

2025 GIPFEL FÜR FORSCHUNG UND INNOVATION



TIME TO ACT – FOR GREATER COMPETITIVENESS IN GERMANY AND EUROPE

Fact & Figures for the Gipfel für Forschung und Innovation 2025

Im Rahmen des:

FALLING
WALLS
**SCIENCE
SUMMIT**

AGENDA

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01 INTRODUCTION

INTRODUCTION

Germany and Europe have been losing ground in research and innovation, particularly in key technologies such as artificial intelligence and quantum technologies. Europe is becoming increasingly dependent on many critical technologies and raw materials for digital products. Punitive tariffs and unreliable supply chains are increasing uncertainty among companies in Germany, Europe, and worldwide. International knowledge flows are also increasingly under pressure: academic freedom is being restricted in many countries, and barriers are being erected to international scientific cooperation. Cross-border research is being re-examined from a security perspective and must prove itself in new geopolitically tense situations.

Against this backdrop, Germany and Europe need to proactively set the course for sustainable and future-proof competitiveness. The Summit for Research and Innovation 2025 (Gipfel für Forschung und Innovation 2025), held under the motto *‘Time to Act – for Greater Competitiveness in Germany and Europe’*, aims to confront the pressing challenges of our time—transformability, cooperation, and security—by raising critical questions and developing practical solutions.

The following facts and figures point to relevant trends in innovation, international cooperation, and upcoming issues relating to knowledge and national security. They all point in the same direction, highlighting the need for action.

02

STRUCTURAL CHANGES IN THE RESEARCH AND INNOVATION SYSTEM

STRUCTURAL CHANGES IN THE RESEARCH AND INNOVATION SYSTEM

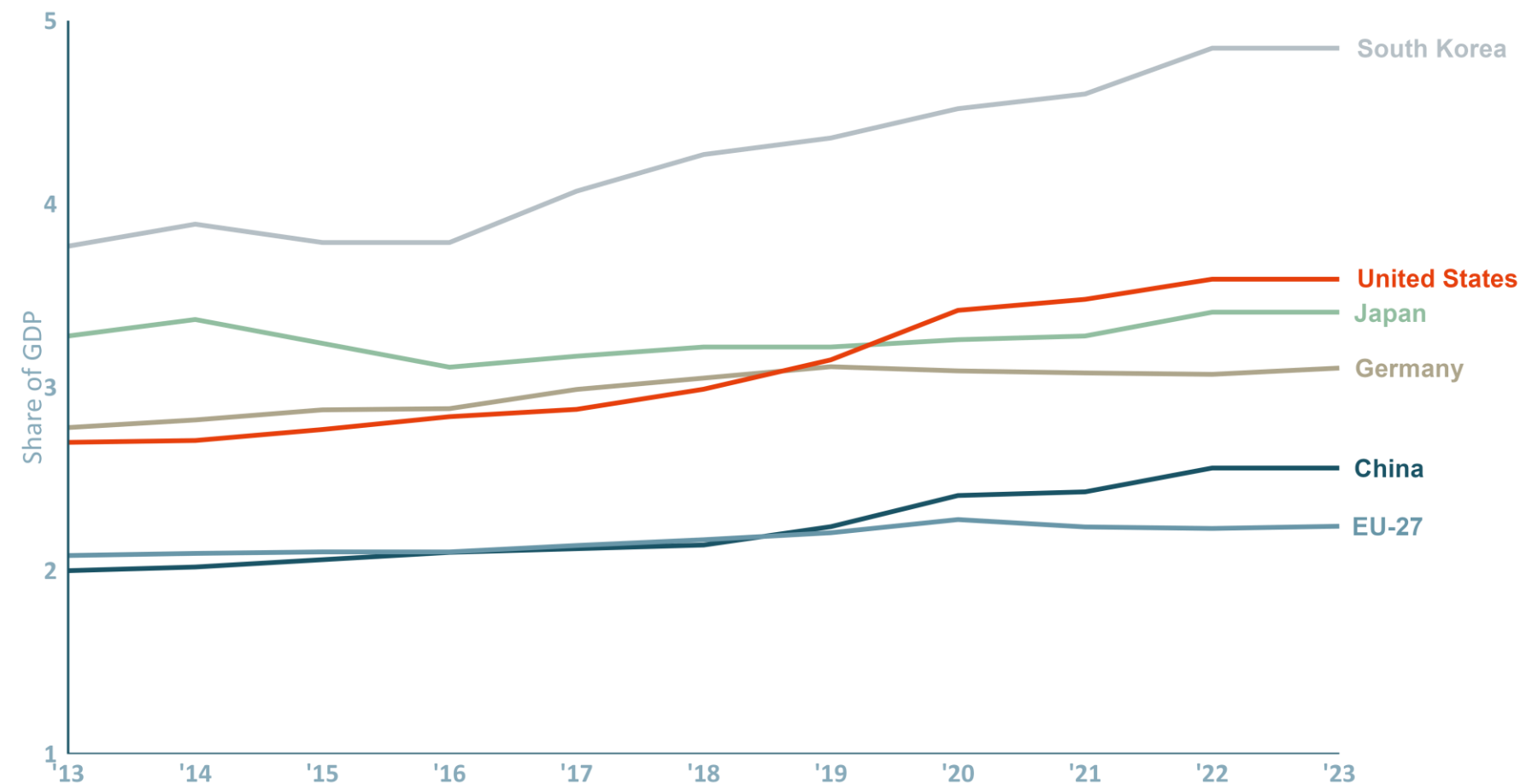
Over the past decade, German **research and development (R&D) spending has grown** by an average of 5% annually—consistently outpacing overall economic growth. Yet, despite this momentum, Germany and Europe still trail the United States in terms of R&D investment dynamics. One factor is the sectoral shifts driven by global transformations. Another is Europe’s difficulty exploiting the value created by research and early-stage innovation. Limited scaling-up capacity and underdeveloped innovation ecosystems are central to this challenge. These dynamics raise pressing questions about the structural changes required in the research and innovation system:

- In order to meet the new challenges and the resulting priorities, what **changes to the structures of the research and innovation (R&I) system** are necessary? What changes are required in the division of labour, cooperation structures and existing financing models in research and innovation so that research can quickly lead to more innovation?
- What **measures should companies** take to position themselves strategically and continue to develop successfully in an increasingly complex international market environment?
- In the light of these new challenges, what must the **science system** do to maintain its performance, and what fundamental structural changes are necessary to achieve this?
- How can **policymakers** initiate and support these structural changes in the R&I system?

EUROPEAN R&D EXPENDITURE LAGS BEHIND THAT OF GLOBAL INNOVATION LEADERS

- German R&D expenditure is above the EU average but below US and other innovation leaders
- Europe and Japan are less dynamic in R&D investments than other innovation hubs (e.g. South Korea)

GROSS DOMESTIC EXPENDITURE ON R&D
as a share of GDP

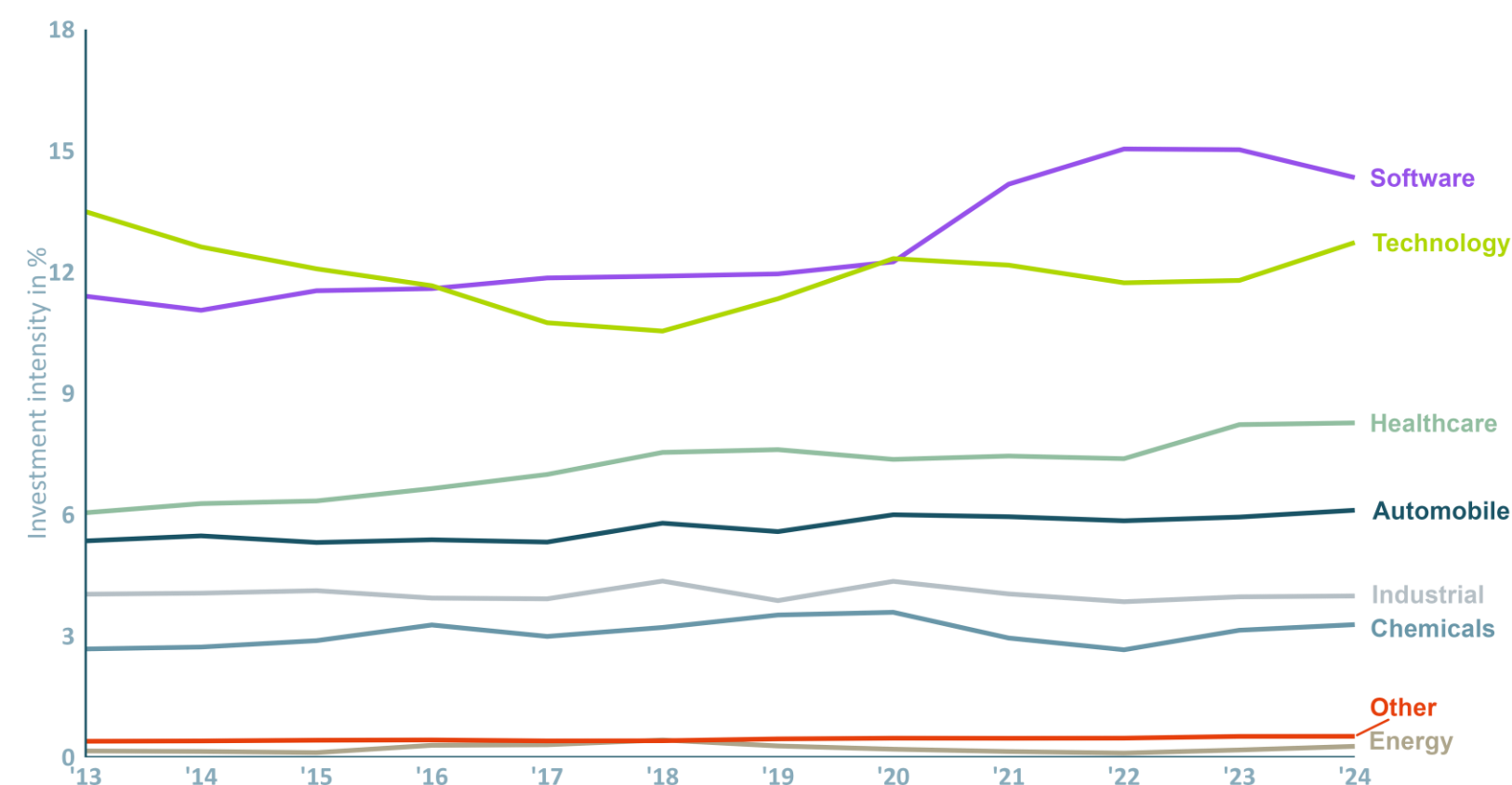


CORPORATE R&D GROWTH SLOWDOWN IN GERMANY IS DRIVEN BY ENERGY, CHEMICALS, AND HEALTH

- R&D intensity varies between different industries.
- Technology shows the strongest growth rate, energy the strongest decline.
- These changes must also be viewed against the backdrop of global crises.

DAX, MDAX AND SDAX COMPANIES' R&D INVESTMENT INTENSITY

defined as R&D expenditure as share of annual revenue



	Growth Rate R&D intensity		Comp.
	'13-19	'19-24	
Software	1%	4%	➡
Technology	-3%	2%	➡
Healthcare	4%	2%	➡
Automobile	1%	0%	➡
Industrial	1%	1%	➡
Chemicals	5%	-1%	➡
Energy	9%	-1%	➡
Other	1%	3%	➡

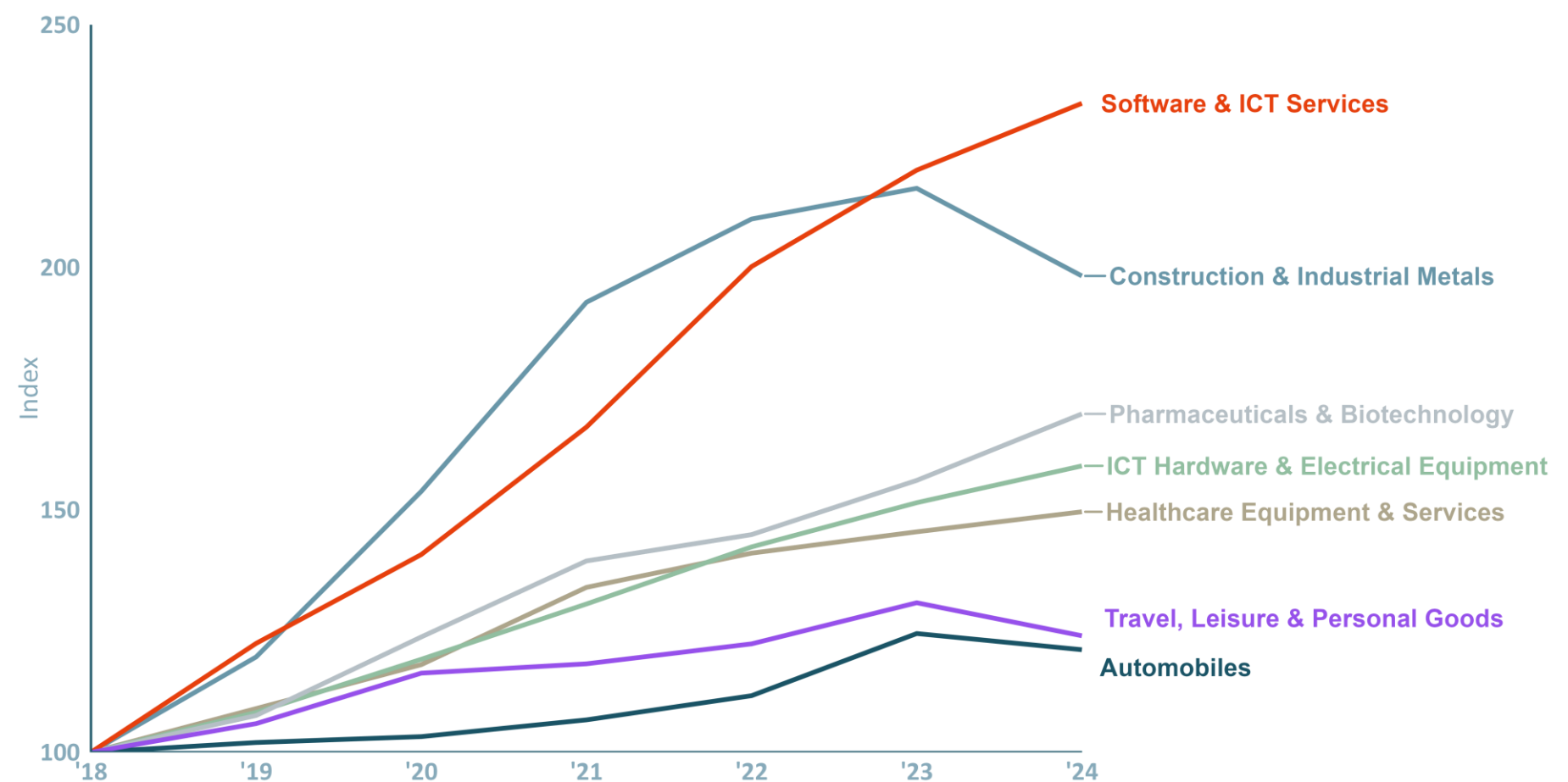
R&D int. CAGR '19-24 > '13-19 ➡
R&D int. CAGR '19-24 < '13-19 ➡
R&D int. CAGR '19-24 = '13-19 ➡

GLOBAL R&D GROWTH VARIES BY INDUSTRY

- Economic transformation is driven by changes in the innovation efforts of various industrial sectors.
- R&D investment in software and ICT services has more than doubled since 2018.
- In contrast, R&D spending in the automotive sector has risen by only 25 percent since 2018.

R&D INVESTMENT TRENDS BY INDUSTRY

Index: 2018 = 100

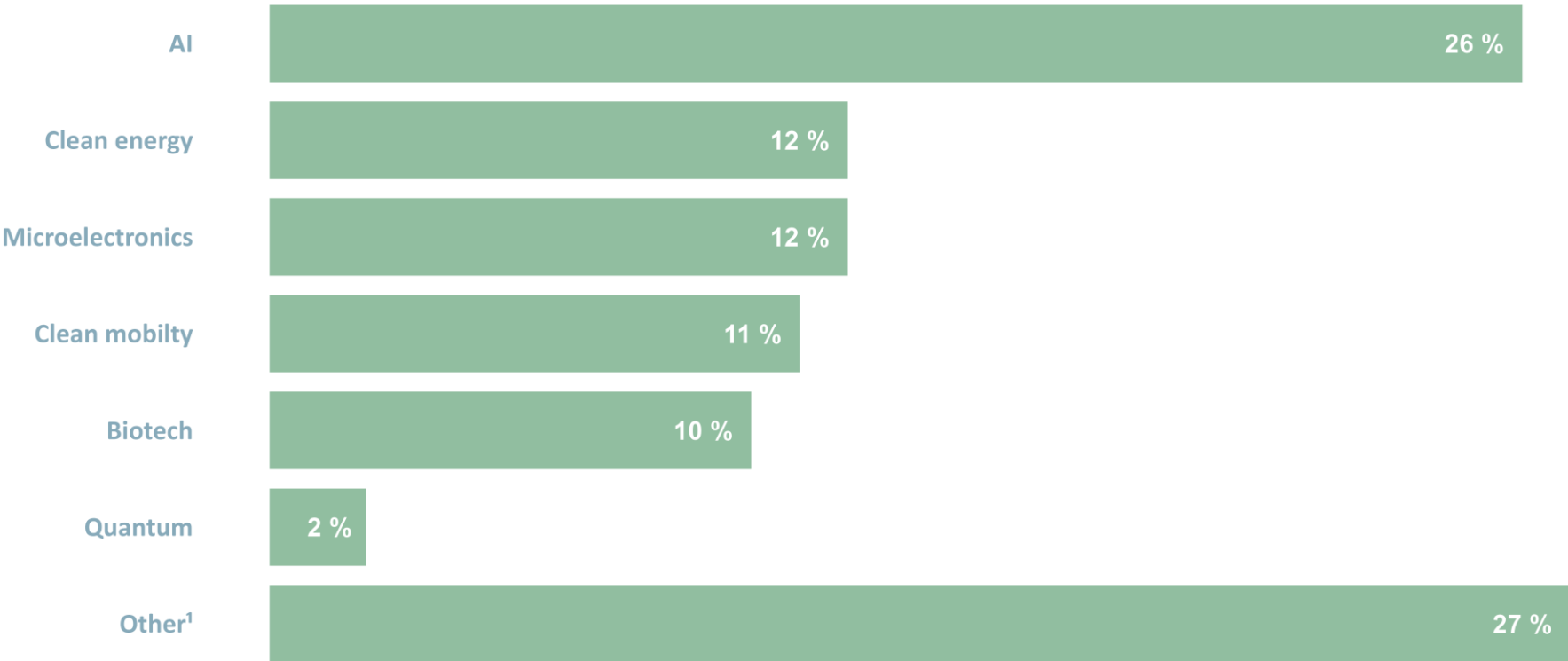


AI PLAYS A PIVOTAL ROLE IN TRANSFORMATION

- 80 percent of publicly announced corporate research and development projects focus on only six fields of innovation.
- More than a third of R&D projects involve AI. Taken together, green technologies (i.e., clean mobility and clean energy) follow.

SHARE OF R&D PROJECTS IN PUBLIC DOCUMENTS OF DAX, MDAX, SDAX COMPANIES

by topic (Jan 2024 - Jul 2025)



¹ Includes autonomous systems, advanced materials, blockchain and medical technology

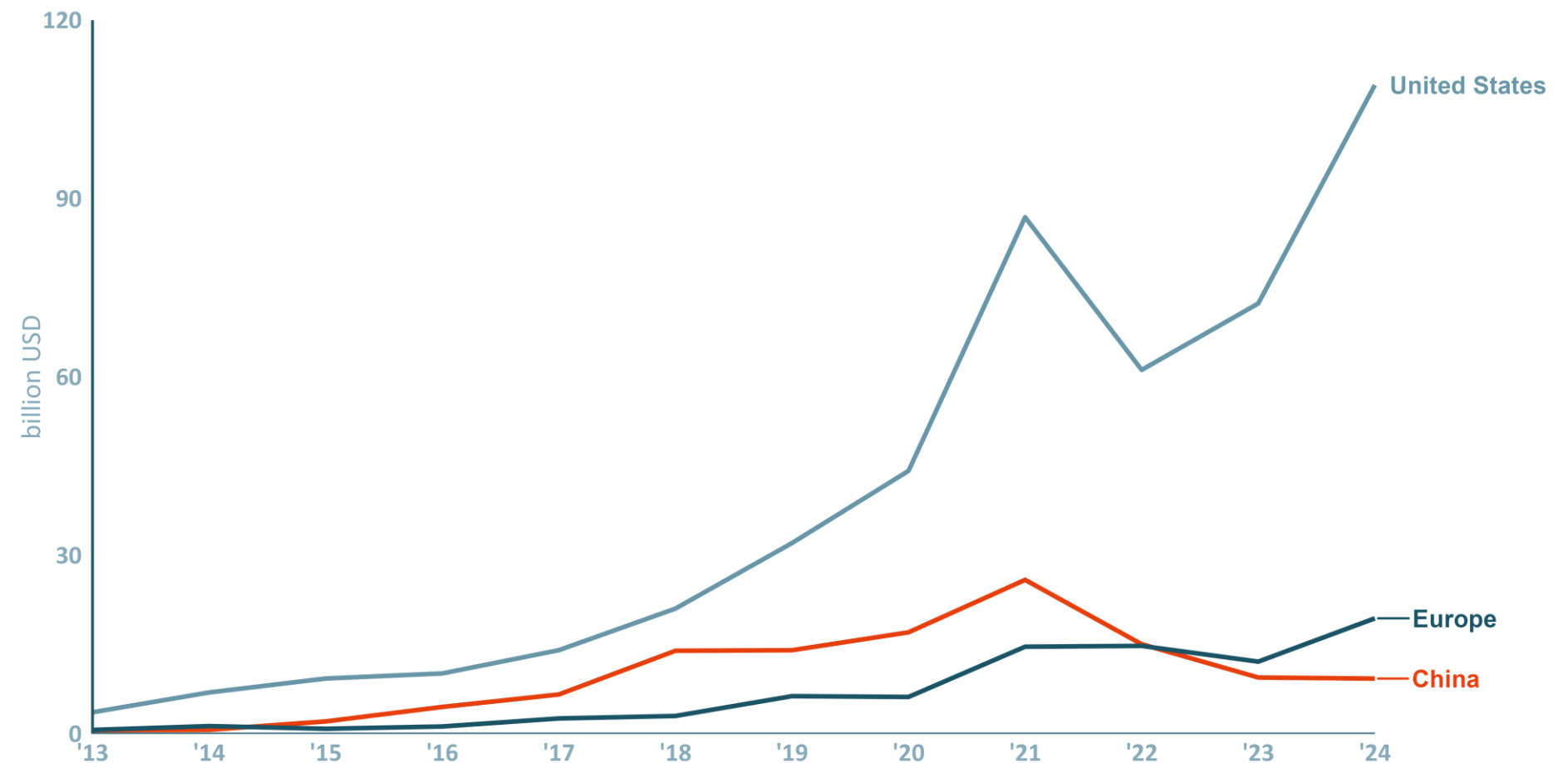
PRIVATE INVESTMENT IN AI IS KEY IN THE US



- The U widens its lead in global AI private investment
- U.S. private AI investment hit \$109.1 billion in 2024, nearly 12 times higher than China's \$9.3 billion

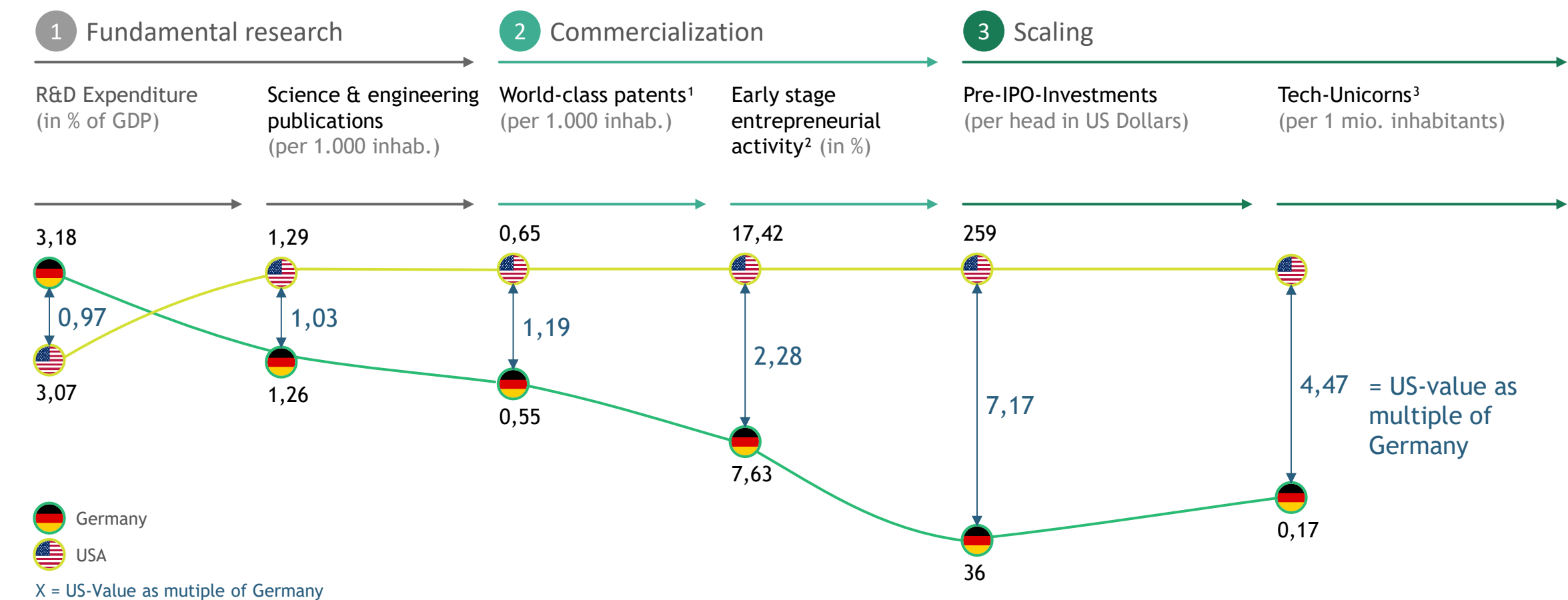
GLOBAL PRIVATE INVESTMENT IN AI BY GEOGRAPHIC AREA

in billion USD (2013-2024)



CHALLENGES IN SCALING AND MARKET ENTRY WIDEN THE INNOVATION GAP BETWEEN GERMANY AND THE US

- Three phases describe the innovation process: (basic) research, commercialization, and scaling.
- When comparing Germany and the USA, both countries are very close together in the early stages. However, the gap widens as the innovation process progresses.
- The biggest gap is in market entry and scaling of innovation. These are particularly challenging for smaller companies and new players, as there are few funding opportunities available.



1. Top 10% of patents, measured by market coverage and technological relevance 2. Individuals aged 18 to 64 who either start a business or are part of the executive management of a newly founded company 3. Start-ups valued at more than one billion dollars with digital business models (internet, software, and hardware)
Source: Handelsblatt; Bertelsmann Stiftung; OECD; National Science Foundation; PitchBook; World Bank

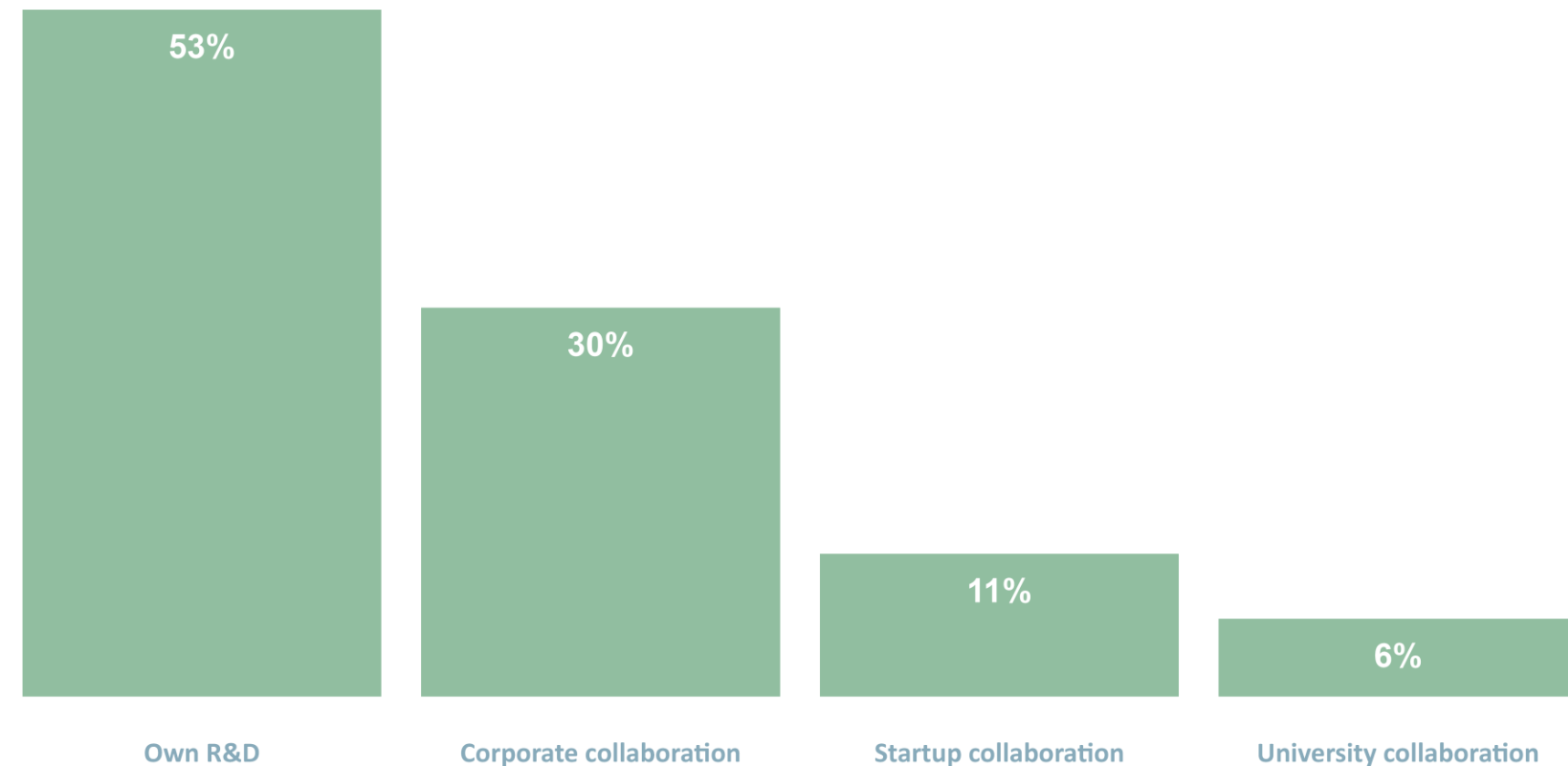
INNOVATION ECOSYSTEMS ARE URGENTLY NEEDED

- When it comes to R&D, collaboration of German companies with universities or startups remains the exception.
- More than half of mentions of R&D activities relate to projects within one and the same company.

SHARE OF R&D PROJECTS IN PUBLIC DOCUMENTS

of DAX, MDAX & SDAX companies by implementation (Jan 2024 - Jul 2025)

n = 838



03

INTERNATIONAL RESEARCH COOPERATION IN A FRAGMENTED WORLD

INTERNATIONAL RESEARCH COOPERATION IN A FRAGMENTED WORLD

International cooperation in research and innovation unlocks comparative advantages, opens up markets, and significantly increases the quality of scientific research. The proportion of international co-publications is particularly high in basic research. The US is by far the largest partner in scientific publications, but also in the registration of co-patents and in the R&D activities of German companies. In view of the increasing divergences between Europe and the US in various policy areas, but also with regard to the large economies of Asia, future R&D cooperation is at stake. This raises key questions about international research cooperation in a fragmented world.

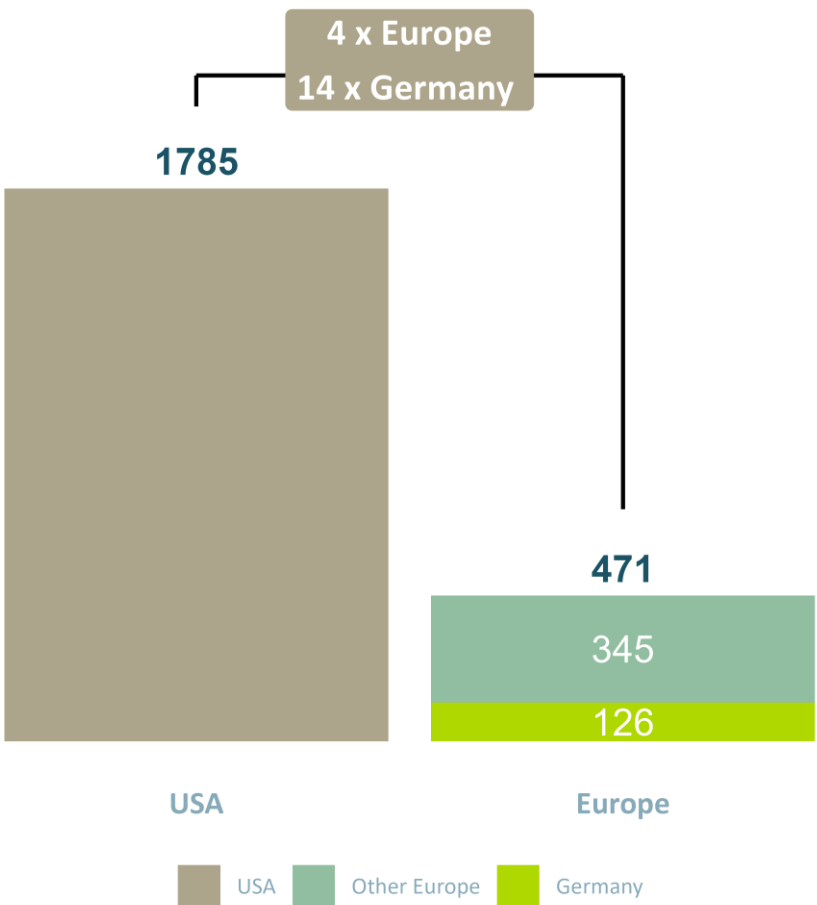
- How can international scientific cooperation succeed in an increasingly fragmented world order?
- What are the consequences for research security, data and knowledge exchange?
- How should Germany and Europe seize the opportunities to become more attractive to top researchers as a space for open and free science and scholarship?
- How is research-based industry positioning itself in the new geopolitical context?

EUROPES START-UP POWER GOES ABROAD

- Germany’s difficulty in commercializing and scaling innovations stems partly from the untapped potential of its startups.
- In stark contrast to Germany, more than twice as many US startup M&A transactions remain in the country.

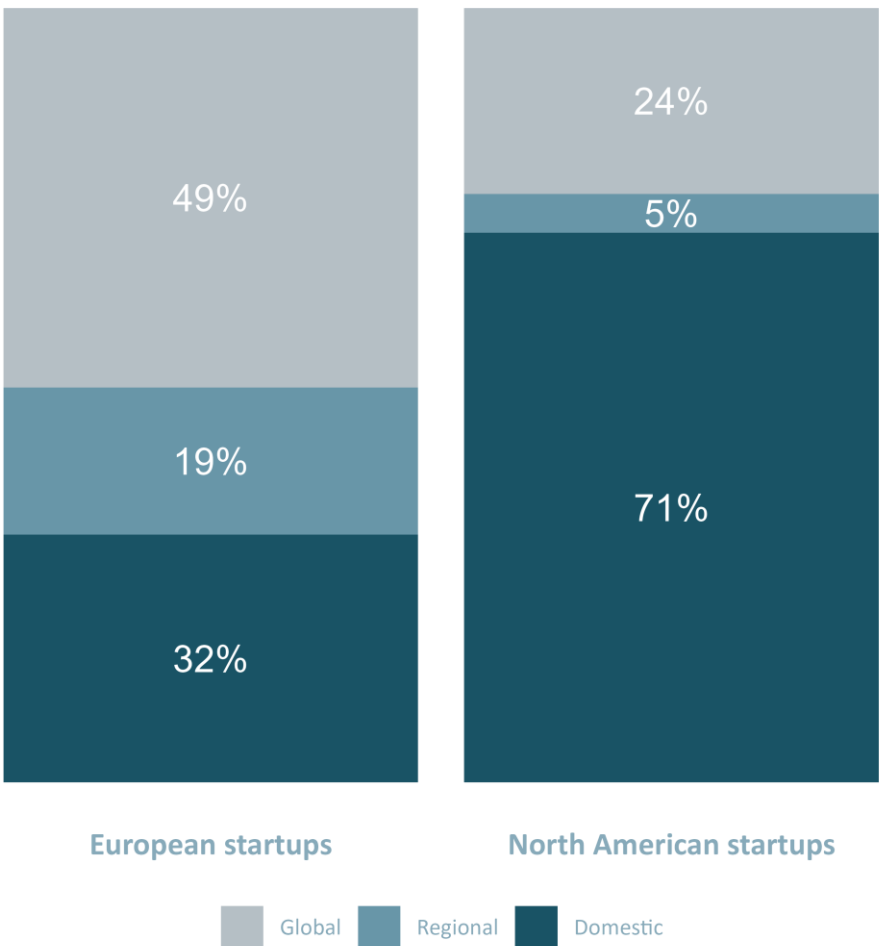
NUMBER OF STARTUP CORPORATE M&A TRANSACTIONS

by Fortune 500 company geography (2000-2024)



GEOGRAPHY OF STARTUP CORPORATE M&A TRANSACTION

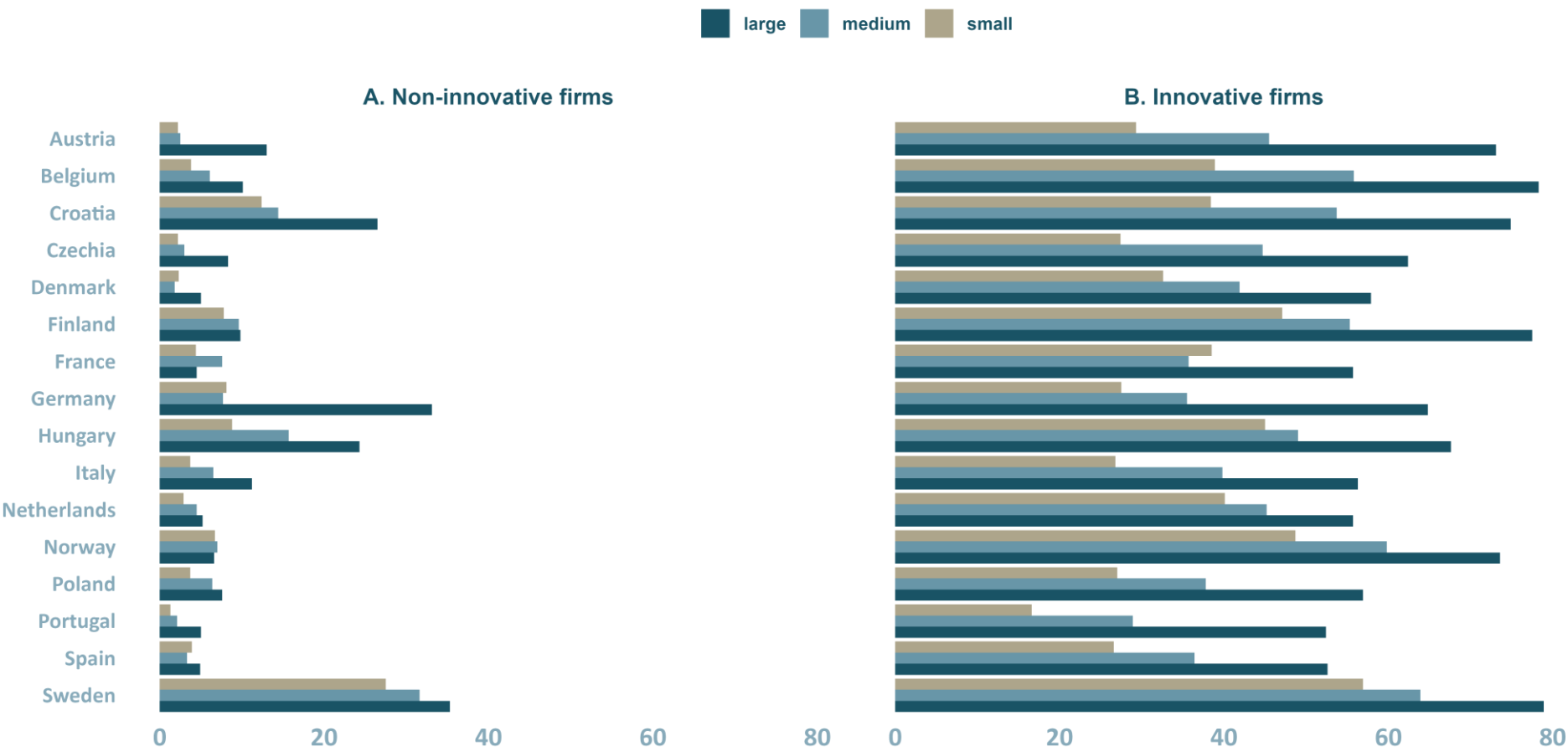
of Fortune 500 by startup geography (2000-2024)



COLLABORATION FOSTERS INNOVATION

- Collaborative firms tend to be more innovative than non-collaborative ones; the most innovative ones tend to collaborate more
- Shift towards “open innovation” reduces the investments needed, making the innovation endeavour more accessible to SMEs

SHARE OF INNOVATIVE VERSUS NON-INNOVATIVE FIRMS THAT CO-OPERATE ON BUSINESS ACTIVITIES WITH OTHER ENTERPRISES OR ORGANIZATIONS
in percent, by size class (2020)

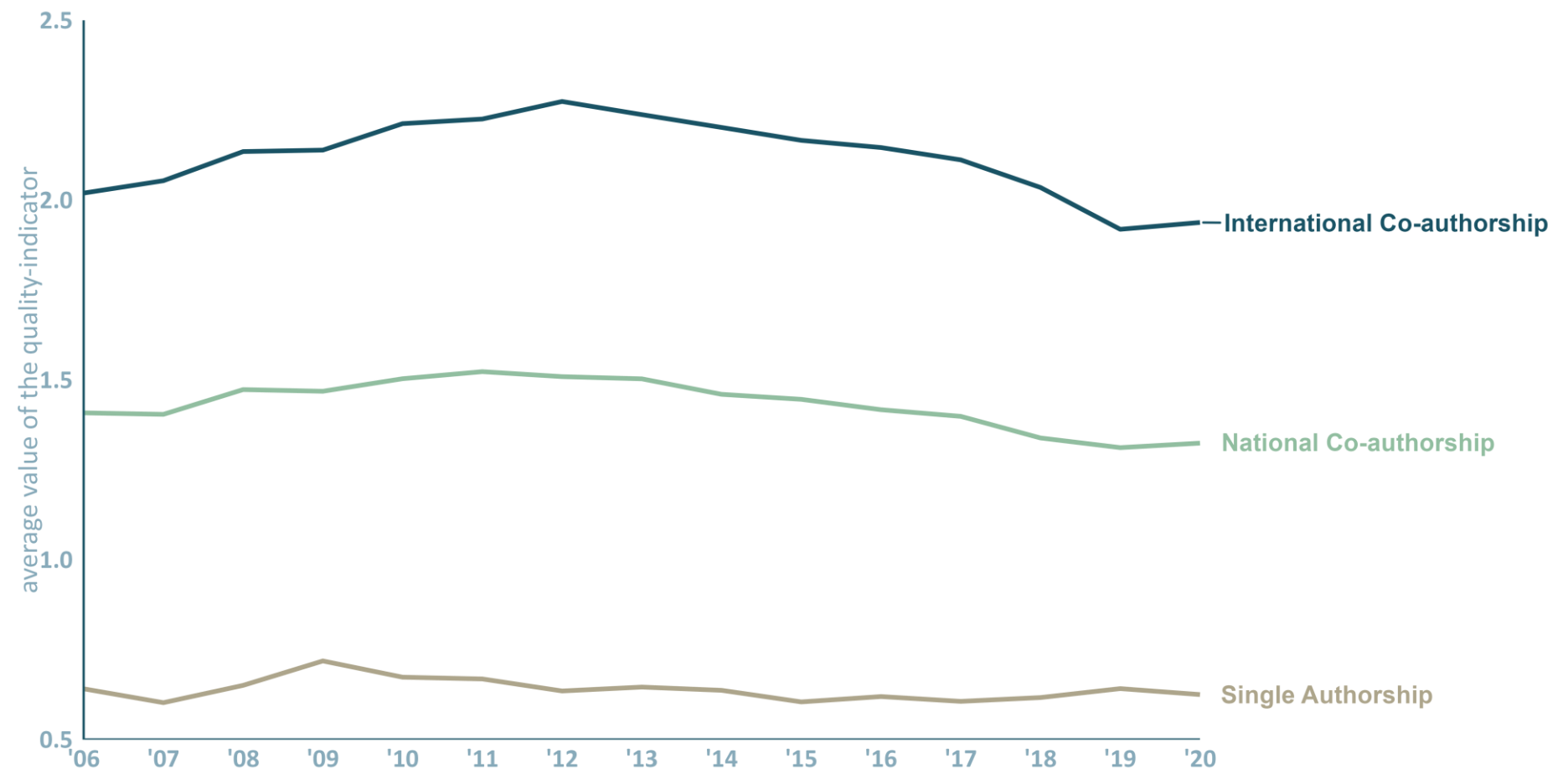


INTERNATIONAL COOPERATION ENHANCES RESEARCH QUALITY

- International mobility of researchers is a driving factor in initiating scientific cooperation, indirectly contributing to an increase in research performance by providing a basis for international collaboration.
- The quality of publications resulting from international cooperation has been somewhat decreasing since 2012, reaching a plateau in 2019.

AVERAGE VALUE OF THE QUALITY-INDICATOR FOR PUBLICATIONS

by cooperation type (2006-2020)



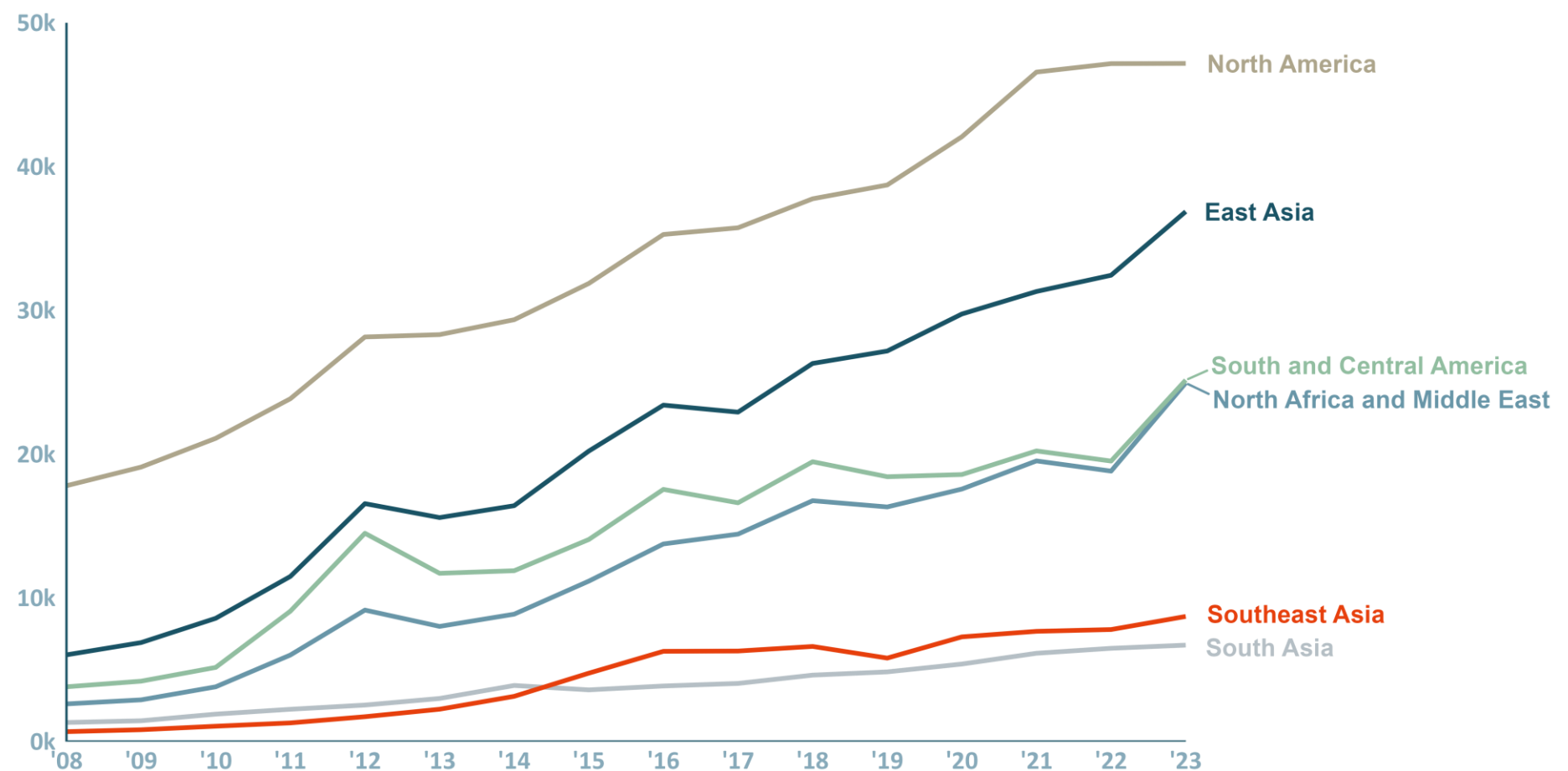
CO-PUBLICATIONS ARE ON THE RISE



- North America is by far the most popular partner region for co-publications from researchers at German universities, even though co-publications with researchers in North America have been plateauing since 2021.
- Since 2022, there has been an uptick in the number of co-publications with researchers based in East Asia, South and Central America, as well as North Africa and the Middle East.

INTERNATIONAL CO-PUBLICATIONS BY PARTNER COUNTRY/REGION

in thousands (2008-2023)



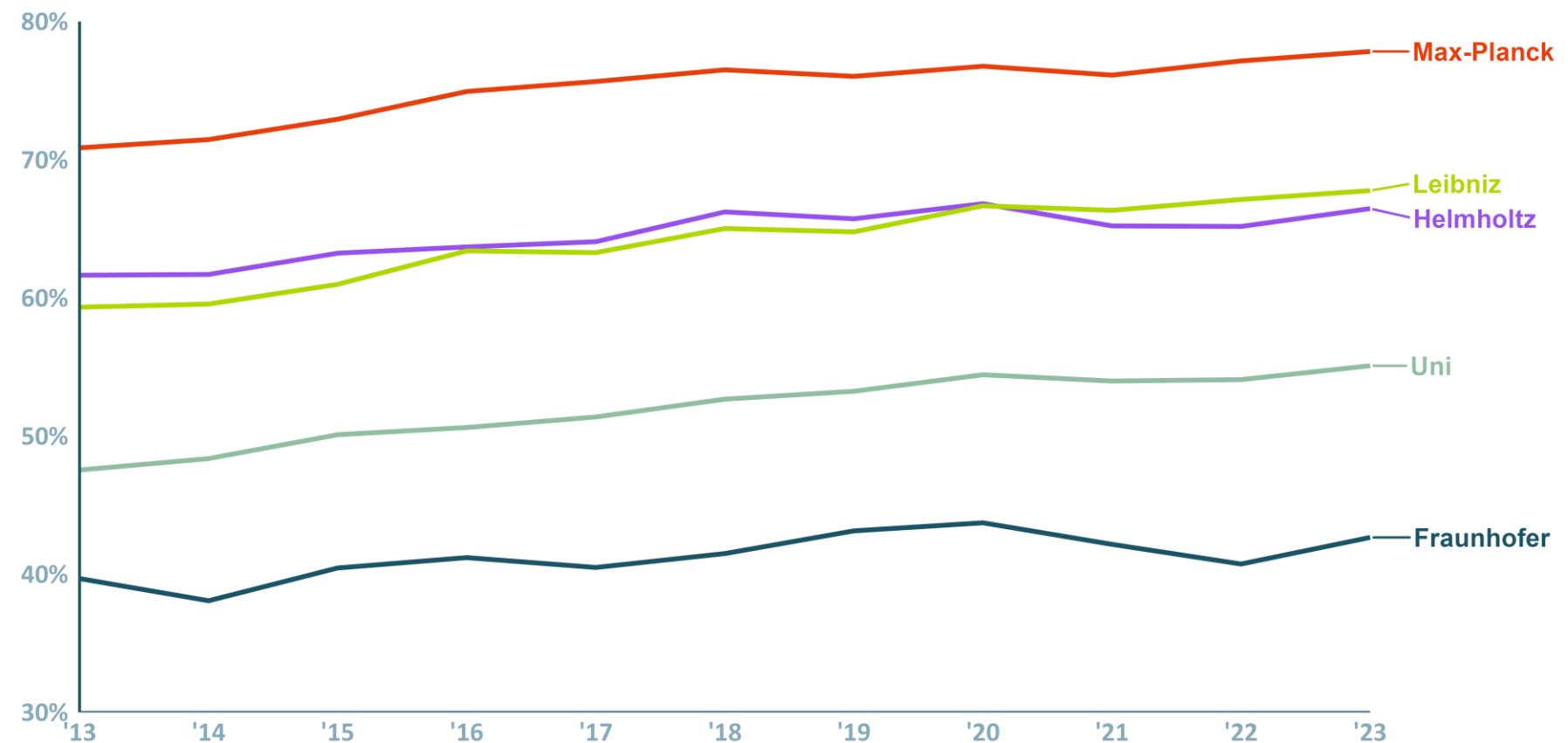
GERMANY'S RESEARCH INSTITUTIONS BOAST STRONG INTERNATIONAL NETWORKS



- German research institutions have strong international ties. The Max Planck Society, with its focus on basic research, leads the way.
- International co-publications are particularly high in basic research. However, their share has also been continuing to grow in institutions engaged in applied research.

SHARE OF INTERNATIONAL CO-PUBLICATIONS FROM NON-UNIVERSITY RESEARCH INSTITUTIONS AND UNIVERSITIES

in percent (2013-2023)

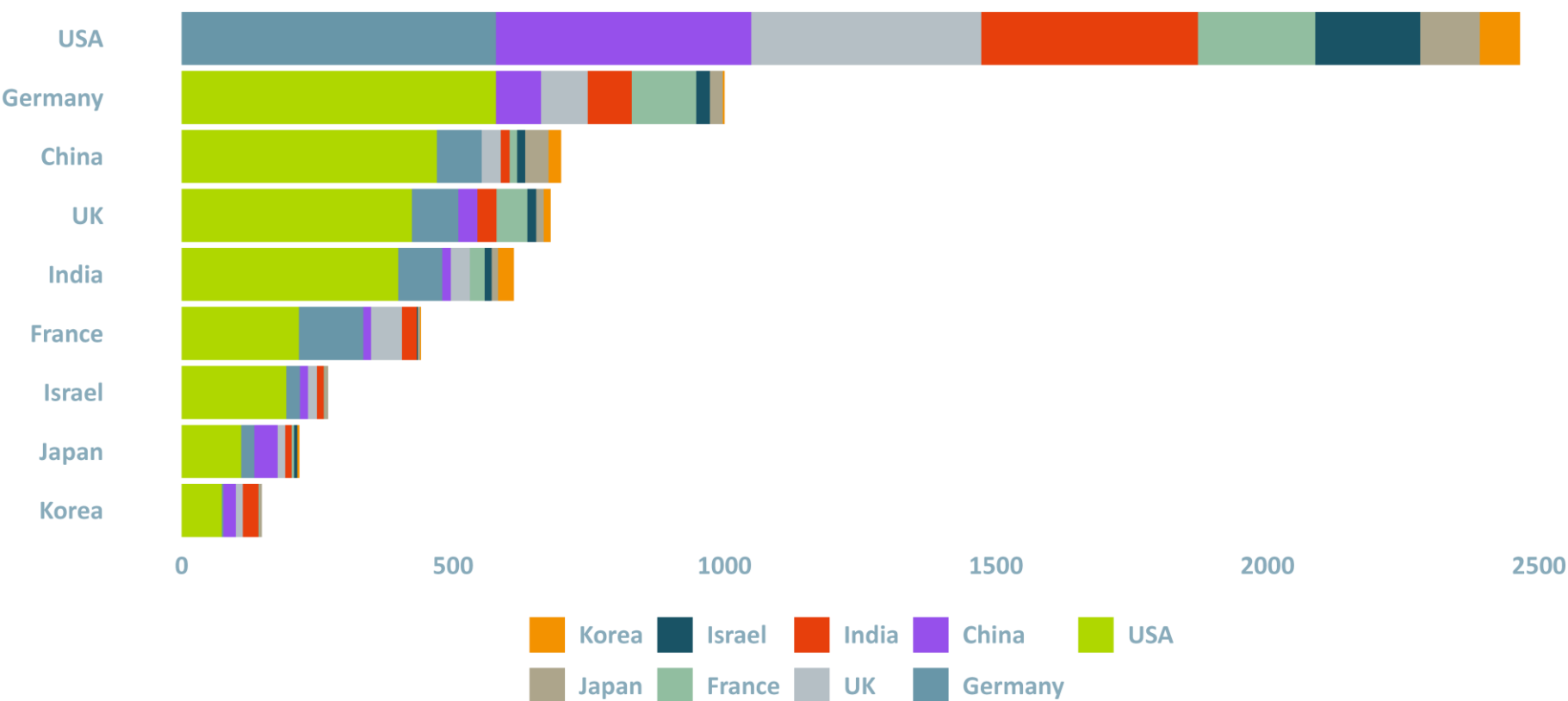


PATENT REGISTRATIONS IN GERMANY STRONGLY DEPEND ON US INVENTORS

- The number of patent registrations in Germany with US involvement is far greater than those with co-inventors from other countries.
- The US is also the most important international partner for patent applications for all other highly innovative countries.

TRANSNATIONAL PATENT APPLICATIONS WITH CO-INVENTORS FROM SELECTED COUNTRIES

in absolute numbers (2002-2022)

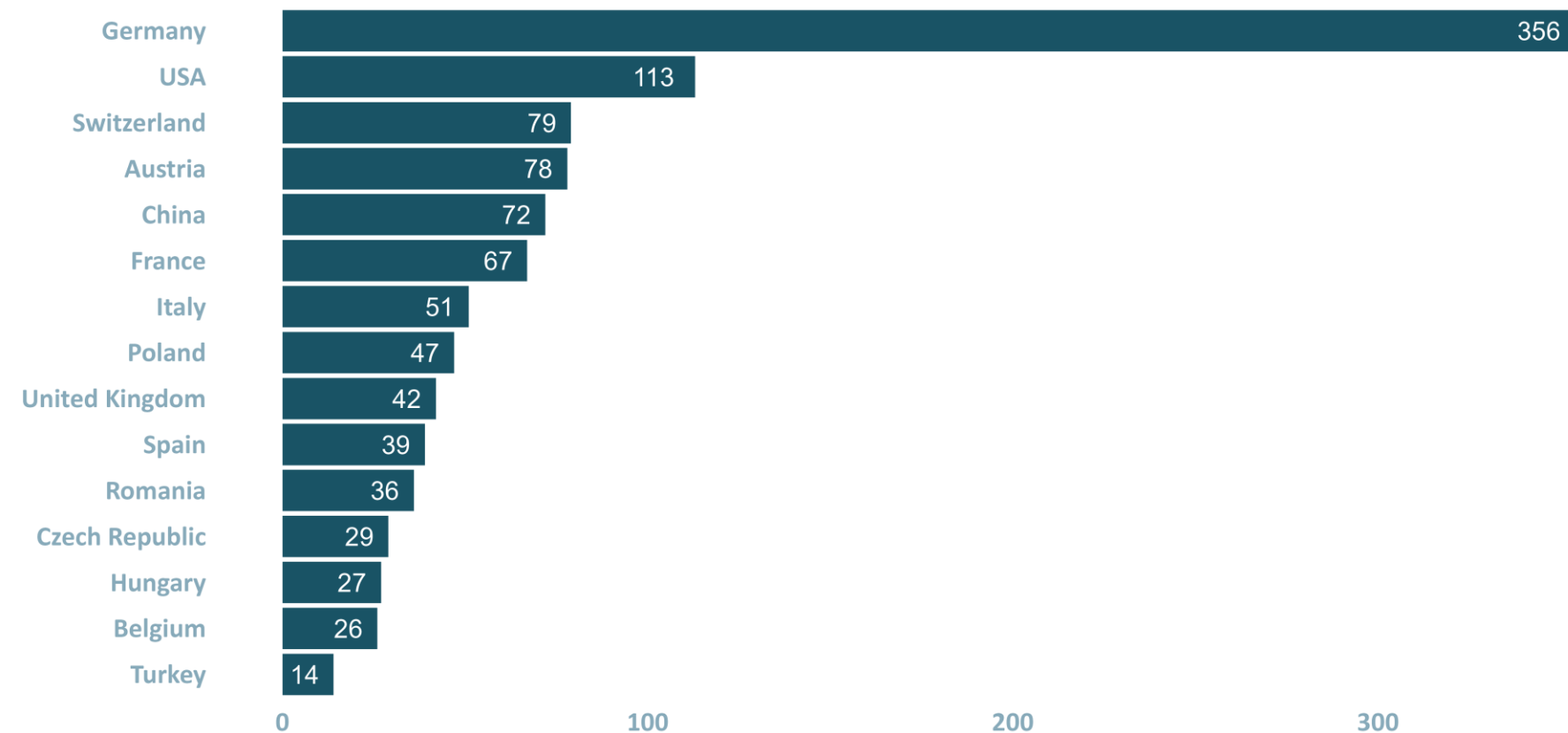


A HIGH PROPORTION OF GERMAN R&D FLOWS ABROAD

- The US leads the way as a target country for German external R&D investments.
- EU countries, as well as China, are amongst the most widely represented countries for external R&D investments of German companies.

MOST IMPORTANT RECIPIENT COUNTRIES OF GERMAN EXTERNAL R&D INVESTMENTS

number of mentions



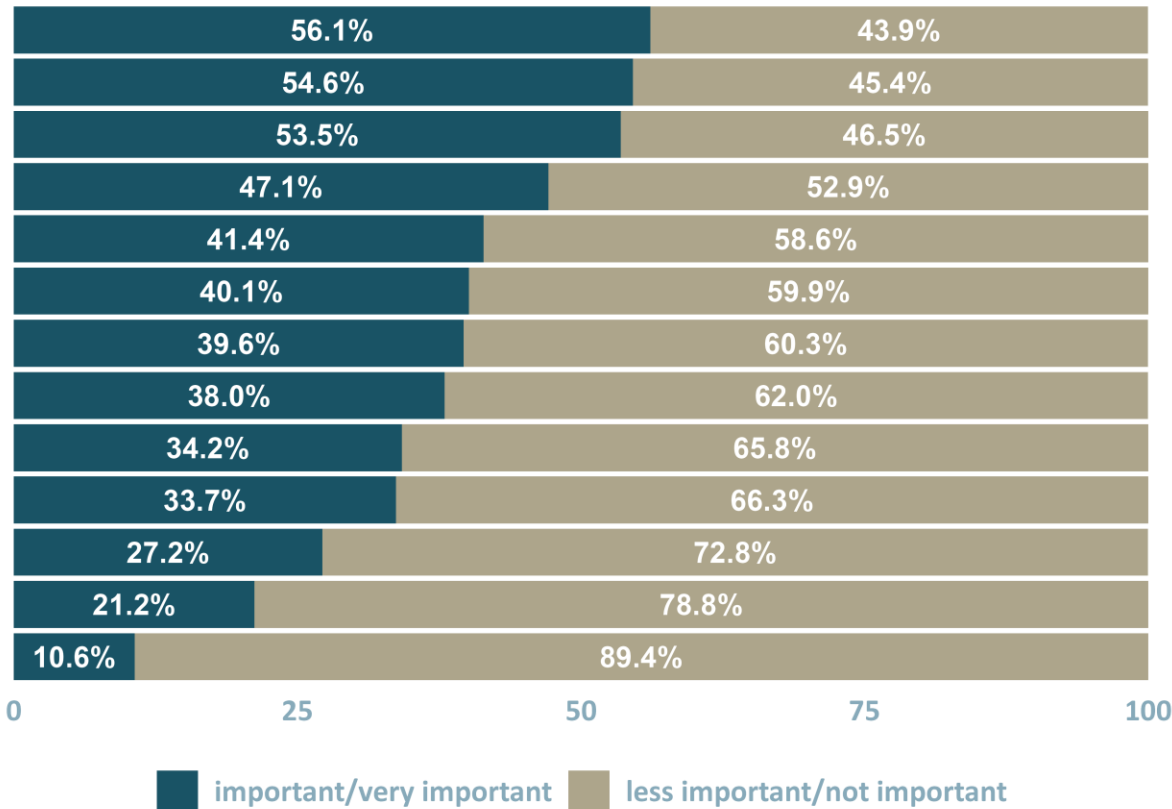
KNOWLEDGE ACCESS IS THE MOST IMPORTANT REASON FOR R&D ABROAD

- There are a number of factors that motivate German companies to move R&D activities abroad.
- Knowledge access, the speed of innovation, as well as securing or tapping into new markets are considered (very) important by more than half of German companies.

IMPORTANCE OF SPECIFIC MOTIVES FOR THE ALLOCATION OF EXTERNAL R&D ABROAD

in percent

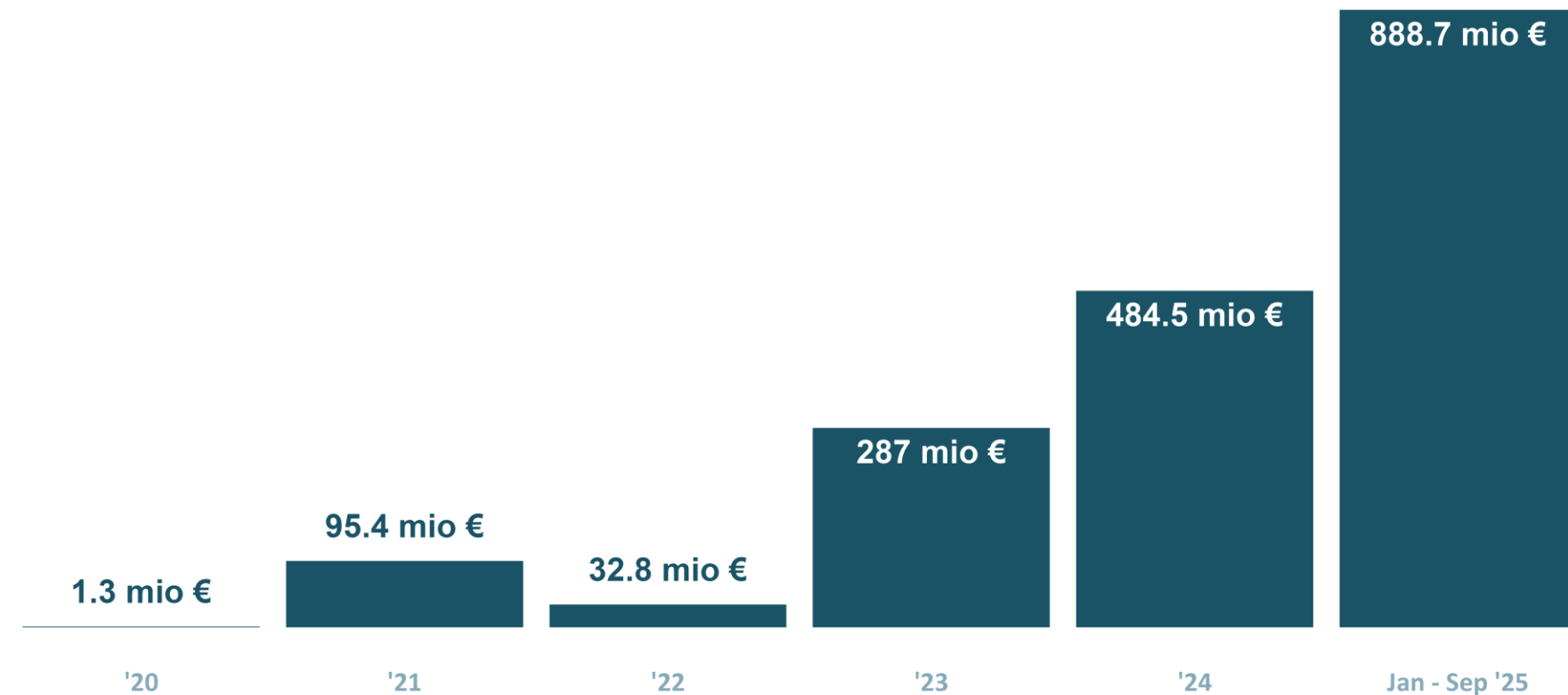
Securing or accessing markets
Accessing specific knowledge
Increasing innovation speed
Achieving cost advantages
Increasing flexibility
Addressing internal bottlenecks
Specific techniques at contractor
More innovation-friendly conditions
Lower bureaucracy and regulation
Reducing risks
Need to meet regulations
Use of subsidies
Participation in or acquisition of companies



INVESTMENTS IN DEFENCE STARTUPS HAVE BEEN RISING SHARPLY

- Funding for defence tech startups in Germany has exploded, rising from just €1.3 million in 2020 to nearly €889 million in the first nine months of 2025.
- This surge is closely linked to Russia's invasion of Ukraine, as well as the broader strengthening of defense budgets in Germany and across Europe.

INVESTMENTS IN DEFENCE TECH START UPS IN GERMANY *in million euro*



04

INNOVATION FOR SECURITY – INNOVATION THROUGH SECURITY

INNOVATION FOR SECURITY – INNOVATION THROUGH SECURITY

Germany and Europe have significantly increased their spending on security and defence in recent years. This has also benefitted security-related research, at least in part. As a result, the share of defence spending in total R&D spending in the EU and Germany has been growing slightly. However, the figures are still far from the levels achieved in the US. This is evident, for example, at universities. Only a few university leaders see a sharp increase in the importance of security-related research at their institutions. At the same time, other countries are demonstrating how R&D investments in security also contribute to economic value creation and innovation that benefit society. This raises key questions on how we can strengthen innovation *for* security and innovation *through* security.

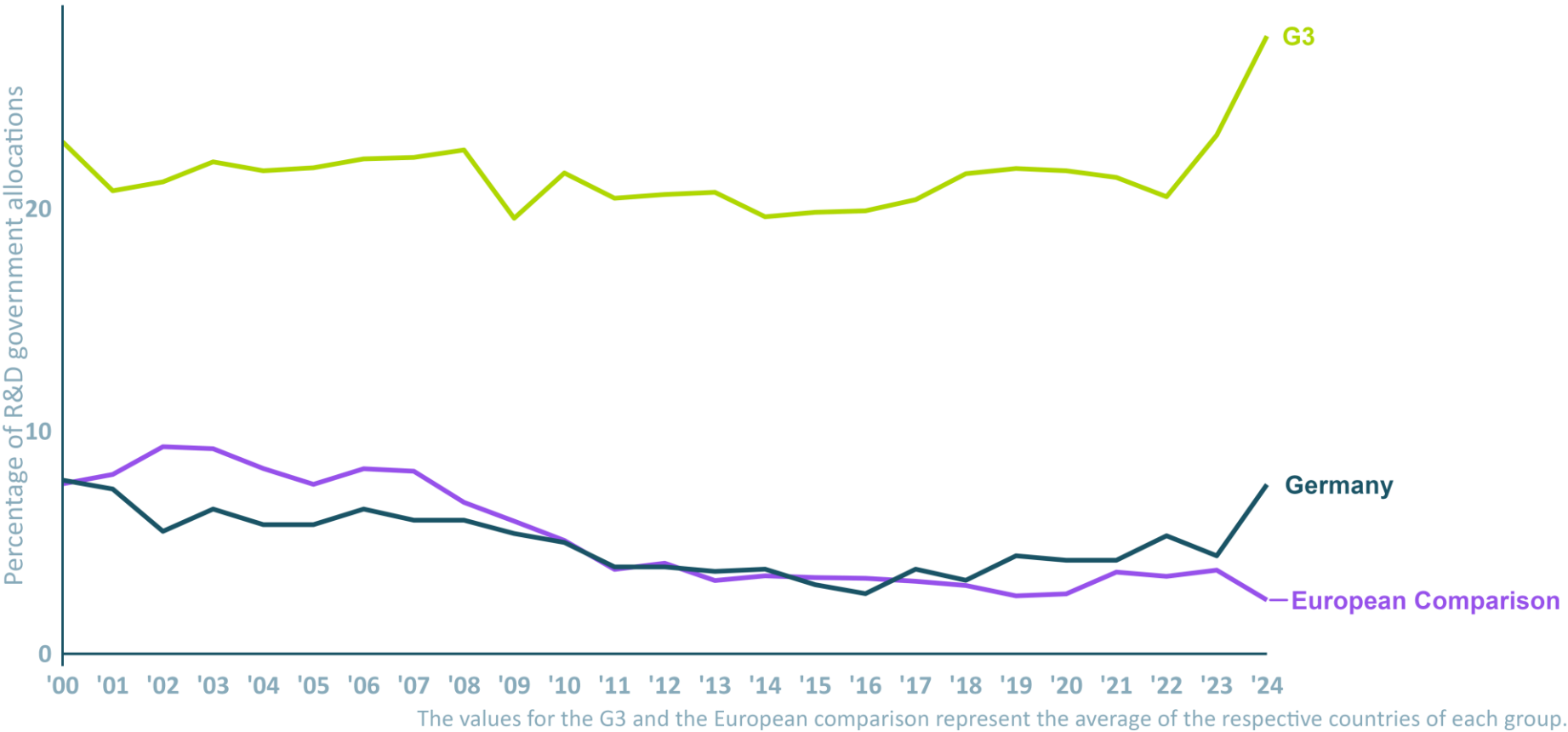
- How is Europe positioned in terms of security-related research?
- How much cooperation between industry and science takes place in security-related research?
- What hinders cooperation (from culture and attitudes to infrastructure and regulations)? What new structures and responsibilities are needed to achieve this?

GERMANY AND EUROPE FALL BEHIND IN DEFENCE AND SECURITY RESEARCH FUNDING

- Compared to other innovation leaders (the United States, Japan and South Korea), both Germany and Europe have been investing much less of public R&D expenditures in defence and security over the past 25 years.

R&D GOVERNMENT ALLOCATIONS FOR DEFENCE

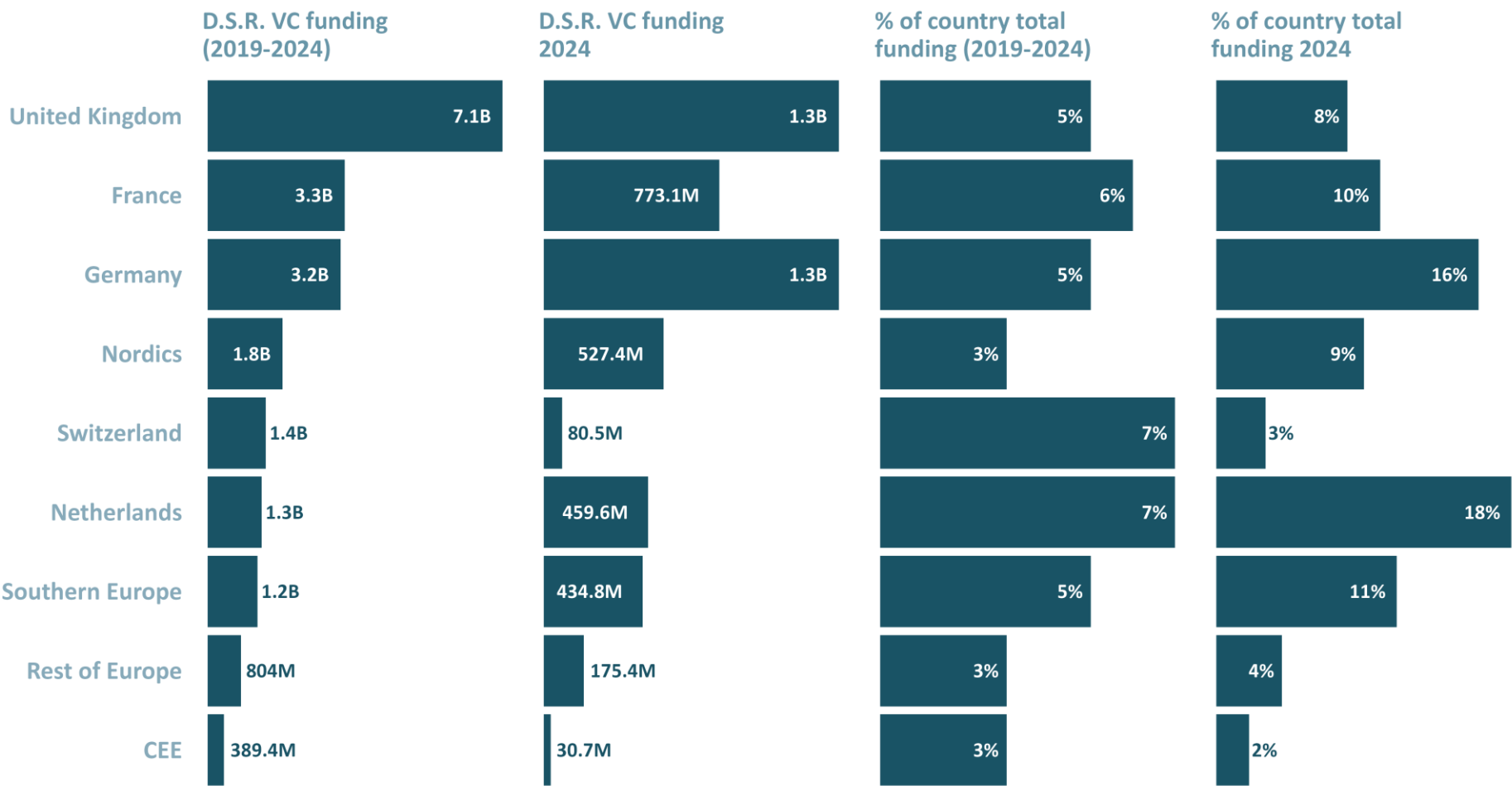
European comparison: GBR, FRA, NLD, SWE, BEL, AUT, CHE, FIN, DNK
G3: USA, JPN, KOR



INNOVATIVE DEFENCE, SECURITY AND RESILIENCE (D.S.R.) START-UPS RECEIVE MORE VENTURE CAPITAL

- Within Europe, the Netherlands and Germany allocated the greatest percentage of VC funding to defence, security and resilience (D.S.R.) in 2024.
- Germany and the UK lead VC funding in Europe, even though both countries trail somewhat behind the Netherlands in terms of total funding allocated to D.S.R.

D.S.R. VC FUNDING IN EUROPE BY REGION

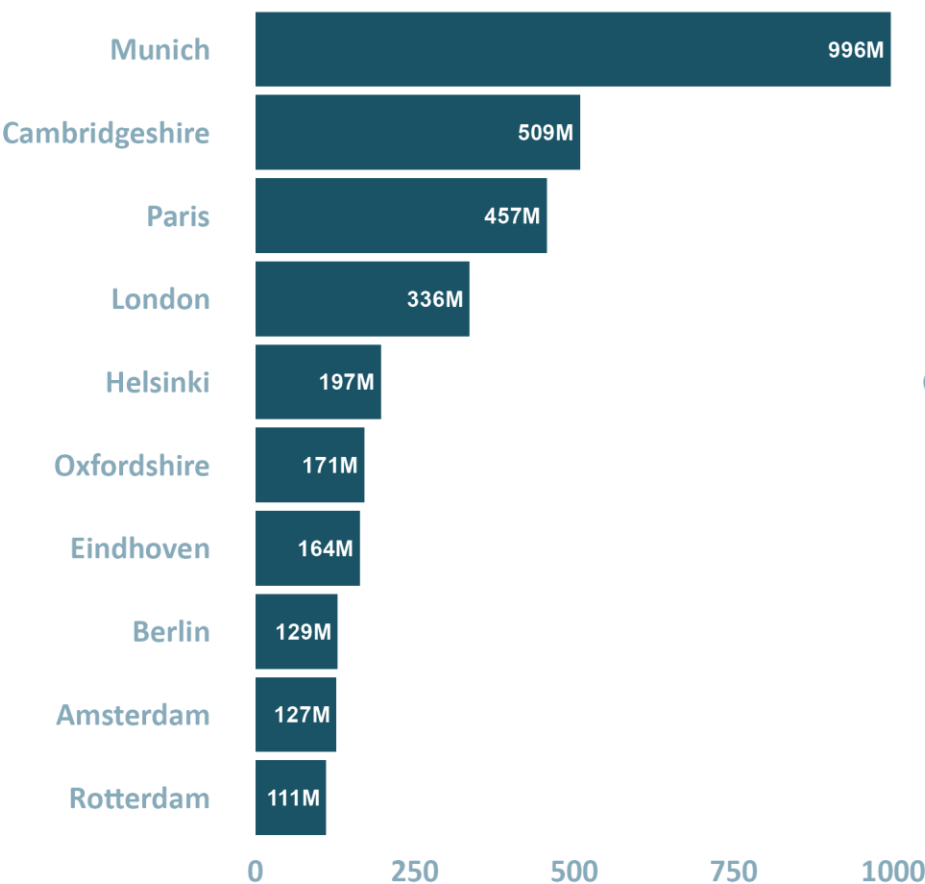


MUNICH BECOMES EUROPE'S D.S.R. STARTUP HUB

- Both Berlin and Munich have been climbing the ranks amongst D.S.R. hubs in Europe since 2024.
- In 2024 top-ranked Munich attracts almost twice as much VC funding as second-placed Cambridgeshire.
- The UK dominates the five-year outlook, with five of the top 10 European hubs for VC funding.

TOP EUROPEAN CITIES FOR VC INVESTMENT IN D. S. R.

VC investment in 2024 (in million USD)



VC investment since 2019 (in million USD)

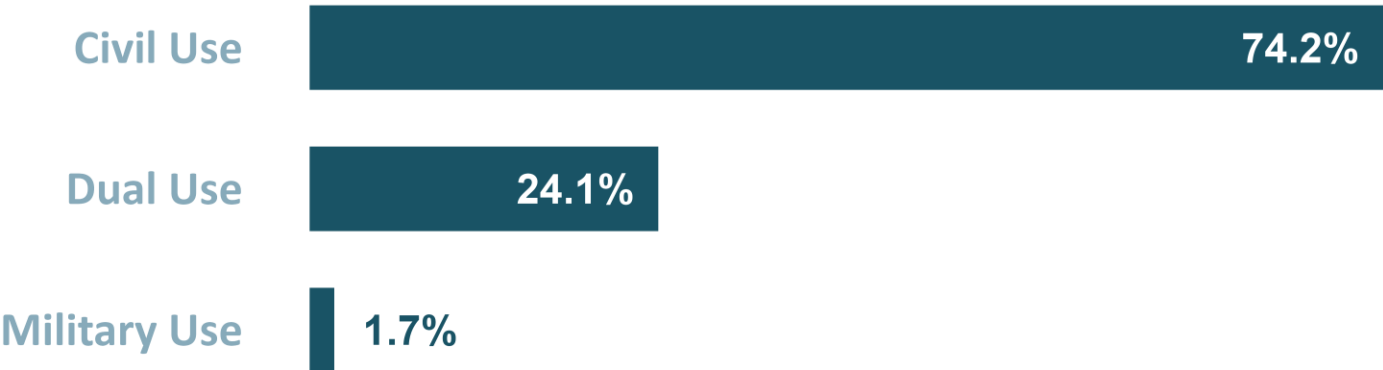


DEFENCE TECH RAISES RECORD FUNDING

- With just under €900 million, twice as much capital has flowed into the defence tech sector in 2025 so far as in the entire previous year.
- 25 percent of startups see potential applications for their business model in defence and security.

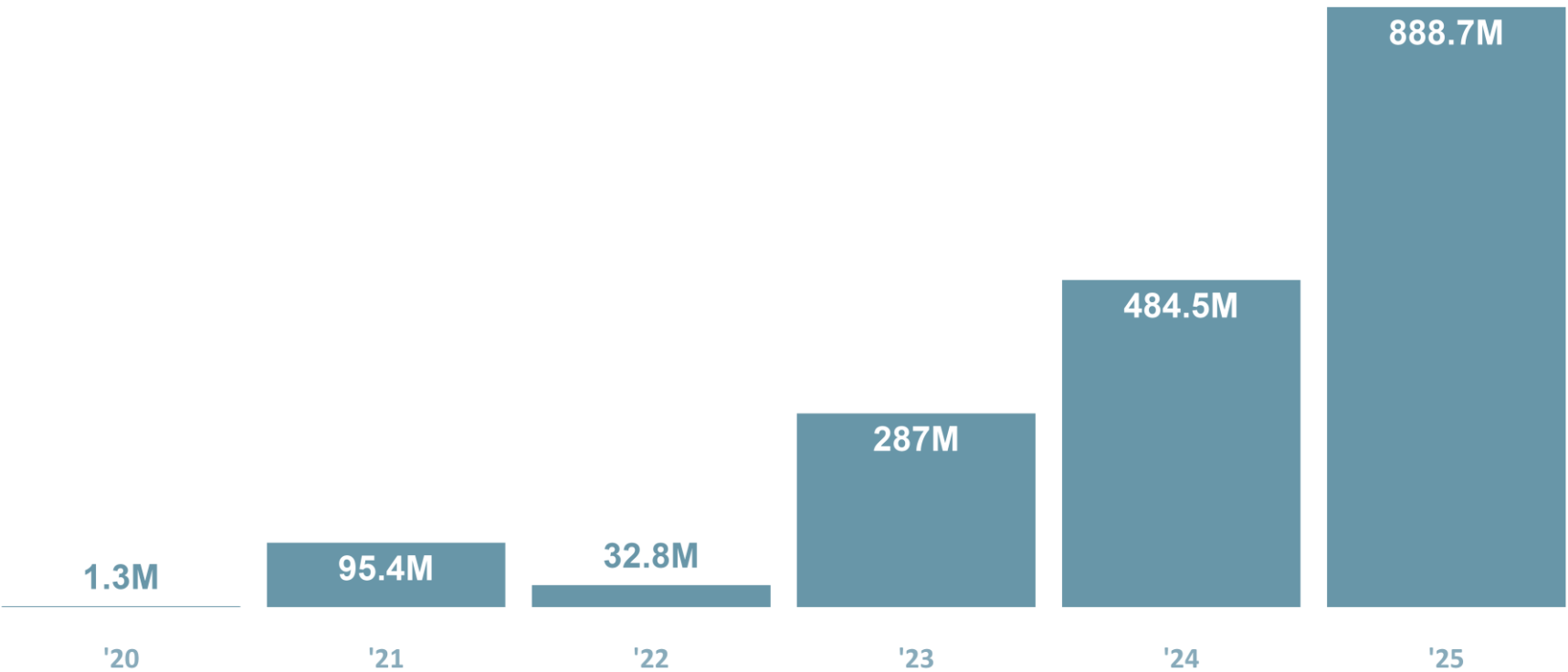
DECLARED PRODUCT USE OF GERMAN STARTUPS

in percent



INVESTMENTS IN GERMAN DEFENSE-TECH STARTUPS

In million euro (2020 - Sep. 2025)



Source: Deutscher Startup-Monitor

GERMAN UNIVERSITIES DIVERGE ON THE IMPORTANCE OF SECURITY-RELATED RESEARCH



- Germany's universities are nearly evenly divided on whether security-related research has grown in importance or remained unchanged.
- Only 16% of university leaders see a sharp increase in security-related research. This contrasts with public debates about the growing need for technological and societal solutions for defense, security, and resilience.

DEVELOPMENT OF THE RELEVANCE OF SECURITY-RELATED RESEARCH OVER THE PAST FIVE YEARS

in percent (n = 81)



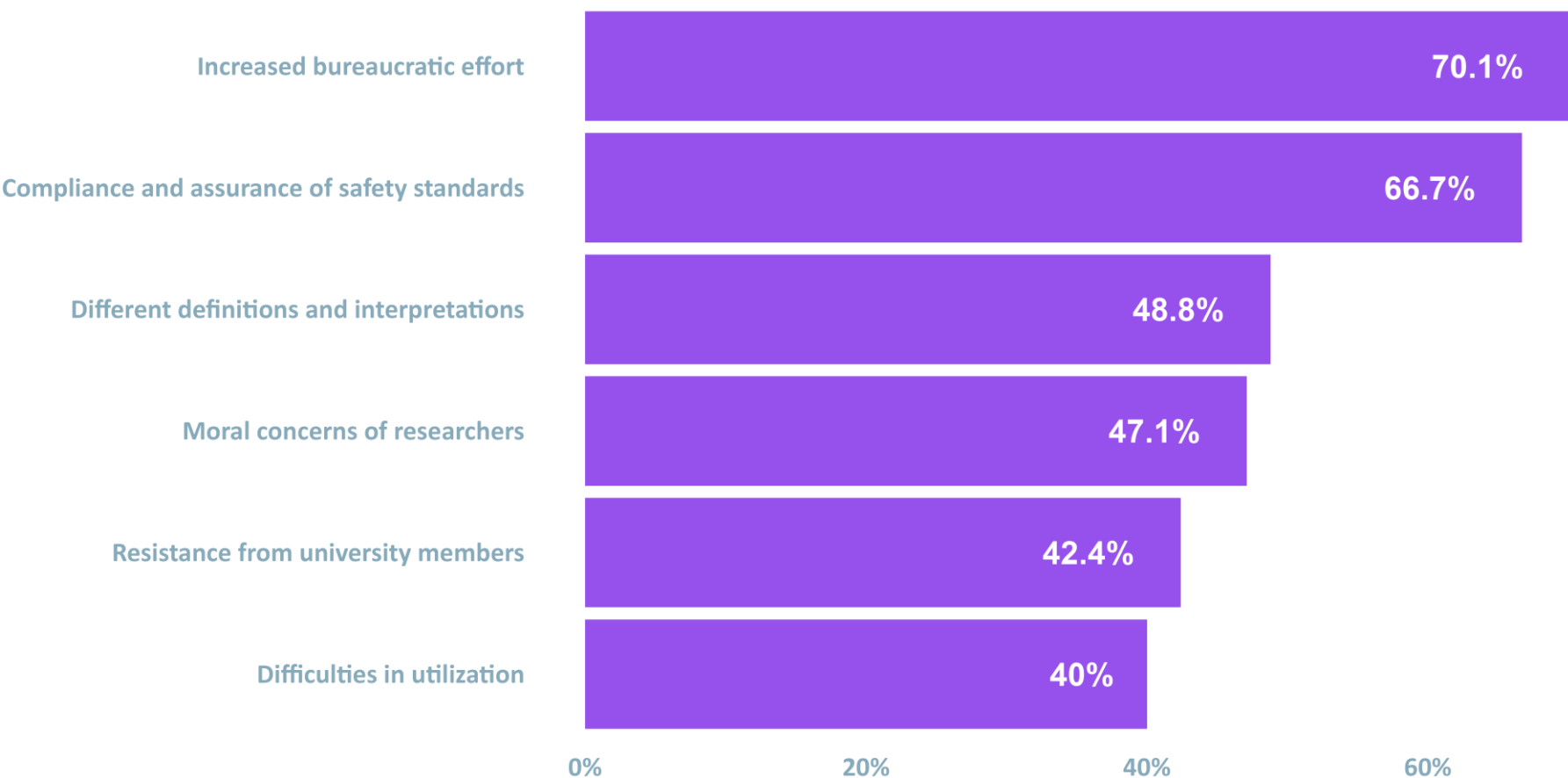
■ Slight decrease ■ Remained the same ■ Slight increase ■ Strong increase

UNIVERSITIES FACE CHALLENGES IN CONDUCTING SECURITY-RELATED RESEARCH

- Germany’s universities identify several hurdles to security-related research, ranging from security standards and increased bureaucratic burdens to ethical concerns among researchers.
- In addition to the challenges posed by increased security requirements for processes and infrastructure, almost half of all universities also encounter resistance within their own staff to research for defence and security purposes.

CHALLENGES IN CONDUCTING DEFENSE-RELEVANT RESEARCH

percent of answers which perceive the following as a challenge (2024)



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