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

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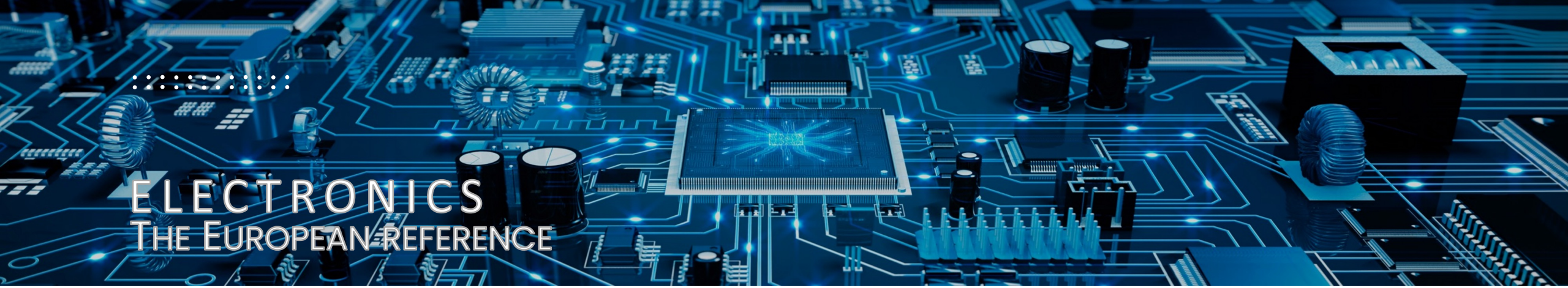
1) Presentation of the study within ICOS

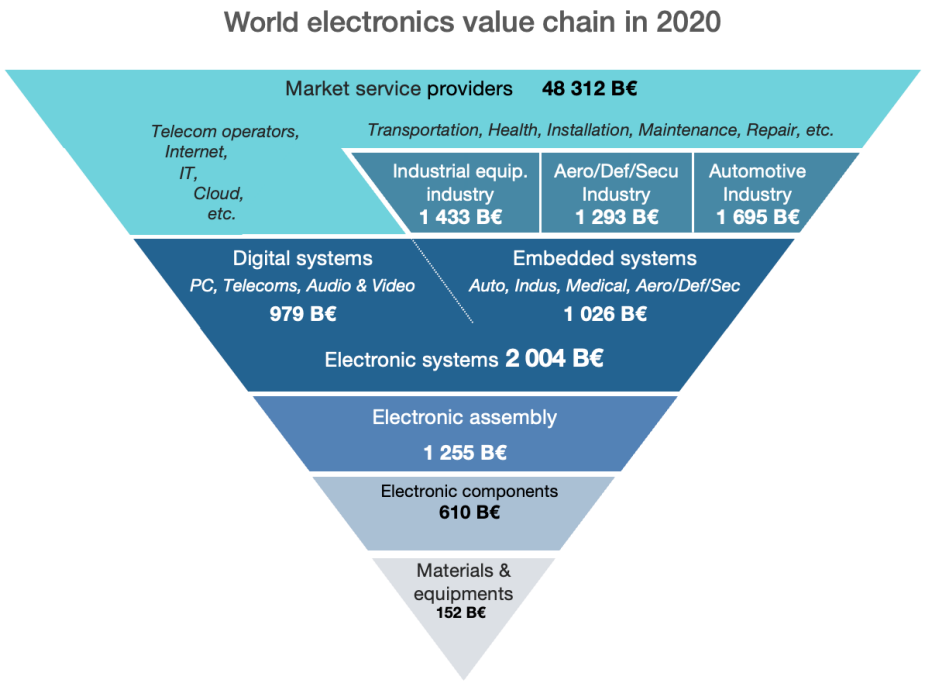
- **The ICOS project**
- The economic study
- Our approach to propose areas for cooperation

2) Interested in sharing your views on the topic?

3) Preliminary key findings

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





DECISION ETUDES & CONSEIL

DECISION carries an economic study detailing the :

- Electronic equipment production for approximatively 50 categories of equipment under :
  - ✓ Audio & video (TV sets, STBs, VCRs, DVD…)
  - ✓ Home Appliances
  - ✓ Data Processing (mainframe, large systems, servers, dedicated terminals, PCs, peripherals, ...)
  - ✓ Telecom (mobile, base station, fixed infrastructure, other terminals...)
  - ✓ Aerospace and defense (airborne systems, space, communications, missiles, land and sea based systems...)
  - ✓ Automotive (powertrain, chassis, safety - security - information)
  - ✓ Industrial and Medical electronics (vehicle systems, power supply, power distribution, automation,
  - ✓ medical electronics, instrumentation – measurement - test...)
- With figures 5-year forecasts for each region : Europe, North America, China, Japan, Other Asian countries, RoW.

The European reference for market research on electronic components, systems and applications

Sample of existing studies that DECISION conducts for the European Commission

OBJECTIVE

2022 – 2023

Study on the Economic Potential of Far Edge Computing in the Future Smart Internet of Things

Client: DG CONNECT

- Assessing the **economic potential** of a paradigm shift in the domain of the **Internet of Things (IoT) towards computing at the Edge**
- Including **AI and edge computing** landscape

2023 – 2026

International Cooperation On Semiconductors (ICOS)

Client: European Commission

- Advise the EC on **joint actions with leading semiconductor countries** in support of EU policies
- Identification of **emerging opportunities** (e.g., technologies, approaches) **for cooperation with other regions**
- Definition of **research areas in which international cooperation would result in tangible benefits for Europe**
- **Including optoelectronics and edge AI**

2023 – 2026

FwC for the provision of Studies and related services on digital policy issues

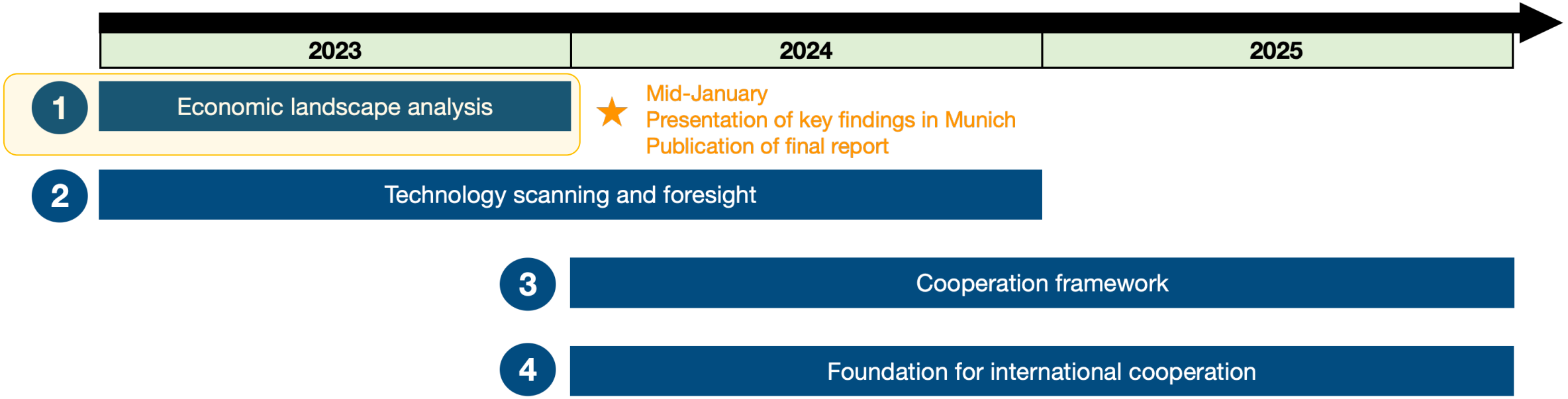
Client: European Commission

- Studies on the **implementation of existing legislation,** programmes and other legislative and non-legislative instruments
- **Economic modelling and forecasting**
- **Technology foresight & monitoring** in specific domains
- **Expert and stakeholder consultation activities**

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

Goals

Economic analysis of the EU semiconductor ecosystem

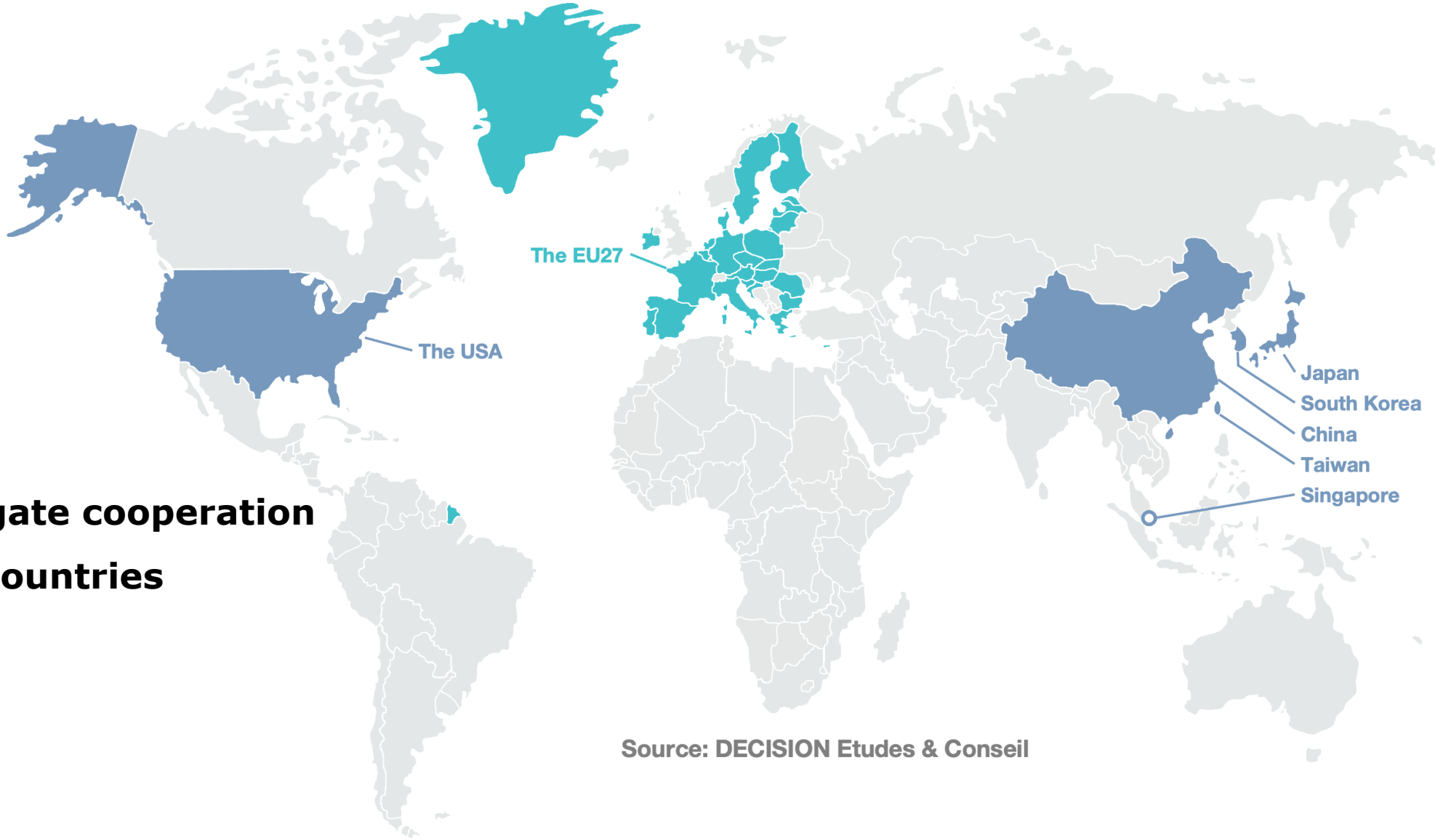
- Economic / industrial strengths & weaknesses
- Strategic dependencies
- Evolution over the past 5 years

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

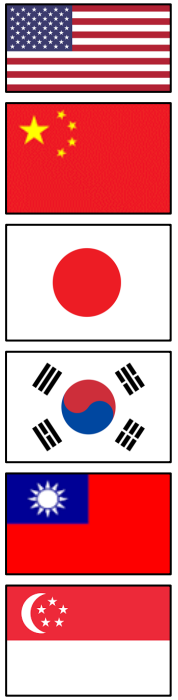
Content of the report

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)

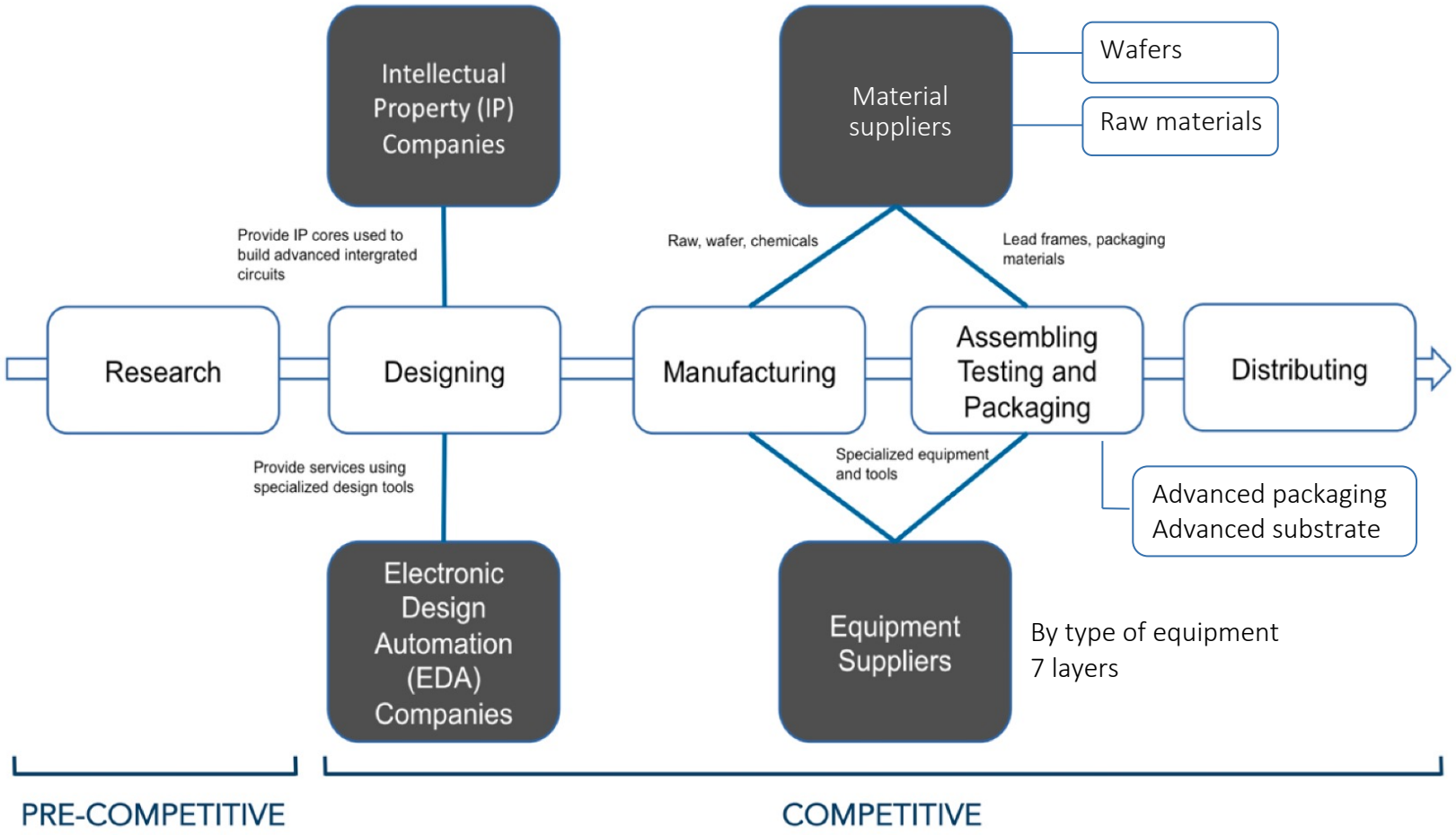
I. Country semiconductor landscape

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

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

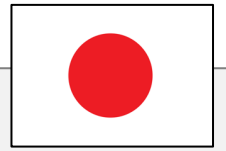
Model of the economic situation
Between the EU and each tier country

The EU

1. Industry (Supply)
2. Market (Demand)
3. R&D
4. Education
5. Policies

Trades

Strategic dependencies



Japan

1. Industry (Supply)
2. Market (Demand)
3. R&D
4. Education
5. Policies

Strategic dependency Definition

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

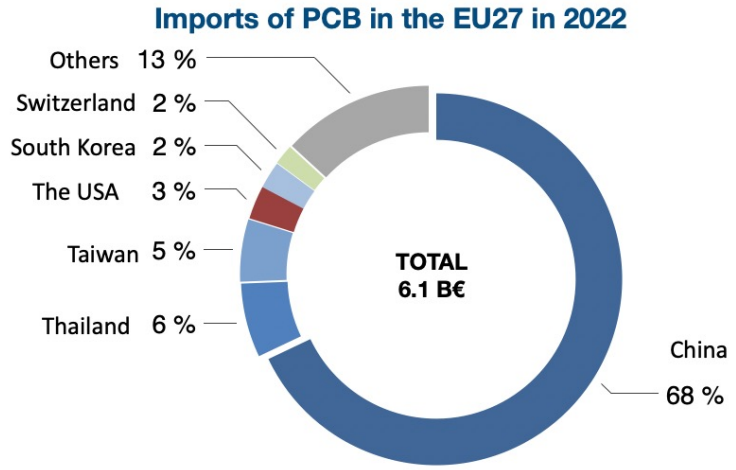
Example of strategic dependency

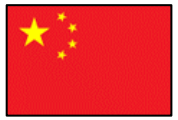
The EU is dependent towards China for **PCB manufacturing**

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 AT&S

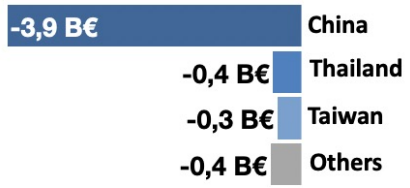
Reliance on a limited number of countries





PCB

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



Source: DECISION Etudes & Conseil, Eurostat

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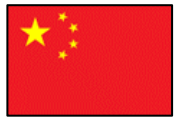
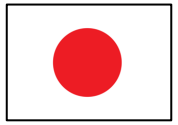
Key question

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

Baseline
Review per country & region




Qualitative Review ● ● ●

Quantitative Review Key figures ● ● ●

Strengths & Dependencies ● ● ●

Approach
Criterium 1: Leverage mutual strengths

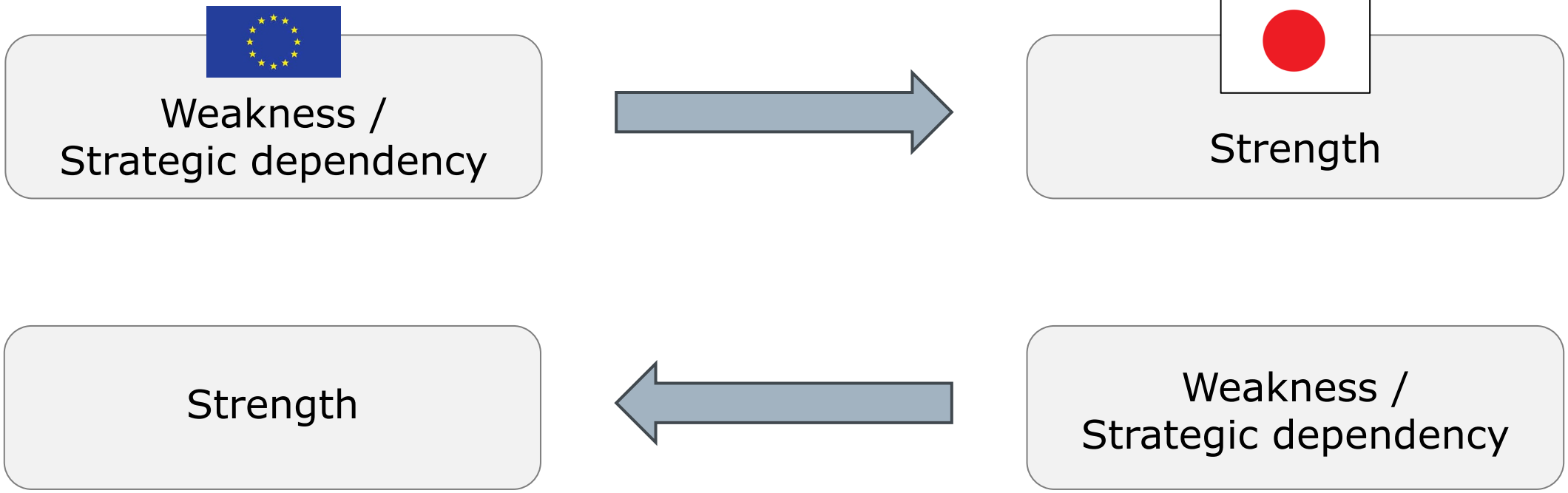
Strengths

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

Leveraging mutual strengths

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

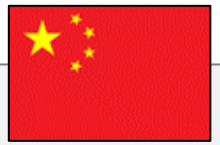
Approach
Criterium 2: Crossed cooperation



Approach
Criterium 3: Bridge mutual weaknesses

Weakness /
Strategic dependency

Common weakness and willingness to cope with it



Weakness /
Strategic dependency

Example:

- EU and China on advanced semiconductor manufacturing
- …

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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?

Link to the online survey

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

28 answers (to date)

Large companies

BOSCH

DASSAULT SYSTEMES

RTO

TNO

cea

Startups

RIBER

Government

GOBIERNO DE ESPAÑA

MINISTERIO DE ASUNTOS ECONÓMICOS Y TRANSFORMACIÓN DIGITAL

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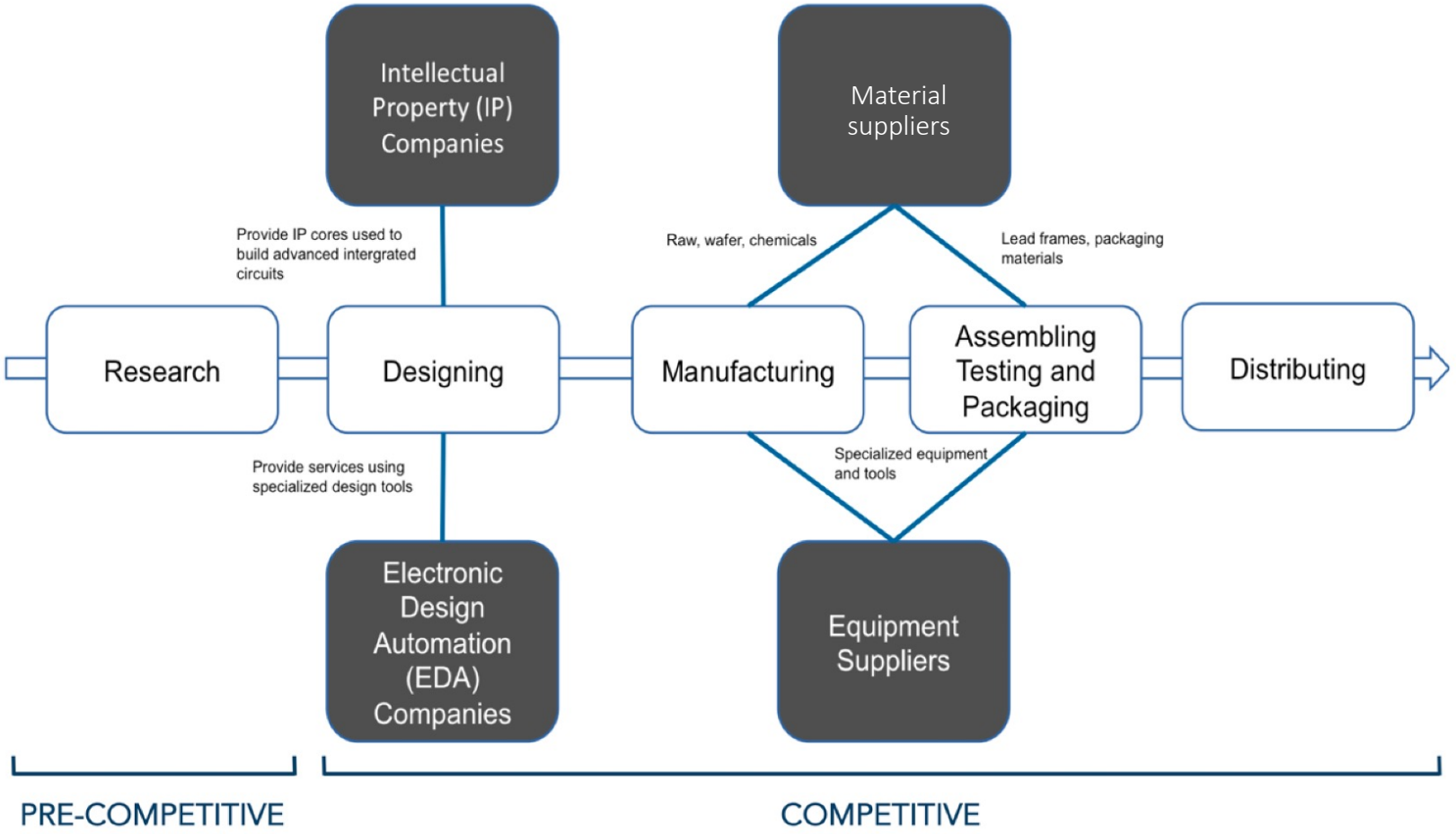
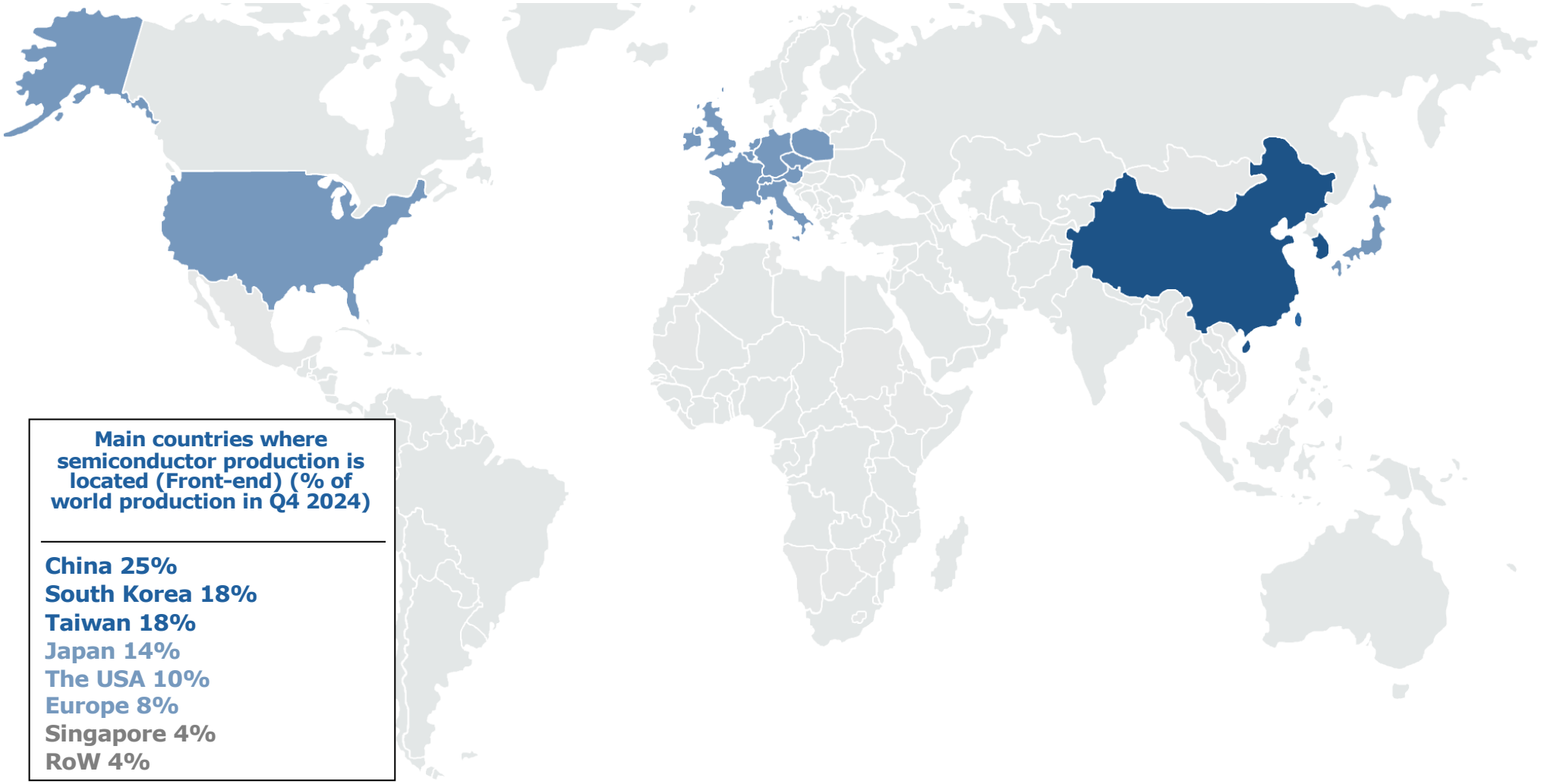
The semiconductor value chain



Source: DECISION Etudes & Conseil, ESIA

Global Semiconductor landscape

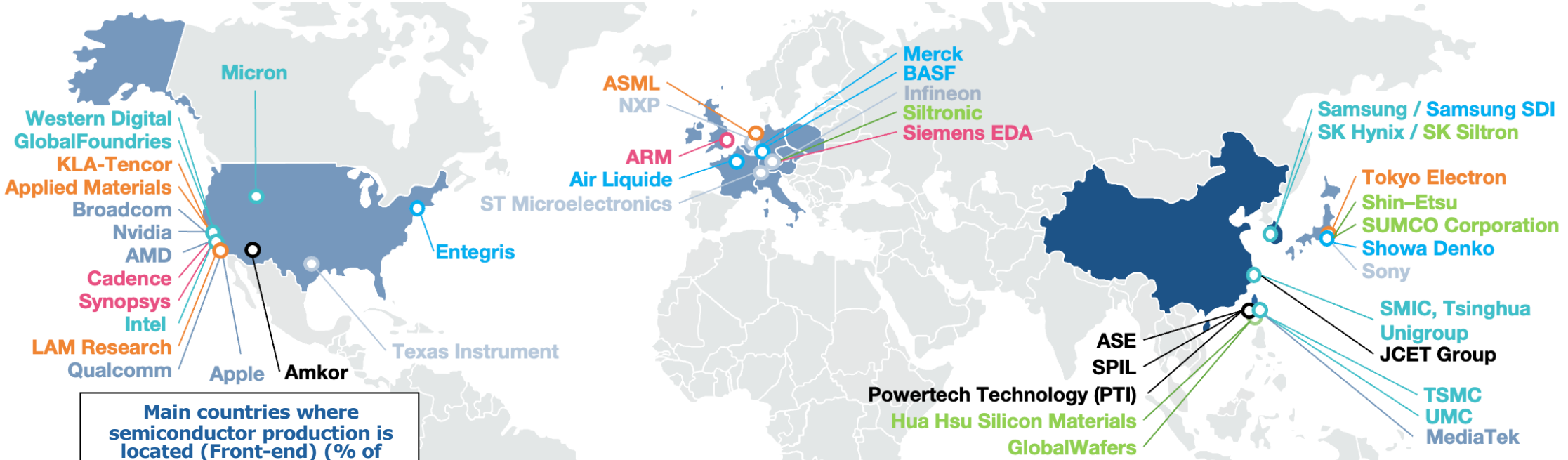


Main countries where semiconductor production is located (Front-end) (% of world production in Q4 2024)

China 25%
South Korea 18%
Taiwan 18%
Japan 14%
The USA 10%
Europe 8%
Singapore 4%
RoW 4%

Source: DECISION Etudes & Conseil, SEMI

Global Semiconductor landscape



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- **The 10 companies capable of producing advanced semiconductors***
  *Processors < 20 nm or multilayers 3D memories
- **Main fabless companies**
- **Other IDM in the TOP 15**
- **Leading manufacturers of semiconductor manufacturing equipment**
- **Other important players**
- **Leading wafer manufacturers**
- **Leading material providers**
- **Leading OSAT (Outsourced Semiconductor Assembly and Test)**

Source: DECISION Etudes & Conseil, SEMI

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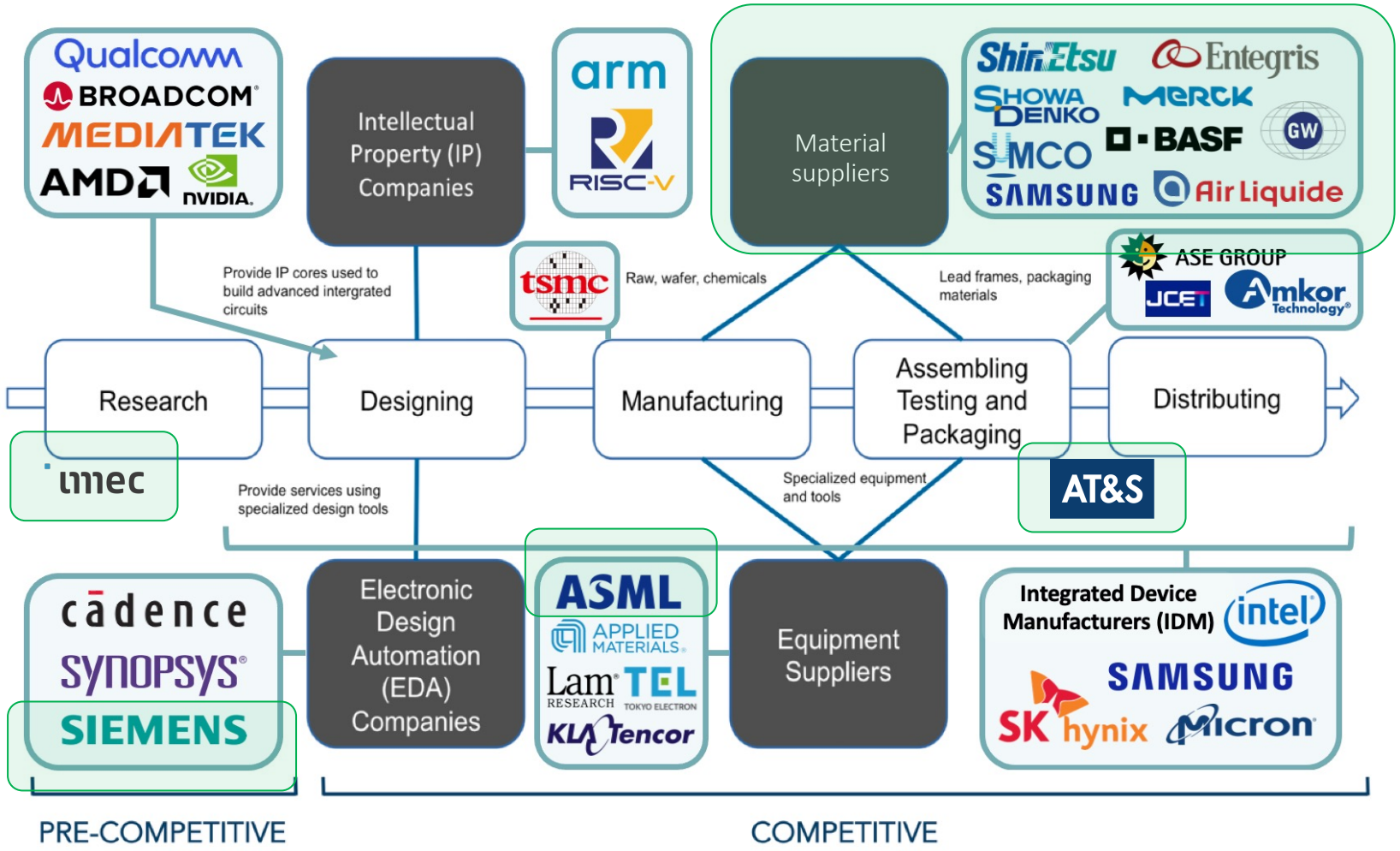
Main EU strengths

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

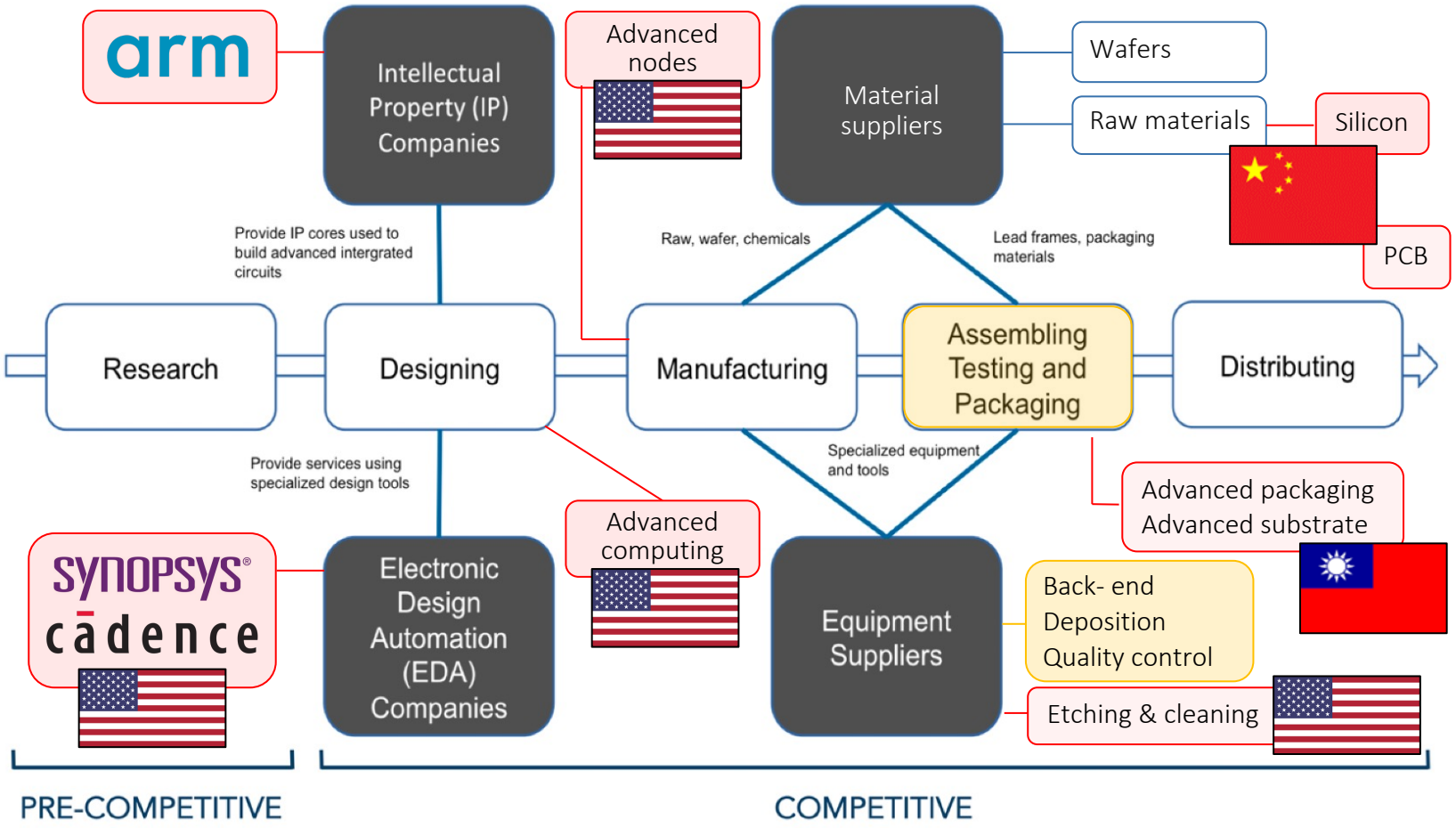
ST NXP Infineon BOSCH ams

Main EU market opportunities by 2030

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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Thank you for your attention

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Link to the online survey

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