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A balance Between Collaboration And Security

The conditions for Danish research are changing. Geopolitical tensions and global competition have increased the demands on how Danish researchers manage other countries' interest in international research collaboration. In Denmark, the guidelines for international research and innovation collaboration (URIS) have shaped institutions' approach to security since 2022[1]. The question is whether Danish institutions and security authorities have found the right balance between collaboration and security, and how we monitor this development.

China's scientific dominance

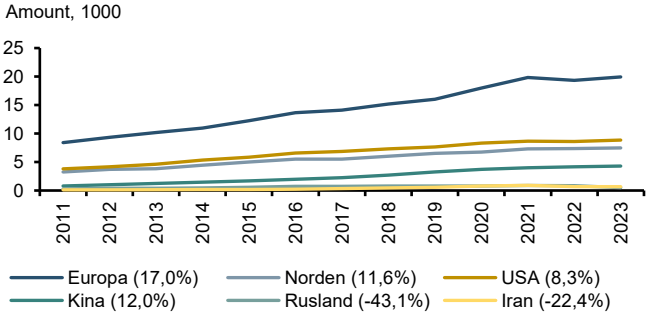
According to the Danish Security and Intelligence Service (PET), China, Iran and Russia constitute risk-countries in relation to Denmark's research security[2]. China is particularly challenging for Danish research environments. Over the past decades, China has invested massively and strategically in research and development, and today invests far more than the EU and at a level comparable to the United States[3]. The outcome of China's investments is striking. Measured by publications and citations, China now dominates 37 of 44 critical technologies, including energy, biotechnology, artificial intelligence, advanced materials, quantum technology and space[4]. This puts Denmark and Danish researchers in a dilemma. If Denmark is to keep up in critical technologies, Danish researchers must collaborate with the leading environments in China.

China has increasingly focused on translating research results into innovation and development. Compared to China's leading technology regions, Denmark, like the rest of the EU and the United States, has lost ground and now produces a far smaller share of high-quality patents per capita across most of the 16 critical technology fields[5]. A possible explanation is that China's investments in experimental development amount to around 80 percent of total R&D spending, while basic and applied research account for 20 percent. In addition, the private sector accounts for 80 percent of China's R&D investments. In Europe, about 60 percent of R&D investments go to basic and applied research and 40 percent to experimental development. Private investment in Europe accounts for less than 60 percent of total R&D spending[6].

International collaboration under pressure

The URIS guidelines aim to protect Danish research from foreign influence, espionage and theft without limiting Denmark's international knowledge exchange and collaboration. The guidelines build upon three principles: identifying and protecting critical research, knowing one's collaboration partners and protecting institutions, their staff and students[7]. Institutions are responsible for implementing the guidelines, supported by the Forum for International Coordination and Collaboration (FIKS). The initiatives include background screening, oversight of secondary employment, procedures for guest access and training for employees. The consequences of the increased security focus should be monitored, for example by FIKS, so institutions and authorities can adjust their approach if the desired outcomes are not achieved. DFIR highlights the developments in two central metrics: the number of international co-publications and the admission of international PhD students.

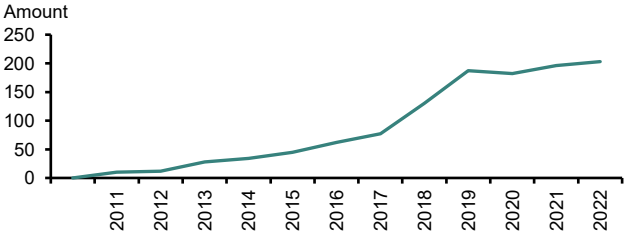
Figure 1 Number of co-publications for selected partner countries and regions. 2011–2023. (Percentage change from 2020 to 2023 indicated in parentheses)



Source: Danmarks Forskningsportal and DFIR's calculations

The number of co-publications with researchers from Europe, the Nordic countries and the United States constitutes the vast majority of internationally co-authored scientific articles and has generally risen steadily since 2011. In contrast, the number of co-publications with researchers from Russia and Iran has fallen from 2020 to 2023, while co-publications with researchers from China continue to rise, but at a slower pace. Preliminary figures for 2024 are still uncertain, but indicate that the number of co-publications with China has declined in 2024.

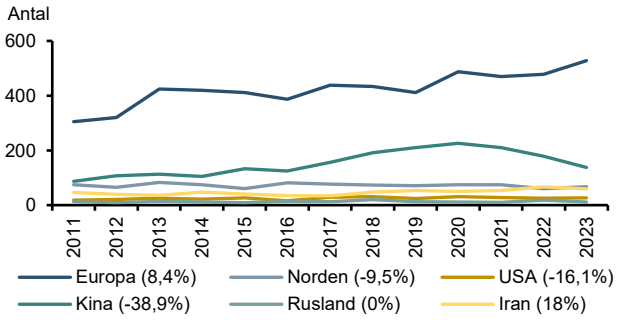
Figure 2 Number of co-publications with researchers from the seven universities affiliated with China's Ministry of Industry and Information Technology. 2011–2023



Source: Danmarks Forskningsportal and DFIR's calculations

The number of co-publications with researchers from the seven universities linked to China's Ministry of Industry and Information Technology has declined since 2022 and is now at the same level as in 2019. These universities are considered strategically important for China's military, although collaboration with these institutions is not the only security concern[8]. From 2020 to 2023, the admission of Chinese PhD students has also fallen by 39 percent. This corresponds to around 90 PhD students and is particularly visible in technical and natural science fields. The decline is mainly due to Danish universities increasingly rejecting PhD applicants funded by the China Scholarship Council. In contrast, the admission of PhD students from Iran has risen, while the intake from Russia has remained stable.

Figure 3 Admission of PhD students by selected countries and regions. 2011–2023. (Percentage change from 2020 to 2023 indicated in parentheses)



Source: Danmarks Statistik and DFIR's calculations
Note: EU includes Liechtenstein, the UK and Switzerland

From 2020 to 2023, the intake of PhD students from Europe increased only modestly, and admissions from the Nordic countries declined. The number of PhD students from the United States remains at a stable low level of around 25 per year. That figure is far below a country such as Iran, which had 59 admissions in 2023. Yet the overall intake of international PhD students has fallen by only 1.1 percent from 2020 to 2023, corresponding to 15 fewer students. This suggests that Danish universities have compensated for the decline in Chinese applicants. EU countries account for some of this increase, but recruitment comes from a much broader geography, which increases the diversity of the PhD population. DFIR considers this positive.

Strategic balance and foresight

It is It is widely recognised that international research collaboration contributes to quality, relevance and progress in research and innovation. Transparency in research results, procedures and data strengthens rigour and reproducibility. These principles are important to the high quality, productivity and impact of Danish research, which help make Danish research environments attractive partners internationally.

There is a need for ongoing discussion about which metrics should be included when monitoring international collaboration, and for following developments and the consequences of current policies. Security procedures should be differentiated, proportionate and precise to ensure the least intrusive measures possible. The OECD is currently developing recommendations that can support such an approach. A differentiated procedure could, for example, refer to technologies' Technology Readiness Level (TRL) and their strategic importance. Collaboration may be more permissible for technologies at lower TRL levels and with lower sensitivity. This includes basic research and much of problem-oriented research. Approvals could also be based on the strategic value of the collaboration for Denmark. If Chinese research contributes to the research frontier, it may benefit Denmark to collaborate. This calls for holistic procedures that consider different risks and potentials, stakeholders and possibly diplomatic concerns. Different critical technologies vary in their potential for military use, and countries differ in their ability to exploit them. It is therefore recommended that security procedures be developed with the researchers and institutions involved and adjusted when necessary.

A contemporary security policy for research requires not only control and security procedures, but also considerations of science diplomacy, technology alliances and strategic foresight. It is also a matter of ensuring that Denmark does not fall behind in international collaboration, but remains a relevant and responsible actor in the global knowledge landscape.

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Notes

[1] URIS (2022), Afrapportering. Udvalg om retningslinjer for internationalt forsknings- og innovationssamarbejde.
[2] PET (2023), Vurdering af spionagetruslen mod DK, Færøerne og Grønland
[3] OECD (2025), Main Science and Technology Indicators Database.
[4] ASPI (2023), Critical Technology Tracker - The global race for future power.
[5] ATV (2025), 16 kritiske teknologiområder som Danmark skal forholde sig til.
[5] EU kommissionen (2025), A comparative analysis of public R&I funding in the EU, US, and China.
[6] UFM (2023), Kommissorium for FIKS.
[8] ASPI (2025), China Defence Universities Tracker.