Fast track to EU Strategic Autonomy

*Speed check for **digital**, green and health*

Tuesday 6th December 2022

![icom institute for competitiveness logo]

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Telecommunications networks and 5G

Digital networks deployment at global level

- Communication **networks** are the **lynchpin** for economic and societal development and especially 5G, as it **enables new services** (eg. IoT).

- In 2021, **mobile** technologies and services contributed to generating **5% of global GDP**, equal to **$4.5 trillion** (expected to increase to $5 trillion by **2025**).

- **5G** alone is expected to bring **$960 billion** in economic benefits globally **by 2030**.

- **5G developent** is based in only a **few** countries

  ➢ The largest holder of **patents** is **China**, followed closely by the **US**

  ➢ the **EU** only counts two representatives among the world's top players in the sector

Patents of 5G family technologies by country of owner

- 41,4% China
- 19,9% South Korea
- 15,4% USA
- 8,9% Japan
- 8,4% Finland
- 4,7% Sweden
- 1,5% Taiwan
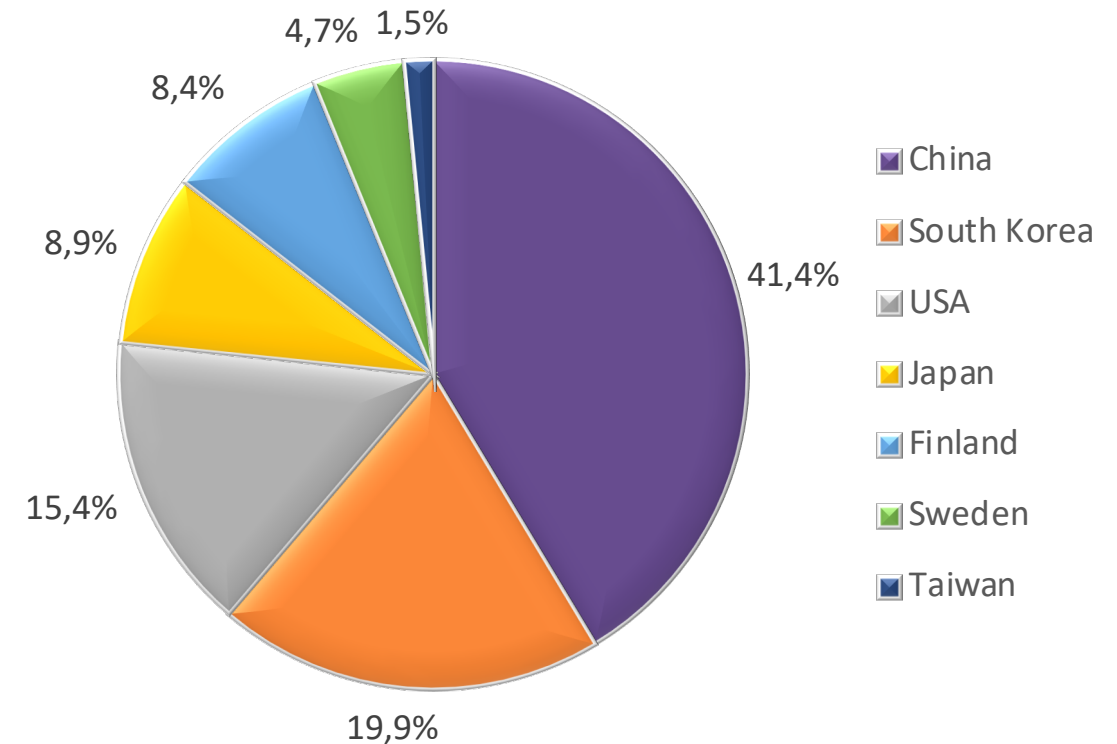
Telecomunications patents

Patents registered in the field of 'telecommunications' by geographical area of applicant (2015-2020)
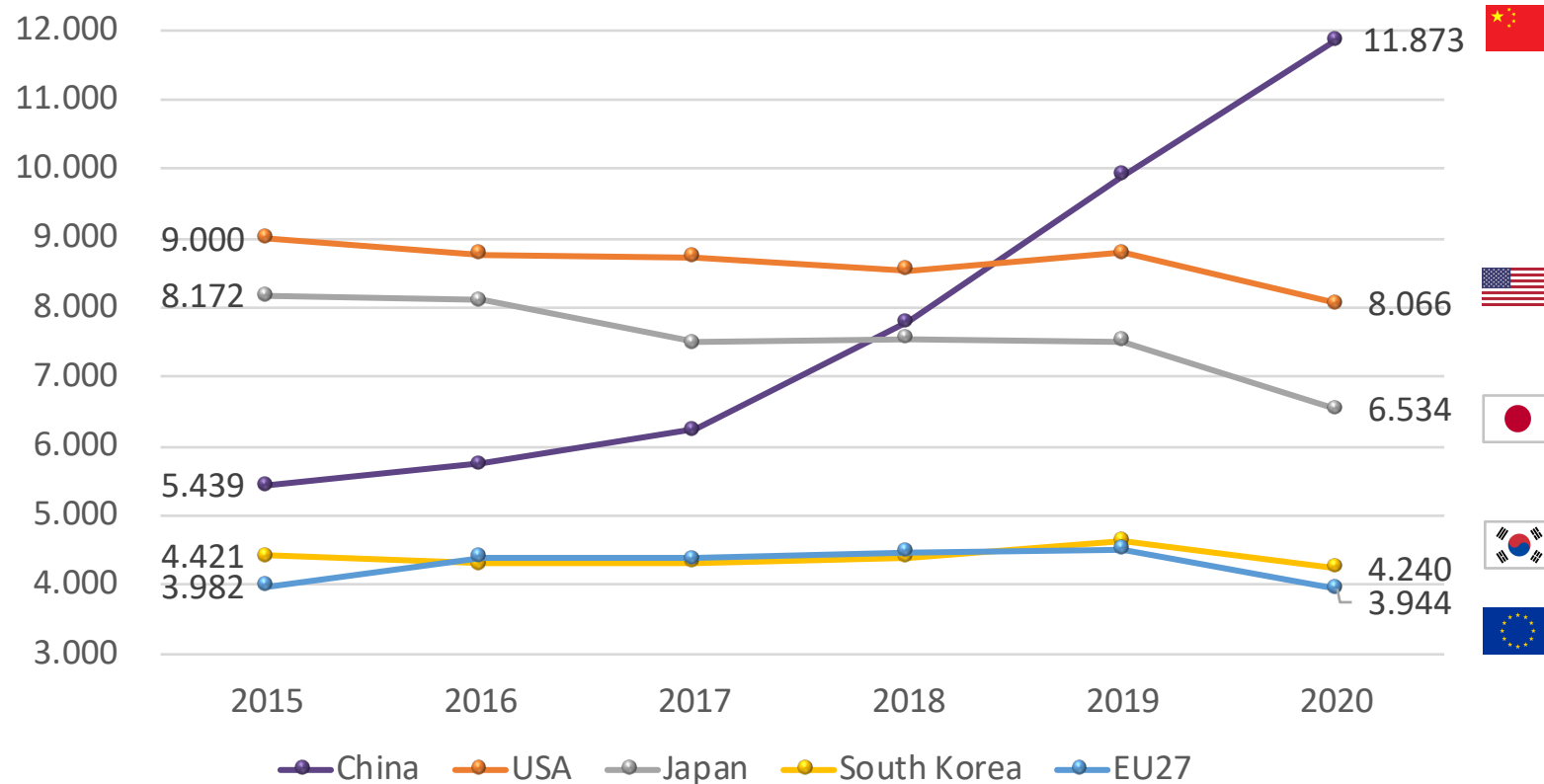
Extending the research to the **entire telecommunications** domain (**WIPO** database) data shows that **China** has embarked on a **powerful growth trajectory** in recent years
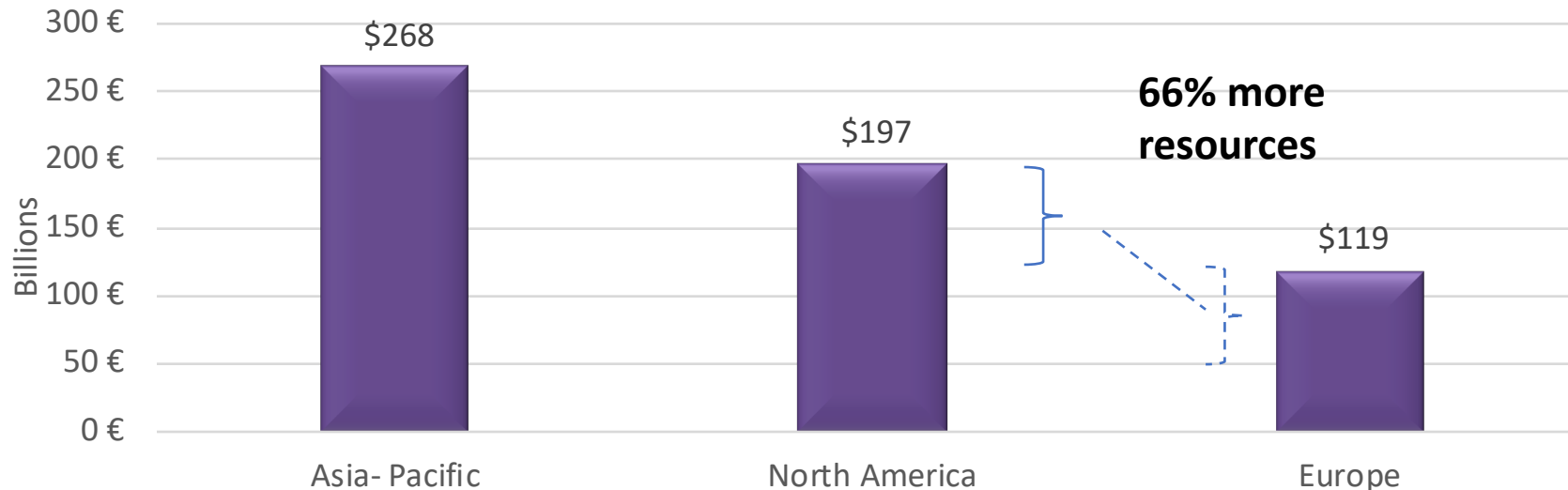
➤ In the period **2015-2020**, **patents** registered by organisations based in China **more** than **doubled** (+112%)

With around **4,000 patents registered annually, the EU** is falling well behind

Legend: China — USA — Japan — South Korea — EU27

Data labels: 11.873, 8.066, 6.534, 5.439, 9.000, 8.172, 4.421, 3.982, 4.240, 3.944

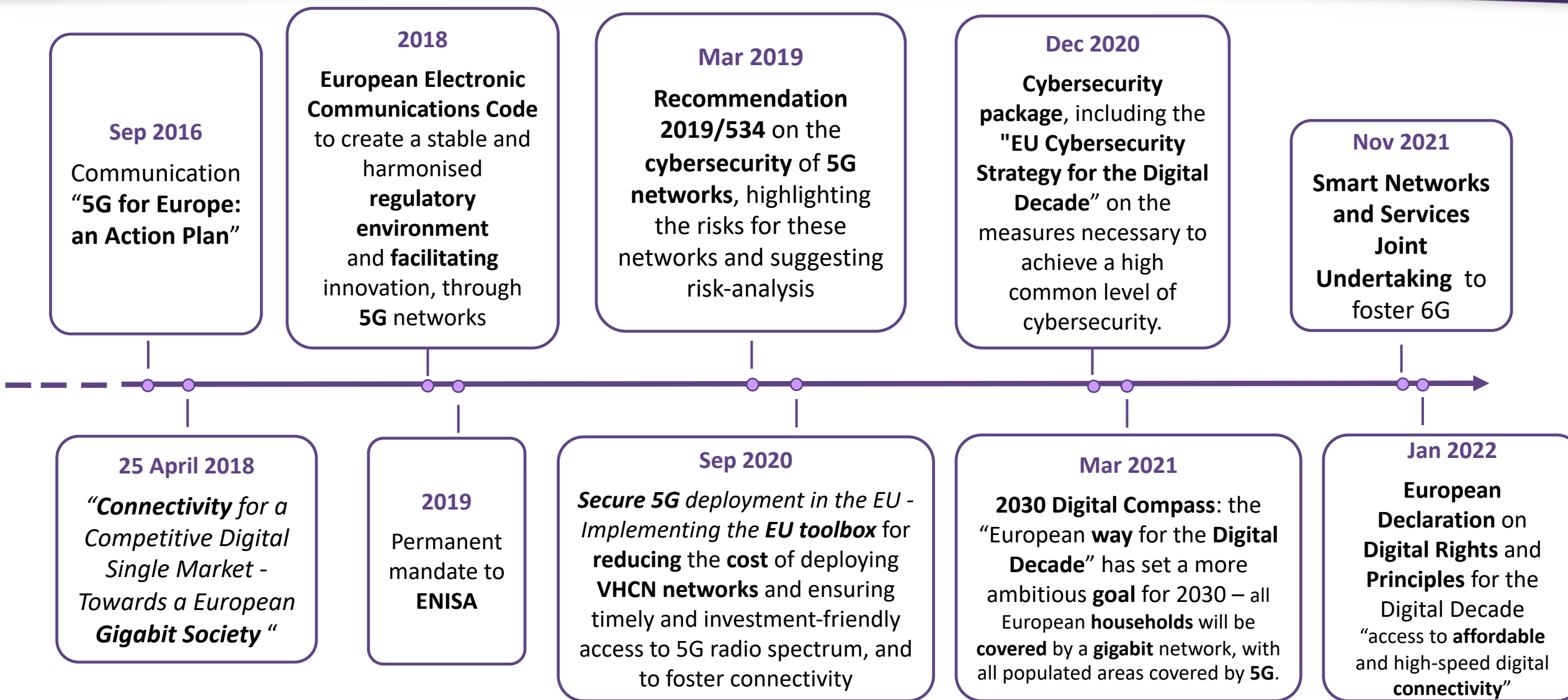# Technology gap as volume of investments

The technology **gap** can also be seen in the **volume** of **investments planned** by mobile network operators

➢ **North American** operators allocate **66% more resources** (over $78 billion) to investments than their European competitors.

Mobile network operators' investments planned for 2022-2025 by geographical area
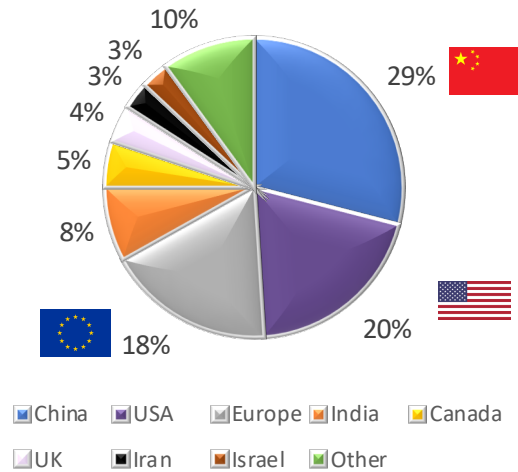
Initiatives to encourage development and security of 5G and digital networks in Europe
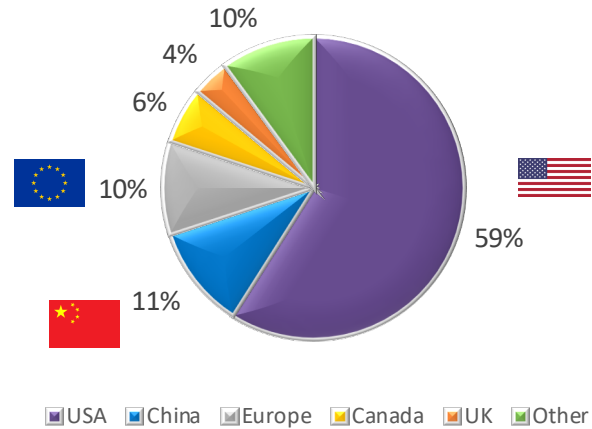
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Sep 2016

Communication "**5G for Europe: an Action Plan**"

2018

European Electronic Communications Code to create a stable and harmonised **regulatory environment** and **facilitating** innovation, through **5G** networks

Mar 2019

Recommendation 2019/534 on the **cybersecurity** of **5G networks**, highlighting the risks for these networks and suggesting risk-analysis

Dec 2020

Cybersecurity package, including the **"EU Cybersecurity Strategy for the Digital Decade"** on the measures necessary to achieve a high common level of cybersecurity.

Nov 2021

Smart Networks and Services Joint Undertaking to foster 6G

25 April 2018

"*Connectivity for a Competitive Digital Single Market - Towards a European Gigabit Society* "

2019

Permanent mandate to **ENISA**

Sep 2020

Secure 5G deployment in the EU - Implementing the EU toolbox for **reducing** the **cost** of deploying **VHCN networks** and ensuring timely and investment-friendly access to 5G radio spectrum, and to foster connectivity

Mar 2021

2030 Digital Compass: the "European **way** for the **Digital Decade**" has set a more ambitious **goal** for 2030 – all European **households** will be **covered** by a **gigabit** network, with all populated areas covered by **5G**.

Jan 2022

European Declaration on **Digital Rights** and **Principles** for the Digital Decade "access to **affordable** and high-speed digital **connectivity**"

Artificial Intelligence

The path of major global economies towards AI

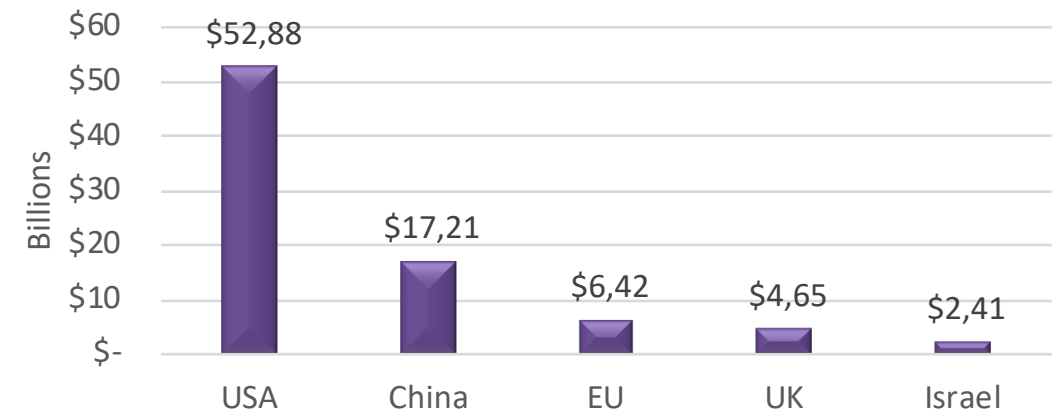## Where do high-level AI researchers come from?

Legend: China, USA, Europe, India, Canada, UK, Iran, Israel, Other

- China 29%
- USA 20%
- Europe 18%
- India 8%
- Canada 5%
- 4%
- 3%
- 3%
- Other 10%

Where do high-level AI researchers work?

Legend: USA, China, Europe, Canada, UK, Other

- USA 59%
- China 11%
- Europe 10%
- 6%
- 4%
- Other 10%

The **US** maintains supremacy in **AI research,** due to the **attractiveness** of working for US organisations

- data on **high-level AI researchers** (UNCTAD) show that
  - while the **countries** of **origin** of researchers appear to be quite **varied** (China 29%, US 20% and Europe 18%)
  - the **place** of **work** of the vast majority of them is the **USA** (59%).
- the **EU** seems unable to **retain** its top talent
  - despite being the area of **origin** of **18%** of top-level researchers, professionally speaking Europe **hosts only 10%** of them.

- This scenario has become possible thanks to the deployment of a **huge amount** of resources **devoted** to **AI**
  - **American companies** becoming much more **attractive** than their competitors
- In 2020, **private investment** in **AI** in the **US** reached **$52.88 billion**
  - **more** than the **total** amount spent by the **four** geographical areas **following** it
- **EU** puts into play **less** than **half** of **China**'s resources and about **1/8** of those of the **US**.

Private investment in AI by geographic area (2020)

- USA $52,88
- China $17,21
- EU $6,42
- UK $4,65
- Israel $2,41

Source: The Global AI Talent Tracker; Artificial Intelligence Index Report 2022, Stanford University

European Framework on AI

It is important to **accelerate** the **development** of AI and **create** a regulatory **framework** to guarantee the effective protection of **fundamental rights**.

➢ 2018: "**AI for Europe**", the official kick-off of the EU's actions

➢ 2019: High-Level **Expert Group** on Artificial Intelligence presents **Ethics Guidelines for Trustworthy AI**

➢ 2020: "Artificial Intelligence: a European Approach to Excellence and Trust" to create an **ecosystem of excellence** and an **ecosystem of trust** for AI

➢ April **2021**: **AI Package**, with proposal for an **AI Regulation** laying down harmonised rules for the EU (**AI Act**), to establish the world's first AI all-encompassing **regulatory framework**, set leverage in **exporting** trustworthy AI around the world and create a **set** of international AI **standards** based on **European values**

  ➢ **risk-based approach** evaluated in an *ex ante* conformity assessment

  ➢ adoption of Codes of **Conduct**

  ➢ wide-randing international debate and still under consideration

➢ Sept. **2022**, the EC adopted a **proposal** for a **Directive** on **AI Liability**: **extending** the **possibility o**f **obtaining compensation** for **damage** caused by products such as **robots**, **drones** or home **automation** systems and to harmonise national rules on liability for AI, making it easier for those who have suffered AI-related damages to obtain compensation through the introduction of a **presumption** of **causation**.

Cloud computing

Cloud computing and data sovereignty between global players and European strategies

Cloud computing is **one** of the **domains** where Europe appears to be most **dependent** on **foreign** providers.
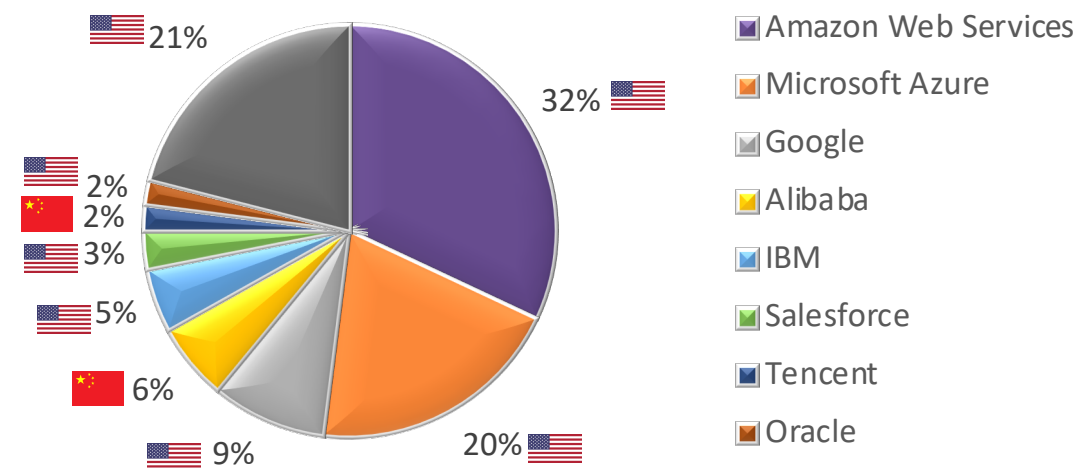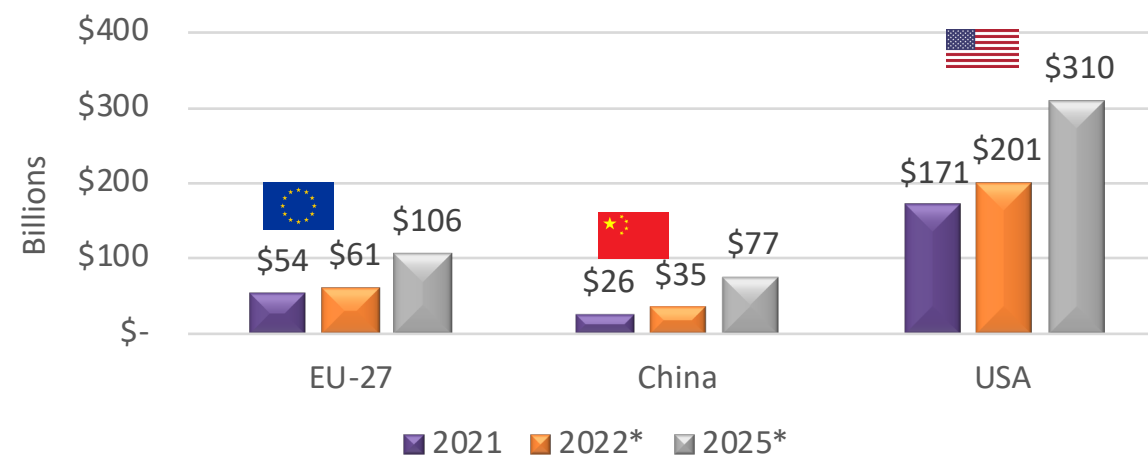
The **US** is the largest market, with reported **revenues** of $**171** billion in 2021.

Although still very far from the US figures, the public cloud market in the **EU27** also appears to be **growing** strongly, with revenues of $**54 billion** in 2021.

➢ **EU** has spark **differences** in its **internal market**, with **15 countries** recording **less** than €**1 billion** in revenues.

About **80%** of the **world market** for cloud computing services is in the hands of only **eight companies**, six from the **US** and two from **China.**

Public Cloud Revenues by Geographical Area

	EU-27	China	USA
2021	$54	$26	$171
2022*	$61	$35	$201
2025*	$106	$77	$310

■ 2021   ■ 2022*   ■ 2025*

Global cloud services sales market share distribution (Q4 2020) >

21%
2%
2%
3%
5%
6%
9%
32%
20%

- ■ Amazon Web Services
- ■ Microsoft Azure
- ■ Google
- ■ Alibaba
- ■ IBM
- ■ Salesforce
- ■ Tencent
- ■ Oracle

To **foster** the **development** of an **internal market** and **reduce dependency** on **foreign providers**, the **EC** has supported the creation of the '**Gaia-X**' project that:

- ✓ Envisages the **creation** of a **new pan-European platform** that brings together different cloud service **providers**, also from **outside Europe**, as long as **they accept** the set of **requirements**, **standards** and **values** promoted at EU level

- ✓ Operates mainly in the areas related to the **establishment** of **trust mechanisms**

- ✓ Intervenes on the **supply side** through the **creation** of **federated catalogues** and the **definition of certifications**

- ✓ Ensures **interoperability** and **security standards** aimed at promoting an open and transparent digital ecosystem

- ✓ Implement a **technology framework** to achieve what is called '**Gaia-X Compliance**'.

As of **October 2022**, Gaia-X has moved from a founder base of **22 members** to **357 members**, with an associated growth rate of 32% per year.

Some **concerns** may regard the Gaia-X **governance**

- ➢ in relation to the wide **number** of **members**, which risks giving rise to **difficulties** in defining **common objectives**, also because of the broad **range** of **views** and interests.

Cloud and data regulation

The European institutions have for a time been focusing on two different aspects

1. the **protection** of **personal data**

2. the **creation** of an **ecosystem** enabling **data circulation** and **use**.

- **Regulation n. 2016/679**: EU has become the **global model** for personal **data protection**

- **Regulation n. 2018/1807** on a framework for the **free flow** of **non-personal data** in the **European Union**

- **Directive n. 2019/1024** on **open data** and the **re-use** of **public sector information (Open Data Directive)**

- In February **2020**, the Communication "*A European Strategy for Data*" outlined **measures** and **investments** to enable the **data economy** over the next five years.

- In **2022**, the **Data Governance Act** establishes:
  - a mechanism for the **reuse** of certain categories of protected data held by **public bodies**;
  - **data altruism** and the possibility for individuals or companies to make their data available on a **voluntary basis** for the common good;
  - on *governance* and *enforcement*, MS need to designate **competent bodies** and to establish a **one-stop shop.**

- **2022 Data Act proposal**, which aims to **remove,** through the establishment of a harmonised EU-wide set of rules, **barriers** to data access for both consumers and businesses.
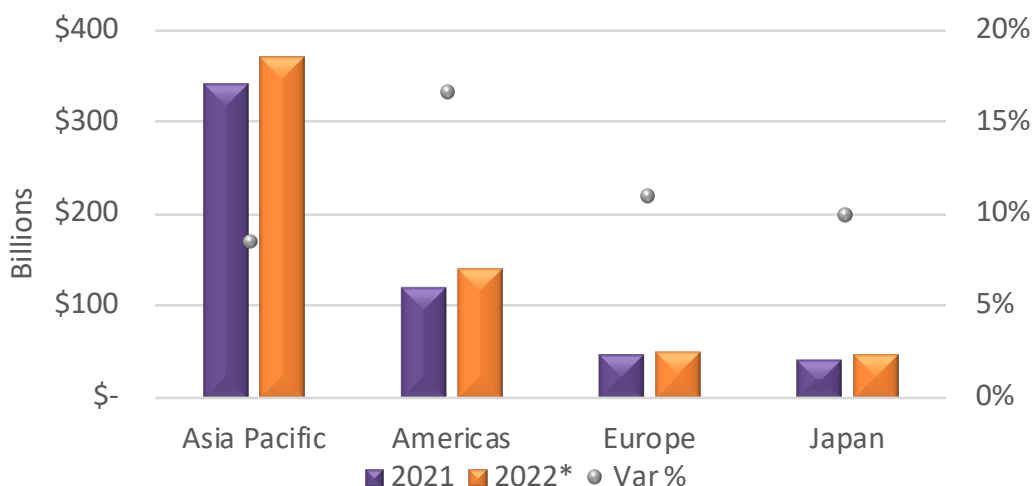
Semiconductors

Technological supply chain: the challenge of semiconductors

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Semiconductors are a strategic **resource** for global value chains.

Global semiconductor turnover stood at **$555.9 billion in 2021**

➤ **Asia** is the **main** market with **$343 billion**

➤ **European** companies traded semiconductors for **$47.8 billion**.

Silicon is one of the main semiconductor materials used in electronic components

➤ **China** is the main producer of semi-finished silicon products: **6 million tonnes** in 2022.

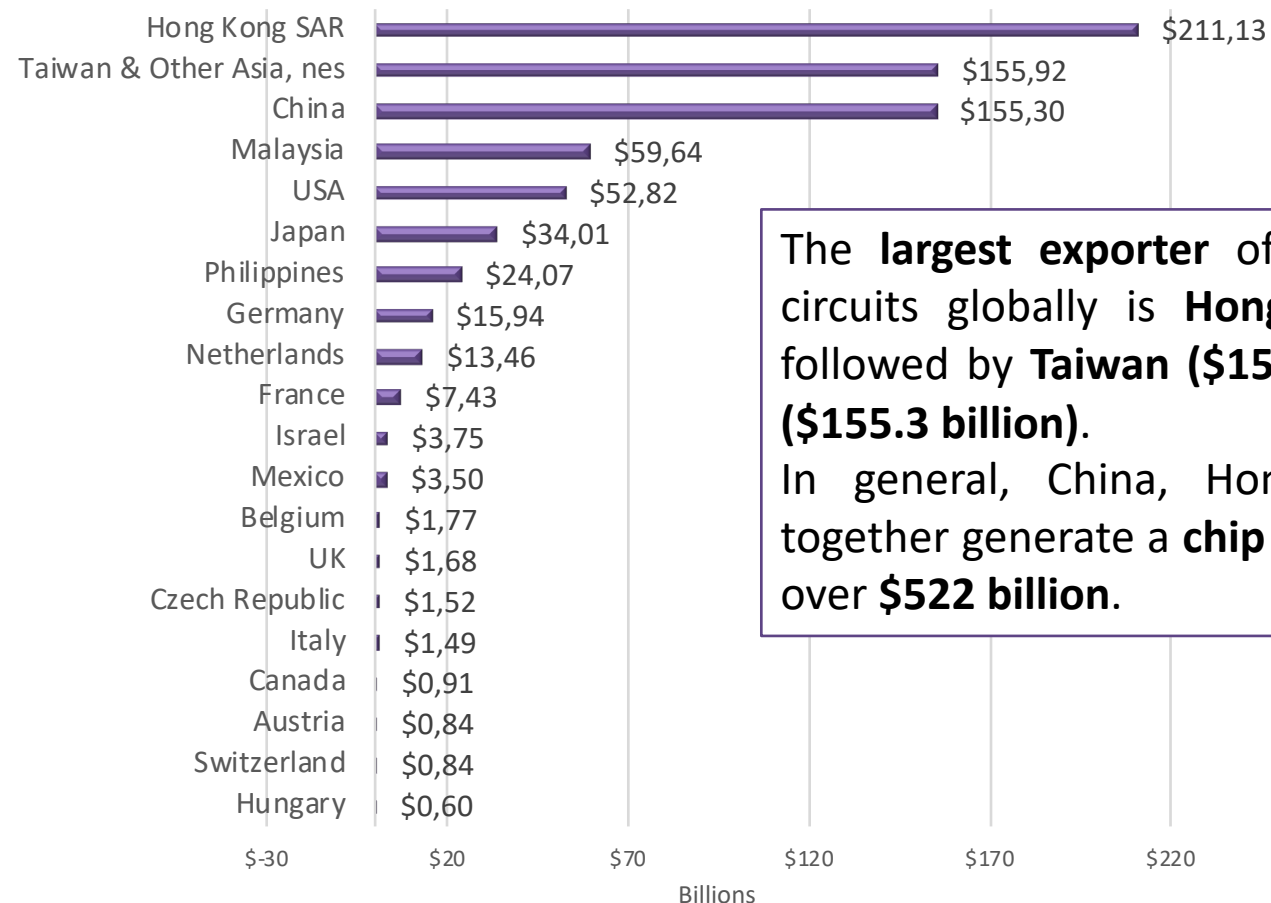➤ The second largest global producer is **Russia**

Among **EU producers**, a **modest** quantity of silicon is processed in **France** (120,000 tonnes), **Spain** (58,000 tonnes) and **Poland** (42,000 tonnes).

World semiconductor market

Billions

| | Asia Pacific | Americas | Europe | Japan |

Legend: ■ 2021 ■ 2022* ● Var %

Main silicon producing countries globally (tonnes per year, 2021)

China, Russia, Brazil, Norway, US, France, Iceland, Malaysia, Bhutan, Kazakhstan, India, Spain, Canada, Ukraine, Australia, Poland, Other

Thousands: -, 2.000, 4.000, 6.000

Chips Market

Another snapshot showing how preponderant **China** is in this market is provided by data on **exports** of **electronic integrated circuits**, i.e. **microchips** (the main finished product made from silicon wafers) collected in the UN Comtrade database.

Top 20 countries with the largest exports of electronic integrated circuits by economic value (2021)

Country	Billions
Hong Kong SAR	$211,13
Taiwan & Other Asia, nes	$155,92
China	$155,30
Malaysia	$59,64
USA	$52,82
Japan	$34,01
Philippines	$24,07
Germany	$15,94
Netherlands	$13,46
France	$7,43
Israel	$3,75
Mexico	$3,50
Belgium	$1,77
UK	$1,68
Czech Republic	$1,52
Italy	$1,49
Canada	$0,91
Austria	$0,84
Switzerland	$0,84
Hungary	$0,60

Billions

The **largest exporter** of electronic integrated circuits globally is **Hong Kong ($211 billion)** followed by **Taiwan ($155.9 billion)**, and **China ($155.3 billion)**.
In general, China, Hong Kong and Taiwan together generate a **chip turnover** equivalent to over **$522 billion**.

The Digital Compass, published in March 2021, set a very ambitious goal for 2030 - to **raise European production** of semiconductors to **at least 20%** of the value of **global production**.

In **2022** the EC launched the **"Chips Package"** including:

-   A **Communication** "Chips Regulation for Europe"

-   a **Recommendation** defining tools for **monitoring** the **chip ecosystem** with immediate actions suggested for MSs

-   a **Proposal** for a **Regulation** to **build** a Resilient European **Ecosystem** and Strengthen Europe's Technology Leadership (**Chips Act**).

    ➢ **Chips** for **Europe** initiative

    ➢ **Criteria** to recognise and support manufacturing **facilities** and open **foundries**

    ➢ Definition of a **coordination mechanism**

European Chip Strategy

1. Strengthen leadership in **research and technology**

2. Forster **innovation in design, fabrication and packaging** of advanced chips and their transformation into commercial products

3. Establish **framework** to substantially increase European **manufacturing capacity** by 2030 through investment in new advanced manufacturing facilities

4. Overcome **lack of skills**

5. Develop an in-depth **understanding** of global semiconductor **supply chains**