EU innovation, corporate venturing and deep tech potential of large firms: the 2022 EU Industrial R&D Investment Scoreboard

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The 2022 EU R&D SCOREBOARD (JRC-DG-R&I)

A tool to benchmark EU players against their global competitors and follow private industrial R&D dynamics going back ten years, since 2004

Global ranking of top R&D investing companies, in 2021

+ to **contribute to policy monitoring**, in particular combining R&D with other data

+ highlighting **the global tech race and R&D resilience**

+ **world top 2500** firms (935k subsidiaries): **€1093.9bn R&D** (>€48.5 mn/firm)

+ focus on **EU top 1000**: **€202.8bn R&D** (>€3.1 mn/firm)

Sources & Data

+ Consolidated **R&D and financial indicators** from audited company accounts (≠BERD's territorial approach)

+ **R&D investment**, net sales, profits, capex, employees and market cap (Moodys)

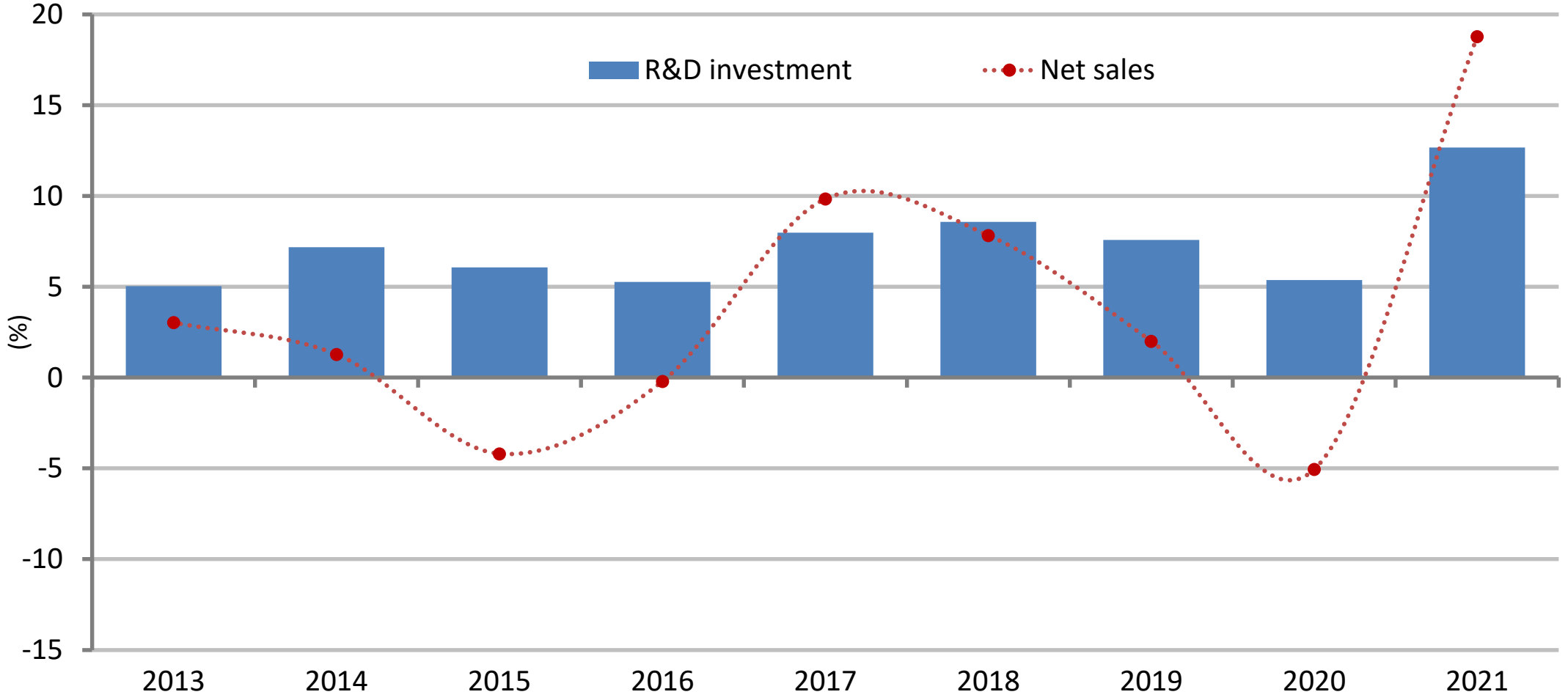
+ firms' **patent portfolio and SDG/environmental indicators** (JRC)

Representativeness

+ ca. **86% of world private-funded BERD** in 2021*

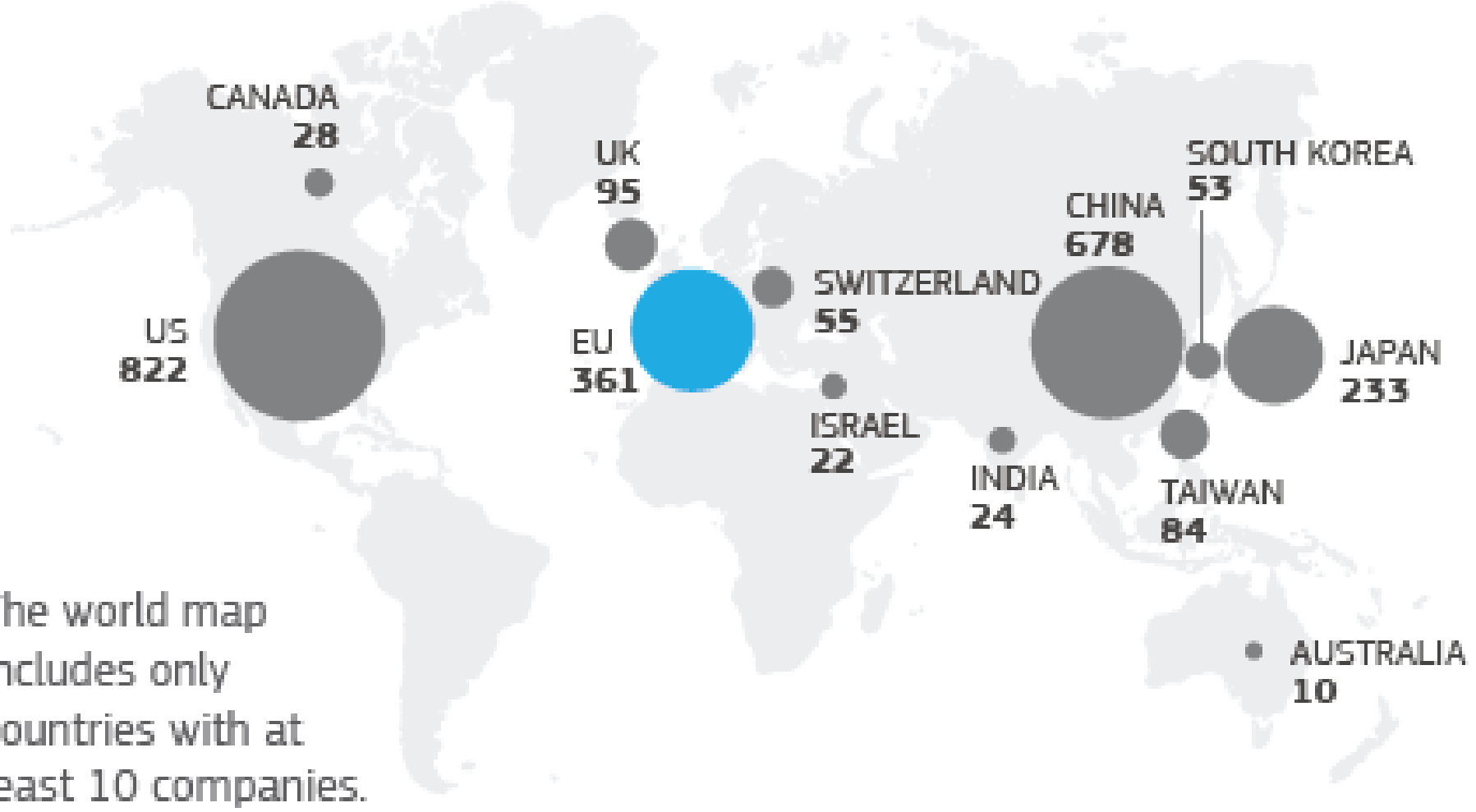
*Comparison with latest [illegible] Eurostat

One Year Growth Rates: 2021 vs 2020



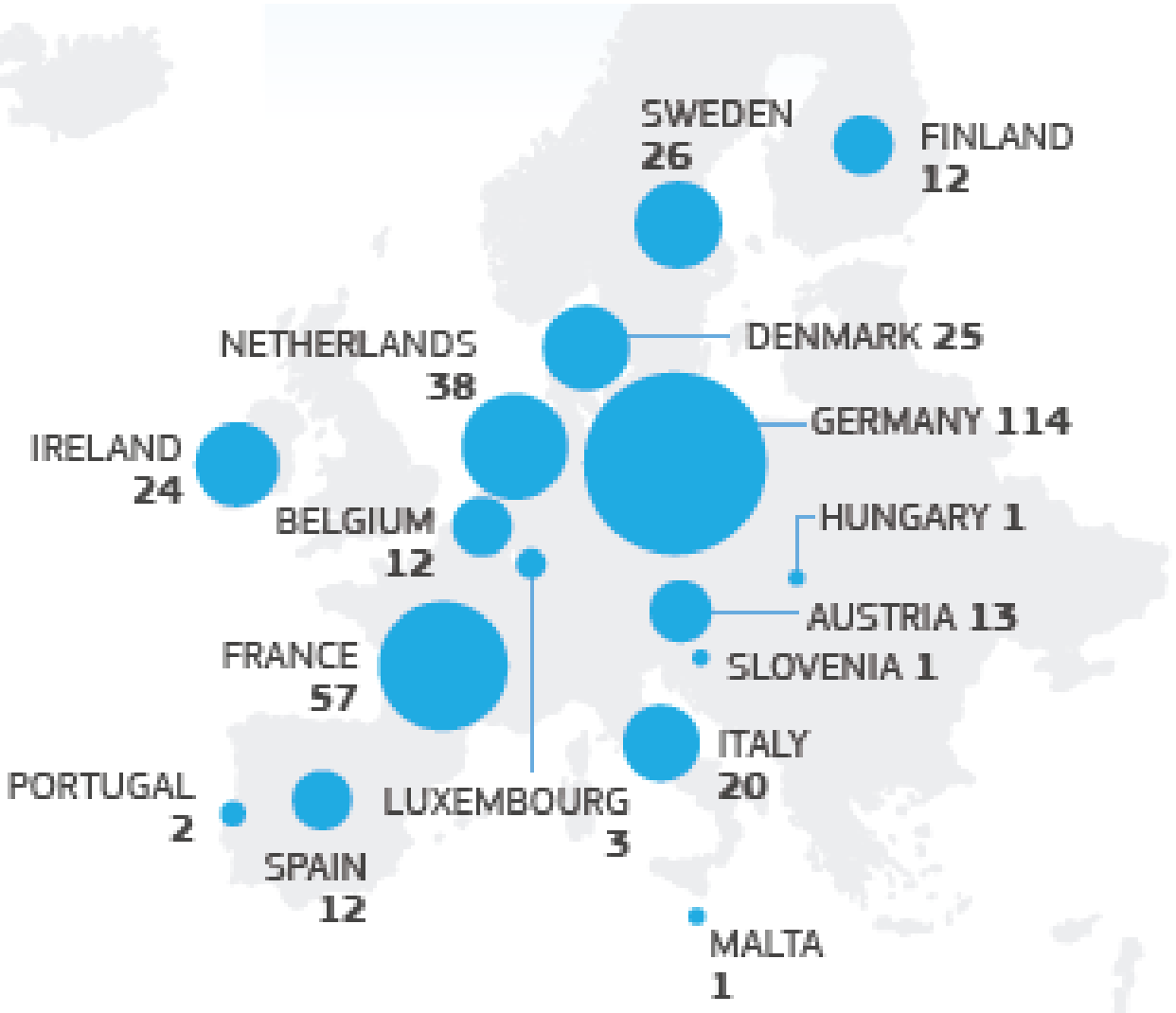
Source: *The 2022 EU Industrial R&D Investment Scoreboard*, European Commission, JRC/DG R&I

Number of EU companies lags behind US and China



Source: *The 2022 EU Industrial R&D Investment Scoreboard*, European Commission, JRC/DG R&I

361 EU-based companies by MS in the top 2500



Source: *The 2022 EU Industrial R&D Investment Scoreboard*, European Commission, JRC/DG R&I

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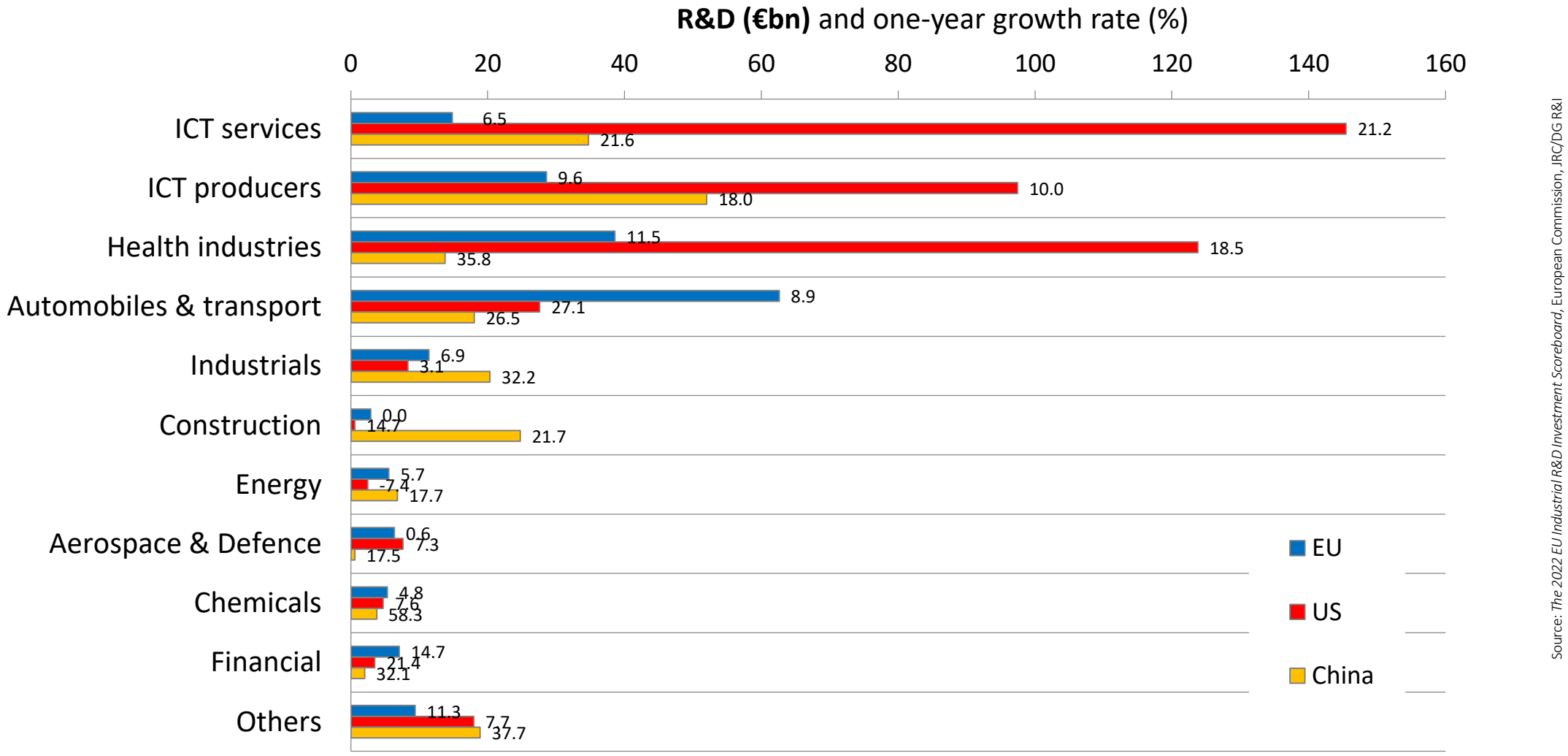
The global tech race with four key sectors



Source: *The 2022 EU Industrial R&D Investment Scoreboard*, European Commission, JRC/DG R&I

almost 80% of total R&D invested in auto, health- and ICT-related sectors

The 2022 EU R&D SCOREBOARD

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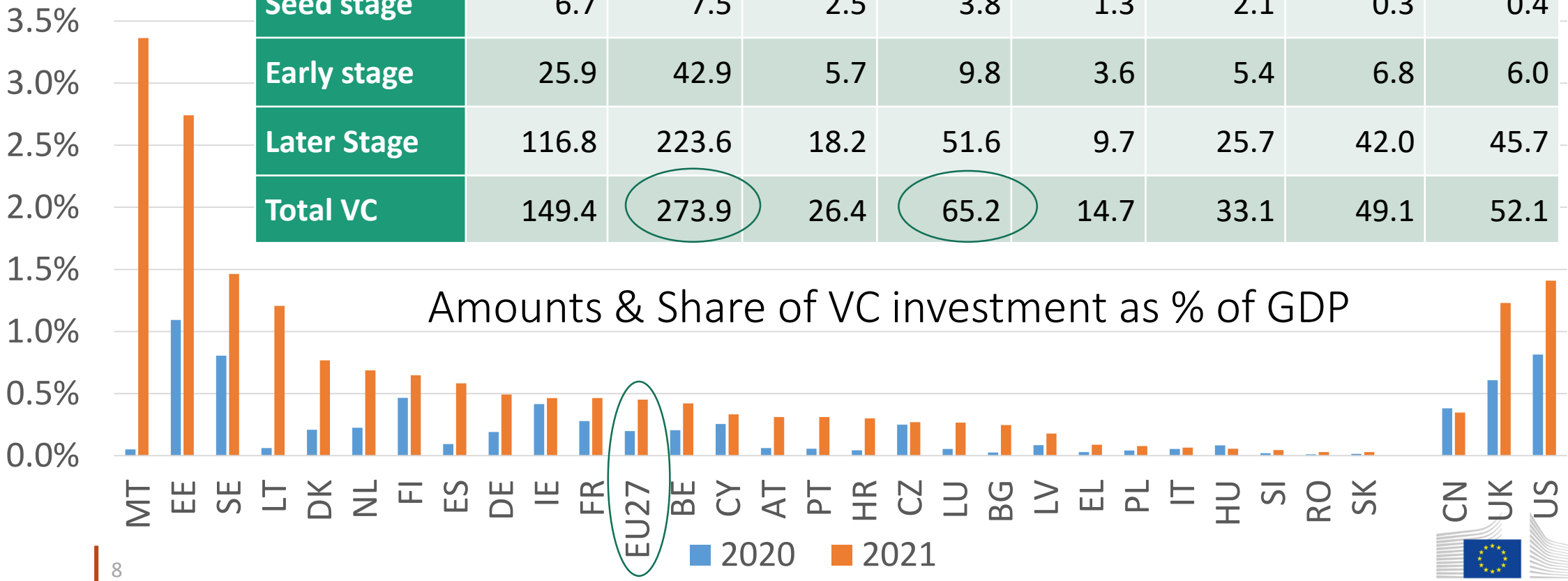
Top 10 R&D investors

RANK 2022	RANK 2012	COMPANY	COUNTRY	SECTOR	R&D 2022	R&D 2012*	CAGR, %
1	26	Alphabet	US	ICT services	27 867	4 558	19.8
2	297	Meta	US	ICT services	21 768	343	51.5
3	2	Microsoft	US	ICT services	21 642	8 662	9.6
4	43	Huawei	CN	ICT producers	19 534	3 122	20.1
5	59	Apple	US	ICT producers	19 348	2 145	24.6
6	5	Samsung Electronics	KR	ICT producers	16 813	7 604	8.3
7	3	Volkswagen	DE	Automobiles & o.t.	15 583	7 203	8.0
8	8	Intel	US	ICT producers	13 412	7 372	6.2
9	7	Roche	CH	Health industries	13 261	7 810	5.4
10	11	Johnson & Johnson	US	Health industries	12 991	6 664	6.9
15	1	Toyota Motor	JP	Automobiles & o.t.	8 691	6 029	3.7
16	4	Novartis	CH	Health industries	7 983	7 998	0.0
11	6	Pfizer	US	Health industries	10 239	7 775	2.8
20	9	General Motors	US	Automobiles & o.t.	6 975	7 173	-0.3
13	10	Merck US	US	Health industries	9 134	6 957	2.8
TOTAL TOP 10					**182 219**	**74 584**	**9.3**
TOTAL TOP 2500					1 093 860	545 757	7.2
SHARE OF TOP 10 IN TOTAL TOP 2500, %					16.7	13.7	

Source: *The 2022 EU Industrial R&D Investment Scoreboard*, European Commission, JRC/DG R&I

Venture Capital by stage

billion EUR	USA		EU27		UK		China	
	2020	2021	2020	2021	2020	2021	2020	2021
Seed stage	6.7	7.5	2.5	3.8	1.3	2.1	0.3	0.4
Early stage	25.9	42.9	5.7	9.8	3.6	5.4	6.8	6.0
Later Stage	116.8	223.6	18.2	51.6	9.7	25.7	42.0	45.7
Total VC	149.4	273.9	26.4	65.2	14.7	33.1	49.1	52.1



Source: *The 2022 EU Industrial R&D Investment Scoreboard*, European Commission, JRC/DG R&I

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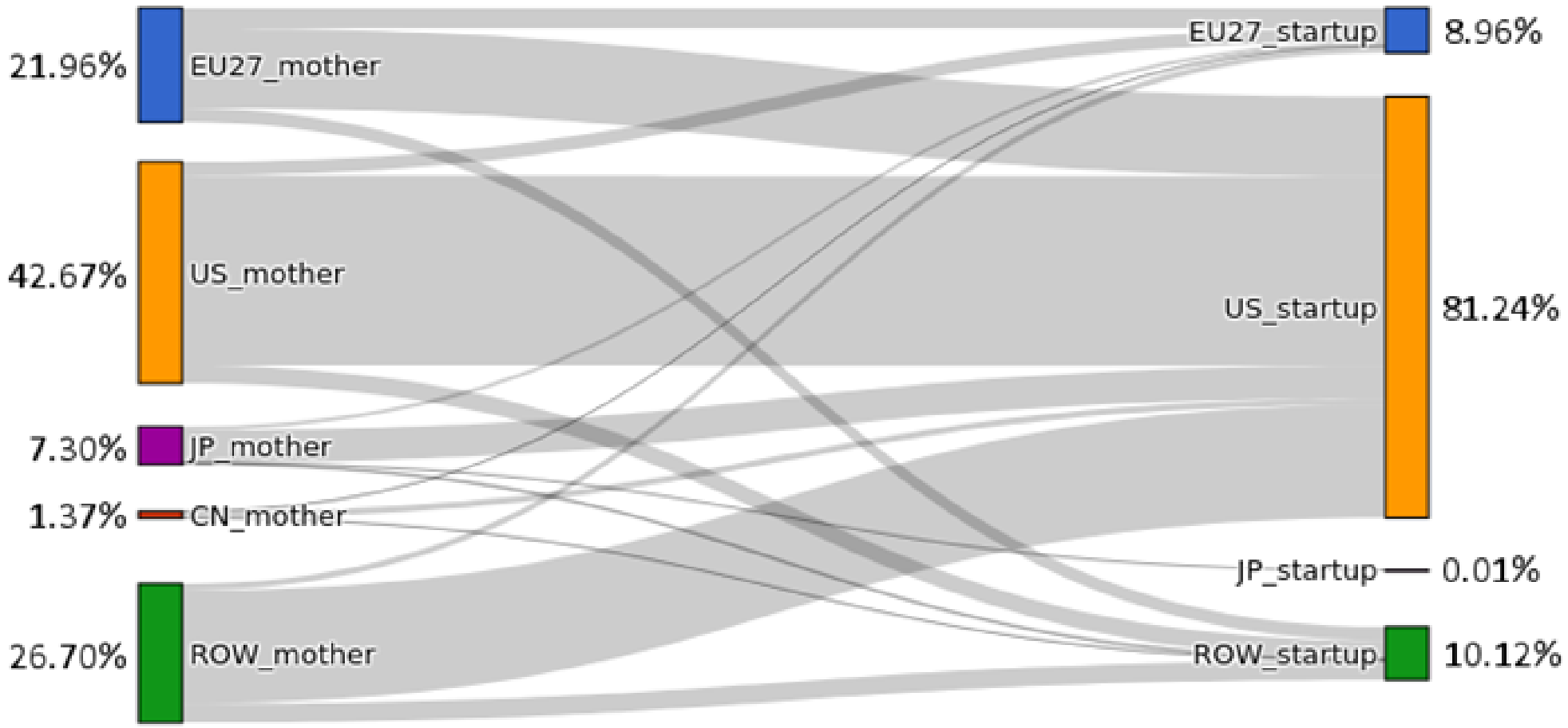
Corporate Venture Capital (CVC) investment by headquarter region of Scoreboard parent company



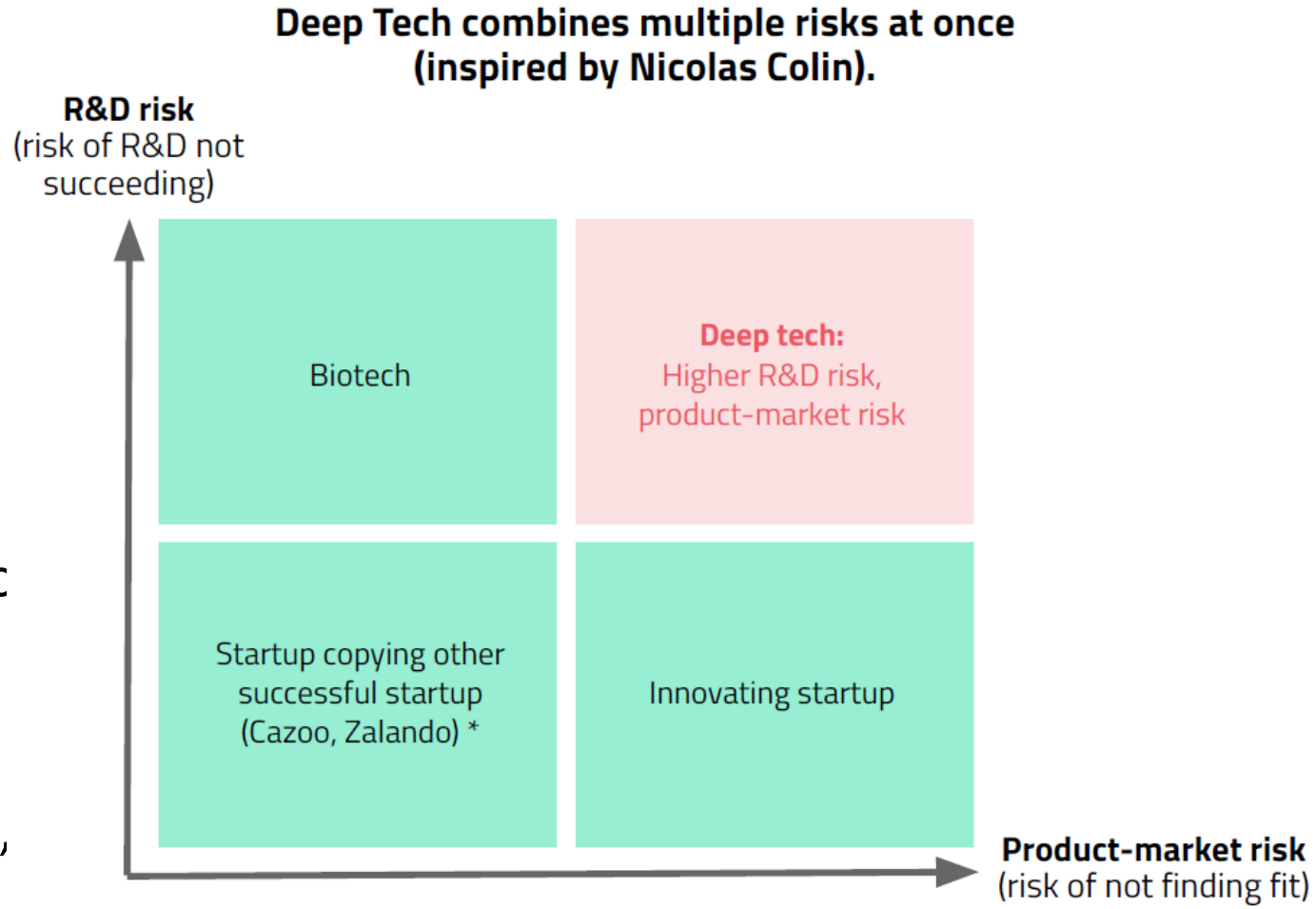
Source: *The 2022 EU Industrial R&D Investment Scoreboard*, European Commission, JRC/DG R&I

Deep(-tech) definitional conundrum

- "Companies founded on a scientific discovery or meaningful engineering innovation" (Chaturvedi, 2015) - industry

- "Deep tech (also called hard tech or tough tech) innovation refers to complex technologies rooted in scienc and advanced engineering" (Arora et al., 2022) - academia

    - Domains: new materials, automation, and eco-innovations (e.g. small-scale nuclear reactors, quantum computing, lab grown tissues)



Source: European Startups. "2021: the year of Deep Tech." report by Dealroom and Sifted – data provider. Available at https://europeanstartups.co/reports/2021-the-year-of-deep-tech

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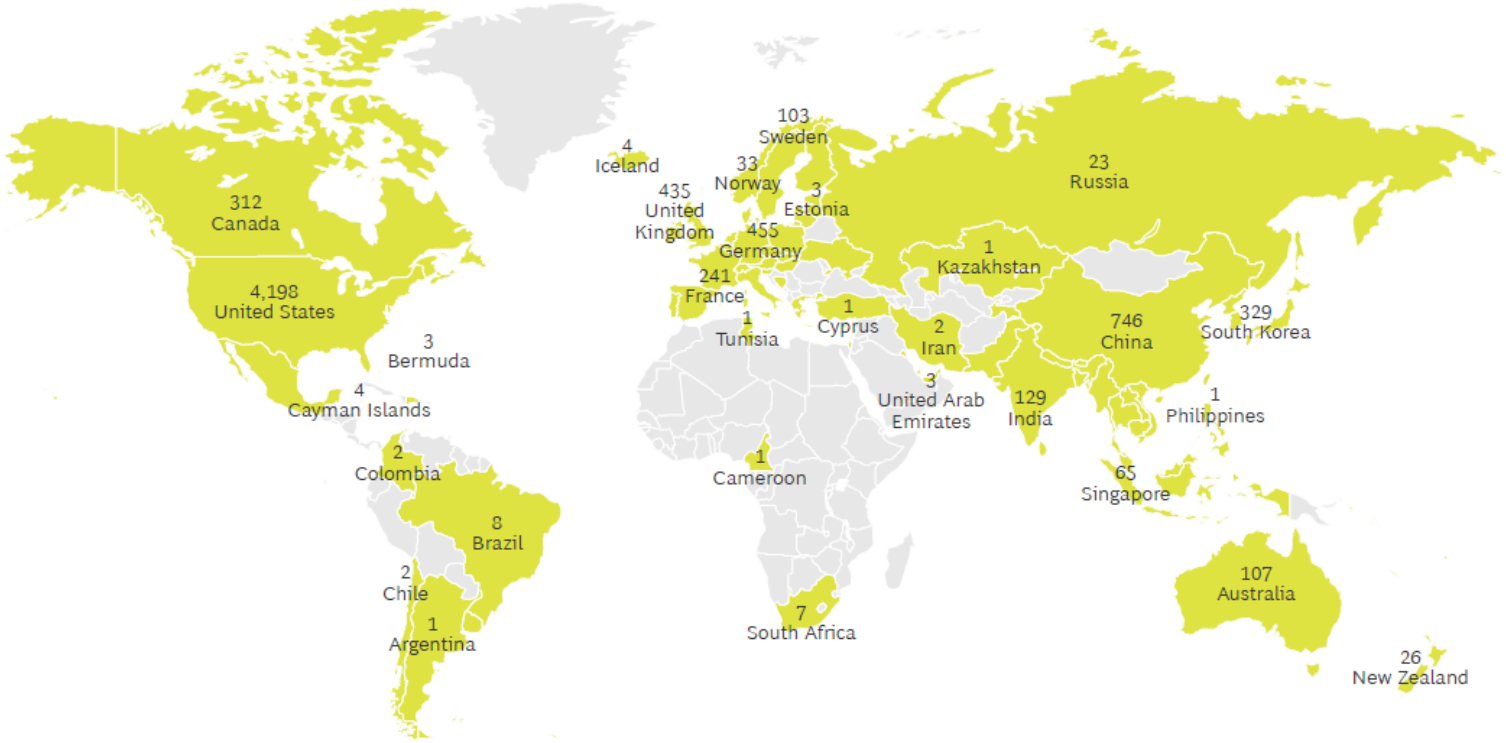
Exhibit 2 - Deep Tech Is a Global Phenomenon: 8,682 Companies in 69 Markets



US (4,198)
Greater China[1] (746)
Germany (455)
UK (435)
Japan (363)
South Korea (329)
Canada (312)

France (241)
Israel (195)
Switzerland (147)
India (129)
Australia (107)
Sweden (103)
Netherlands (78)

Italy (70)
Spain (66)
Singapore (65)
Denmark (59)
Belgium (41)
Finland (41)
Ireland (39)

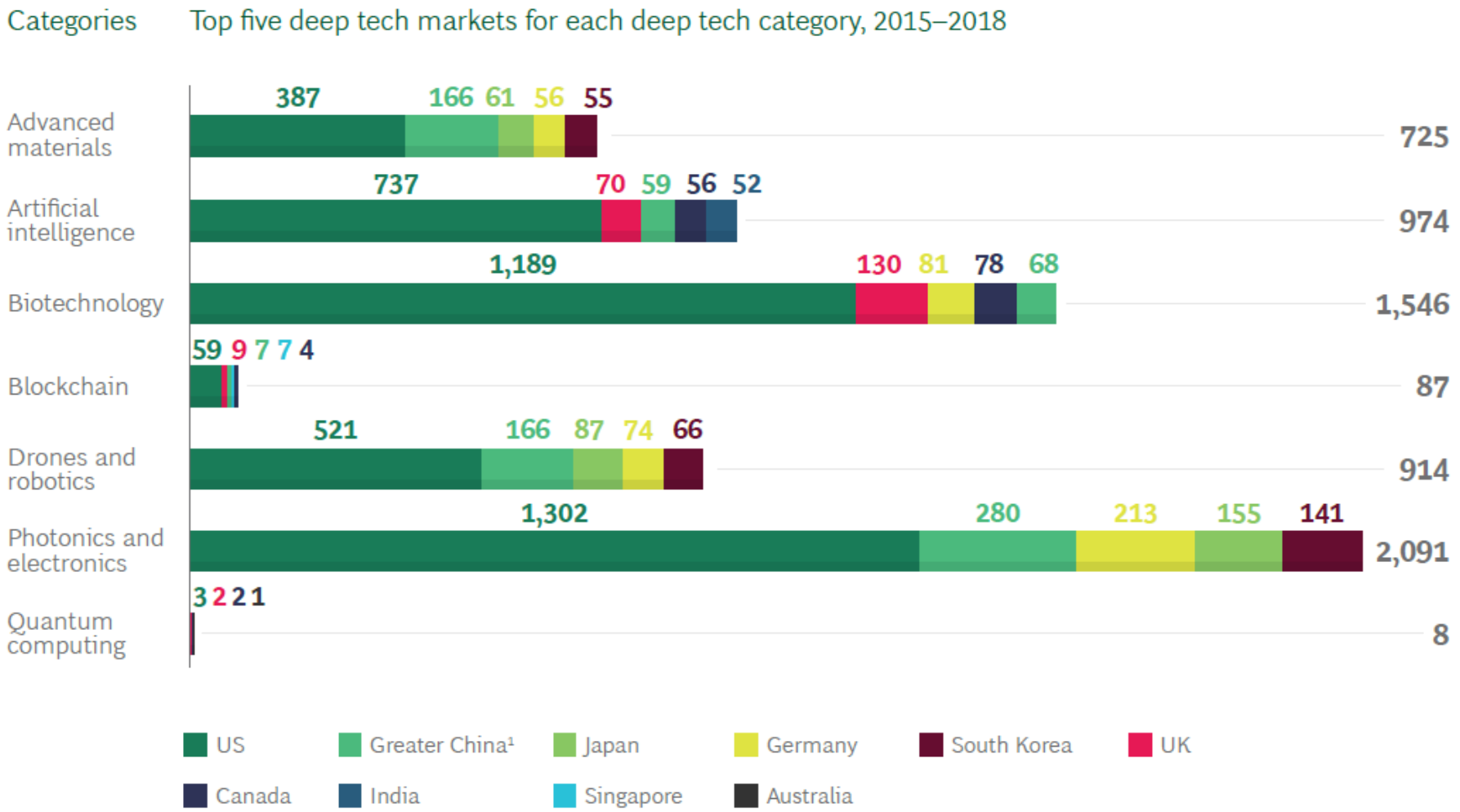
Austria (35)
Norway (33)
New Zealand (26)
Russia (23)
Poland (20)
Portugal (10)

Sources: Tableau; BCG Center for Innovation Analytics; BCG and Hello Tomorrow analysis.

Note: Analysis is based on 8,682 deep tech companies related to 16 technologies across seven categories: advanced materials, artificial intelligence, biotechnology, blockchain, drones and robotics, photonics and electronics, and quantum computing. Exhibit is missing geographic information for 199 companies.

[1]Greater China includes the People's Republic of China, Hong Kong, Macau, and Taiwan.

Exhibit 6 - The US Leads as a Deep Tech Hub, but Considerable Activity Is Occurring Elsewhere



The Dawn of the Deep Tech Ecosystem, Boston Consulting Group x hello tomorrow, 2019

Sources: Capital IQ; Quid; BCG Center for Innovation Analytics; BCG and Hello Tomorrow analysis.

¹Greater China includes mainland China, Hong Kong, Macau, and Taiwan.

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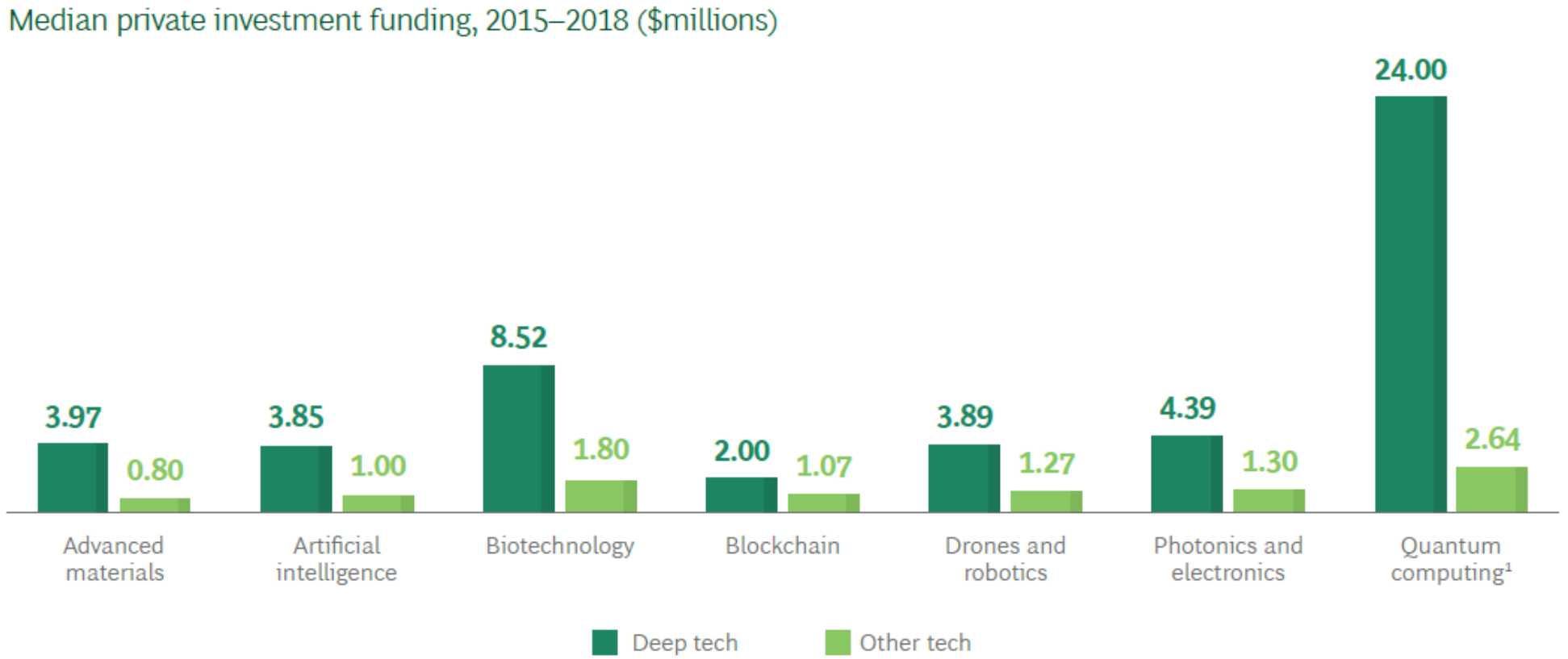
Exhibit 3 - Deep Tech Companies Attract More Private Investment Funding Than Others



Sources: Capital IQ; Quid; BCG Center for Innovation Analytics; BCG and Hello Tomorrow analysis.

[1]Quantum computing has only eight deep tech companies, with two raising a combined $64 million in 2016 and 2017.

The Dawn of the Deep Tech Ecosystem, Boston Consulting Group x hello tomorrow, 2019

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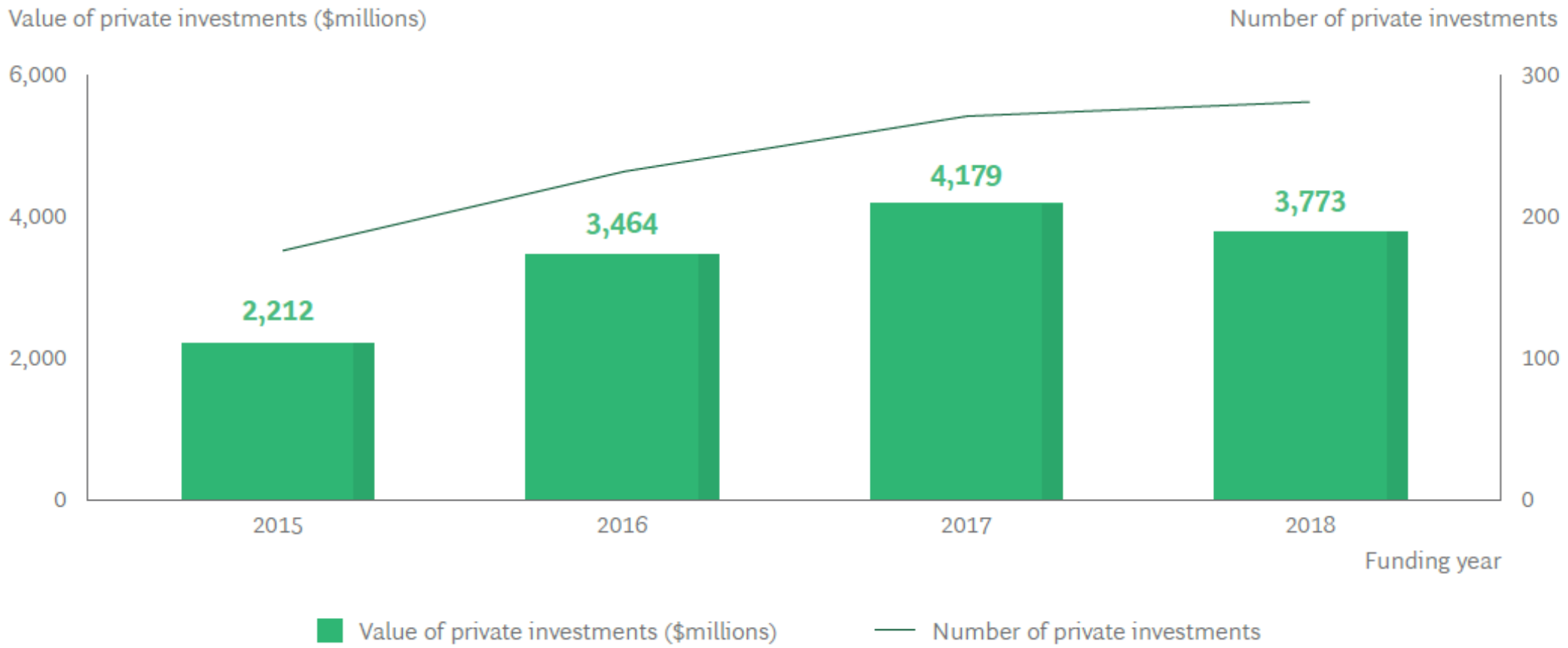
Exhibit 5 - Corporate Investment in Deep Tech Is on the Rise



Sources: Capital IQ; Quid; BCG Center for Innovation Analytics; BCG and Hello Tomorrow analysis.

Note: Includes investment in seven deep tech categories: advanced materials, artificial intelligence, biotechnology, blockchain, drones and robotics, photonics and electronics, and quantum computing.

The Dawn of the Deep Tech Ecosystem, Boston Consulting Group x hello tomorrow, 2019

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Deep tech in top R&D investors

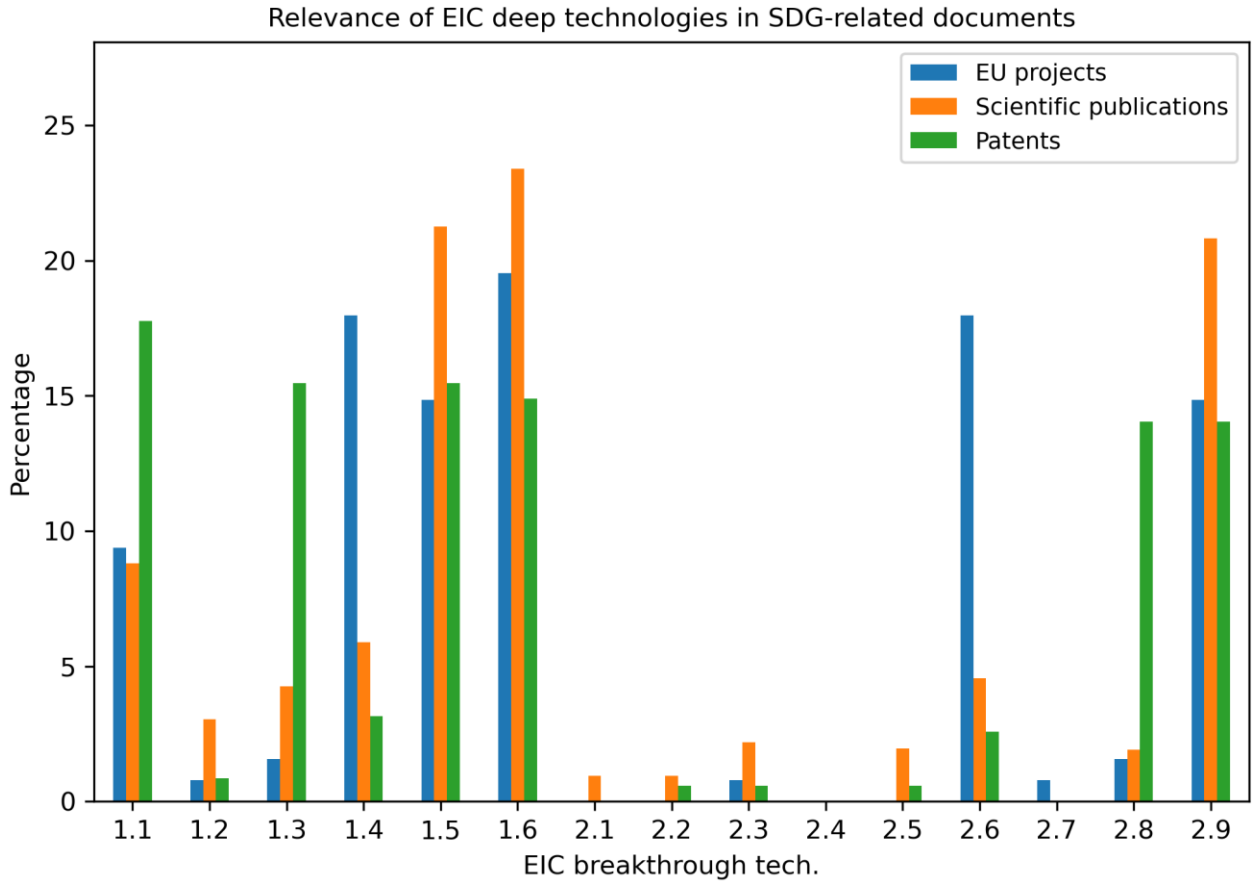
- Operational definition of Deep Tech: Tech (patent) + science (publication) + patient capital (public funding)
- List of emerging breakthrough technologies and keywords from EIC report (Lopatka et al., 2022)

Num.	Dimension	Deep-tech
1.1	Green deal	Energy harvesting, conversion, and storage
1.2	Green deal	Cooling and cryogenics
1.3	Green deal	Industry and agriculture decarbonisation and pollution abatement
1.4	Green deal	Environmental intelligence and monitoring systems
1.5	Green deal	Water-energy nexus
1.6	Green deal	Sustainable, safe and regenerative buildings
2.1	Digital & Industry	Next generation computing devices and architectures
2.2	Digital & Industry	Chip-scale frequency combs
2.3	Digital & Industry	Photon, phonon,electron triangle
2.4	Digital & Industry	DNA-based digital data storage
2.5	Digital & Industry	Alternative approaches to quantum computation
2.6	Digital & Industry	AI-based local digital twins
2.7	Digital & Industry	New uses of space
2.8	Digital & Industry	2D materials for low-power electronics
2.9	Digital & Industry	Sustainable electronics

Source: Industrial R&D Investment Scoreboard Report 2022 (Table 6.2)

Deep tech in top R&D investors

- Link to database identifying SDGs in patents, publications and H2020 research grants of top R&D investors (Massucci and Seri, 2022)
  - Focus is on Water-energy nexus (1.5), Sustainable buildings (1.6), Sustainable electronics (2.9) and, to a lesser extent, on Energy storage (1.1)
  - Still strong imbalance in pollution abatement (1.3), environmental intelligence (1.4), and AI-based solutions (2.6)



Source: Industrial R&D Investment Scoreboard Report 2022 (Figure 6.10)

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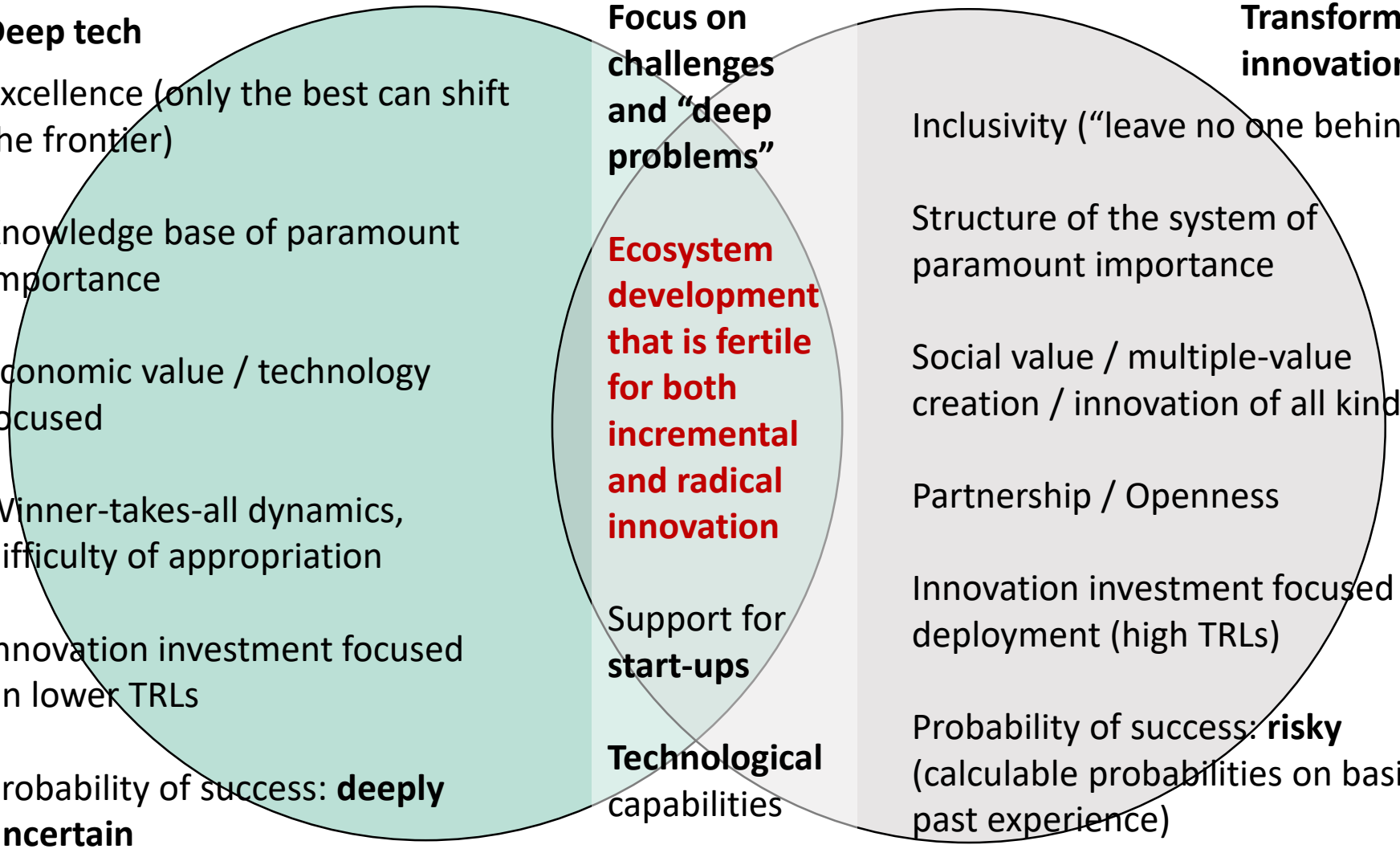
Policy angle on deep tech vs transformative innovation



Thank you

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