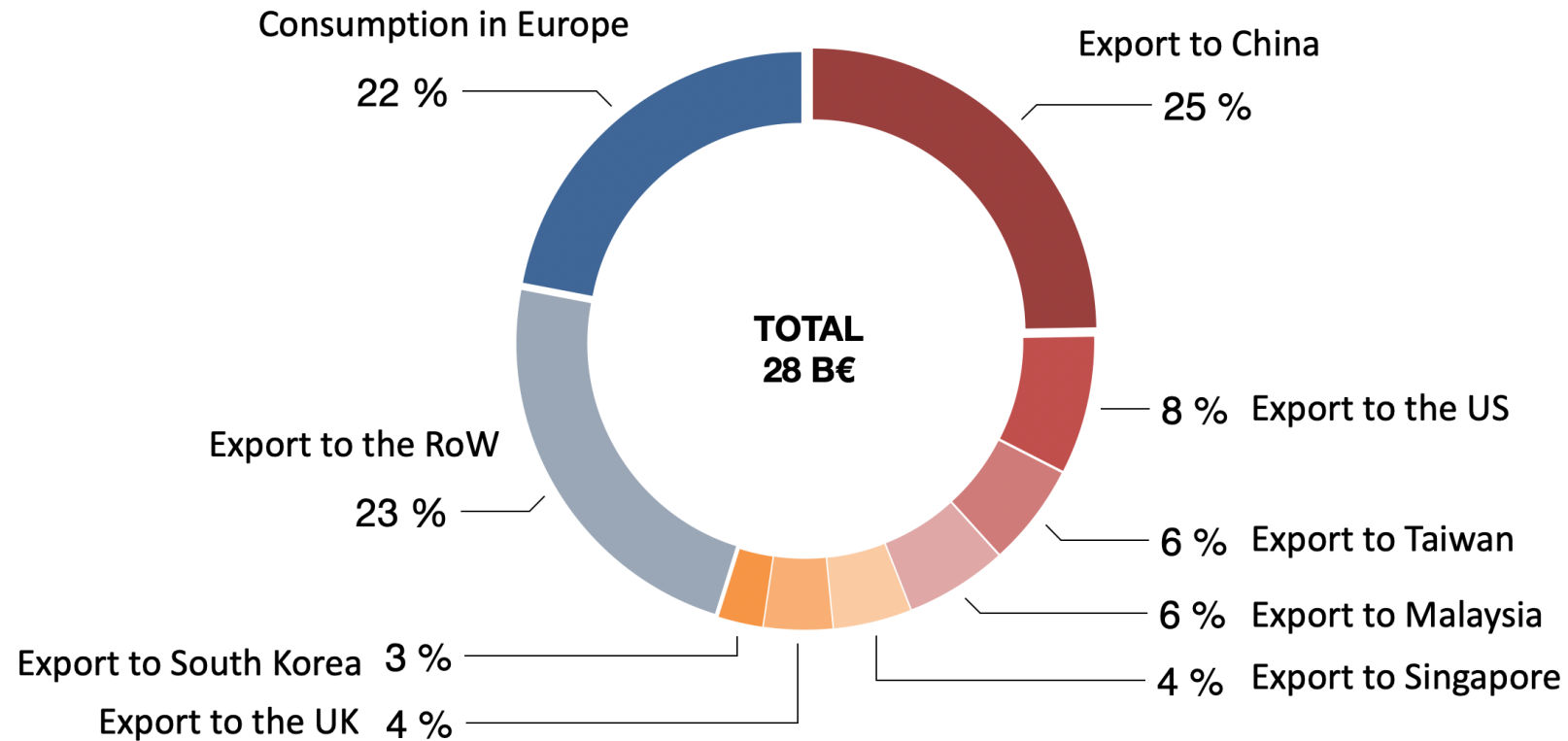
## European semiconductor market in 2021



Source: DECISION Etudes & Conseil, Eurostat, company financials

# Semiconductor trade partners of the EU (By location)

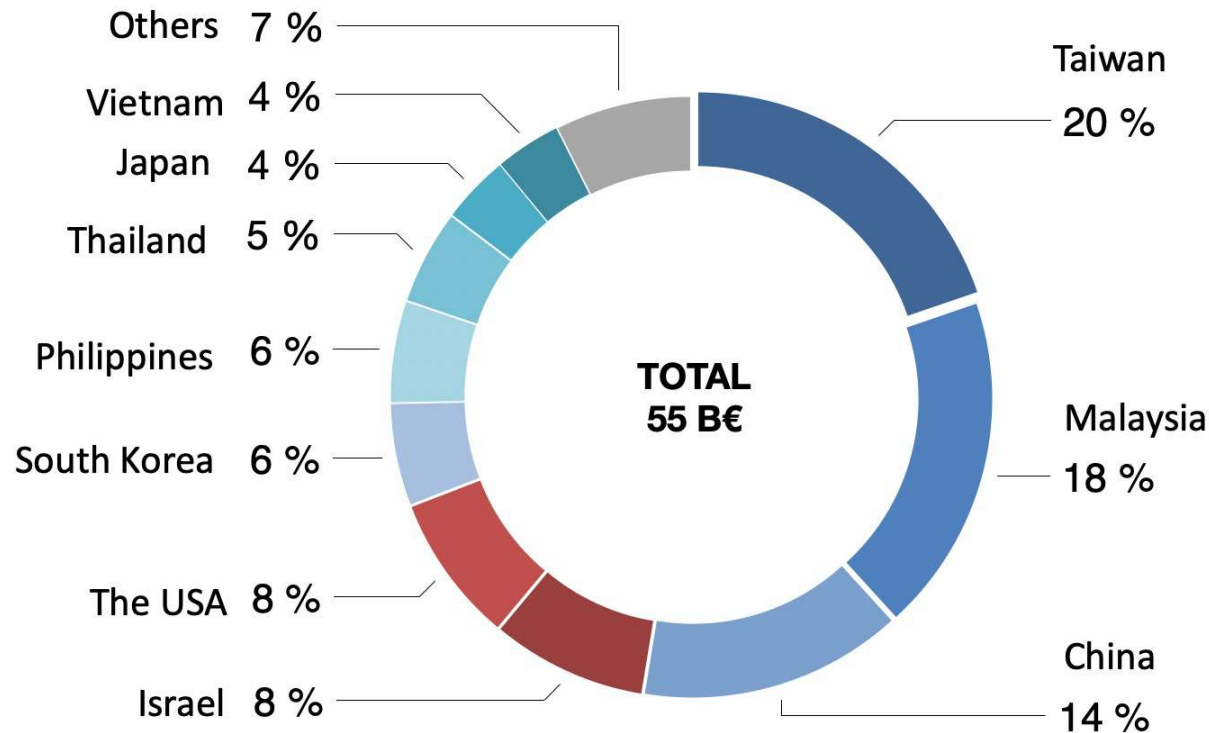
## Production of semiconductors in the EU27 in 2021



Source: DECISION Etudes & Conseil, Eurostat, company financials

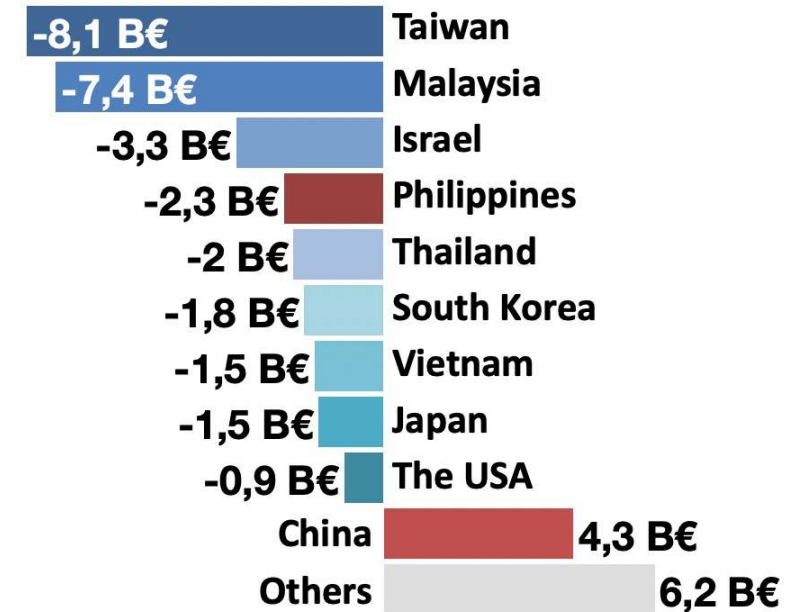
# Semiconductor trade partners of the EU (By location)

## Imports of semiconductors (excluding Opto) in the EU27 in 2022



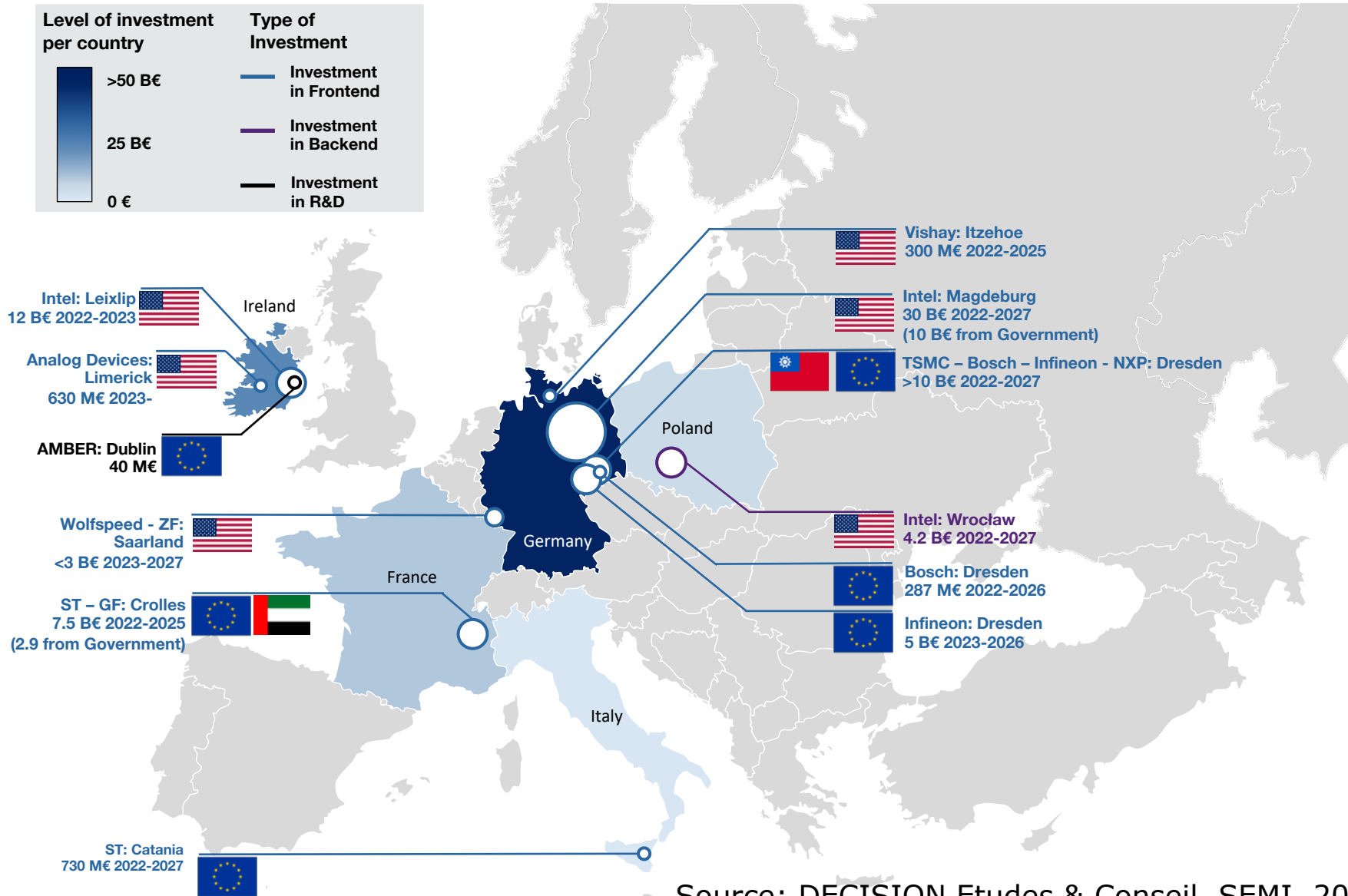
Source: DECISION Etudes & Conseil, Eurostat

## Semiconductors (excl. opto) Ranking of countries towards which the EU27 has a negative trade balance in 2022





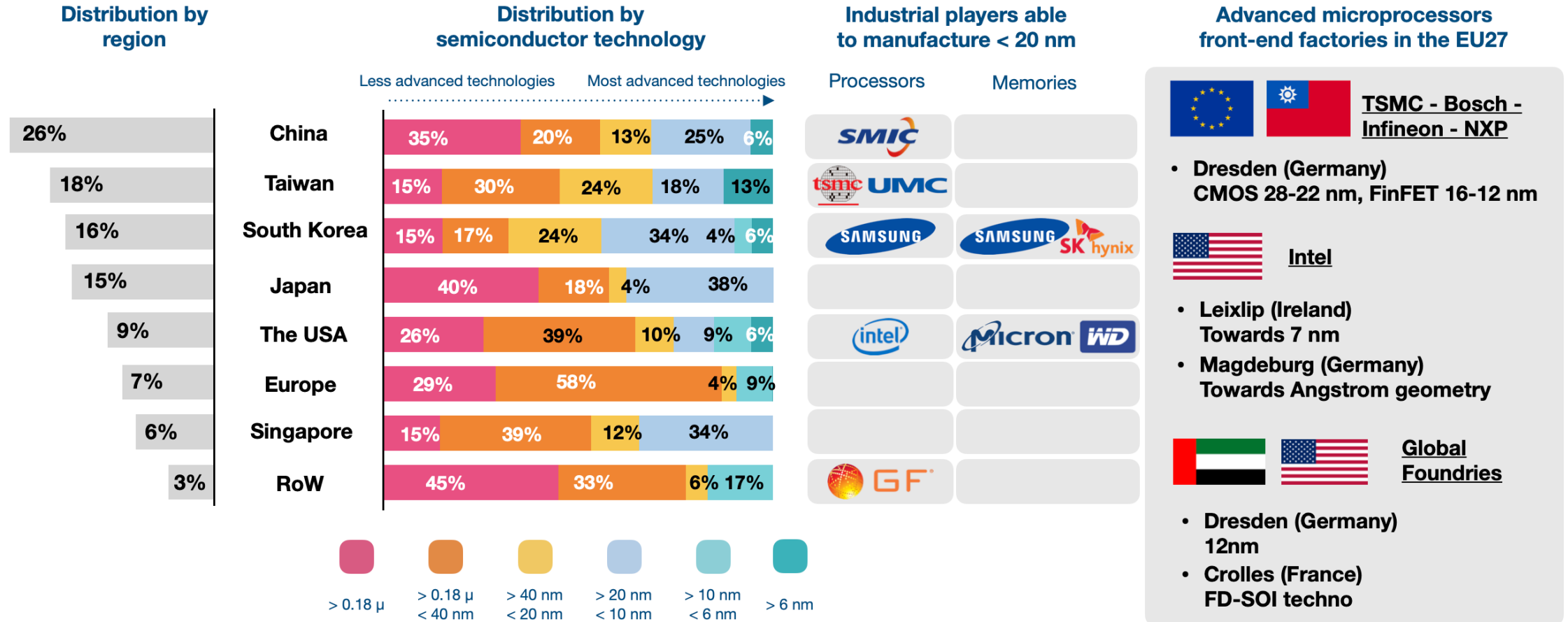
# Key investment projects in the EU



Source: DECISION Etudes & Conseil, SEMI, 2023

# Positioning the EU in terms of Front-end production capacities

## Installed capacity of semiconductor production in the World

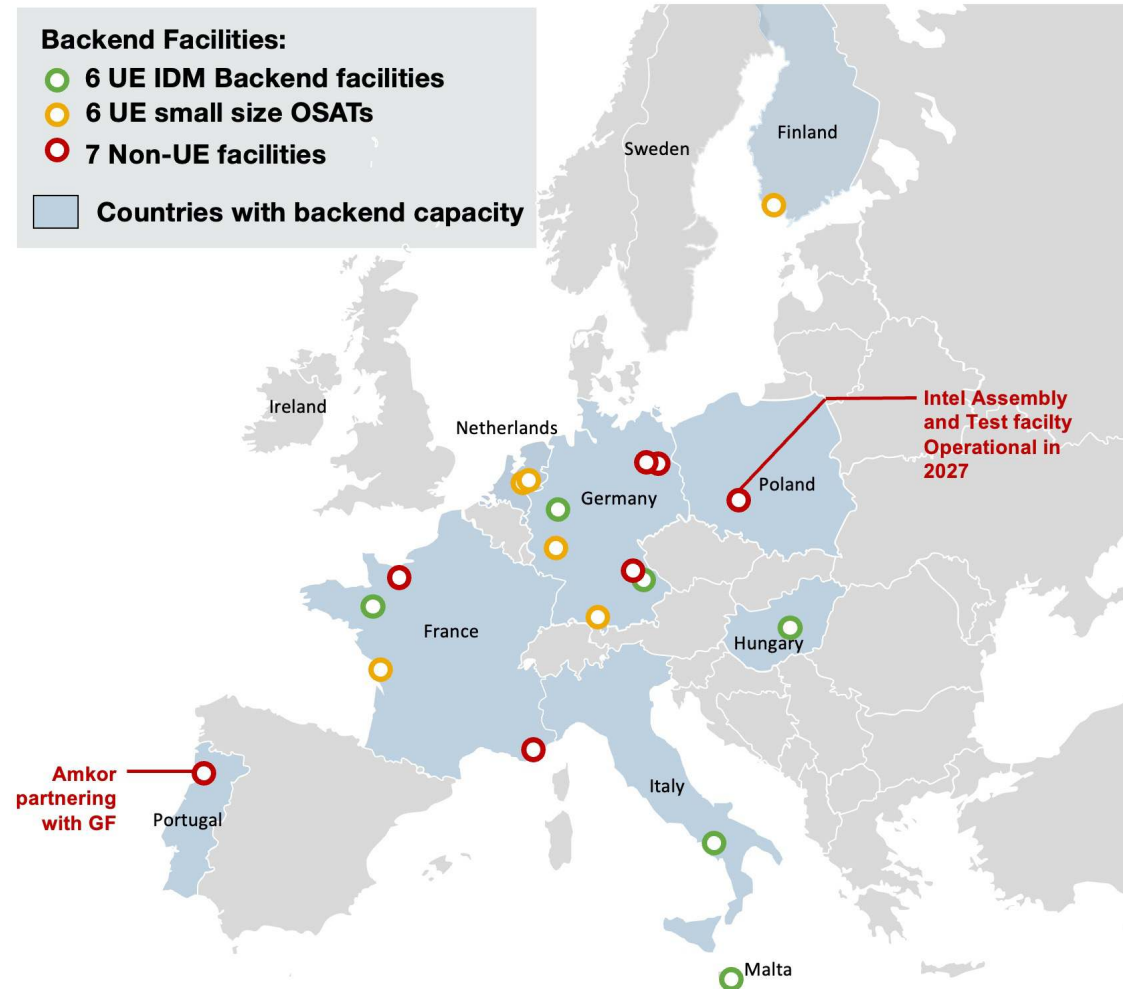


Millions of wafers per month (200 mm equivalent)

Source: DECISION Etudes & Conseil, Semi Database Q1 2022

# Positioning the EU in terms of Back-end production capacities

## Semiconductor: Backend facilities in Europe



# Thank you for your attention



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**Link to the online survey**

<https://fr.surveymonkey.com/r/8YPFB8R>