

Chapter 14

Knowledge Security: A New Policy Concept for Science and Politics

LEO EIGNER

Center for Security Studies (CSS), ETH Zurich

Abstract: The global science, technology, and innovation (STI) sector thrives on open exchange and international collaboration, yet it also underpins national economic and political competitiveness and can intensify geopolitical rivalries. In recent years, authoritarian governments have exploited the openness of the global STI sector to their advantage, creating significant security and ethical risks. To address these challenges, scientifically leading, democratic nations have developed the policy concept of knowledge security (or research security), which seeks to safeguard scientific values and assets as well as national security. This paper describes six overarching knowledge security risks faced by higher education institutions (HEIs) and research-performing organizations (RPOs) and highlights the divergent perspectives of science and policy actors. It outlines the emerging consensus on balancing openness with security and outlines diverse approaches and measures shaping knowledge security policy. The paper concludes with a description of seven guiding principles that can support the process of policy formulation and implementation.

Keywords: knowledge security; research security; science, technology, and innovation policy; strategic competition; security policy

Scientific and technological advancements result from the free exchange of ideas. For this reason, open science, academic mobility, and international cooperation are cornerstones of national science, technology, and innovation (STI) sectors, which collectively form a globally integrated STI sector. Because STI are perceived to lie at the heart of national competitiveness, higher

education institutions (HEI) and other research performing organizations (RPO) inhabit a highly contested space where multiple actors vie for access and control of crucial STI assets and developments. To some extent, this has always been the case. Yet due to rising tensions between rival political systems and ideologies, this competition has reached new heights.

Over the past decades, certain autocratic countries, which have a broader interpretation of national security, have exploited the openness of the global STI sector to further their own agendas.¹ The governments of China, Russia, Iran, and North Korea have, for instance, strengthened their military capabilities, expanded their repressive surveillance systems, deployed STI to suppress human rights domestically, and spread propaganda and self-censorship abroad.² This poses security and ethical risks to scientific values and national interests in democratic, scientifically leading countries. For this reason, science and policy actors in Australia, Canada, the EU, EU Member States, Japan, Norway, Switzerland, Taiwan, the UK, and the US are currently formulating and implementing policies at institutional, national, and international level to tackle these security and ethical risks.³ These policies are generally referred to as knowledge security or research security.

The aim of knowledge security is to safeguard scientific values and practices as well as national security and interests.⁴ More specifically, it seeks to

¹ For country agnostic studies, see: Arena Baykal and Thorsten Brenner, “Risky Business: Rethinking Research Cooperation and Exchange with Non-Democracies,” *Global Public Policy Institute*, October 22, 2020. For China related studies, see: Ingrid D’Hooghe et al., “Assessing Europe-China Collaboration in Higher Education and Research,” *Leiden Asia Centre*, 2018; Rebecca Arcesati, Irène Hors and Sylvia Schwargg Serger, “Sharpening Europe’s approach to engagement with China on science, technology and innovation,” *MERICs*, December 2021.

² For military related topics, see: Alex Joske, “Picking flowers, making honey: The Chinese military’s collaboration with foreign universities,” *Australian Strategic Policy Institute*, October 30, 2018. For surveillance and human rights related reports, see: Yves Moreau, “Crackdown on genomic surveillance,” *Nature*, December 5, 2019, <https://www.nature.com/articles/d41586-019-03687-x>; Billy Perrigo, “Exclusive: Workers at Google DeepMind Push Company to Drop Military Contracts,” *Time Magazine*, August 23, 2024, <https://time.com/7013685/google-ai-deepmind-military-contracts-israel/>. For propaganda related studies, see: Clive Hamilton and Mareike Ohlberg, *Hidden Hand: Exposing How the Chinese Communist Party is Reshaping the World* (Oneworld Publications, 2020).

³ For an overview of national policies, see: Ingrid D’Hooghe and Jonas Lammertink, “How National Governments and Research Institutions Safeguard Knowledge Development in Science and Technology,” *Leiden Asia Centre*, November 2022.

⁴ Leo Eigner, “Knowledge Security at Stake,” *CSS Analyses in Security Policy*, no. 336 (2024).

address six overarching risks: (1) preventing the transfer of sensitive knowledge and technology to actors involved in human rights violations and/or foreign military and security systems; (2) mitigating infringements of scientific integrity and scientific values, such as academic freedom and institutional autonomy; (3) ensuring reciprocity and transparency with international partners; (4) avoiding science monopolies and financial dependencies on international partners; (5) avoiding discriminatory knowledge security policies and a hard decoupling; and (6) preventing loopholes and asymmetrical implementation of knowledge security policies.⁵ In short, knowledge security seeks to “derisk” and to “decouple” national STI sectors from the global STI sector. Knowledge security thus represents a new intersectional policy concept that, like economic or energy security, grapples with a much larger concern, namely, how to engage in strategic competition in a highly interconnected world.

Since the late 2010s, science and policy actors in the above-mentioned countries have debated how best to address knowledge security risks. While most stakeholders agree that neither a completely open nor a completely closed STI sector is desirable, opinions differ as to the degree to which the STI sector can and should be open or closed. A free and open STI sector would risk perpetuating its exploitation as well as the long-term erosion of scientific values and national security. By contrast, a secure and closed STI sector would harm international relations and scientific partnerships. It could also curtail the free exchange of ideas and cut science actors from accessing important STI developments, talent, infrastructure, and capital from abroad. The answer, then, is to find a balanced, proportionate approach that preserves scientific excellence, values, and exchange while ensuring safety and security of the STI sector and the nation’s interests at large⁶

⁵ Leo Eigner, “Knowledge Security: Ein neues Konzept für die Schweiz,” *Bulletin 2024 zur schweizerischen Sicherheitspolitik* (Center for Security Studies, 2024), 111–138.

⁶ This view is widely expressed by science as well as policy actors: “Die akademische Zusammenarbeit mit China realistisch gestalten,” *DAAD*, January 4, 2024; Irna van der Molen et al., “Keeping science open? Current challenges in the day-to-day reality of universities,” *CESAER*, October 18, 2023; “Integrity and Security in the Global Research Ecosystem,” *OECD*, June 22, 2022; Tommy Shih, “We cannot adopt a blanket approach to research security,” *University World News*, October 2, 2024, <https://www.universityworldnews.com/post.php?story=20241001140316637>.

However, science and policy actors often have different perspectives on this balancing act. Policy actors, such as bureaucrats, government agencies, and parliamentarians, generally believe that knowledge is power and a national asset. To them, STI are a source of national prosperity, competitiveness, and security that should be preserved in the nation's interests. By contrast, science actors, such as individual researchers, funding agencies, and HEI, generally believe that knowledge is free and a global public good. To them, this is primarily a matter of practice, as scientific excellence results from international exchange and mobility. At the same time, it is also a principle, as knowledge cannot be owned and therefore belongs to everyone. In addition, science actors are often wary of knowledge security, because they fear domestic political interference or prescriptive policymaking that may infringe on their academic freedom—a law in many scientifically leading, democratic countries—and the institutional autonomy of their home organizations.⁷ This divergent, epistemic interpretation of STI and its role in society can pose difficulties when formulating national knowledge security policies.

Since the late 2010s, when the awareness for knowledge security risks rose among various science and policy communities, international consensus on how best to address these risks has grown.⁸ For instance, there is a broad agreement regarding the distribution of roles and responsibilities. Science actors, particularly individual researchers and their home organizations, are considered to be responsible for implementing knowledge security policies. This safeguards their academic freedom and institutional autonomy and thus ensures the legitimacy of knowledge security policies. However, if science actors implement measures on their own, this could create loopholes that foreign actors can exploit. Cooperation with policy actors is therefore essential. Generally speaking, policy actors are assigned supportive and

⁷ This UK example illustrates a common fear among science actors: John Morgan, “Red tape warning for research projects over national security law,” *Times Higher Education*, February 17, 2022, <https://www.timeshighereducation.com/news/red-tape-warning-research-projects-over-national-security-law>.

⁸ A recent survey found that science actors spend more time on knowledge security issues: Mark Hahnel, Simon Porter and Rachael Delevante, “Research Transformation: Change in the era of AI, open and impact,” *Digital Sciences*, October 28, 2024.

coordinating responsibilities. Ideally, they provide science actors with advice and expertise on security and foreign policy, financial and intelligence resources, and sound legal frameworks that empower science actors to act according to their mandates, needs, and functions. Due to the complexity of knowledge security risks and policies, coordination is widely considered a joint responsibility.

Consensus is also forming around the general approach to knowledge security. Following pushback from science communities against top-down and prescriptive approaches in countries such as Australia, Canada, and the US, governments are increasingly adopting a more bottom-up approach geared towards supporting science actors in the formulation and implementation of knowledge security policies.⁹ In this respect, the Netherlands has become something of a blueprint for sound knowledge security policy. Not only were Dutch science and policy actors early to respond to knowledge security risks; their experience in the formulation and implementation of knowledge security policies exemplifies a process of common threat representation, information gathering and exchange, stakeholder assemblage, role allocation, and coordination within and between their national science and policy communities.¹⁰ As a result, Dutch actors have influenced international standards when it comes to knowledge security policies, particularly within Europe and the EU.

When it comes to concrete measures, however, there is no national nor international consensus. Instead, there are a broad range of measures taken at institutional and national level that vary in their scope and latitude. Institutional measures include: raising awareness for knowledge security through educational programs; reviewing codes of conduct and ethical review processes; screening individual researchers in “sensitive” areas and

⁹ For pushback against top-down policymaking, see: Richard L. Hudson, “Canada tightens security for university research, affecting ties to China,” *Science | Business*, January 18, 2024, <https://sciencebusiness.net/news/international-news/canada-tightens-security-university-research-affecting-ties-china>; Richard L. Hudson, “Pentagon advisors urge caution in tightening science security,” *Science | Business*, March 22, 2024, <https://sciencebusiness.net/news/international-news/pentagon-advisors-urge-caution-tightening-science-security>.

¹⁰ David Snetselaar, “DREAMS Lab: Assembling knowledge security in Sino-Dutch research collaborations,” *European Security* 32, no. 2 (2023), 233–251.

with certain scholarships for links to foreign military and security apparatuses¹¹ screening foreign investment in projects, research centers, HEI, and RPO designed to shape public opinion and spread propaganda;¹² screening collaborations, programs, and partnerships with HEI, RPO, and companies for human rights abuses and/or links to foreign military and security apparatuses;¹³ establishing compliance offices and implementing national and international export control regulations. National measures include: raising awareness among HEI and RPO through intelligence sharing and support;¹⁴ establishing working groups and issuing non-binding knowledge security guidelines and strategies;¹⁵ establishing national support structures for HEI, RPO, and companies;¹⁶ providing funds to HEI and RPO to implement knowledge security policies;¹⁷ reviewing and amending laws and regulations to provide a sound legal basis for knowledge security po-

¹¹ Yojana Sharma, “ETH foreign student screening leans on West’s sanctions list,” *World University News*, November 7, 2024, <https://www.universityworldnews.com/post.php?story=20241107142108558>; Yojana Sharma, “German university ends ties with China scholarship scheme,” *World University News*, July 20, 2023, <https://www.universityworldnews.com/post.php?story=20230720113914406>.

¹² Bonnie Girard, “The Rise and Fall of Confucius Institutes in the US,” *The Diplomat*, November 28, 2023, <https://thediplomat.com/2023/11/the-rise-and-fall-of-confucius-institutes-in-the-us/>.

¹³ Examples on collaborations with Russia, China, and Israel: Richard Stone, “Western nations cut ties with Russian science, even as some projects try to remain neutral,” *Science*, March 8, 2022, <https://www.science.org/content/article/western-nations-cut-ties-russian-science-even-some-projects-try-remain-neutral>; Pieter Haec, “Belgian research powerhouse turns hawkish on China,” *Politico*, April 4, 2024, <https://www.politico.eu/article/belgium-university-town-leuven-reposition-protectionist-world-trade-technology-council/>; David Matthews, “Academic boycotts over Gaza war jeopardise Israel’s place in Horizon Europe,” *Science | Business*, May 23, 2024, <https://sciencebusiness.net/news/universities/academic-boycotts-over-gaza-war-jeopardise-israels-place-horizon-europe>.

¹⁴ Chris Havergal, “Security vetting plan for researchers of sensitive technologies,” *Times Higher Education*, April 26, 2024, <https://www.timeshighereducation.com/news/security-vetting-plan-researchers-sensitive-technologies>.

¹⁵ For a (slightly outdated) overview of national guidelines, see: D’Hooghe and Lammertink, “Safeguard Knowledge Development in Science and Technology.”

¹⁶ For example: the National Contact Point for Knowledge Security in the Netherlands, the Research Collaboration Advice Team (RMAT) in the UK, or the planned center, Safeguarding the Entire Community of the U.S. Research Ecosystem (SECURE), in the US.

¹⁷ For example, the Canadian government has created a fund worth £75 million for five years. The UK is contemplating a similar approach: Jack Grove, “Russell Group urges creation of UK research security fund,” *Times Higher Education*, October 17, 2023, <https://www.timeshighereducation.com/news/russell-group-urges-creation-uk-research-security-fund>.

licies;¹⁸ initiating counter-espionage programs;¹⁹ and expanding sanctions lists and export control regimes.

Knowledge security policies require alignment between science and policy actors. Seven principles—intrinsic to knowledge security and thus unavoidable—can help to guide stakeholders towards achieving this alignment.²⁰ First, national laws, such as academic freedom or the state's responsibility for national security, must be asserted. Determining which laws take precedence depends on the context and requires consultation among stakeholders. Second, knowledge security is a political issue rather than a scientific one, necessitating policies that balance national laws with international scientific norms and practices. Third, security and ethics are deeply interconnected aspects of knowledge security. As the STI sector becomes more securitized, a corresponding ethicalization of national security will take place. Fourth, knowledge security risks are complex. They are highly granular and constantly evolve, making them difficult to detect and monitor. Fifth, targeted interventions guided by a precautionary approach can address the inherent complexity of knowledge security risks. Sixth, knowledge security is a shared responsibility, relying on both collective efforts and individual accountability. Seventh, knowledge security is rooted in established norms, aims, and policies. It seeks to preserve open science, academic mobility, and international collaboration while ensuring these activities remain safe, fair, and secure.

The risks and policies of knowledge security represent a profound, long-term challenge to the core principles upon which the global STI sector is built. It is possible that the global STI sector may become less global and fragment into blocks that continue to interact, but in a far more pointed and risk-aware manner. While knowledge security represents a challenge, it is an

¹⁸ In the UK, the Higher Education (Freedom of Speech) Act 2023 mandated the Office for Students, a regulator, to monitor HEI's dependence on foreign funding: Tom Williams, "Zahawi wants OfS to audit foreign donations for free speech risk," *Times Higher Education*, June 7, 2022, <https://www.timeshighereducation.com/news/zahawi-wants-ofs-audit-foreign-donations-free-speech-risk>.

¹⁹ Natascha Gilbert, "China Initiative's shadow looms large for US scientists," *Nature*, February 23, 2024, <https://www.nature.com/articles/d41586-023-00543-x>.

²⁰ Eigner, "Knowledge Security," 133–136.

opportunity. It can prioritize relations between certain countries, expand the science-policy interface, and reinvigorate science diplomacy in crucial areas addressing global challenges.

Policy Recommendations

1. Adopt a balanced and precautionary approach to knowledge security to continue to promote international scientific collaboration.
2. Foster inclusive, consensus-driven knowledge security policy development between the science and policy communities at inter-institutional, national, and international level.
3. Ensure targeted, coherent, and consistent knowledge security policies that are in line with academic freedom and national security.

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