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Preface

Science needs freedom – freedom entails responsibility! This guiding principle has always been part of the way the German Research Foundation (DFG) and the German National Academy of Sciences Leopoldina see themselves. Almost 10 years ago, it spurred the establishment of the Joint Committee of the DFG and the Leopoldina on the Handling of Security-Relevant Research with the aim of strengthening self-regulation of the sciences and humanities and doing justice to their special responsibility. However, in times of war in neighbouring European countries and escalating global systemic rivalries between democracies and autocracies, the vital freedom of research is confronted with changing framework conditions. This *Zeitenwende* (turning point) is also affecting the academic system, and the strategic role of research and innovation for national security interests such as competitiveness, autonomy and defence is becoming increasingly important in the political arena. The claim is being made that academic research also bears responsibility for safeguarding our basic democratic order and other national values and that it can no longer be pursued solely for its own sake. In addition, the numerous voluntary commitments of German research institutions to conduct research exclusively for peaceful goals and purposes are to be revised and research with potential for both civilian and military applications is to be expanded, organised more efficiently and better funded.

Even if these demands may be understandable from a political perspective, research must also protect itself from becoming a political pawn in a newly emerging world order in which freedom of research is increasingly under threat and international scientific cooperation in research and teaching is changing from a gold standard to an instrumentalized political issue. Freedom of research is not unconditional and must be constantly renegotiated in consideration of other constitutionally protected goods. Proportionality should always be kept in mind, as not all risks can be completely eliminated without being paralysed by complex documentation and review processes and the resulting restrictions. There are numerous pressing global challenges, such as the transformation of energy systems, preparing for future pandemics, and protecting the oceans, which we can only meet through the free scientific exchange of the brightest minds from around the world.

With the establishment of advisory Committees for Ethics in Security-Relevant Research (KEFs), the German science system has already created a forward-looking framework so that the sciences can address many of the above-mentioned challenges autonomously. However, the KEFs must not be overburdened with too many new tasks. Their core competence should continue to lie in ethically evaluating and advising on the potential for misuse of specific research results and methods. The responsibility remains with the individual researchers to draw personally justifiable conclusions in favour of or against a project. Furthermore, the KEFs' involvement in security-relevant research issues of concern must be even more routinely incorporated, their visibility, acceptance and assessment expertise must be further increased, and appropriate resources must be made available to them so that they can continue to fulfil these demanding tasks with diligence.

PROFESSOR DR GERALD HAUG
President of the German National Academy of Sciences Leopoldina

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President of the German Research Foundation

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Summary and prospects

Security-relevant research and the associated risks of misuse are constantly evolving, for example through synergies between artificial intelligence and other disciplines such as biometrics, engineering and biotechnology. The Joint Committee on the Handling of Security-Relevant Research, an advisory body set up by the German Research Foundation (DFG) and the German National Academy of Sciences Leopoldina, continuously monitors these developments, identifies where action is necessary, and advises the DFG and the Leopoldina executive boards in this regard. In addition, the Joint Committee works closely with the Commissions for Ethics in Security-Relevant Research (KEFs) to strengthen the responsible handling of freedom of research within the framework of self-regulation in the sciences and humanities.

Challenges such as the coronavirus pandemic, the Russian war of aggression on Ukraine, far-reaching technological changes, and a global shift in power towards autocratic political systems are leading to a fundamental change in the scientific system and the purpose of research being questioned, especially with regard to national security interests. This is associated with major challenges for researchers, research institutions and research funding organisations in Germany. The aim should be to preserve their own values, principles and strategic autonomy on the one hand, while continuing to facilitate top international research and teaching on the other.

In Chapter A, this fifth report of the Joint Committee explains the background to the changes in the global scientific system, in particular with regard to the challenges of international research cooperation using the example of China, and related initiatives to safeguard research integrity and research security. Furthermore, examples of security-relevant fields of research are presented, i.e. scientific work that has the potential to generate knowledge, products or technologies that could be misused (by third parties) to harm human dignity, life, health, freedom, property, the environment or peaceful coexistence. These are labelled as “concerning” if misuse can occur directly and potential damage is significant. Information is provided on the status of German and international debates on security-relevant research, e.g. work on pathogen research and artificial intelligence, as well as on the general questioning of the often-practised separation of civilian and military research. Finally, the legal framework and the funding of security-relevant research is discussed.

Chapter B deals with the progress made in the self-regulation of the sciences in Germany when it comes to dealing with security-relevant research and research cooperation. The chapter takes up a selection of recommendations and guidelines in the academic field, for example from the DFG and the Leopoldina, the German Rectors’ Conference, and the Max Planck Society. The tasks, objectives and activities of the Joint Committee are also described. More than 150 German research institutions, research organisations, professional societies and an industry association have now appointed contact persons to deal with security-relevant research. There are at least 122 KEFs or comparable bodies across Germany that advise more than 300 research institutions on ethical issues relating to security-relevant research. Based on the results of surveys and investigations by the Joint Committee, insights into the work and skills of the KEFs are provided and guiding questions for the ethical evaluation of security-relevant

research are presented. These are guiding questions that (1) suggest the need for a KEF to advise researchers, (2) may be important for the processing of the enquiry by the KEFs and (3) for the final assessment and advice by the KEFs. According to all four Joint Committee surveys, at least 124 security-relevant cases were deliberated in the KEFs between 2016 and 2023, of which nine received outright negative advisory votes. The surveys showed that security-relevant research of concern continues to be a rare exception in academic research, but that the KEFs also deal with other, sometimes overlapping security-relevant topics. These include the compatibility of research with constitutional principles and guiding principles of research institutions, international research cooperation, questions of research funding, data protection and export controls, and risks associated with military sponsors and cooperation partners. However, in many cases the work of the contact persons and KEFs is still not yet an institutionally established and continuous process. There is often a lack of mechanisms to consolidate the visibility and acceptance of procedures involving security-relevant research and prevent the expertise gained in dealing with security-relevant research from being lost again. Finally, the Joint Committee presents examples of good practice and recommendations that can help to raise awareness of and improve the ability to assess ethical aspects of security-relevant research in the scientific community. For example, fundamental ethical knowledge and evaluation methods should be an integral part of all degree programmes and the respective area ethics should be integrated in the teaching content and curricula of as many relevant degree programmes as possible.

Chapter C provides information on the involvement of the members and the Joint Committee office in public debates and their further contributions to the responsible handling of security-relevant research. For example, the Leopoldina Lecture "Brain-Computer Interfaces: Will the boundaries between man and machine soon blur?" took place in May 2023. According to the event, various scenarios involving the misuse of sensitive personal data and disembodied actions, for example, should be considered in the research and development of brain-computer interfaces and ethical issues should be included in the development process. The conference "Sensitisation and skills development for ethics of security-relevant research (dual use) in teaching – theories, methods, good practices" in June 2023 focused on raising awareness and imparting ethical knowledge in teaching at universities. From this, the Joint Committee developed the above-mentioned recommendations for integrating security-relevant ethical aspects into research and teaching. In January 2024, the Joint Committee organised a film evening aimed at a wider audience entitled "The responsibility of science: Which technology could turn out to be the next atomic bomb?", which used a screening of the film *Oppenheimer* to address issues of scientific ethics in a subsequent panel discussion. At the fourth "KEF Forum" at the Historisches Kolleg in Munich in 2024, members of the KEFs discussed the structural and content-related challenges of their advisory work, the content and framework conditions of military contract research, and the consequences resulting from the public focus on research security and the civil clause debate.

Against the background of new tasks formulated for the scientific community, particularly in the political arena, Chapter D takes a critical look at the self-regulation of the sciences in dealing with ethical aspects of security-relevant research, and outlines perspectives on the tasks and objectives, but also on the limits of the work of the KEFs and the Joint Committee. In the future, the Joint Committee's work will focus on: (1) monitoring functioning procedures and new developments in the field of security-relevant research as well as the pooled communication of relevant information in science, politics and among the public up to the international level, (2) strengthening the evaluation competence of German research (funding) institutions in dealing with security-relevant ethical aspects autonomously, including via networking and the preparation of experiences from the consulting practice of KEFs and other relevant information material from Germany and abroad, and (3), examining the Joint Committee's options for promoting the implementation of its recommendations on the integration of security-relevant ethical aspects in research and teaching.

A. Background: Developments and framework conditions for security-relevant research

1. Science in times of geopolitical polarisation

1.1 International debate on research integrity and research security

The disruption of supply chains during the COVID-19 pandemic, the Russian war of aggression on Ukraine and the general increase in geopolitical tensions have exposed dependencies and other significant weaknesses in the globally networked scientific and economic systems, including in Germany and Europe. In addition, far-reaching technological changes, such as major advances in semiconductor technology and generative artificial intelligence, have further exacerbated security policy challenges. China, now a world leader in many high-tech sectors involving comprehensive political control of its own scientific and economic system, is increasingly considered both a competitor and systemic rival. As a result, science and innovation are increasingly being identified as geopolitical levers of power in Europe and North America in order to strengthen resistance and competitiveness in the interests of national security.[1]

A fundamental change is therefore currently taking place in many areas of science. International scientific collaborations and publication practices that were previously liberal are being scrutinised and entire scientific fields, such as quantum and semiconductor technology, artificial intelligence, biotechnology or materials science, are being classified as "critical", "sensitive" or "security-relevant" in order to provide them with comprehensive protection against espionage and foreign influence and to secure competitive advantages. This is often a balancing act with regard to the necessary scientific freedom, as world-class higher education and research cannot be guaranteed without international cooperation and scientific talent from all over the world.

In this changing geopolitical context, the international research community and national authorities are engaged in intense debates about the integrity and security of research (Box 1). Under the guiding principle of "as open as possible, as restrictive as necessary", a key objective is to develop procedures to continue to enable responsible international research cooperation with countries that have divergent values and standards, for example with regard to human rights and democratic principles. At the same time, the aim is to prevent an unwanted outflow of knowledge and ensure the country's own strategic autonomy and defence capability.

1 See www.iau-aiu.net/IMG/pdf/2024_internationalization_survey_report_digital.pdf (last accessed: 25 September 2024).

BOX 1. The term *research integrity* is often used with different meanings depending on the initiative and focus. It generally implies adherence to objectivity, honesty, transparency, fairness, accountability and responsibility in the initiation, conduct, evaluation and reporting of research and development activities. Research integrity should be the basis for collaboration in a fair, innovative, open and trustworthy research environment and enable confidence in the methods used and the resulting outcomes. While these values and principles may vary from country to country, they are key to safeguarding academic freedom as a universal right and public good.

Research security generally refers to the protection of research and innovation from interference by or on behalf of foreign state actors that compromise national security and/or run counter to national values and principles, including the integrity of research. Undesirable end uses of research results and methodologies include (possibly covert) military applications as well as political instrumentalisation by state actors, scientific espionage, the violation of intellectual property rights, and unethical applications, such as those that violate universal human rights.

Security-relevant research includes scientific work that has the potential to generate knowledge, products or technologies that could be misused to harm human dignity, life, health, freedom, property, the environment or peaceful coexistence. This is labelled as **"of concern"** if misuse can occur directly and the potential damage is significant (see also Chapter A 2).

In order to counteract the impairment of research integrity and research security, all phases of the research process should be taken into account – from development and review by the funding organisations to the establishment of responsible collaboration and the implementation of the project as well as dissemination of the results. Ensuring freedom of research also requires efforts by researchers, teachers, students, governments, large research teams, and the international community. With this in mind, the DFG published country-independent recommendations on "Dealing with Risks in International Research Cooperation" in 2023, which focus primarily on raising awareness, self-reflection and self-regulation in the sciences and humanities (Chapter B 1).

1.2 International guidelines and practices for safeguarding research integrity and research safety

For some years now there have been a number of international guidelines and recommendations for researchers and research institutions on maintaining research integrity and security, which can only be shown in excerpts here. They are being closely monitored in the political arena with regard to their model character for the German science system. In 2022, for example, the **OECD** published a report entitled "Integrity and security in the global research ecosystem" which describes various political initiatives and measures to ensure national and economic security while protecting freedom of research, promoting international research cooperation, and ensuring openness and non-discrimination. The report offers recommendations to help coun-

tries develop effective policies to strengthen research security as part of a broader framework of research integrity.[2]

In parallel, a working group with representatives from science and politics from the G7 countries developed a series of papers entitled "Security and Integrity of the Global Research Ecosystem" (SIGRE). They summarise common values and principles of research security and integrity as well as best practices of the **G7 countries** for more secure yet open research.[3]

In autumn 2023, the **European Commission** published recommendations on ten sensitive high-tech areas that are crucial to the economic security of the European Union for further risk assessment by the Member States.[4] The list includes: semiconductor technology, quantum technology, artificial intelligence, biotechnology, connectivity and navigation technology, sensor technology, space propulsion technology, energy technology, robotics and autonomous systems, and materials, manufacturing and recycling technology. For the first four areas mentioned, it is assumed that there are particularly immediate risks in connection with technology security and technology leaks. In addition to the risks to the EU's technological sovereignty and supply chains, the risks to international scientific cooperation will also be subject to an (extended) assessment for all ten technology areas. At the beginning of 2024, the European Commission submitted a series of draft decisions and recommendations to the Council of Europe on strengthening economic security, which were adopted by the Council of Europe in May 2024.[5] These also include recommendations on strengthening research security, which aim, among other things, to support higher education and research institutions in recognising and reducing the misuse risk of their own critical technologies while continuing to engage in open international research cooperation. It further proposes the establishment of an accompanying "European Centre of Expertise on Research Security" at EU level and corresponding national exchange platforms, as well as a closer exchange between state institutions, e.g. intelligence services, with research institutions and research sponsors. Similarly, research partnerships should, as far as possible, only take place if cooperation agreements are concluded that regulate mutual respect for scientific values and framework conditions as well as an exit strategy in the event of non-compliance. The following were also proposed: an extended screening of foreign investments, the standardisation of export controls, and new funding models to increase support for research and development regarding technologies that

2 The report is available at: www.oecd-ilibrary.org/science-and-technology/integrity-and-security-in-the-global-research-ecosystem_1c416f43-en (last accessed: 25 September 2024).

3 See, for example, the resolution "G7 Common Values and Principles on Research Security and Research Integrity" from 2022, available at: https://science.gc.ca/site/science/sites/default/files/attachments/2023/1135-g7-common-values-and-principles-on-research-security-and-research-integrity_.pdf and "G7 Best Practices for Secure & Open Research" from 2024, available at: https://science.gc.ca/site/science/sites/default/files/documents/1136-g7-best-practices-for-secure-and-open-research-february-2024.pdf (each last accessed: 25 September 2024).

4 The recommendations and their appendix are available at: https://defence-industry-space.ec.europa.eu/system/files/2023-10/C_2023_6689_1_EN_ACT_part1_v8.pdf and (each last accessed: 25 September 2024).

5 See https://ec.europa.eu/commission/presscorner/detail/en/ip_24_363 (last accessed: 25 September 2024).

can be used for both civil and defence purposes (see also Chapter A 5).[6]

Canada likely has the most restrictive approach to research security of all the democratically governed countries. In July 2021, the Canadian government introduced the National Security Guidelines for Research Partnerships to integrate national security considerations into the development, evaluation and funding of research partnerships.[7] The guidelines were developed in consultation with university representatives and aim to better enable the research community to conduct consistent, risk-focused due diligence on research security risks. Applicants for research funding programmes to which these guidelines apply must submit a risk assessment form including a risk mitigation plan. In the assessment, they must be transparent about whether their research area has potential for both military and civilian applications or whether it could be targeted by foreign governments, militaries, their proxies or other actors to advance their national security capabilities and interests. Whether proposed research partners could pose a risk to Canada's national security is a further relevant factor. In 2024, the Canadian government published a related "Policy on Sensitive Technology Research and Affiliations of Concern". According to this policy, as part of a review process yet to be implemented, international research collaboration between Canadian universities in sensitive technology areas will no longer be supported with public funds if the cooperation partners are associated with military or national defence or state security units that could pose a risk to Canada's national security. Regularly updated lists of sensitive technology research areas and scientific institutions and organisations designated as such, regardless of country, will serve as a guide. To date, the lists only include institutions in China, Russia, and Iran.[8]

The **Dutch** government has also taken an active role in strengthening research and "knowledge security". In 2022, a number of academic institutions, in cooperation with government institutions, published the "National knowledge security guidelines – Secure international collaboration", which prioritise self-regulation in the sciences.[9] Since then, scientific institutions can seek advice from the National Contact Point for Knowledge Security[10] with regard to national security interests.

6 The white paper is available at: https://research-and-innovation.ec.europa.eu/document/download/7ae11ca9-9ff5-4d0f-a097-86a719ed6892_en (last accessed: 25 September 2024).

7 Further information at: https://science.gc.ca/site/science/en/safeguarding-your-research/guidelines-and-tools-implement-research-security/national-security-guidelines-research-partnerships (last accessed: 25 September 2024).

8 The papers, lists and further information are available at: https://science.gc.ca/site/science/en/safeguarding-your-research/guidelines-and-tools-implement-research-security/policy-sensitive-technology-research-and-affiliations-concern (last accessed: 25 September 2024).

9 Available at: https://english.loketkennisveiligheid.nl/documents/2022/04/07/national-knowledge-security-guidelines (last accessed 25 September 2024).

10 Further information on the contact point at: https://english.loketkennisveiligheid.nl (last accessed 25 September 2024).

In **Denmark,** due to concerns about scientific espionage in certain research areas, visiting scientists from China, Russia and Iran have, as of 2024, been subject to a comprehensive background check by the universities prior to the start of cooperation. In addition to publicly accessible sources, a telephone contact point at the domestic intelligence service is used for this purpose, which does not, however, disclose any personal data.[11]

In 2023, the **US** Department of Defense introduced a guideline for reviewing basic research projects for conflicts of interest due to foreign influence, which contains a decision matrix for evaluating funding applications as well as lists of problematic foreign research institutions and talent programmes.[12] As of 2024, the US National Research Foundation has also been offering online training with information on risks and threats to the global research ecosystem and on tools to protect against these risks for recipients of government research funding.[13] It also supports the recently established SECURE Centre, which advises US universities, scientific institutions and companies on research security and international research cooperation.[14]

Regulatory measures to protect national research security, some of which have been taken unilaterally by governments in recent years, have met with mixed reactions in the scientific community.[15] On the one hand, they offer research organisations a framework for orientation and reduce the often lamented burden of personal responsibility in the assessment and reduction of security risks in international research collaborations; on the other hand, there are fears of state interference in the freedom and autonomy of science, generalised discrimination, and the premature prevention of promising collaborations. Overall, the development of these new guidelines and review procedures, the related (scientific) public debate and their respective implementation is a highly dynamic and complex process in most countries.

1.3 Cooperation with China as an empirically relevant special case

Even if many of the political initiatives mentioned in Chapter A 1.2 are explicitly described as "country-independent", the outlined risk scenarios and published lists of problematic research institutions with which cooperation should not take place, or only with reservations, suggest that many of these efforts are being primarily under-

11 See interview (in German): Staib, J. (2024, 20 March). Research in Denmark: On the hunt for scientific spies. FAZ Online, available at: www.faz.net/aktuell/politik/forschung-in-daenemark-auf-der-jagd-nach-wissenschaftsspionen-19595170.html (last accessed: 25 September 2024).

12 Available at: https://media.defense.gov/2023/Jun/29/2003251160/-1/-1/1/COUNTERING-UNWANTED-INFLUENCE-IN-DEPARTMENT-FUNDED-RESEARCH-AT-INSTITUTIONS-OF-HIGHER-EDUCATION.PDF (last accessed: 25 September 2024).

13 Available at: https://new.nsf.gov/research-security/training#take-the-research-security-training-66a (last accessed: 25 September 2024).

14 Further information at: https://new.nsf.gov/news/nsf-backed-secure-center-will-support-research (last accessed: 25 September 2024).

15 For example, in the Netherlands or in Scandinavia, see www.knaw.nl/en/news/royal-netherlands-academy-arts-and-sciences-knaw-warns-against-proposed-knowledge-security-act and www.universityworldnews.com/post.php?story=20220531144822860 (last accessed: 25 September 2024).

taken to change further scientific cooperation with the People's Republic of China. The feedback from the KEFs (Chapters B 3 and C 4) and new recommendations and guidelines from research organisations in Germany in this regard suggest a particular empirical relevance of China in the reassessment of how to deal with international research cooperation. This special case is therefore addressed in more detail here.

China is now clearly staking a claim to leadership in global science in the 21st century. Thanks to a targeted science policy and international cooperation, Chinese scientific contributions have caught up with the world leaders within a few decades according to the common international performance indicators and rankings.[16] On the one hand, the Communist Party and the Chinese government are signalling an increased interest in international research cooperation, e.g. in large-scale European equipment, and China is increasingly investing in basic research infrastructures and large-scale research facilities in its own country.[17] On the other hand, nationalist rhetoric and calls for scientific and technological independence and ultimately supremacy, as well as corresponding demands on the Chinese scientific community, are on the rise. While the aim is to close technology gaps through strategic planning and promotion, including international scientific cooperation, there are growing concerns among China's foreign partners regarding patent and copyright infringement, one-sided technology transfer, scientific misconduct, and lack of access to important research infrastructures and data. There are also more and more reports of the Communist Party's growing influence on science in China and an increasing fusion of military and civilian research, for example in the fields of artificial intelligence, robotics, semiconductors, cryptography, unmanned vehicles, and radar technology.[18]

In 2019, the Dutch Hague Centre for Strategic Studies developed a checklist to guide political and scientific decisions on how to minimise risks when it comes to cooperation with Chinese research institutions.[19] In Germany, the German Rectors' Conference published a comprehensive list of key questions on university cooperation with the People's Republic of China in 2020, focussing on aspects of academic freedom and research and teaching integrity (see also Chapter B 1).[20] A stronger focus on research security and on manifest security risks through cooperation has developed particularly due to signals from China itself. In recent years, several laws have been passed to pro-

16 Whetsell, T. A., Dimand, A., Jonkers, K., Baas, J. & Wagner, C. (2021). *Democracy, Complexity, and Science: Exploring Structural Sources of National Scientific Performance. Science and Public Policy, 48*(5). 697-711.

17 Crow, J. M. (2024). Beaming with pride. *Nature 630.* 6-7.

18 See also reports by the Australian Strategic Policy Institute (ASPI) "Picking Flowers, Making Honey: The Chinese Military's Collaboration with Foreign Universities" from 2018 available at https://ad-aspi.s3.ap-southeast-2.amazonaws.com/2018-10/Picking%20flowers%2C%20making%20honey_0.pdf?VersionId=H5sGNaWXqMgTG_2F2yZTQwDw6OyNfH.u and "The China Defence Universities Tracker" from 2019 at: https://ad-aspi.s3.ap-southeast-2.amazonaws.com/2019-11/The%20China%20Defence%20Universities%20Tracker_0.pdf?VersionId=ozIi2cWm.kXpe7XsEZ44vUMMQBNfnR_x and (in German) "China Science Investigation – China's Military Interest in Research Cooperation" at www.deutschlandfunk.de/china-science-investigation-hintergrund-recherche-100.html (each last accessed: 25 September 2024).

19 The checklist is available at: https://hcss.nl/report/checklist-for-collaboration-with-chinese-universities-and-other-research-institutions (last accessed: 25 September 2024).

20 Available at: http://hrk.de/resolutions-publications/resolutions/beschluss/detail/guiding-questions-on-university-cooperation-with-the-peoples-republic-of-china (last accessed: 25 September 2024).

tect national security (including state secrets, national data and espionage), which also directly affect scientific collaboration and the activities of foreign researchers in China. In addition, there are documented cases of cooperation between German scientific organisations and military-affiliated institutions in China and of scientific espionage for China in Germany and other European countries (see also Chapter A 3.1).[21] Although the motive of a general and systematic influence of Chinese authorities on research integrity abroad is feared, this has not yet been empirically proven.[22]

These developments make China a special case in the group of "difficult" partner countries for research cooperation. Scientific organisations face a dilemma: the wide range of available scientific resources and cutting-edge research in many fields make institutions and individuals in China attractive cooperation partners in many respects. At the same time, research cooperation with China should be avoided so as not to further technologically strengthen an authoritarian and possibly militarily expansive world power as well as to mitigate other risks of deliberately abusive knowledge siphoning, and for the sake of one's own research security and independence.

In order to support scientific organisations in these considerations, attempts have been made in recent years to provide practical information about the Chinese scientific system and the risks and opportunities of cooperation, and there has been much investment in further training measures, particularly for research-supporting areas. In addition to measures for protecting research security, e.g. in the legally manageable area of export controls, there is often uncertainty as to which indicators can be used to guide decisions regarding the broader risks to research integrity. It is being discussed, for example, whether institutions with a clear affiliation with the Chinese People's Liberation Army or the Chinese Ministry of Defence should be excluded from cooperation from the outset, even though they may be conducting research in theoretical fields or medicine that is of interest to partners.[23]

There are a number of prerequisites – such as in-depth language and technical expertise, but also an understanding of how the Chinese scientific system works and how it is politically influenced – when it comes to assessing the advantages and disadvantages of research cooperation in the complex case of China and being able to make competent and effective decisions. In many cases, individual case reviews are preferable to blanket regulations. On an organisational basis, consideration is often given to supporting individual researchers by providing contact points that refer to further background information and can accompany an independent, structured risk assessment by those interested in cooperation.

21 Further information (in German) on espionage events at: www.bayerische-staatszeitung.de/staatszeitung/politik/detailansicht-politik/artikel/drei-festnahmen-wegen-mutmasslicher-wissenschaftsspionage-fuer-china.html#topPosition and www.bbc.com/news/uk-67142161 (each last accessed: 25 September 2024).

22 Ahlers A., Schimank, U., Schreiterer, U. (2023). *Threats to academic freedom from international interdependencies: institutionalised monitoring required.* BBAW. Available (in German) at: www.bbaw.de/files-bbaw/publikationen/denkanstoesse/BBAW_Denkansto__sse_14_2023_Lay3_Web.pdf (last accessed: 25 September 2024).

23 See for example https://sciencebusiness.net/news/r-d-funding/how-european-academics-can-set-safe-research-collaborations-china (last accessed: 25 September 2024).

BOX 2. There is a constantly growing range of analyses and databases to support these evaluation processes in planned research collaborations with China, e.g.:

- Advisory and information services of the Federal Ministry of Education and Research (BMBF)[24]
- Seminars of the Competence Centre for International Academic Cooperation (KIWi) of the DAAD[25]
- Collection of information from the DLR project management organisation[26] which has also developed a risk assessment tool ("Operate")[27]
- Brochures from the Federal Office for Economic Affairs and Export Control[28]
- Reports of the Federal Foreign Intelligence Service and the reconnaissance materials of the Federal Office for the Protection of the Constitution[29]
- The project "Monitoring the Asia-Pacific Research Area" (APRA)[30]
- Initiatives of the European Union[31] such as the EU Knowledge Network on China (EU-KNOC), the Horizon projects for the creation of independent knowledge on China[32]

The BMBF is currently supporting the regional development of expertise for scientific cooperation with China. In this context, comprehensive decentralised contact points and repositories of studies and recommendations in this field are being established.[33] Specific support for individual case decisions, i.e. in the form of clearing centres, is offered by the legal advice services of the BMBF and other federal authorities (such as the BAFA) or the China-specific advice of the DAAD.

24 See www.bmbf.de/EN/Research/InternationalAffairs/Asia-PacificRegion/China/china_node.html (last accessed: 25 September 2024).

25 See www.daad.de/en/information-services-for-higher-education-institutions/kiwi/ (last accessed: 25 September 2024).

26 See (in German) https://projekttraeger.dlr.de/de/referenzen/orientierung-geben-fuer-die-wissenschaftskooperation-mit-china (last accessed: 25 September 2024).

27 See (in German) https://projekttraeger.dlr.de/de/news/neues-online-tool-zur-bewertung-internationaler-forschungskooperationen (last accessed: 25 September 2024).

28 See (in German) www.bafa.de/DE/Aussenwirtschaft/Ausfuhrkontrolle/Embargos/China/china_node.html (last accessed: 25 September 2024).

29 See www.verfassungsschutz.de/EN/topics/economic-and-scientific-protection/economic-and-scientific-protection_node.html (last accessed: 25 September 2024).

30 See www.internationales-buero.de/de/deutsche_forschungspraesenzen_asien_pazifik.php and www.giga-hamburg.de/de/publikationen/giga-focus/potenziale-der-wissenschafts-und-technologiekooperation-asien-pazifik-raum?utm_source=alert&utm_medium=email (last accessed: 25 September 2024).

31 See https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/europe-world/international-cooperation/bilateral-cooperation-science-and-technology-agreements-non-eu-countries/china_en (last accessed: 25 September 2024).

32 See https://sciencebusiness.net/news/eu-puts-eu105m-towards-strengthening-pan-european-research-china (last accessed: 25 September 2024).

33 See www.internationales-buero.de/en/regio_china_expansion_of_china_competence_in_science.php (last accessed 25 September 2024).

2. Focus on security-relevant fields of research

In accordance with the recommendations of the DFG and the Leopoldina for handling of security-relevant research (Chapter B 1), this includes scientific work that may produce knowledge, products or technologies that could be misused (by third parties) to harm human dignity, life, health, freedom, property, the environment or peaceful coexistence. This is designated "concerning" if misuse can occur directly and the potential damage is significant. However, the omission of research can also be problematic from an ethical perspective, for example if it blocks the development of therapies, vaccines and other protective measures or if important innovations that serve the common good, e.g. environmental and climate protection, are not realised.

2.1 Security-relevant research risks in almost all scientific fields

Security-relevant research risks exist, albeit to varying degrees, in almost all disciplines. As is well known, nuclear research not only led to the development of new energy sources and medical imaging techniques, but also initially and primarily to the development and use of nuclear weapons of mass destruction. Materials research and nanotechnology can also contribute to the development of weapons of war; research into autonomous industrial and domestic robots can enable the manufacture of intelligent combat robots and drones. Analyses in molecular plant genetics for breeding purposes could enable targeted attacks on seeds. Research in information technology, e.g. on movement analyses and biometrics, could be used for the comprehensive surveillance and repression of individuals. In order to improve cyber security, researchers often develop intentionally compromising hardware and software and break encryption procedures. Psychological, medical or neurobiological research could support the manipulation of individuals, including aggressive interrogation techniques and torture. Scientific advances in assistance systems for physically impaired people could be used to misappropriate sensitive information directly from the brain. Linguistic research on speech recognition systems may also be used for communication surveillance. Finally, the humanities, cultural, social and behavioural sciences could also produce security-relevant results, for example if they are used to make disinformation campaigns more efficient or justify human rights violations. The list can be extended almost indefinitely (for more specific examples of security-relevant work, see Appendix 1).

2.2 Pathogen research – a paradigm for the ambivalence of the sciences

Research on highly pathogenic pathogens is paradigmatic for the frequent dilemma of security-relevant research of concern, as new risks often have to be accepted during the projects in order to master the risks of naturally occurring pathogens. This applies in particular to "gain-of-function experiments", in which pathogens acquire new or previously undescribed properties in the laboratory, e.g. increased transmissibility or pathogenicity in humans and animals. A better understanding of the mechanisms of

infection and disease progression can be achieved by means of these experiments and it is hoped that the development of targeted protective measures based on this will help us be better prepared for outbreaks of natural pathogens that have already occurred or regularly occur. At the same time, there is concern that the pathogens could be unintentionally released into the environment during the experiments (biosafety) or that the new findings could be misused for the targeted production of biological weapons (biosecurity). The work on the transmissibility of H5N1 influenza viruses (see Case Study 7 in Appendix 1) triggered an intense international debate on gain-of-function experiments in 2011. This debate is ongoing and is causally linked to the establishment of the Joint Committee on the Handling of Security-Relevant Research (Chapter B 2).[34]

In the search for the origin of SARS-CoV-2, the question arose internationally at the beginning of 2020 as to whether the virus could have been released from a laboratory at the Chinese Wuhan Institute of Virology due to negligence, as the potential transmissibility of animal pathogenic coronaviruses to humans had also been researched there for several years. The scientific community still considers this laboratory hypothesis very unlikely in view of the DNA sequence data of the coronavirus variants described.[35] For example, the much-discussed cleavage site in the virus' surface protein, which has been cited as evidence of genetic engineering of SARS-CoV-2, is a feature that is lost in cultured cells and thus indicates a natural adaptation of the virus to the host.[36] In the USA, the debate nevertheless contributed to the expansion of risk assessment procedures in the allocation of public research funds for work with potentially pandemic microorganisms.[37] Depending on the future practical design of the new regulations, this could also significantly complicate the hurdles for important research into new pathogens and corresponding protective measures.[38]

In this context, the German Society of Virology (GfV) and its "Commission for Safety-Related Research" have drawn up a statement entitled "Call for a rational discourse on the risks and opportunities of 'gain-of-function research' in virology", in which they explain how gain-of-function experiments play an important role in almost all areas of virological research and that increased pandemic potential of pathogens only occurs in a few exceptional cases. In Germany, there are far-reaching legal regulations for eval-

34 For further information on the international debate on work on highly pathogenic H5N1 influenza viruses and the related discussion in the German Bundestag on stricter regulation of pathogen research in Germany, see Progress Report of the Joint Committee from 2018, Chapters A 1 and A 2. Available at www.security-relevant-research.org/publication-progressreport2018/ (last accessed: 25 September 2024).

35 Gorbalenya, A. E., Baker, S. C., Baric, R. S., de Groot, R. J., Drosten, C., Gulyaeva, A. A., et. al. (2020). The species *Severe acute respiratory syndrome-related coronavirus:* classifying 2019-nCoV and naming it SARS-CoV-2. *Nat Microbiol 5,* 536-544.

36 Chaudhry, M. Z., Eschke, K., Hoffmann, M., Grashoff, M., Abassi, L., Kim, Y., et al. (2022). Rapid SARS-CoV-2 adaptation to available cellular proteases. *Journal of Virology, 96*(5), article e02186-21. Lau, S. Y., Wang, P., Mok, B. W. Y., Zhang, A. J., Chu, H., Lee, A. C. Y., et al. (2020). Attenuated SARS-CoV-2 variants with deletions at the S1/S2 junction. *Emerging microbes & infections, 9*(1), 837-842.

37 The new "United States Government Policy for Oversight of Dual Use Research of Concern and Pathogens with Enhanced Pandemic Potential" is available at: https://aspr.hhs.gov/S3/Documents/USG-Policy-for-Oversight-of-DURC-and-PEPP-May2024-508.pdf (last accessed: 25 September 2024).

38 See for example www.nytimes.com/2024/05/07/science/covid-lab-leak-biosafety-rules-virus-research.html?unlocked_article_code=1.qU0.Gr0U.ac4xstsBuNU9&smid=url-share (last accessed: 25 September 2024).

uating such experiments and minimising risks. In contrast to the USA, private-sector research in Germany is also subject to these regulations.[39]

2.3 New risks of misuse due to quantum leaps in generative artificial intelligence

The rapid advances in machine learning and related artificial intelligence (AI), which also includes generative AI systems such as the publicly accessible large language model ChatGPT, have opened up enormous and as yet barely foreseeable potential to take over and accelerate some very demanding everyday tasks and even research work. At the same time, due to their sometimes comprehensive access to relevant knowledge, the systems could also enable malicious intentions to be realised with significantly less effort and greater precision in the future. For example, researchers from the US military published a scientific study in which they demonstrated the potential use of ChatGPT for military purposes. According to the authors, the software was able, after being trained accordingly, to design precise strategic deployment plans for various war situations in simulations within a very short time – better than programmes specially developed for this purpose have been able to do so far.[40]

A few years earlier, researchers from various non-military research institutions already demonstrated how AI software, which is often used for virtual toxicity testing of drug candidates for development, can be used to predict toxic molecules with little effort.[41] In this way, thousands of largely unknown, highly toxic, potentially weaponisable substances could be identified within a few hours. This suitability would still have to be proven for most of the substances through synthesis, stability testing and their systemic effect in the organism, but this example impressively demonstrates the risks that can also emerge from AI systems actually designed for peaceful medical use. Some members of the Joint Committee have used the AI toxicity study and the authors' publications based on it to put the Joint Committee's key questions for the ethical evaluation of security-relevant research (Chapter B 4) to the test in a simulated KEF consultation procedure.[42]

Even if the benefits for research still clearly exceed the risks of misuse, it is also assumed in the field of protein design and pathogen research that, due to the growing performance capabilities of AI-supported programmes such as the AlphaFold Suite and the Large Language Models, these will also increasingly be able to support the devel-

39 The statement "Sicherheitsrelevante Forschung in der Virologie – Aufruf für einen rationalen Diskurs über Risiken und Chancen von ‚Gain-of-Function-Forschung' in der Virologie" is available (in German) at: https://g-f-v.org/wp-content/uploads/2024/09/GoF-in-der-virologischen-Forschung.pdf (last accessed: 25 September 2024).

40 Goecks, V. G. and Waytowich, N. (2024). Coa-gpt: Generative pre-trained transformers for accelerated course of action development in military operations. *2024 International Conference on Military Communication and Information Systems (ICMCIS)* (pp. 01-10). IEEE.

41 Urbina, F., Lentzos, F., Invernizzi, C. et al. (2022). Dual use of artificial-intelligence-powered drug discovery. *Nat Mach Intell, 4,* 189-191.

42 See Jakob, U., Kraemer, F., Kraus, F., & Lengauer, T. (2024). Applying Ethics in the Handling of Dual Use Research: The Case of Germany. *Research Ethics, 0*(0).

opment of previously unknown biological warfare agents based on proteins or pathogens suitable for use as biological weapons. Although experts often emphasise that such substances and pathogens have already been sufficiently described even without AI, the risks are primarily seen in the easier availability of relevant knowledge and the lack of identifiability and protective measures against new, previously unknown pathogens and substances. In order to limit these risks through responsible action and transparent communication, numerous researchers in the USA have signed a voluntary commitment to use these technologies for exclusively peaceful purposes, and there are discussions about using AI-based testing methods in future for the early detection of new risks of misuse, for example when ordering DNA or RNA sequences from synthesis companies and cloud lab providers.[43] It remains to be seen to what extent the analytical programmes themselves could be misused.

3. Political debates in Germany

3.1 Focus on international research cooperation

The debate on research security and research integrity in the context of international research cooperation outlined in Chapter A 1 is also taking place in Germany. This was fuelled by a series of journalistic investigations in mid-2022, which suggested that visiting Chinese researchers in Germany may have deliberately collected militarily relevant research results and methods and passed them on to military-related organisations or party and government agencies.[44] The conclusions were largely drawn from the affiliations documented in the respective publications of researchers from China who were listed as co-authors in German-Chinese studies over the last 20 years. The journalists warned that German researchers had naively passed on sensitive information in the context of the collaborations without having any knowledge of the politically controlled intertwining of science and the military in China (Chapter A 1.3). Similar conclusions were reached by a US study that analysed deficits in current research security systems based on case studies of German-Chinese cooperation projects.[45] Since then, several German universities, concerned that security-relevant knowledge could be transferred to China, have considered no longer admitting young Chinese academics with a scholarship from the Chinese Scholarship Council (CSC) in the future,

43 See Callaway, E. (2024). Could AI-designed proteins be weaponised? Scientists lay out safety guidelines. *Nature, 627*(8004), 478; Baker, D. and Church, G. (2024). Protein design meets biosecurity. *Science, 383*(6681), 349-349. On the trend towards the provision and hypothetical misuse of remote-controlled laboratories via the Internet, see for example https://thebulletin.org/2019/07/laboratories-in-the-cloud/ (last accessed: 17 September 2024).

44 See, for example, the research (in German) "China Science Investigation – China's military interest in research cooperation" at www.deutschlandfunk.de/china-science-investigation-hintergrund-recherche-100.html (last accessed: 25 September 2024).

45 See Stoff, J. (2023). *Should Democracies Draw Redlines around Research Collaboration with China? A Case Study of Germany.* The Center for Research Security & Integrity, ed. Available at: https://researchsecurity.org/resources/ (last accessed: 25 September 2024).

unless they are co-selected with a "trustworthy" organisation such as the DAAD and are co-financed by it.[46]

In this context, the parliamentary group Die Linke submitted a question to the Federal Government in July 2022 on dual-use and armaments research in the academic sector, calling for a corresponding status report and asking, among other things, about planned measures to monitor and regulate the use of research results for military and security and defence-related purposes more closely, especially by foreign clients. In its response, the Federal Government referred to existing laws, the protection of scientific freedom, and the KEFs as well as the Joint Committee (Chapter B 2), but reserved the right to freeze or critically review current and planned measures of the Federal Government in the field of research and innovation in cases where German interests are specifically jeopardised.[47]

In July 2023, the German government finally published a "China Strategy" with a focus on economic cooperation. While it continued to clearly advocate scientific cooperation with China, it also emphasised the continuous shift from partnership-based cooperation with the country to China's two more conflictual roles as a competitor and systemic rival. According to the paper, scientific institutions should critically evaluate their Chinese cooperation partners and minimise risks. How this "derisking" should look specifically was left undefined, but the German government advised the German scientific community to take precautions against risks in its dealings with China and to prevent the emergence of one-sided dependencies in these collaborations.[48] In response to this debate, the DFG published its country-independent recommendations "Dealing with Risks in International Research Collaborations" in September 2023 and the Max Planck Society (MPG) published its "Action recommendations for cooperation with China" in November 2023 (see Chapter B 1).

At the beginning of 2024, the BMBF and the FDP parliamentary group published two position papers that particularly focused on reinforcing research security and dual-use research in the *Zeitenwende* against the backdrop of increased national security interests.[49] To this end, structures for self-regulation in the sciences such as the Joint Committee and the KEFs (Chapter B 3) should be examined and, if necessary, further developed and nationwide guidelines for research security should be set out. It would also be desirable to increase the resilience of German science through training and

46 Further information (in German) at: www.forschung-und-lehre.de/politik/universitaet-erlangen-schliesst-chinesische-stipendiaten-aus-5789 (last accessed: 25 September 2024).

47 The minor interpellation by the Die Linke parliamentary group and the Federal Government's response are available at: https://dserver.bundestag.de/btd/20/030/2003034.pdf (German version only, last accessed: 25 September 2024).

48 Federal Foreign Office (2023). *Strategy on China of the Government of the Federal Republic of Germany,* 30. Available at: www.auswaertiges-amt.de/blob/2608580/49d50fecc479304c3da2e2079c55e106/china-strategie-en-data.pdf (last accessed: 25 September 2024).

49 See the BMBF position paper "Forschungssicherheit im Lichte der Zeitenwende" from 2024, available at: www.bmbf.de/SharedDocs/Downloads/DE/2024/positionspapier-forschungssicherheit.html and the FDP parliamentary group's position paper "Wissenschaft in der Zeitenwende" from 2024, available at: www.fdpbt.de/sites/default/files/2024-03/positionspapier-wissenschaft-in-der-zeitenwende.pdf (both German version only, last accessed: 25 September 2024).

awareness-raising measures, a central information platform for research security and a corresponding clearing centre with the participation of the ministries and security authorities, as well as official lists of critical foreign research institutions and sensitive technology areas with dual-use potential.

3.2 Reassessing the separation of civilian and military research

For some years now, there have been increasing debates in Germany as to whether certain security-relevant research projects or areas violate the voluntary commitments of universities to conduct research exclusively for civilian purposes (known as civil clauses), which are sometimes formulated in very different ways and are the subject of controversial legal discussions.[50] The focus here is often on the military association of (foreign) employees or cooperation partnerships and the potential that they could specifically siphon off research results and methods for military purposes. In some cases, this also relates to issues of foreign trade law and export controls (see also Chapter A 4). Civilian clauses generally exclude misuse scenarios, for example in political (e.g. imminent human rights violations), criminal or terrorist contexts. Furthermore, it is known that cooperation with actors associated with the military and the military use of research results cannot automatically be equated with misuse, for example when it comes to the defence of state sovereignty and the preservation of the basic democratic order. For this reason, some universities in Germany have introduced advisory services through KEFs as a solution to the "civil clause dilemma" (Chapters B 3 and D 2).

In view of the changed security policy situation caused by the war in Ukraine, the German Academy of Science and Engineering (acatech) called for the civilian clauses to be completely abolished as early as 2022 in order to allow universities to conduct research for military purposes and thus contribute to strengthening Germany's sovereignty.[51] In its annual reports of 2023 and 2024, the Commission of Experts for Research and Innovation (EFI) also argued in favour of revising the strict separation between military and civilian research in Germany so that dual-use applications and transfer effects from military-civilian cooperation could no longer be ignored.[52] The Federal Ministry of Education and Research, the FDP parliamentary group, and the

50 Legal experts repeatedly underline the difficulty of reconciling academic freedom with a civil clause. Cf. on this: Hufen, F. (2017). Science between freedom and control. Civil clauses, ethics committees and third-party funding control from a constitutional perspective. *NVwZ 17,* 1265-1268; Lassahn, P. (2014). Civil obedience and freedom of research. On the legal reliability of "civil clauses". *JZ 69,* 650-658.

51 See impulse paper of the German Academy of Science and Engineering (acatech) from 2022: "Security, resilience and sustainability", available at: https://en.acatech.de/publication/security-resilience-and-sustainability/ (last accessed: 25 September 2024).

52 See www.e-fi.de/fileadmin/Assets/Gutachten/2024/EFI_Report_2024.pdf (last accessed: 25 September 2024).

CDU/CSU parliamentary group agreed to this at the beginning of 2024.[53] Against the backdrop of geopolitical tensions, reference was also made to the responsibility of the sciences in safeguarding Germany's increased security policy interests. According to the FDP parliamentary group, the Committees for Ethics in Security-Relevant Research (Chapter B 3) are a proven and suitable means of scrutinising individual research projects in terms of their responsibility.

At the beginning of 2024, the Bavarian state government presented a draft for a "Law on the Promotion of the Bundeswehr in Bavaria", which, among other things, envisages banning civil clauses at Bavarian universities and obliging universities to cooperate academically with the Bundeswehr upon the latter's request in the interests of national security.[54] The plan formulated at EU level to promote dual-use research more strongly (see Chapters A 1.2 and A 5) may also lead to new challenges for the compatibility of the acquisition of corresponding third-party funding at universities and applicable civil clauses. A motion submitted to the Federal Government by the Die Linke group in summer 2024 goes in the opposite direction. Among other things, it calls for mechanisms to be strengthened that guarantee the civilian orientation of academic research and exclude armaments, military and dual-use research.[55]

4. Legal framework conditions for security-relevant research

Security-relevant research in Germany is subject to a number of legal regulations. In the field of life sciences, these include, for example, the Biological Substances Ordinance, the Genetic Engineering Act, and the Infection Protection Act, which are intended to ensure optimum biological safety. The general misuse of research is prevented by a number of legal provisions, above all by regular criminal law, international treaties such as the United Nations Biological and Chemical Weapons Conventions, and, in Germany, the export regulations of the Federal Office of Economics and Export Control (BAFA). The BAFA implements the authorisation requirements and procedures prescribed by the EU for all member states for the export of goods (e.g. chemicals, machines, technologies, materials or software) that can be used for both civilian and military purposes. This dual-use regulation[56] affects the export of goods (e.g. laboratory equipment, test equipment, technology embodied in emails or on data carriers,

53 See (all in German) the BMBF's 2024 position paper "Research Security in the Light of the Turning Point", available at: www.bmbf.de/SharedDocs/Downloads/DE/2024/positionspapier-forschungssicherheit.html, the FDP parliamentary group's position paper "Science at the Turning Point", available at: www.fdpbt.de/sites/default/files/2024-03/positionspapier-wissenschaft-in-der-zeitenwende.pdf and the CDU/CSU parliamentary group's 2024 motion to the Federal Government "For a genuine turning point in German foreign and security policy", available at: dserver.bundestag.de/btd/20/103/2010379.pdf (each last accessed: 25 September 2024).

54 Further information (in German) at: www.forschung-und-lehre.de/politik/bayern-plant-verpflichtung-zu-militaer-kooperation-6371 (last accessed: 25 September 2024).

55 The proposal "Implementing a civil mission statement for universities and science" from 2024 is available (in German) at: dserver.bundestag.de/btd/20/121/2012108.pdf (last accessed: 25 September 2024).

56 Regulation (EU) 2021/821 of the European Parliament and of the Council setting up a Union regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items, available at: eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021R0821 (last accessed: 25 September 2024).

clouds), but also the intangible transfer of knowledge (i.e. "technical assistance"). Export controls in the academic sector also apply to visiting academics.

In order to provide researchers with better access to their binding export control obligations, BAFA published the second edition of the "Export Control and Academia" handbook in 2022,[57] which is primarily aimed at export control officers at the respective research institutions. BAFA pays particular attention to the guidelines for an International Compliance Programme (ICP) for the assessment of research in accordance with the Dual-Use Regulation, which the EU Commission published in 2021 as an EU-wide, legally non-binding guide for research and academia.[58]

In June 2024, the EU regulation on artificial intelligence (known as the AI Act) came into force, which aims to ensure that the AI systems used in the EU are safe, transparent, traceable, non-discriminatory and environmentally friendly. Accordingly, AI technologies must be assessed and categorised into one of four risk groups in terms of the risk to users.[59] This means that systems that enable, for example, the cognitive manipulation of people's behaviour, the classification of people based on behaviour, socio-economic status and personal characteristics, or the biometric identification and categorisation of people are classed as "unacceptable risk" and prohibited. The regulation lays down standardised requirements for the development and use of artificial intelligence in the European Union. AI projects and models used only for research purposes are excluded from the regulation, as are military applications.[60]

The higher education legislation of the federal states of Bremen, Hesse, Lower Saxony, Brandenburg, Berlin, Saxony-Anhalt, Thuringia, and Schleswig-Holstein calls on universities to handle security-relevant research responsibly and to consider possible consequences and potential for misuse.[61] Section 3 (8) of the Higher Education Act of Saxony-Anhalt states, for example "Universities contribute to a sustainable, peaceful and democratic world. They shall address the possible consequences of the dissemination and utilisation of their research results."[62] Section 4 (2) of the State Higher Education Act in Berlin contains the following wording: "The universities fulfil their special responsibility for the development of solutions to social issues and the development of society. Conscious of their responsibility to society, they shall also address the pos-

57 Available and further information on export controls for science at: www.bafa.de/SharedDocs/Downloads/EN/Foreign_Trade/ec_awareness_academia.html (last accessed: 25 September 2024).

58 Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021H1700 (last accessed: 25 September 2024).

59 Further information at: www.europarl.europa.eu/news/en/press-room/20240308IPR19015/artificial-intelligence-act-meps-adopt-landmark-law (last accessed: 25 September 2024).

60 For example, Article 25 of the Regulation states: "It is therefore necessary to exclude from its scope AI systems and models specifically developed and put into service for the sole purpose of scientific research and development. Furthermore, it is necessary to ensure that this Regulation does not otherwise affect scientific research and development activity on AI systems or models prior to being placed on the market or put into service."

61 For detailed explanations on higher education legislation, see Chapter A.4 of the Joint Committee 2020 activity report, available online: www.security-relevant-research.org/publication-progressreport2020/ (last accessed: 25 September 2024).

62 HSG LSA available (in German) online: www.landesrecht.sachsen-anhalt.de/bsst/document/jlr-HSchulGST2021pIVZ (last accessed: 25 September 2024).

sible consequences of utilising their research results, in particular the risk of their use threatening the peaceful coexistence of people."[63]

The higher education laws of the states of Brandenburg, Schleswig-Holstein, Hesse, and Lower Saxony explicitly require the involvement of research ethics committees. While North Rhine-Westphalia abolished a civil clause in its state higher education act in 2019,[64] Thuringia explicitly recognises this in Section 5 (3): "The universities shall adopt a civil clause of their own accord that is based on moral and ethical standards. To this end, they shall, in awareness of their responsibility to society, consider the possible consequences of disseminating and utilising their research results, in particular any use that could endanger the peaceful coexistence of people; the results shall be published."[65]

5. Requirements for the funding of security-relevant research

The DFG refers to the Recommendations for Handling of Security-Relevant Research (Chapter B 1) on its website under the basic and general conditions for funding[66] and in its guidelines for submitting proposals[67] and asks applicants to check their project accordingly when applying for funding. With regard to risks in international collaborations, the DFG also refers to its more specific recommendations that focus primarily on sensitisation and self-reflection[68] (see Chapter B 2). If direct risks are seen in a project generating knowledge, products or technologies that could be misused for significantly harmful purposes, applicants are asked for a statement on the risk-benefit ratio and possible risk minimisation measures. If, due to internal university regulations, a KEF or a comparable body must be involved in advance, a statement from the KEF should be attached to the application.

Relevant projects are also discussed with particular attention in the DFG's scientific panels, such as the DFG's Joint Committee (*Hauptausschuss*). The revised, mandatory DFG "Guidelines for Safeguarding Good Research Practice" also include formulations on the legal and ethical framework conditions of research: "Researchers adopt a responsible approach to the constitutionally guaranteed freedom of research. They comply with rights and obligations, particularly those arising from legal requirements and contracts with third parties, and where necessary seek approvals and eth-

63 The BerlHG is available online (in German) at: www.lexsoft.de/cgi-bin/lexsoft/justizportal_nrw.cgi?xid=167583,1 (last accessed: 25 September 2024).

64 The reasons for this step can be found in the detailed explanation of the Higher Education Act, available (in German) at www.mkw.nrw/system/files/media/document/file/mkw_nrw_hochschulen_hochschulgesetz_hochschulgesetz_novelliert_begr%C3%BCndet_0.pdf (last accessed: 25 September 2024).

65 The THürHG is available (in German) online at: https://landesrecht.thueringen.de/bsth/document/jlr-HSchulGTH2018rahmen (last accessed: 25 September 2024).

66 See www.dfg.de/en/basics-topics/basics-and-principles-of-funding/security-relevant-research (last accessed: 25 September 2024).

67 Available at: www.dfg.de/resource/blob/168314/9c1a931f2b58c0ec2ccfa7023fb687c7/54-01-en-data.pdf (last accessed: 25 September 2024).

68 Available at: www.dfg.de/resource/blob/289704/585cb3b48bb8e9f5b6e57e0e0a0d700e/risiken-int-kooperationen-en-data.pdf (last accessed: 25 September 2024).

ics statements and present these when required. With regard to research projects, the potential consequences of the research should be evaluated in detail and the ethical aspects should be assessed."[69] The associated explanatory notes to DFG Guideline 10 explicitly point out that universities and non-university research institutions are responsible for the compliance of their members' and employees' actions and should promote this through suitable organisational structures.

The Federal Ministry of Education and Research (BMBF) requires projects to be checked for a possible risk of misuse as part of the calls for proposals to fund international collaborative projects on the bioeconomy and quantum technology. Specifically, Point 4 of the calls for proposals "Special funding requirements" requires: "The applicant must check whether there is a direct or indirect risk that the research project will generate knowledge, products or technologies that could be misused (possibly by third parties) for significant harmful purposes. If such a risk exists or becomes apparent during the funding relationship, an assessment of the risk-benefit ratio must be made and the measures planned to minimise the risk must be indicated. The recommendations for handling security-relevant research (see German Research Foundation and Leopoldina handout on 'Scientific Freedom and Scientific Responsibility – Recommendations for Handling Security-Relevant Research', as of 28 May 2014) must be observed. If there is a Committee for the Ethics in Security-relevant Research at the applicant's university or research institution, it must be involved in advance. The result of the review and any assessment of the risk-benefit ratio must be documented in the application."[70]

In the EU Framework Programme for Research and Innovation "Horizon Europe", an ethical self-assessment with regard to possible risks endangering humans, animals and the environment arising from misuse of the research project is also mandatory when submitting an application. Accordingly, the associated guidelines also recommend the establishment of advisory bodies for related ethical issues.[71]

It can be assumed that research with dual-use potential will be increasingly promoted and expanded as part of the successor programme to Horizon Europe from 2027. According to the European economic security strategy, potential in the area of research and development should already be used to minimise risks for the member states and increase security, e.g. in relation to critical infrastructure, basic supplies, social peace in the event of provocative disinformation campaigns, and cyberattacks.

69 See the DFG's "Guidelines for Safeguarding Good Scientific Practice" from 2019, page 16, available at: www.dfg.de/resource/blob/174052/1a235cb138c77e353789263b8730b1df/kodex-gwp-en-data.pdf (last accessed: 25 September 2024).

70 Announcement of guidelines for the funding of international collaborative projects as part of the National Bioeconomy Strategy "Promotion of agroecology in agricultural business systems and regional landscape", Federal Gazette of 08.03.2024. See (in German): www.bmbf.de/bmbf/shareddocs/bekanntmachungen/de/2024/03/2024-03-08-Bekanntmachung-Agroecology.html#searchFacets (last accessed: 25 September 2024).

71 See Directorate-General for Research & Innovation of the European Commission "EU Grants – How to complete your ethics self-assessment" (Version 2.0 of 13 July 2021), page 32, available at: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/how-to-complete-your-ethics-self-assessment_en.pdf (last accessed: 25 September 2024).

At the same time, technological dependencies on non-European countries are to be reduced. To this end, the European Commission published a white paper at the beginning of 2024 that deals with the future expansion of funding opportunities for dual-use research. The aim is to fundamentally blur the boundaries between civilian and defence research in order to achieve greater synergy effects. In a subsequent public consultation of the European Commission with authorities, civil society, industry and science, three scenarios from the white paper were to be discussed on how this could be implemented at European level. In the first scenario, the status quo of Horizon Europe and the European Defence Fund would be maintained and better use would be made of the existing scope. In the second scenario, Horizon Europe funding would no longer be restricted to civilian applications, while a third scenario envisages a separate funding instrument for dual-use projects.[72]

72 See the European Commission's 2024 white paper "On options for enhancing support for research and development involving technologies with dual-use potential", available at: https://research-and-innovation.ec.europa.eu/document/download/7ae11ca9-9ff5-4d0f-a097-86a719ed6892_en (last accessed: 25 September 2024).

B. Progress in the self-regulation of science in dealing with security-relevant research at German research institutions

1. Recommendations and guidelines related to security-relevant research

In the opinion of the DFG and the Leopoldina, additional legal regulations can only control the opportunities and risks of free research to a limited extent, as research methods and content are constantly changing and the results of research and their future application can rarely be predicted with certainty. The DFG and the Leopoldina have therefore been working for many years to ensure that ethical principles and mechanisms for the responsible handling of research freedom and research risks are observed and further developed in the sciences. To this end, the two organisations published general "Recommendations for Handling of Security-Relevant Research" in the sciences in 2014. Due to the subsequent comprehensive establishment of commissions responsible for the ethical evaluation of security-relevant research (Chapter B 3) and the partially changed framework conditions for this research in Germany, the Joint Committee on the Handling of Security-Relevant Research (Chapter B 2) updated the above-mentioned recommendations in 2022.[73]

The instruments of self-regulation in the sciences and humanities are accorded central importance owing to their particular relevance and flexibility. In the first part of the recommendations, the DFG and the Leopoldina appeal to researchers not to simply comply with legal regulations. As they have a special ethical responsibility due to their constitutionally guaranteed freedom, their knowledge and their experience, they must be aware of the risk of research misuse and should weigh up the opportunities of research against the risks to human dignity, life and other important goods. The recommendations clarify this with regard to the necessary risk analysis, measures to minimise risks, and the examination of the publication of research results. The primary objective is the responsible conduct of research and the responsible communication of the results. In individual cases, however, it may also be necessary to suspend research projects or not to carry them out at all.

The second part of the recommendations is aimed at research institutions, which should create the framework conditions for ethically responsible research in their respective areas and provide their employees with the necessary awareness and knowledge of the legal boundaries of research. In addition to complying with legal regulations, they are required to define ethical rules for dealing with security-relevant research and to create the appropriate structural conditions for implementing these rules. The above-mentioned KEFs should be established to advise on matters arising from the implementation of these ethical rules, such as questionable conditions for conducting research projects or the need for mediation in the event of differences of opinion between researchers.

73 The recommendations were originally based on the "Guidelines and rules for dealing with research freedom and research risks" adopted by the Max Planck Society in 2010, which were updated in 2017. Available at www.mpg.de/197392/guidelines-and-rules-of-the-max-planck-society-on-a-responsible-approach-to-freedom-of-research-and-research-risks.pdf (last accessed: 25 September 2024).
The paper "Scientific Freedom and Scientific Responsibility – Recommendations for Handling of Security-Relevant Research" (2022) by the DFG and the Leopoldina is available at: www.security-relevant-research.org/publication-scientificfreedom2022/ (last accessed: 25 September 2024).

As explained in Chapter A 5, the mandatory DFG Guidelines for Safeguarding Good Research Practice also explicitly refer to the need for researchers to treat freedom of research responsibly and for suitable organisational structures that promote compliance from members and staff at research institutions in their actions.

Particularly in view of the reassessment of international research collaborations outlined in Chapters A 1 and A 3, numerous research institutions have developed guidelines and recommendations for the responsible conduct of research with foreign partners in recent years, which can only be described in extract form here.[74] In September 2023, for example, the DFG published the recommendations "Dealing with Risks in International Research Collaborations". These are intended to encourage applicants and other persons involved in the funding decision to reflect beyond foreign economic regulations on whether, for example, there could be dependencies on the partner country in the research field, whether the knowledge generated could be misused by third parties, or whether there could be possible hidden objectives being pursued by research partners. In addition, reflections on the research conditions should be encouraged, e.g. whether the research partners also conduct research for military or comparable purposes, or whether research data or experience from the research work could be systematically siphoned in view of the political constitution of the partner country.[75]

The German Rectors' Conference has developed key questions on university cooperation with the People's Republic of China. These questions ought to serve as a review aid and to raise awareness when it comes to examining the sustainability of the commitment and equality in scientific exchange and to sound out possible political intentions and contexts of the cooperation partners.[76] Following Russia's invasion of Ukraine, international research cooperation was increasingly viewed in the light of the *Zeitenwende* (turning point). The German Academic Exchange Service (DAAD) referred to the still valid strategy of a foreign "science diplomacy"[77] and called for it to be interest-led, regionally differentiated, risk-reflective and carried out according to the aspects of value and responsibility orientation.[78] The German Association of University Professors and Lecturers also expressed its views in a resolution and called for the German scientific community to set itself apart but not isolate itself, to keep an eye on the po-

74 A comprehensive compilation of these documents is available on the Joint Committee's website at: www.security-relevant-research.org/tag/research-collaborations/ and www.security-relevant-research.org/tag/assessment-procedures/ (last accessed: 25 September 2024).

75 See "Dealing with risks in international collaborations. Recommendations of the German Research Foundation" from 2023. Available at: www.dfg.de/resource/blob/289704/585cb3b48bb8e9f5b6e57e0e0a0d700e/risiken-int-kooperationen-en-data.pdf (last accessed: 25 September 2024).

76 See (in German) "Key questions on university cooperation with the People's Republic of China" of the German Rectors' Conference of 2020, available at: www.hrk.de/fileadmin/redaktion/hrk/02-Dokumente/02-01-Beschluesse/HRK_Beschluss_Leitfragen_zur_Hochschulkooperation_mit_der_VR_China_9.9.2020.pdf (last accessed: 25 September 2024).

77 See: "Science Diplomacy – Eine Strategie in der Außenwissenschaftspolitik" by the Federal Foreign Office from 2020. Available at: www.auswaertiges-amt.de/blob/2436494/2b868e9f63a4f5ffe703faba680a61c0/201203-science-diplomacy-strategiepapier-data.pdf (last accessed: 25 September 2024).

78 See (in German) "Foreign science policy for a multipolar world" of the German Academic Exchange Service from 2022. Available at: https://static.daad.de/media/daad_de/pdfs_nicht_barrierefrei/der-daad/220705_daad_awp-papier_perspektiven.pdf (German version only, last accessed: 25 September 2024).

litical implications, and to see the continuation of cooperation at a personal level as an opportunity.[79]

In 2023, the Max Planck Society (MPG) published recommendations for action for collaboration with China. These primarily focus on the risk management of research collaborations and call for a consistent risk-benefit analysis. In research fields considered by a panel of experts as too risky in the context of the planned internal MPG decision-making process, cooperation with Chinese partners should not be pursued in future, particularly in the case of cooperation with research institutions that are clearly directly subordinate to the Chinese military or involved in military research. However, the MPG is fundamentally committed to continuing and further developing its relationships with Chinese research partners. It would like to strengthen the Chinese expertise of its employees and therefore offers regular training courses and supports the institutes in contract management.[80]

On behalf of the DLR Project Management Agency, risk analysts from environmental research at the Institute for Qualifying Innovation Research and Consulting GmbH (IQIB) have developed a working aid for research institutions and authorities in order to recognise the sometimes complex causes, correlations and effects of risks of international research cooperation at an early stage and to take appropriate measures to minimise risks. Regarding unintended knowledge transfer, the misuse of research and external influences on cooperation, various risk indicators and the resulting appropriate measures were systematised, defined and illustrated using extensive hypothetical case studies.[81] In this context, the DLR Project Management Agency has also published a handout on the development of review processes for international research cooperation that are customised to the needs of the institutions.[82]

79 See (in German) "Science Diplomacy nach der Zeitenwende" by the German University Association from 2023. Available at: www.hochschulverband.de/fileadmin/redaktion/download/pdf/resolutionen/Resolution-ScienceDiplomacy.pdf (last accessed: 25 September 2024).

80 See (in German) "Recommendations for action for cooperation with China" of the Max Planck Society from 2023. Available at: www.mpg.de/21535920/mpg-china-handlungsempfehlung.pdf (last accessed: 25 September 2024).

81 The analysis "Risks in international research cooperation – causes, correlations and effects" is available (in German) at: www.safeguarding-science.eu/wp-content/uploads/Risiken-in-der-internationalen-Forschungskooperation.pdf (last accessed: 25 September 2024).

82 Available (in German) at: www.safeguarding-science.eu/wp-content/uploads/Due-Diligence-in-Science_German-Handreichung2024.pdf (last accessed: 25 September 2024).

2. Tasks and objectives of the Joint Committee

In 2014, the DFG and the Leopoldina decided to establish the Joint Committee on the Handling of Security-Relevant Research in order to implement their joint "Recommendations for Handling of Security-Relevant Research" (Chapter B 1) in a sustainable manner. In accordance with the resolutions of the Presidiums of both organisations, the Joint Committee has had the following mandate since December 2024:

> **BOX 3.** "[…] to promote the effective and sustainable implementation of the recommendations of the DFG and the Leopoldina on 'Scientific Freedom and Scientific Responsibility'. The Joint Committee shall monitor and proactively advance the status of implementation at research institutions and support them in properly implementing the recommendations by drafting sample texts, for example. This applies in particular to the establishment of the Committees for Ethics in Security-Relevant Research (KEFs) as outlined in the recommendations.
>
> The Joint Committee shall act as a point of contact for the KEFs for any questions and as a platform for the sharing experience and knowledge. The responsibility for individual cases under discussion shall lie with the research institutions at which the work is carried out. In special cases that cannot adequately be appraised by the KEFs, the Leopoldina may appoint ad-hoc working groups with the necessary specialist expertise to carry out a risk-benefit assessment of the research in question in close collaboration with the Joint Committee.
>
> In addition, the Joint Committee shall monitor developments in the field of security-relevant research in Germany and, where necessary, identify potential areas for action and advise the DFG and the Leopoldina on these issues. Where necessary, Committee members will take part in public discussions. In order to focus attention on this issue over the long term, the Committee shall organise regular events to raise awareness of the responsible handling of security-relevant research within the scientific community and also including the communication to policymakers and the public."

The Joint Committee meets at regular intervals, usually twice, but at least once, a year. Statements and other papers prepared by the Joint Committee, including regular progress reports, are published in consultation with the Presidiums of the DFG and the Leopoldina.

As a rule, the Joint Committee consists of 12 researchers from various disciplines and institutions who are appointed by mutual agreement by the Presidiums of the DFG and the Leopoldina for a period of three years. At least one member covers ethical or legal subject areas. The committee is jointly chaired by the vice presidents of the DFG and the Leopoldina or by representatives appointed by the presidiums.

The Joint Committee's office is affiliated with the Leopoldina's Presidential Office. In addition to the Leopoldina's expenses for maintaining the Joint Committee's office, it is supported by the DFG, the Fraunhofer-Gesellschaft, the Helmholtz Association, the Leibniz Association and the Max Planck Society as part of a cooperation agreement.

Chairpersons of the Joint Committee (as of 01/10/2024)

PROFESSOR BRITTA SIEGMUND, Vice President of the DFG
PROFESSOR THOMAS LENGAUER, German National Academy of Sciences Leopoldina, appointed representative of the Leopoldina Presidium

Other members of the Joint Committee (as of 01/10/2024)

DR ANNA LISA AHLERS, Max Planck Institute for the History of Science, Berlin
PROFESSOR DANIEL BARBEN, University of Klagenfurt, Department of Society, Knowledge and Politics
PD DR JENS BOHNE, Hannover Medical School (MHH), Institute of Virology
DR UNA JAKOB, Leibniz Peace Research Institute (PRIF), Frankfurt am Main
PROFESSOR ANIKA KLAFKI, Friedrich Schiller University Jena, Faculty of Law
PROFESSOR FLORIAN KRAUS, Philipps University Marburg, Department of Chemistry
PROFESSOR ULRIKE VON LUXBURG, University of Tübingen, Theory of Machine Learning
PROFESSOR LARS SCHAADE, Robert Koch Institute Berlin, Centre for Biological Threats and Special Pathogens
PROFESSOR SILKE SCHICKTANZ, University Medical Center Göttingen, Department of Medical Ethics and History of Medicine

Office of the Joint Committee (as of 01/10/2024)

DR JOHANNES FRITSCH, Head of Office, German National Academy of Sciences Leopoldina
DR ANITA KRÄTZNER-EBERT, Scientific Officer, German National Academy of Sciences Leopoldina

Contact persons at the German Research Foundation (as of 01/10/2024)

DR ING. BURKHARD JAHNEN, German Research Foundation
DR INGRID OHLERT, German Research Foundation

The Joint Committee held its constituent meeting in February 2015 and has met 19 times since then. Representatives from the KEFs, the German Ethics Council, bioethics, virology, neuroscience, science management, a chemical and pharmaceutical company, a student initiative, and relevant federal ministries and federal offices were invited to the meetings. The progress reports from 2016, 2018, 2020 and 2022 provide information on the activities and focal points of the Joint Committee to date as well as on the respective status of implementation of the above-mentioned recommendations as part of the monitoring defined in the mandate.[83]

In order to fulfil its function as a coordinating platform for the exchange of experience and to create transparency regarding the handling of security-relevant research in Germany, the Joint Committee has set up an extensive public internet platform, which it is constantly updating and expanding.[84] A large number of thematically relevant, annotated publications and other information (e.g. topics and case studies, legal framework conditions, relevant aspects of research funding, education and training) relating to security-relevant research are available there. It also lists contact persons at German research institutions, organisations and specialist societies who are responsible for dealing with security-relevant research, as well as the local committees and representatives responsible for the ethical evaluation of security-relevant research.[85] In addition to networking within the scientific community, this overview list (see also Appendix 2) also enables the public and political decision-makers to follow how German research institutions and organisations deal with the issue of security-relevant research risks.

In order to provide guidance for the establishment and ongoing work of KEFs and to standardise their tasks and powers as far as possible in the statutes, the Joint Committee published model statues for KEFs in 2016.[86] These identify issues that require regulation and need to be adapted in detail to the respective local circumstances. For example, Section 6 (1) of the model statutes on the question of the specific cases in which the KEFs should become active states: “Members of the university/institution/society [name] should seek advice from the KEF before carrying out a research project if the research project is associated with significant security-relevant risks to human dignity, life, health, freedom, property, the environment or peaceful coexistence. Security-relevant risks exist in particular in the case of scientific work that is likely to generate knowledge, products or technologies that can be directly misused by third parties.” In addition, the Joint Committee published a handout entitled “Dealing with security-relevant research in Germany – At a glance” and updated it in 2024,[87]

83 The progress reports are available at: www.security-relevant-research.org/tag/progress-reports/ (last accessed: 25 September 2024).

84 See: www.security-relevant-research.org/ (last accessed: 25 September 2024).

85 The list can be viewed at: www.security-relevant-research.org/contactpersons/ (last accessed: 25 September 2024).

86 The model articles of association are available at: www.security-relevant-research.org/publication-modelstatutes2016/ (last accessed: 25 September 2024).

87 Available at: www.security-relevant-research.org/publication-informationbrochure2025/ (last accessed: 25 September 2024).

which is intended to provide researchers and the interested public with low-threshold access to the topic.

With the aim of strengthening awareness and assessment competence for the responsible handling of security-relevant research in the sciences, the Joint Committee has organised a series of events over the last two years to establish topics and exchange experiences, which are documented in Chapter C, as is the participation of Joint Committee members and its office in public debates.

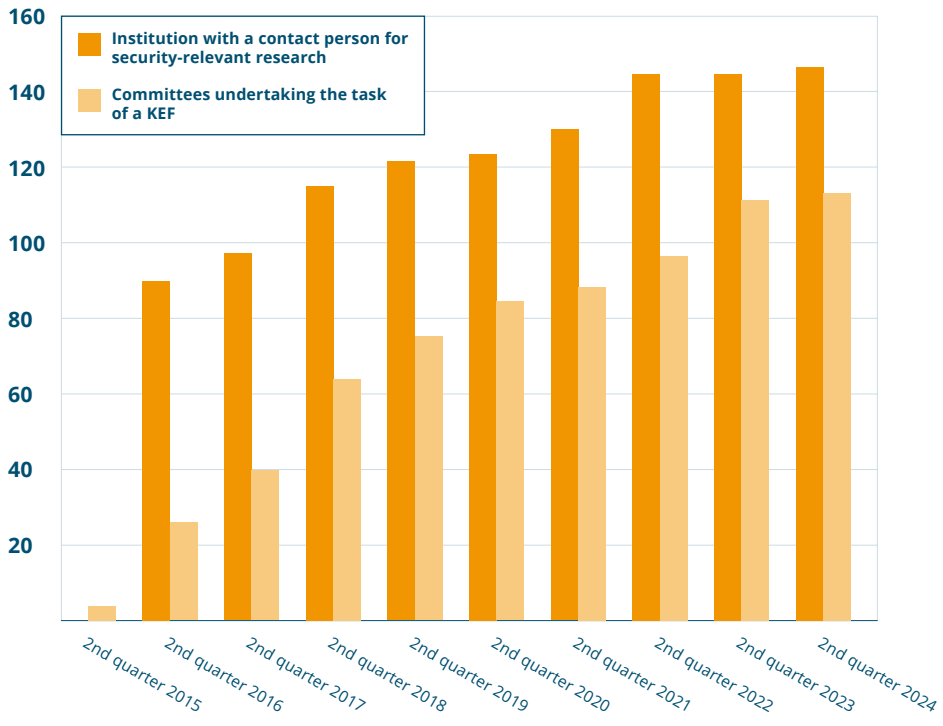
At the suggestion of the DFG Presidium, the Joint Committee sought strategic advice from three external experts from Germany and abroad on the further development of its work at the end of its third mandate period in June 2023. The consultation focused on the realisation of the tasks defined in the mandate, the evaluation of the existing structures of self-regulation of the sciences and humanities in dealing with security-relevant research, and possible additional tasks for the Joint Committee. The results of the consultation process influenced, among other things, the revision of the above-mentioned mandate by the Presidiums of the DFG and the Leopoldina, the strategic selection of new members for the committee's fourth term of office, and the Joint Committee's intensified focus on the risks of international research cooperation and research security (Chapter A 1).

3. Insights into the work of the Committees for Ethics in Security-Relevant Research (KEFs)

As described in the previous chapters, there is a constantly increasing need for risk-benefit assessments and corresponding advisory procedures on ethical aspects of security-relevant research projects with the aim of limiting risks. Although the majority of academic research institutions in Germany are now supported by KEFs or comparable committees in an advisory capacity, there is often still a lack of visibility throughout the institution and a corresponding lack of awareness of these processes among researchers.

By 1 September 2024, a total of 158 German research institutions, organisations, professional associations and one industry association had notified the Joint Committee of 142 contact persons for security-relevant research. To the Joint Committee's knowledge, there are at least 122 KEFs or comparable bodies throughout Germany that advise more than 300 research institutions on ethical issues relating to security-relevant research. The establishment process from 2015 to 2024, which suggests a certain saturation in the last two years, is shown in Figure 1.

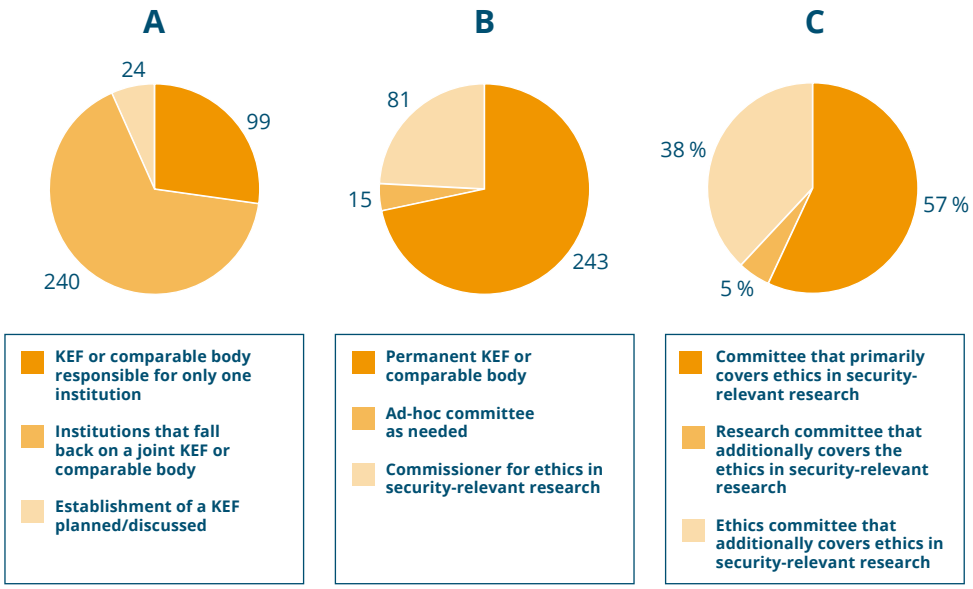
ILLUSTRATION 1



Development over time of the number of German research institutions, research organisations and professional societies that have appointed contact persons for dealing with security-relevant research, as well as established committees responsible for the ethical evaluation of security-relevant research, in the period from mid-2015 to mid-2024.

The Max Planck Society and the Leibniz Association have higher-level committees, while the Fraunhofer Society has a contact person who can advise the institutes represented in the consortia and issue ethics votes if required. Some Leibniz Institutes and Helmholtz Centres also have local KEFs. Some colleges and universities also operate jointly run committees in order to ensure a continuous advisory process and thus save resources. For example, 15 Bavarian universities and a competence centre have set up the Joint Ethics Committee of Bavarian Universities (GeHBa) to issue statements on ethical aspects of planned research projects, including security-relevant issues.[88] According to surveys conducted by the Joint Committee, almost 100 universities and other research institutions have their own local committees or representatives responsible for advising on ethical issues relating to security-relevant research. The establishment of a KEF is being discussed or planned at 24 research institutions. The total number of research institutions that can rely on one of the two types of committee or commissioner, the respective administrative integration of the committees and their responsibilities in terms of content are shown in Figure 2. Detailed information on the contact persons and KEFs can be found in Appendix 2.

ILLUSTRATION 2



A: Feedback from the contact persons for security-relevant research on the number of research institutions that can rely on KEFs or comparable competent bodies (N = 339); B: Administrative involvement of the respective bodies in relation to the number of institutions; C: Responsibilities of the bodies in terms of content in relation to the number of institutions (as of 1 September 2024).

88 Further information (in German) at: www.gehba.de/home (last accessed: 25 September 2024).

While around two-thirds of the above-mentioned research institutions have access to permanent committees to advise them on ethical issues relating to security-relevant research, one-third have access to commissioners for ethics in security-relevant research (Fig. 2 B). The latter usually investigate cases on request and obtain feedback or, if needed, the necessary expertise from executive boards or at working level. Four percent of the institutions make use of ad-hoc committees when necessary.

The content-related responsibilities of the KEFs are mainly determined by other existing committees and requirements as well as local structures (e.g. the content-related orientation of the research institutions or existing faculties). In five percent of research institutions, general research commissions (e.g. the Senate Commission for Research at the University of Rostock) also cover ethical advice on security-relevant research (Fig. 2 C). A good third of research institutions can turn to ethics committees that cover either general topics in research ethics or research involving humans and animals. At the University of Mannheim, for example, the ethics committee has extended its statutes to include security-relevant ethical research issues and, in security-relevant cases, calls in two additional committee members with the relevant expertise.[89] Leipzig University has an Ethics Advisory Board that can convene a dual use subcommittee for security-relevant issues.[90] The majority of research institutions have established specialised KEFs that primarily deal with ethical issues relating to security-relevant research.

Of the 142 contact persons for security-relevant research, 72 took part in the fourth Joint Committee survey, which focussed on the current status of the cases discussed in the KEFs, the assessment criteria applied, the self-assessment, and further activities of the KEFs in the period 2022–2023.[91]

As in previous surveys, the contact persons estimated the visibility of their respective KEF at less than 50 percent on average (see question 13 in Appendix 3), and a quarter even at less than 30 percent. It appears that the committees and contact persons continue to face major challenges in publicising how their own institution handles security-relevant research within the university or public parties interested in their research as well as in raising awareness of the topic. Half of the contact persons responded that their institution publishes information on the topic on a website, while just under a third stated they organise public events or discussion groups on the subject. Similarly, 14 of the 72 participating contact persons reported that, as far as they were aware, security-relevant ethical aspects of research were integrated in teaching at their institution. 24 people stated that corresponding training courses were offered for employees and 20 that they discuss events to raise awareness of security-relevant aspects of research in their committee.

89 Statute, see www.uni-mannheim.de/media/Lehrstuehle/jura/Mueller-Terpitz/Extracts_Statute_ethics_committee.pdf/flipbook (last accessed: 25 September 2024).

90 Further information at: www.uni-leipzig.de/en/research/academic-integrity/ethics-advisory-board (last accessed: 25 September 2024).

91 The current survey can be found in Appendix 3.

According to the survey, at least 30 potentially security-relevant research projects were advised by 11 KEFs between 2022 and 2023. As only around half of the contact persons took part in the survey and there are only 59 out of a total of 122 KEFs at their research institutions, it can be assumed that the actual number of advised cases is significantly higher. Of the documented cases, seven were assigned to biology, six to engineering and two to computer science. In 15 research projects, however, the contact persons did not provide any information on the respective subject area or the background to the application or advice. Further, in the cases described, specific information was not often provided on the respective research content, which likely indicates a particular confidentiality. In this respect, cross-disciplinary comparisons and statistics for the period 2022 to 2023 would only be of limited value.

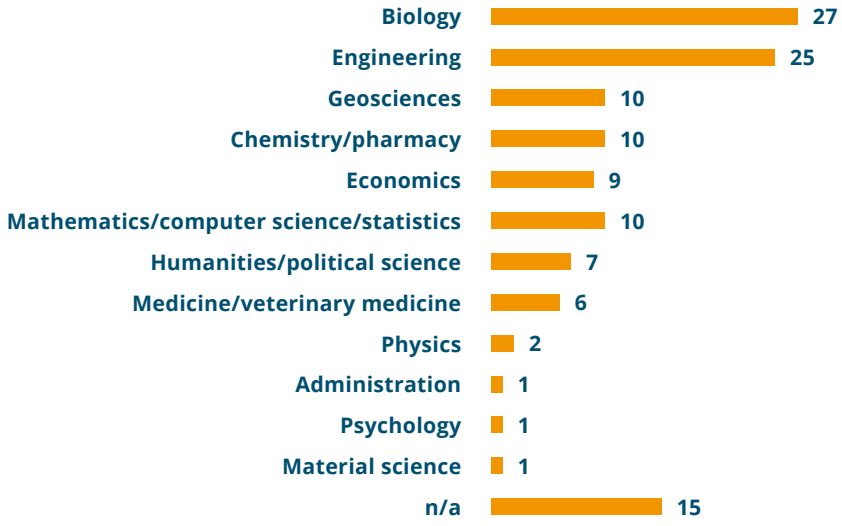
At least seven of the research projects discussed in the KEFs were classified as unobjectionable and approved without conditions, eleven with certain conditions. Two projects were advised against entirely. The conditions included, for example, that risky results from experiments with potentially pandemic pathogens should be resubmitted to the KEF for further risk assessment prior to publication. In some cases, restrictive publication of the results was advised, a higher biological safety level was recommended for the experiments on the basis of risk assessments than was specified by the competent state authority, or it was advised against creating new pathogen variants in the course of the experiments that had not already been previously described. In another project in the field of biology, the person commissioning the project was found to be problematic and special conditions were imposed regarding the handling of confidentiality and publication.

For a project in the field of engineering with a clear dual-use orientation, one KEF recommended further coordination at board level and with the federal ministry which is authorised to issue directives to the research institution. This was due to the framework conditions stipulated by the third-party funding provider, which made the project appear to be contract research. A further project for the development of simulation software with potential application in fluid mechanics and semiconductor technology was partially discouraged due to the cooperation with a US and Chinese company with close ties to the military. A project related to materials science was also partially discouraged, although no further details were provided in the survey response. One project from the field of energy research received a completely negative advisory vote because, in the opinion of the KEF, it was clearly an arms cooperation. In the case of the second project with a negative advisory vote, no information was provided on the specialist affiliation, but the decisive factor for the vote was that the Chinese cooperation partners involved are known to work with the Chinese military.

Twelve contact persons stated that international research collaborations had also been a topic of discussion at the respective KEF in the last two years. These were primarily collaborations with Chinese partners, but also with Russia, Iran, the United Kingdom, and the USA. Export control issues were discussed in 16 committees. The contact persons stated that the KEFs took between one week and three months to process the enquiries.

According to all four Joint Committee surveys, at least 124 cases were discussed in the KEFs between 2016 and 2023, of which nine received outright negative advice. Figure 3 shows the respective professional affiliation of the cases dealt with.[92]

ILLUSTRATION 3



Number and subject affiliation of potentially security-relevant research projects that were discussed in the KEFs according to the results of the four Joint Committee surveys from 2016 to 2023 (N = 124).

4. Key questions or checklists relating to the ethical evaluation of security-relevant research

4.1 Insights into existing key questions and checklists

According to the current and past surveys of contact persons (Chapter B 3) and telephone consultations, at least 30 research institutions use checklists or key questions in their application procedures for approving or advising on research projects. Only some of these are publicly accessible, some of which were made available to the Joint Committee as part of the survey. The application documents of "traditional" ethics committees, whose mandate on medical and psychological issues has been expanded to include security-relevant aspects of research, continues to focus primarily on the welfare of the test subjects.[93] In the life sciences, on the other hand, the relevant guide-

92 A description of the cases in the years 2016–2022 can be found in the Joint Committee's previous progress reports, available at: www.security-relevant-research.org/tag/progress-reports/ (last accessed: 25 September 2024).

93 See for example "Accompanying overview form for applications from Carl von Ossietzky University Oldenburg" from 2023. Available at: uol.de/fileadmin/user_upload/gremien/download/EK/full_proposal_10_2023.docx?v=1697449887 (last accessed: 25 September 2024).

lines and checklists have a clear biosafety and biosecurity focus.[94] At other institutions, such as the Technical University of Darmstadt[95] and the University of Göttingen[96], the focus is partly on the compatibility of research projects with the applicable civil clause (cf. Chapter A 3.2). The TU Bergakademie Freiberg has drawn up a checklist with key questions for the early identification of various risks of planned research projects. These relate, for example, to methods used, objectives pursued, the potential for misuse of the results, and possible risks arising from cooperation with research partnerships and the involvement of employees from embargoed countries.[97] The University of Freiburg has drawn up a questionnaire that covers possible misuse and the critical examination of unintended consequences by cooperation partners.[98] In the questionnaire of the ethics committee of the Department of Informatics at the University of Hamburg, in addition to questions about the welfare of the test subjects and data protection, questions are also asked about the dual-use potential (with regard to general misuse and military use).[99] The various responses from research institutions in recent years indicate that the following issues are of particular importance for the evaluation of security-relevant research projects:

- violations of legal regulations, guidelines or codes of conduct,
- involved researchers and third-party funders, e.g. international or military cooperation partnerships,
- risk-benefit assessment, e.g. the probability of damage occurring, possible extent of damage, other options for minimising risk, and possible consequences of not carrying out the research project,
- the objectives and purposes of the research and possible unintended use by third parties, and
- classification as basic research or assessing the proximity to application and the corresponding direct potential for misuse.

94 See “House ruling: Dual-use potential in research – procedural rules for avoiding and minimising risks” of the Robert Koch Institute from 2013. Available at: www.rki.de/EN/Topics/Research-and-data/Dual-use/dual-use-node.html (last accessed: 25 September 2024); see “Guidelines for dealing with potentially safety-relevant research” – Annex 10 of the organisational decree 2015-0 1-V03 “Principles for scientific work and action at the Paul-Ehrlich-Institut” (not available online); see “Questionnaire for DURC-relevant research” of the Hannover Medical School from 2015 (not available online).

95 See “Checklist for self-assessment/documentation of a research project in relation to the civil clause” of the Technical University of Darmstadt from 2019. Available at: www.intern.tu-darmstadt.de/gremien/ethikkommisson/formulare_8/index.en.jsp (last accessed: 25 September 2024).

96 See “Instructions for applicants” of the Georg-August-Universität Göttingen from 2020, available at: www.uni-goettingen.de/de/document/download/474cbc5b606dbbeb2e32fceb75369cbf-en.pdf/Hinweise%20f%C3%BCr%20Antragstellende_engl.pdf (last accessed: 25 September /2024).

97 See (in German) https://tu-freiberg.de/sites/default/files/2023-06/leitfragen_sicherheitsrelevanz.pdf (last accessed: 25 September 2024).

98 See “Responsible Science by Identifying potential Risks: Questionnaire of the University of Freiburg” from 2023 (not available online).

99 See: “Ethic assessment form” of the University of Hamburg from 2024. Available at: www.inf.uni-hamburg.de/home/ethics.html (last accessed: 25 September 2024).

On this basis and based on experience in dealing with security-relevant research at German research institutions, the Joint Committee developed the following "Guiding questions for the ethical evaluation of security-relevant research" in 2020, which have already served as a template for the guiding questions of the Commission for Security- and Environmentally Relevant Research (KSUF) of the Friedrich Schiller University Jena[100], the Commission for Responsibility in Science of the TU Dresden[101], and the Commission for Ethics in Security-Relevant Research of the TU Bergakademie Freiberg[102]. The key questions were also put to the test as part of a study on a case-based simulated KEF advisory procedure[103] (see also Chapter A 2.3).

100 Available (in German) at: www.uni-jena.de/unijenamedia/forschung/pdfs/leitfragen-kommission-fuer-sicherheits-und-umweltrelevante-forschung.pdf (last accessed: 25 September 2024).

101 Feedback from the TU Dresden contact person in the Joint Committee survey.

102 Available (in German) at: https://tu-freiberg.de/sites/default/files/2023-06/leitfragen_sicherheitsrelevanz.pdf (last accessed: 25 September 2024).

103 ee Jakob, U., Kraemer, F., Kraus, F., & Lengauer, T. (2024). Applying Ethics in the Handling of Dual Use Research: The Case of Germany. *Research Ethics, 0*(0).

4.2 Key questions for the ethical evaluation of security-relevant research

Preamble: The key questions of the Joint Committee on the Handling of Security-Relevant Research are designed to help researchers and committees responsible for the ethics in security-relevant research (KEFs) decide in which instances a further ethical assessment of security-relevant research projects and risk reduction measures is called for. This particularly applies to "security-relevant research of concern", in other words scientific research that produces knowledge, products or technologies that could be misused directly by third parties to cause significant harm to human dignity, life, health, freedom, property, the environment or peaceful coexistence.[104]

In the experience of the Joint Committee, such research projects are rare exceptions in academic research. In practice, the work of the KEFs in advising security-relevant projects generally concerns the compatibility of the research with constitutional principles or the basic rules of the respective research institution and the DFG "Guidelines for Safeguarding Good Research Practice".[105] They consult on issues of data security and foreign trade legislation (export control). The KEFs also assess security-relevant risks connected to military non-disclosure and to research funding from sponsors with military associations, and security-relevant risks which could arise from cooperation with researchers with military associations or from authoritarian regimes.

The Joint Committee has therefore compiled the following key questions based on the KEFs' feedback on their own work from 2016–2019 and published checklists and guides on research risks.[106] The Joint Committee believes that the respective responses of researchers and KEFs and the consequences derived from them for the work in question should always be the result of case-by-case considerations within the respective local framework for research and their ethical evaluation. The Joint Committee therefore does not want to prescribe generally valid ethical criteria or "red lines" and instead primarily aims to sustainably strengthen the independent handling of security-relevant research risks in the sciences.

104 Further information on security-relevant research and the work of the KEFs in the Joint Committee's progress reports is available at: www.security-relevant-research.org/publications (last accessed: 25 September 2024).

105 See "Guidelines for Safeguarding Good Research Practice" Available at: www.dfg.de/resource/blob/174052/1a235cb138c77e353789263b8730b1df/kodex-gwp-en-data.pdf (last accessed: 25 September 2024).

106 See "Code of Conduct: Working with Highly Pathogenic Microorganisms and Toxins" (DFG Permanent Senate Commission on Genetic Research 2013). Available at: www.dfg.de/resource/blob/170898/2a155efa6ecb11a3da2b1d222fc752de/130313-verhaltenscodex-dual-use-en-data.pdf (last accessed: 25 September 2024). Scientific Freedom and Scientific Responsibility – Recommendations for Handling Security-Relevant Research (DFG and Leopoldina 2014). Available at: www.security-relevant-research.org/publication-scientificfreedom2022/ (last accessed: 25 September 2024). Completion aid for the civil clause checklist of TU Darmstadt (as of: 5 November 2014) Available at: www.intern.tu-darmstadt.de/gremien/ethikkommisson/formulare_8/index.en.jsp#text___bild_1 (last accessed: 25 September 2024). Internal Guidelines of the Paul-Ehrlich-Institut for the Handling of Potentially Security-Relevant Research.

1. Key questions for researchers, the answer to which may suggest the need for consultation by KEFs

1.1 Is it likely that your research project is security-relevant research according to the above-specified meaning and/or the above-mentioned contexts?
1.2 Is it possible for cooperation partners to cause additional security-relevant risks in the above sense in the context of this work?
1.3 Does the research project conflict with legal regulations[107] and thus need to be referred to a compliance office alongside a KEF?

2. Key questions for processing the query by the KEFs

2.1 What concrete objectives and purposes are the researchers and any sponsors involved pursuing with this research project?
2.2 Is the required expertise available to make an informed assessment of the research project in regard to its potential risks or does additional expertise need to be brought in?
2.3 Is it possible to adequately specify and weigh up the benefits and risks of the known and potential research findings with the information currently available?
2.4 Are the security-relevant outcomes and resulting risks of the research project new or could they also arise from previously published work?
2.5 How likely is it that the security-relevant findings will be disseminated and that this will lead to a direct[108] concrete misuse in the above-specified meaning of security-relevant research of concern?
2.6 In the event of an intentional harmful application of the findings through third parties, what would be the scale of the potential damage and are any suitable countermeasures[109] available?
2.7 What are the potential harmful consequences[110] of not carrying out the research project?

3. Key questions for the conclusive assessment and consultation by the KEFs

3.1 Can the research project produce knowledge, products or technologies that could very likely be misused directly by third parties to cause significant damage of the above-specified legal interests?
3.2 Should the project be reassessed by the KEF at a more advanced stage when the security-relevant risks can be judged more easily
3.3 Are the research project and its objectives and purposes compatible with the constitutional principles and the basic code or guidelines of the research institution?
3.4 Can the security-relevant risks be sufficiently reduced by imposing certain conditions on the project (e.g. usage agreement or alternative research strategy) or by adapting the publication?
3.5 How can the researchers involved in the research project be made aware of the ethical aspects of security-relevant research so that they consider the direct and future consequences of their work?

107 E.g. regular criminal law, export control law and the export regulations of the Federal Office of Economics and Export Control (BAFA), the Biological and Chemical Weapons Convention, protection of human rights, international humanitarian law, international law of war, prohibition of torture and violence, biodiversity convention.

108 For example, the skills, expertise and technical equipment required for misuse must be considered.

109 In the event of an intentional harmful application of the findings through third parties, what would be the scale of the potential damage and are any suitable countermeasures available?

110 Can the absence of certain innovations result in additional damage, for example, in the course of ongoing military conflicts, in the course of climate change, in naturally emerging waves of infection?

5. Integration of security-relevant ethical aspects in research and teaching

In their "Recommendations for Handling of Security-Relevant Research" (Chapter B 1), the DFG and the Leopoldina advocate for researchers to convey and exemplify the principles of responsibly handling research risks in university teaching and in training programmes for early career researchers, and to raise awareness of these issues. The research institutions and their KEFs should also promote these measures through appropriate campaigns and training measures and help to ensure that the relevant content is included in teaching and training programmes. In order to narrow this down this, the Joint Committee developed the following supplementary recommendations (Box 4), taking into account the results of its conference on awareness-raising and competence-building for ethics in security-relevant research in teaching (see conference report in Chapter C 2):

BOX 4. Recommendations of the Joint Committee on the integration of security-related ethical aspects in research and teaching

In order to raise awareness of security-relevant ethical aspects of research at an early stage and to develop subject-related assessment skills in an interdisciplinary and non-scientific context, universities should incorporate the relevant ethics in the teaching content and curricula of all relevant degree programmes wherever possible. Knowledge of basic ethical standards of scientific work is a prerequisite for compliance with good research practice. Therefore, despite the already high density of information in degree programmes and limited resources, the teaching of basic ethical knowledge and evaluation methods should at least be an integral part of all degree programmes.

In the course of a meeting[111] of the Joint Committee on integrating the ethics of security-relevant research in teaching, it was determined that a qualified and sustainable acquisition of ethical competence can best be guaranteed with corresponding continuous and compulsory courses. In particular, illustrative subject-related and interdisciplinary case studies of possible misuse scenarios can sharpen students' awareness and provide methodologically sound guidance for their assessment processes.

111 See conference report "Sensitisation and competence building for ethics of security-relevant research (dual use) in teaching – theories, methods, good practices" in Chapter C 2.

> With a view to the continuous educational process, the Joint Committee considers the following teaching formats to be suitable.
>
> 1. **In Bachelor's degree programmes,** security-relevant aspects of research should be integrated, for example, in overview courses on good research practice and on fundamental questions of scientific ethics.
> 2. **In Master's degree programmes,** it is advisable to build on this, e.g. to deal with specific ethical and security-relevant aspects of one's own subject in depth within seminars – both on a theoretical level and using case studies – and to introduce students to the relevant state of research in the field of ethics (possibly in interdisciplinary cooperation).
> 3. **Doctoral students, post-docs** and **other staff** involved in research should also develop and reflect on the specific current risks of research and the relevant state of ethical research in an interdisciplinary and non-scientific context as part of group seminars, further training events, summer schools, or graduate schools.
>
> The implementation of these recommendations requires the corresponding qualification of teaching staff and the adaptation of study and examination regulations.

According to the Joint Committee's research, surveys (Chapter B 3) and events (Chapter C 2), the KEFs at the research institutions have so far taken on hardly any and only few coordinating functions in the context of raising awareness of ethical aspects of research. Departmental ethics are primarily established in biology and biotechnology degree programmes, especially since the Conference of Biology Departments (Konferenz Biologischer Fachbereiche) recommended integrating ethical issues in the core curricula in 2013. Overview courses such as the lecture "Legal Foundations and Ethics" for biology students at Kiel University are based on these recommendations.

A standardised ethical accompanying course, as introduced by the technical universities in the Netherlands a few years ago (see chapter C 2), has not yet been observed in Germany, although many universities and colleges already offer courses relating to the ethics in security-relevant research in engineering degree programmes. One example of this is the seminar "Responsibility in engineering: from military research and genetic engineering to plagiarism and whistleblowing" at the Technical University of Braunschweig.[112] In the 2024 summer semester, the University of Potsdam offered the lecture and combined seminar "AI and the Responsibility of Science" in the "Computer Science and Society" module, in which a debate on "Dual Use Research of Concern" was prepared and held over several sessions.[113]

As the need for interdisciplinary ethical education is growing in both industry and research, some universities are offering ethics specialisation programmes. The "Berlin

112 See (in German) www.tu-braunschweig.de/gtm/lehre/wintersemester-2014/15/verantwortung-und-ethik-in-ingenieurwissenschaften (last accessed: 25 September 2024).

113 See (in German) https://puls.uni-potsdam.de/QIS/VVZ/20241/VVZ_20241_2476.pdf (last accessed: 25 September 2024).

Ethics Certificate – Reflection and Responsibility" of the Berlin University Alliance is an inter- and transdisciplinary certification programme and offers five profile areas: Ethics of AI, Bioethics and Medical Ethics, Technology Ethics and Technology Assessment, Animal Ethics, and Climate Justice.[114] Kiel University also offers a certificate programme in research ethics, which can be completed in four semesters by students from the third semester onwards. Courses offered in the 2024 summer semester focused on topics such as "Ethics of scientific research" or "Guiding ideal(s) of scientific research".[115] Leuphana University of Lüneburg offers a two-semester certificate programme in "Digital Ethics".[116]

114 See www.tu.berlin/en/philtech/study-and-teaching/berlin-ethics-certificate (last accessed: 25 September 2024).

115 See (in German) www.forschungsethik.uni-kiel.de/de (last accessed: 25 September 2024).

116 See www.leuphana.de/en/professional-school/certificate-courses/it-digitalisation/digital-ethics.html (last accessed: 25 September 2024). Further examples of good practice for courses that raise awareness of how to deal with security-relevant research are available at the following link: www.security-relevant-research.org/education-and-teaching/ (last accessed: 25 September 2024).

C. Public activities of the Joint Committee

1. Brain-computer interfaces: Will the boundaries between man and machine soon blur?

Leopoldina Lecture, 23 May 2023, Hanover

The term "brain-computer interface" (BCI) refers to the interface between the human brain and a computer. By means of non-invasive electroencephalograms (EEG) or the implantation of electrodes in the brain, it is now possible to read out intentions of all kinds. This neurotechnology thus holds groundbreaking potential for improving mobility or communication and for controlling vehicles, for example, and not only for physically impaired people. Thanks to intensive research and development, the reliability of the data is constantly improving. But what happens when the technology can capture or even influence thoughts? The Leopoldina Lecture organised by the Joint Committee together with the Volkswagen Foundation addressed the question of whether the boundaries between human thought and machines could actually blur in the near future and what this could mean for individuals and society. The three speakers, neuroinformatics scientist at Bielefeld University Helge Ritter, neurologist and neuroscientist at the University of Mannheim Philipp Kellmeyer, and philosopher at the University of Hagen Orsolya Friedrich, presented the technical applications and observation methods of BCIs. There has been a rapid development in research and development, particularly in the field of AI, which has also had an impact on the applications of BCIs – especially on the highly complex analyses of the information that can be read from the brain. The speakers emphasised that the sensitive data obtained in the course of research must therefore be increasingly protected against misuse. The "ethics by design" approach, which involves those affected in the technical development process at an early stage, was particularly important. For example, various scenarios of military misuse and disembodied actions should be considered. Complex philosophical, legal and ethical consideration processes would be necessary for this.[117]

117 A detailed conference report is available (in German) at: www.volkswagenstiftung.de/de/veranstaltungen/brain-computer-interfaces-verschwimmen-bald-die-grenzen-zwischen-mensch-und-maschine (last accessed: 25 September 2024).

2. Sensitisation and competence building for ethics in security-relevant research (dual use) in teaching – theories, methods, good practices

Conference, 5 June 2023, Berlin

At the conference, the two chairs of the Joint Committee introduced the conference topic and the tasks of the committee, including the strengthening of self-regulation in the sciences when it comes to the responsible handling of security-relevant risks in research. In its previous recommendations for raising the awareness of (prospective) researchers, the Joint Committee advocated a three-stage process, from overview courses on good research practice at Bachelor's level to subject-specific seminars at Master's level and courses and graduate schools on security-relevant research during the doctoral and post-doctoral phases.

In the panel on theoretical and didactic concepts for raising awareness of ethics in security-relevant research, Julia Dietrich from the FU Berlin recommended that teaching should be accompanied by ethical questions throughout and reflect positively on action-oriented values. Corresponding courses should be compulsory and impart specific ethical skills and knowledge in a theory-based manner. This could also help to increase motivation in the initial study phase and reduce drop-out rates. According to her surveys of chemistry degree programmes offered throughout Germany, ethics was strongly underrepresented in this security-relevant subject. Thorsten Fitzon from Furtwangen University explained the need to differentiate between ambiguity and ambivalence with regard to dual-use considerations. It was often less about making clear-cut judgements and more about stimulating processes of understanding. Fitzon presented the "Dilemma Games" project at Erasmus University Rotterdam, which sensitised researchers to ethical problems by preventing a certain aspect-blindness by playfully practising changes of perspective. Tijn Borghius from Eindhoven University of Technology presented the accompanying ethics programme at technical universities in the Netherlands. Ethics seminars relating to the application of technologies and technical processes were mandatory in engineering programmes. Case-based exercises helped students become more sensitive and competent in analysing ethical issues. The subsequent panel discussion focussed on how the different backgrounds of students' experiences should be taken into account in basic studies. Ethical content was easily transferable to the evaluation of security-relevant research, but its integration was difficult to implement due to the already high density of information in most degree programmes.

In the first panel on good practices, Sebastian Weydner-Volkmann from the Ruhr University Bochum highlighted the dilemma that IT security research often faced. On the one hand, it was essential for the research process and scientific careers to publish recognised IT security vulnerabilities, but on the other hand, this also enabled cyberattacks. Ethics was rarely on the curriculum of IT security training, with compliance issues taking centre stage. Weydner-Volkmann advocated compulsory interdisciplin-

ary seminars on ethics between IT sciences and technology ethics, where students of IT and practical philosophy would be addressed with the help of case studies. Volker Gollnick, Chair of Air Transport Systems and active reserve officer in the German Air Force, who trains engineers in aviation technology at the TU Hamburg, reported on ethical challenges in the teaching of military aviation systems. Linking aircraft with various technologies, in particular high-performance sensors, IT networking and artificial intelligence for purposes such as intercepting foreign missiles, required an intensive ethical debate that he explicitly addressed in his lectures. Alexander Bagattini presented the Academy for Responsible Research, Teaching and Innovation, which aimed to raise awareness of the social and ethical implications of research at KIT. The aim was not so much to teach the content and theories of ethics, but rather to strengthen researchers' ability to reflect. The "ethical literacy" built up in this way could enable independent ethical judgement in practice. Bagattini reported on a workshop on dual-use and biometric data, in which participants would have liked to see more ethical accompanying research. In the panel discussion, it was noted that civil clauses often led to certain research topics that were also relevant for defensive purposes being deemed as taboo. The panel discussed how we would have to learn to live with certain IT security problems and promote the professionalisation of ethics, while recognising that the development of ethical assessment skills is a long process that would have to build on gradually increasing knowledge.

In the second panel on good practices, Siegfried Preiser explained how the Berlin School of Psychology was one of the first universities of applied sciences in Germany to establish a KEF. Preiser used the example of the scientific investigation of recruitment strategies for extremists and social media statements made by later assassins to show that psychological research can also deliver security-relevant results. Students at the School of Psychology already had to deal with ethical issues in the introductory phase of their studies – albeit in the context of general ethics, e.g. in surveys. In the Master's programme, students would prepare ethics reports as part of group work as a simulated ethics committee and learn to approach research ethics issues in a problem-oriented manner. Jens Hartmann from Hochschule Anhalt University of Applied Sciences presented the challenges facing the new generation of engineers. He considers ethics as a necessary companion in a technological society. Since 2016, an engineering ethics module had been offered, which consists of four topics: an introductory discussion, a main section on ethics in the life sciences and engineering, a section on climate change and sustainability, and a final poster presentation. The latter is be organised independently by the students, who address the seminar content in depth and come up with their own solutions or questions. Volker Anders and Cyra Ossenkopp from BAFA presented the BAFA Export Control and Academia Manual and explained which steps and questions would have to be adhered to with regard to export control in academia. This knowledge would also have to be imparted to young academics at an early stage. The numerous case studies from the handbook, some of which Ossenkopp presented, would be suitable for this purpose. In the discussion round, Preiser explained that research into the early detection of potential extremist attackers

through social media analyses was also shared and agreed with security authorities. Hartmann made it clear that the module catalogues in practice-oriented teaching were generally too tightly structured to include ethical aspects throughout.

Finally, moderator Heike Schmoll summarised that there was a clear consensus among those present on the need for mandatory engagement with ethics throughout the entire degree programme. Thematic focussing on one's own subject could promote students' willingness to engage. There was still some catching up to do when it came to designing specific forms of teaching; this should be pluralised, above all through further training for teachers. Best practice examples should be publicly accessible at a low threshold. The development of departmental ethics would have to progress in order to create a sustainable awareness that could also have an impact on students' future careers.

3. The responsibility of science: Which technology could turn out to be the next nuclear bomb?

Film evening, 23 January 2024, Berlin

The Joint Committee organised a film evening followed by a panel discussion at Cinema Paris in Berlin. Christopher Nolan's film *"Oppenheimer"* was shown, which not only dramatically describes the events surrounding the manufacture of the first atomic bomb as part of the Manhattan Project, but also raises fundamental questions about the responsibility of science. In particular, the physicist and head of the project Robert J. Oppenheimer is portrayed as a torn figure who was driven by scientific curiosity to make an atomic bomb, while also being critical of the consequences of the availability of such weapons of mass destruction in a geopolitical context.

Journalist Markus Weißkopf moderated the subsequent panel discussion, which was attended by science historian Alexander Blum, chemist Florian Kraus, and Lars Schaade, a specialist in microbiology and infection epidemiology and President of the Robert Koch Institute. Together, the panellists attempted to transfer the issues of scientific ethics addressed in the film to the present day. Blum began by emphasising that the Manhattan Project was clearly commissioned military research, which took place under different conditions than free academic research. Oppenheimer and some of his colleagues had become important voices in favour of the peaceful use of nuclear fission after the Second World War. Even today, however, researchers are often confronted with the fact that their newly developed knowledge or technologies open up both useful and harmful applications. Schaade explained security-relevant research projects in the field of microbiology, in particular gain-of-function research on pathogens, for which ethical advice should be made available by the research institutions on a mandatory basis. In response to a question from the audience as to whether civilian clauses at universities would not be the better way to control such risks of misuse, Kraus explained that this could also prevent useful peaceful applications of research that had been initially military-oriented. Furthermore, civilian clauses at universities

would not stand in the way of military contract research at other institutions. On the question of the general frequency of security-relevant research of concern, Kraus and Schaade explained that this tends to be the exception in academia and provided a few examples from chemistry and pathogen research.

4. Forum for the Committees for Ethics in Security-Relevant Research

Conference, 5 September 2024, Munich

At the fourth KEF Forum, which the Joint Committee organised in cooperation with the Bundeswehr Institute of Microbiology at the Historisches Kolleg in Munich, KEF members and other contact persons for handling security-relevant research were once again given the opportunity to exchange experiences and discuss the challenges, particularly with regard to the risks of international research cooperation and the civilian clause debate, of their advisory work in a confidential setting.

Joint Committee chair Thomas Lengauer began with an introduction to the topic of security-relevant research and the tasks and objectives of the Joint Committee. He presented the results of the fourth survey of the KEFs and the Joint Committee's proposals for strengthening the KEFs' evaluation skills. The co-chair of the Joint Committee, Britta Siegmund, then presented the DFG's recommendations "Dealing with Risks in International Research Cooperations", which encourage a reflective approach to risks in research activities in the sense of a research culture that responds to geopolitical changes. In the second part of the introduction, Roman Wölfel, Director of the Bundeswehr Institute of Microbiology and member of its KEF, described the tasks of his departmental research facility for protection against infectious diseases in the context of national and international outbreaks and for defence against biological weapons. Every project processed at the institute undergoes a mandatory DURC review and could be advised by the local KEF in case of doubt. A checklist was also available for this purpose. Gain-of-function experiments, for example, were not carried out at the institute.

Five representatives of committees responsible for providing ethical advice on security-relevant research then gave insights into the advisory and structural processes at their institutions. Christoph Rehmann-Sutter presented the preliminary considerations regarding the definition of security and the role of research and technology of the relatively young "Committee for the Ethics of Security-Relevant Research" at the University of Lübeck. The process of clarifying security could itself constitute ethical behaviour. One of the committee's main tasks at present – in addition to discussing initial cases – was to raise awareness in all areas of study concerned. So far, the commission has advised a research project on AI-supported analysis of images from helicopters, which was designed to rescue people in distress, but the results of which could also be misused.

Bernd Eylert from the ethics committee of the TH Wildau presented considerations on analysing genetic patient data using AI against the background of applicable data protection regulations. Using a medical research project as an example, he outlined the risks of misuse that could result from legal loopholes. At the same time, he emphasised the crucial importance of comprehensive patient consent. The German Society of Haematology and Oncology, for which the aforementioned study was conducted, founded a working group on "AI in haematology-oncology" due to the increasing volatility of AI projects.

Ulrike Beisiegel, chairperson of the KEF of the Deutsches Elektronen-Synchrotron (DESY), outlined various topics that the committee dealt with under the title "How political can science be?". Among other things, the KEF advised the DESY executive board on the extent to which the organisation could establish rules for making political statements. The KEF also dealt with security risks posed by international cooperation in large analytical infrastructures at DESY (e.g. in the BMBF-funded WIKOOP-INFRA project). As a consequence of the politically proclaimed "turnaround", the KEF was involved in consultations with the Directorate on the possible further development of DESY's mission statement, in which research had so far served "civil and peaceful purposes". The central question was whether projects with a military connection should be explicitly permitted in future.

Karsten Weber presented the Joint Ethics Committee of the Universities of Applied Sciences of Bavaria (GeHBa), in which 15 universities and one competence centre were represented. In the early days, ethics opinions and advice were primarily given on health and care projects, but now projects from the engineering sciences on automated driving, digitalisation and artificial intelligence were increasingly being brought to the committee. Members of the GeHBa convey the basics of ethics in research through lectures at universities of applied sciences. Due to the Hightech Agenda Bayern and the increase in doctorates at universities of applied sciences, an increased volume of applications to the GeHBa could be expected in the coming years.

Jan-Hendrik Heinrichs explained that security-relevant research projects at Forschungszentrum Jülich were subject to mandatory consultation with the local KEF, with bodies such as the third-party funding department ensuring compliance. The objectives of the researchers or cooperation partners and the respective technology readiness level (TLR) were particularly important for the KEF's evaluation system. He illustrated this with reference to a research project in the field of energy research, in which cooperation was planned with a military partner from a third country. In light of the research centre's peace clause and unclarified publication modalities, a negative advisory vote was issued, as it could not be ruled out that the product could be developed and used primarily for military purposes. The votes of the KEF were communicated to the executive board, which ultimately has to make the final decision in favour of or against such a project.

Michael Lauster, head of the Fraunhofer Institute for Technological Trend Analysis (INT), provided insights into security research in the Fraunhofer Segment for Defense and Security (VVS). Services, technologies and products were developed to industrial

maturity in order to identify potential dangers at an early stage, counteract them and minimise consequential damage. Separating internal and external security was becoming increasingly difficult, e.g. in cyber security. In the meantime, freely available high-end technologies such as commercially available civilian drones were being misused for military or terrorist purposes. Security researchers faced the dilemma of first having to research and understand risks that they want to reduce, even though they may contradict their own ethical ideas. Lauster cited the genetic manipulation of soldiers or the psychological manipulation of the population as examples of this. INT was currently monitoring 50 fields of technology in the context of security research. The executive board of the Fraunhofer-Gesellschaft could convene an ethics committee if ethical advice was required.

To illustrate the challenges of international research cooperation, Anna Lisa Ahlers from the Max Planck Institute for the History of Science presented the Max Planck Society's recommendations for cooperation with China. She explained the context in which the recommendations were drawn up. In the case of China, the currently discussed difficulties of international research cooperation, e.g. with regard to military-linked research, ideas of scientific ethics, political instrumentalisation and censorship, espionage, and one-sided knowledge transfer, were growing against the background of a changing foreign science policy and diffuse empiricism. Scientific organisations such as the MPG now wanted to counter these risks by honing a sense of responsibility, risk mitigation approaches and the partial reorientation of international collaborations. In particular, the MPG recommendations would provide for the bottom-up definition of security-relevant research fields and systematic support in the initiation of collaborations. She concluded by pointing out that in Germany there were often calls for national advisory centres for research cooperation with China, but that it was not yet clear how these could be administratively linked and equipped with the necessary expertise. Ahlers said that the research landscape and policy in China is very dynamic and good advice required a wide range of in-depth knowledge.

In the discussion rounds following each presentation, the extent to which a categorical rejection of cooperation between academic research institutions and the Bundeswehr as a defence army controlled by parliament could still be justified from a peace perspective was discussed. It was debated whether other ethical standards could apply to application-orientated security research in the Fraunhofer-Gesellschaft, much of which was not published. In addition, the assessment framework has shifted significantly in recent years, meaning that civil and peace clauses could now follow a different interpretation. Whether joint KEFs such as the GeHBa could possibly be subject to fewer conflicts of interest than traditional KEFs due to their inter-institutional composition was also discussed. It was also questioned as to what extent commercial providers of research security databases should also be utilised for risk considerations.

In the final discussion, the participants agreed that topics such as the challenges of international research cooperation and research security were an omnipresent issue in the KEFs and their research institutions, also due to the political debates. In some cases, the corresponding requests for advice from the KEFs were also increasing

and responsibilities and evaluation standards now needed to be clarified. People were very grateful for advice and information from the Joint Committee and other sources, as this topic still requires a great deal of discussion.

5. Participation in public debates and other activities on the handling of security-relevant research

Between November 2022 and October 2024, members of the Joint Committee and its office actively participated in the following contributions and other activities relating to the handling of security-relevant research:

04/11/2022:	Publication of the fourth progress report of the Joint Committee and the updated recommendations "Scientific Freedom and Scientific Responsibility – Recommendations for Handling of Security-Relevant Research"
07/11/2022:	Publication of the redesigned, expanded website of the Joint Committee
16/11/2022:	Lecture on ethics in (physical) research at the Alfried Krupp Wissenschaftskolleg Greifswald
27/02/2023:	Participation in the stakeholder workshop "Design of instruments to protect research security and integrity" of the G7 working group "Security and Integrity of the Global Research Ecosystem" (SIGRE), organised by the BMBF
29/03/2023:	Lecture on the responsibility of researchers in the ethical assessment of research consequences at the event "Ethical responsibility in research: How to deal with contract research and research risks" at the Zurich University of Applied Sciences
12/05/2023:	Participation in panel discussion "Export Control in Research and Science" at the BAFA Export Control Day, Berlin
22/05/2023:	Participation in panel discussion at the conference "Security in research cooperation with China", organised by the Deutsches Elektronen-Synchrotron (DESY) and the German Institute for Global and Area Studies (GIGA) in Berlin
24/05/2023:	Organisation of the Leopoldina Lecture "Brain-Computer Interfaces: Will the boundaries between man and machine soon blur?" in cooperation with the Volkswagen Foundation in Hanover
05/06/2023:	Organisation of the conference "Sensitisation and competence building for ethics of security-relevant research (dual use) in teaching – theories, methods, good practices" in Berlin
06/06/2023:	16th meeting of the Joint Committee and external evaluation and consultation of the Joint Committee in Berlin

13/07/2023:	Presentations at the BMBF workshop “Assessment of the German science system on the topic of dual use” in Berlin
18/10/2023:	Participation in panel discussion at the Helmholtz Association workshop “Reliability in international scientific cooperation” in Berlin
08/11/2023:	Presentation at the Erlangen Conference 2023 in Erlangen of the BAFA, the Federal Foreign Office, and the United Nations Office for Disarmament Affairs
10/11/2023:	Lecture on the responsible handling of security-relevant research at the KEF of the TU Braunschweig
15/11/2023:	Lecture at the event series “Dual-Use in international scientific cooperation” of the Competence Centre for International Academic Cooperation (KIWi) (virtual)
07/12/2023:	Participation in the workshop “Multilateral dialogue on principles and values in international research & innovation cooperation – Research Security” of the European Commission (virtual)
11/12/2023:	17th meeting of the Joint Committee (virtual)
13/12/2023:	Fourth survey of contact persons on the handling of security-relevant research
18/12/2023:	Lecture on the responsible handling of security-relevant research at the KEF of the TU Dresden
16/01/2024:	Participation in the CBWNet practice partner workshop at the Institute for Peace Research and Security Policy in Berlin
23/01/2024:	Organisation of the film evening “The responsibility of science: Which technology could turn out to be the next nuclear bomb?” in Berlin
01/02/2024:	Lecture at the Australia Group Intersessional Meeting at the Federal Foreign Office in Berlin
08/03/2024:	Lecture at the workshop “Red Lines in Science” of the Volkswagen Foundation in Hanover
15/03/2024:	Lecture “Prerequisites for cooperation with international research partners” at the KEF of the TU Braunschweig
02/04/2024:	Publication of the article “Difficult impact and risk assessment – self-administration of the sciences and humanities in the area of conflict between freedom of research and research responsibility” in the journal Forschung&Lehre
18/04/2024:	Lecture at the conference “World – Power – Science: Between Cooperation and Competition” organised by the Bündnis90/DIE GRÜNEN parliamentary group in Berlin

24/04/2024:	Participation in the expert workshop on the verification of the BWC at the Federal Foreign Office in Berlin
28/05/2024:	18th meeting of the Joint Committee (virtual)
10/06/2024:	Publication of the article “Applying Ethics in the Handling of Dual Use Research: The Case of Germany” in the journal Research Ethics
20/06/2024:	Lecture at the conference “Framework conditions for successful cooperation with China” organised by BMBF and HRK (virtual)
28/06/2024:	Participation in the conference “Rethinking Arms Control – Artificial Intelligence and Weapons of Mass Destruction” at the Federal Foreign Office in Berlin
05/07/2024:	Participation in the House of Commons debate “What is research allowed to do?” as part of the Long Night of Science at the Leopoldina in Halle
02/09/2024:	Lecture at the symposium “Ethics in Chemistry” at the Ruhr-University Bochum in cooperation with the German Chemical Society
05/09/2024:	Organisation of the fourth KEF Forum in cooperation with the Bundeswehr Institute of Microbiology in Munich
06/09/2024:	19th meeting of the Joint Committee in Munich
18/09/2024:	Moderation of the panel “Is Dual Use the Better Use? Innovation at the interface of civil and military industrial research” at the InnoNation Festival of the Federation of German Industries in Berlin
30/09/2024:	Participation in the CBWNet practice partner workshop at the Institute for Peace Research and Security Policy in Berlin
11/10/2024:	Participation in the kick-off conference “Research Secuity in light of the Zeitenwende” of the BMBF in Berlin

D. Results sheet and prospects for self-regulation in the sciences and humanities

1. Academic freedom put to the test

Academic freedom enjoys constitutional protection in Germany and thus enables researchers to exchange ideas with each other as freely as possible within the framework of the legal possibilities and to work on scientific issues independently. Academic freedom, which includes both teaching and research, is considered to be an essential basis for progress, serves to increase knowledge, and thus promotes the health, prosperity and security of people as well as the protection of the environment. However, academic freedom is not unconditional and must be regularly renegotiated against the backdrop of changing framework conditions and other protective interests. The question arises again and again as to how much knowledge and assessment skills researchers and teachers or their research institutions should have in order to do justice to the protection interests of other rights such as human dignity, health, property, the environment or peaceful coexistence in their actions. While the assessment of unknown future chains of action and the associated ethical evaluation of security-relevant risks is challenging, the same also applies to assessing the consequences of not conducting research and the free exchange of knowledge.

Challenges such as the coronavirus pandemic, the Russian war of aggression on Ukraine, far-reaching technological changes (Chapter A 2.3), and a feared global shift in power towards autocratic political systems (Chapters A 1.1 and A 1.3) are also leading to a fundamental change in the science system and increasing public scrutiny of the purpose of research. This is associated with major challenges for researchers in Germany, their research institutions and research funding organisations (Chapter A 5). On the one hand, various countries with divergent values and political principles, such as Russia and China in particular, are conducting cutting-edge research in many scientific fields in which both sides can benefit from free exchange and cooperation. On the other hand, there is growing political pressure to stop cooperating with these countries, oronly cooperate to a limited extent, in order to secure strategic competitive advantages and one's own research integrity, avoid dependencies and not indirectly support developments abroad that are questionable from a Western perspective. Researchers are thus presented with the challenging task of focussing not only on their own curiosity and progress-driven perspective, but also on geopolitical and human rights aspects, for example, and playing a role in safeguarding national security (Chapter A 3). This naturally raises the question of how many resources researchers and research funding organisations can devote to these balancing processes beyond their core competence, where researchers' personal responsibility for their work ends, and where the responsibility of political decision-makers begins.

There still appears to be a consensus that international research cooperation and the largely free publication of research results and methods are an integral part of cutting-edge science and, on balance, harbour more benefits than risks. The borderline areas in which restrictions would be justified on the basis of the above-mentioned considerations must now be clearly defined, and ideas for streamlined bureaucratic measures are needed. The numerous initiatives and regulatory measures to safeguard

research security and research integrity (Chapters A 1.2 and A 1.3), some of which have been taken unilaterally by governments in Europe and North America, can contribute to greater certainty of action and thus to relieving the burden on researchers in this area of tension. However, they also have the challenging task of maintaining a balance between containing realistic security-relevant risks and freely acquiring knowledge for the benefit of people and the environment. In the coming years, assessment processes that have been initiated or planned will have to prove themselves in day-to-day research and, if necessary, be adapted in coordination with the scientific community depending on development and requirements, so that research work and cooperation are not made disproportionately difficult. Another prerequisite for researchers' comprehensive compliance is that the measures are always designed and justified in a comprehensible manner.

2. KEFs as instruments of scientific self-regulation and the associated challenges

The need for risk-benefit assessments and corresponding advisory procedures on ethical aspects of security-relevant research projects with the aim of limiting the risks of misuse is steadily increasing, and not only due to the conditions being increasingly attached to research funding (Chapter A 5). Even though the majority of academic research institutions in Germany are now supported by KEFs or comparable bodies in an advisory capacity, the Joint Committee's surveys have shown that expansion is still required in terms of the sensitisation of researchers and students to security-relevant ethical aspects of research as well as the institution-wide visibility of the advisory structures that have been created (Chapters B 3 and C 2).

Such cases can only be evaluated in the KEFs as part of a risk-benefit assessment from an ethical perspective and risks efficiently limited if researchers and other employees involved in research are aware of the possible risks of their potentially security-relevant work (Chapter A 2), are aware of the KEF responsible for them, and are open to advice. Of course, this is also often an individual weighing-up process for researchers between the importance of responsible ethical behaviour and the speed naturally required in scientific competition. This is where the KEFs are called upon to draw attention to security-relevant research topics and the added value and practicability of the advisory procedures through regular events and other information materials. It should be communicated that, in addition to excellence, compliance with ethical standards is also a quality feature of research.

The Joint Committee's current survey of the KEFs suggests that the procedures generally take between one week and three months (Chapter B 3). However, several consultations with KEF members have shown that they often reach their limits due to numerous other research and teaching commitments, especially when complex research fields and relevant political backgrounds require extensive familiarisation with the respective subject matter. In some cases, KEF members can be relieved of some of their workload by means of sustained personnel support for the committee, e.g. by

taking on the registration of applications, coordinating appointments, taking minutes of meetings, and preparing reports. However, the necessary resources are rarely available, especially in universities and smaller research institutions. The same applies to the lack of visibility of the KEFs through a professional website. It is often difficult to find the committees with a web search or there is insufficient information about their responsibilities and working methods on the website if it exists. As already noted in the Joint Committee's previous surveys, there is still a lack of continuity in some of the KEF's work and a lack of sustained development of evaluation expertise, particularly when responsibilities change at the research institutions, such as the Vice-Presidency for research and teaching, which is often linked to the function of contact person for security-relevant research (Chapter B 3) and the chairmanship of the respective KEF. In addition to well-thought-out and consistently followed statutes, professional training programmes for new KEF members are also required here.

As described in Chapters B 3 and B 4 and in previous Joint Committee reports[118], the range of topics relating to security-relevant research is broad and, in addition to ethical aspects of security-relevant research, the KEFs sometimes also deal with issues relating to data protection, export controls, the compatibility of projects with the basic regulations and guidelines of the respective research institution, which also include the civil and sustainability clauses, or they are tasked with ensuring compliance with the DFG Guidelines for Safeguarding Good Research Practice. In addition, numerous institutions have expanded the mandate of their existing research or ethics committees to include the area of security-relevant research.

The changes in the scientific system outlined in Chapter A 1.1 and Chapter D 1 will also have an impact on the work of the KEFs, as the transfer of research results and methods in the context of international cooperation and international teaching is increasingly being categorised as security-relevant with regard to "difficult" partner countries such as China (Chapter A 1.3), especially in sensitive high-tech areas such as biotechnology or artificial intelligence (Chapter A 1.2). Here, the KEFs are often cited as suitable assessment bodies due to the lack of alternative contact points for researchers in matters of research security (Chapters A 3.1 and A 3.2), without questioning whether they are even capable of dealing with such complex geopolitical balancing processes, which, for example, also involve a precise understanding of the respective foreign science system, including political influence. In future, the skills of the KEFs in such cases may lie more in carrying out an initial investigation of the cases and referring them to the relevant authorities (e.g. compliance offices, DAAD, BAFA and BMBF) and suitable information platforms (Chapter A 1.3).

Furthermore, the plans in the EU, and in some cases the German Bundestag, to blur the boundaries between civilian and defence research in order to expand dual-use research and thus achieve more synergy effects (Chapters A 3.2 and A 5) will pose further challenges for the KEFs and their research institutions. In addition to general se-

118 See www.security-relevant-research.org/tag/progress-reports/ (last accessed: 25 September 2024).

curity-relevant ethical aspects, it will also be necessary to examine the extent to which the increasing number of security-relevant research projects and collaborations to be expected in the academic sector are in line with the numerous civil clauses (Chapters A 3.2 and A 4) in state university laws, basic regulations and guidelines of the respective research institutions and their autonomy.

3. Achievements and future tasks of the Joint Committee

Over the past nine years, the Joint Committee has established itself as the German scientific system's central point of contact for ethical issues relating to security-relevant research. The Presidiums of the Leopoldina and the DFG have therefore extended the Joint Committee's mandate for the fourth time until 31 March 2030, but have also taken account of new developments relating to the topic of risks in international research cooperation (Chapter A) by strategically reappointing the Joint Committee and updating the mandate (Chapter B 2). According to the mandate, the committee should continue to support the German research institutions in implementing the joint "Recommendations for Handling of Security-Relevant Research" (2022) with the aim of sustainably strengthening the self-regulation of the scientific community in dealing with potential risks in research. This particularly applies to the work of the more than 120 KEFs now operating across Germany, which have frequently adapted the templates provided by the Joint Committee, such as the model statutes (Chapter B 2) and key questions for the ethical evaluation of security-relevant research (Chapter B 4). The encouragement of the Joint Committee's work among non-university research organisations is reflected in the second extension of the cooperation agreement between the Fraunhofer-Gesellschaft, the Helmholtz Association, the Leibniz Association, the Max Planck Society, the DFG, and the Leopoldina to support the Joint Committee office.

In its fourth term of office, the Joint Committee will continue to monitor the implementation of the above recommendations by means of research and surveys (Chapters B 3 and B 4.1) and encourage other research institutions to establish KEFs, particularly universities of applied sciences, which to date have hardly had any KEFs or comparable bodies available to them (see also Appendix 2). It will also support the KEFs in further professionalising and consolidating themselves and in gaining visibility and acceptance (Chapter D 2). To this end, the DFG has commissioned a report in which a systematic overview of best practices and one or more model rules of procedure are to be developed by analysing the existing organisational forms of the KEFs and conducting interviews with KEF members.

Through its regular topic-specific events, the Joint Committee will continue to raise awareness of security-relevant fields of research such as brain-computer interfaces (Chapter C 1), generative artificial intelligence (Chapter A 2.3), and pathogen research (Chapter A 2.2). With the help of the KEF forums (Chapter C 4), it will also offer a platform for the pooled exchange of experience in order to further increase the assessment skills of the KEFs. Experiences from the KEFs' advisory practice and other relevant information materials from Germany and abroad will also be collected, processed and

made transparent by the Joint Committee as a knowledge repository, e.g. on its constantly growing website (Chapter B 2), the reports and other publications, such as the updated information brochure.[119] The Joint Committee will also examine the extent to which it can promote the implementation of its recommendations on the integration of security-relevant ethical aspects in research and teaching (Chapter B 5).

The Joint Committee will provide the KEFs with the best possible advice on the challenging task of sorting through the numerous, in some cases new, subject areas (Chapters A 1, D 1 and D 2) relating to security-relevant research, especially if they are unable to reach a decision independently on particularly controversial security-relevant research projects. In such cases, the Joint Committee can provide suitable expertise for advice or organise regional exchange forums for the KEFs. In accordance with the mandate of the Joint Committee (Chapter B 2), for topics of overarching relevance, the intention is to recommend to the Leopoldina Presidium that an ad-hoc working group be set up which, in close dialogue with the Joint Committee, can issue a statement with recommendations on how to proceed following a detailed risk-benefit analysis. Here too, the Joint Committee will carefully examine new security-relevant fields of research with regard to the need for such action and advise the Presidiums of the DFG and the Leopoldina as required.

The changes in the scientific system and the public focus on research security outlined in Chapters A 1 and D 1 are the subject of intense discussion in the Joint Committee with regard how it sees itself and both the possibilities and limits, and of the responsibilities of the Joint Committee and the KEFs. The Joint Committee will continue contributing to the debates on research security if these are closely related to security-relevant research of concern. It will examine how the KEFs can fulfil their tasks.

Against this background and the impetus provided by the external experts as part of the consultation process (Chapter B 2) and the fourth KEF Forum (Chapter C 4), the Joint Committee will discuss not only its thematic focus but also the need to revise its guiding questions on the ethical evaluation of security-relevant research (Chapter B 4.2) and its definition of security-relevant research of concern (Chapter A 2). It will also examine if it can offer concrete strategies for minimising risks, for example in the form of a further handout. The Joint Committee's exchange with other national and international partners (Chapter C 5) such as the Alliance of German Science Organisations, the Robert Koch Institute, the Federal Foreign Office, the Federal Office of Economics and Export Control, the Federal Ministry of Education and Research, professional societies, industry associations, the European Commission, the United Nations and the WHO should be continued and strengthened.[120] The Joint Committee will work to ensure that any new regulations on research security are complied with, but it will also counteract any potentially disproportionate restriction of scientific freedom.

119 Available at: www.security-relevant-research.org/publication-informationbrochure2022/ (last accessed: 25 September 2024).

120 For further activities of the Joint Committee with partner organisations in recent years, see also previous progress reports, available at: www.security-relevant-research.org/tag/progress-reports/ (last accessed: 25 September 2024).

Appendix

1. Case studies to illustrate security-related research of concern

Case study 1: Production of synthetic, infectious smallpox viruses – an instruction manual for manufacturing bioweapons?

A research group intends to produce infectious horsepox viruses by introducing a synthetically constructed horsepox genome into cells infected with an innocuous rabbit virus. The innovative value of this project is primarily the realisation of a complex technical process of synthesis, as the theoretical feasibility of this kind of experiment has long been accepted. The researchers argue new vaccines could then be developed using this procedure. The main risks of the project are that the technology could be used to produce human pathogenic smallpox viruses, which could be misused as a bioweapon (biosecurity) or spread to the population through negligent behaviour (biosafety). The human smallpox virus has been eradicated since the 1980s and good vaccines have long been available. However, as the project requires an extremely high level of technological expertise, the experiment cannot be simply and readily copied.

Noyce, R. et al. (2018). Construction of an infectious horsepox virus vaccine from chemically synthesized DNA fragments. *PLoS One, 13*(1), article e0188453.

Case study 2: Exploring radicalisation pathways – recruitment aid for terrorist groups?

The study investigates the connection between the consumption of extremist (Islamist) material on the internet by young people and associated radicalisation. Previous research has already shown the importance of the internet for the spread of radicalising material. This study also examines which characteristics make target persons particularly susceptible in this respect and which channels and media are especially effective. For example, it found that although video footage of beheadings is the most popular among young people, it has a low potential for radicalisation. In contrast, while online magazines of the so-called Islamic State and Al-Qaeda are only sought out by very few, they have the greatest cognitive effect. The aim is to gain insights for deradicalisation strategies. At the same time, the results could be incorporated into more effective recruitment methods for extremist and terrorist groups.

Frissen, T. (2021). Internet, the great radicalizer? Exploring relationships between seeking for online extremist materials and cognitive radicalization in young adults. *Computers in Human Behavior, 114*, article 106549.

Case study 3: Improving brain-computer interfaces – a tool for reading passwords?

The aim of the research projects is to use electroencephalography to identify regions of the brain that are responsible for motor commands and the storage and reproduction of numbers, images and geodata, and to extract such data. This could, for example, enable physically impaired people to interact better with machines, carry out banking transactions without manual input, or communicate with other people. The reliability of the extracted data is constantly improving. However, sensitive information such as passwords could in future be extracted in this way using specific stimuli and people could even be improperly influenced.

Bernal, S. et al. (2023). Eight reasons to prioritize braincomputer interface cybersecurity. *Communications of the ACM, 66*(4), 68–78.

Case study 4: Predicting sexual orientation based on portrait photos – unlawful acquisition of sensitive personal data?

The research project aims to further develop a deep learning algorithm to recognise patterns in portrait photos. The algorithm is trained with photos of openly homosexual and heterosexual individuals so that it can predict sexual orientation when analysing further portraits. The researchers see a benefit in finding out how deep learning algorithms connect data and which reference points they select for predictions. The findings should also further our understanding of the physiological origins of people's sexual orientation and the limits of human perception. The risk of misuse lies in the possible illegal acquisition of sensitive personal data based on the biometrics of individuals, for example in countries where homosexuality is a criminal offence. Sophisticated deep learning algorithms of this kind could also be used to categorise people in terms of their consumer, voting or criminal behaviour.

Wang, Y. & Kosinski, M. (2018). Deep neural networks are more accurate than humans at detecting sexual orientation from facial images. *Journal of personality and social psychology, 114*(2), 246.

Case study 5: AI methods for detecting and eliminating software vulnerabilities – assistance for criminal hackers?

The research project involves using AI methods to systematically identify vulnerabilities in computer programs, particularly in the operating systems of Wi-Fi routers, smartphones and laptops, and to then develop automated defence measures. The results of this research project would be useful wherever computer programs need to be monitored and regularly updated. At the same time, however, the results also make it possible to identify and exploit these vulnerabilities in numerous devices that are not subject to regular monitoring and updates. The WannaLaugh ransomware is worth mentioning in this context. It is constantly updated with new vulnerabilities and used to blackmail users of vulnerable IT devices. The results of the research project could undoubtedly be used to make WannaLaugh even more damaging.

Brundage, M., Avin, S., & Clark, J. (2018). *The malicious use of artificial intelligence: forecasting, prevention, and mitigation.* Future of Humanity Institute, University of Oxford, Centre for the Study of Existential Risk, University of Cambridge. Center for a New American Security, Electronic Frontier Foundation, Open AI.

Case study 6: AI for predicting harmful interactions of new active substances – a tool for the efficient design of chemical warfare agents?

In order to draw attention to potential risks of misuse of AI systems, researchers are changing the settings of software normally used for the virtual toxicity testing of drug candidates for drug development so that the software specifically searches for particularly toxic molecules. In this way, they can identify thousands of substances within a few hours, most of which were previously unknown, possibly highly toxic and potentially suitable for weaponisation. Even if this suitability still has to be proven for most of the substances through synthesis, stability testing and their systemic effect in the organism, this shows the risks that can also be posed by AI systems designed for medical use. At the same time, pointing out such potential for misuse could also lead to actors with harmful intentions becoming aware of such strategies in the first place.

Urbina, F., Lentzos, F., Invernizzi, C., & Ekins Sean (2022). Dual use of artificial-intelligence-powered drug discovery. *Nat Mach Intell, 4*, 189–191. https://doi.org/10.1038/s42256-022-00465-9; Jakob, U., Krämer, F, Lengauer, T, Kraus, F. (2024). Applying Ethics in the Handling of Dual Use Research: The Case of Germany. *Research Ethics, 0*(0). https://doi.org/10.1177/17470161241261044.

Case study 7: Gain-of-function experiments on avian influenza viruses – basis for new bioweapons or unintended pandemic outbreaks?

Two research groups identify five genetic changes that are necessary for highly pathogenic H5N1 influenza viruses (known as avian influenza viruses) to become airborne transmissible between mammals. The researchers see the significance of their work in being able to better predict how these viruses can gradually develop into a threat to humans. This would make it much easier to categorise the pandemic potential of new virus variants that regularly emerge in nature and to take more targeted protective measures, e.g. to break chains of infection at an early stage or to develop specific vaccines. Concerns about such work include the fact that the viruses produced could be unintentionally released into the environment through negligent behaviour and trigger a serious wave of infection. Furthermore, the new knowledge about the pathogens could be misused specifically for the production of biological weapons.

Herfst, S. et al. (2012). Airborne transmission of influenza A/H5N1 virus between ferrets. *Science 336*(6088), 1534–1541; Imai M. et al. (2012). Experimental adaptation of an influenza H5 HA confers respiratory droplet transmission to a reassortant H5 HA/H1N1 virus in ferrets. *Nature 486*(7403), 420–428.

2. Overview list of contact persons and committees responsible for the ethics in security-relevant research

The following overview list, sorted by location, is based on the information provided by the contact persons (as of 11/03/2025). The current list is available at: www.security-relevant-research.org/contactpersons/.

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
RWTH Aachen	Fakultätsübergreifende Ethikkommission	Univ.-Prof. Dr.-Ing. Verena Nitsch	Aachen	22.11.2023
Ostbayerische Technische Hochschule Amberg-Weiden	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Amberg-Weiden	25.10.2022
Hochschule Ansbach	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Ansbach	25.10.2022
Technische Hochschule Aschaffenburg	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Aschaffenburg	25.10.2022
Universität Augsburg	Ethikkommission	Prof. Dr. Elisabeth André	Augsburg	15.11.2024
Hochschule Augsburg	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Augsburg	25.10.2022
Otto-Friedrich-Universität Bamberg	Bestehende Ethikkommission wurde um den Aufgabenbereich einer KEF erweitert	Prof. Dr. Thomas Weißer (Laubach)	Bamberg	26.10.2022
Universität Bayreuth	Ethikkommission	Prof. Dr. Kai Purnhagen	Bayreuth	05.03.2024
Freie Universität Berlin	Kommission für Ethik sicherheitsrelevanter Forschung (gemeinschaftlich mit der Charité – Universitätsmedizin Berlin und der HU Berlin)	Prof. Dr. Susanne Michl	Berlin	04.03.2024
Charité – Universitätsmedizin Berlin	Kommission für Ethik sicherheitsrelevanter Forschung gemeinschaftlich mit der FU Berlin und der HU Berlin	Frau Prof. Dr. Susanne Michl	Berlin	04.03.2024
Humboldt-Universität zu Berlin	Kommission für Ethik sicherheitsrelevanter Forschung (gemeinsam mit der Charité und der FU Berlin)	Prof. Dr. Christoph Schneider	Berlin	04.03.2024

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
Akkon-Hochschule für Humanwissenschaften	Die Etablierung einer Kommission wird diskutiert.	N.N.	Berlin	13.12.2023
Berlin-Brandenburgische Akademie der Wissenschaften	Kommission vorerst nicht geplant	Dr. Jörg Brauns	Berlin	03.01.2023
Technische Universität Berlin	Kommission zur Ethik in der Forschung (KEF)	Prof. Dr.-Ing. Stephan Völker	Berlin	25.10.2022
Max-Planck-Gesellschaft zur Förderung der Wissenschaften e. V.	KEF, zuständig für alle Max-Planck-Institute	Thomas Dantes	Berlin	12.08.2024
Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz	Leibniz-Kommission für Ethik der Forschung	Dr. Luzia Goldmann	Berlin	25.10.2022
Nationale Akademie der Wissenschaften Leopoldina	Gemeinsamer Ausschuss zum Umgang mit Sicherheitsrelevanter Forschung	Dr. Johannes Fritsch	Berlin	25.10.2022
Stiftung Preußischer Kulturbesitz	KEF nicht geplant	Prof. Dr. Stefan Simon	Berlin	25.10.2022
Max-Delbrück-Centrum für molekulare Medizin	KEF wird diskutiert	N.N.	Berlin	26.10.2022
Deutsche Hochschule für Gesundheit und Sport	Ethikkommission	Frau Prof. Dr. med. Meike Hoffmeister	Berlin	26.10.2022
Bundesinstitut für Risikobewertung	Kommission vorerst nicht geplant. Fragen zu sicherheitsrelevanter Forschung werden in Fachgruppenbesprechungen adressiert.	Dr. Martin Richter	Berlin	26.10.2022
Robert Koch-Institut	Bei Bedarf Ad-hoc-Kommission	Dr. Iris Hunger	Berlin	26.10.2022

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
Weierstraß-Institut für Angewandte Analysis und Stochastik	Kommission für Ethik sicherheitsrelevanter Forschung	Dr. Andreas Rathsfeld	Berlin	26.10.2022
Helmholtz-Zentrum Berlin für Materialien und Energie GmbH	Bei Bedarf wird eine Ad-hoc-Kommission eingesetzt.	Dr. Ralf Feyerherm	Berlin	26.10.2022
Deutsches Archäologisches Institut	Vorerst keine Ethikkommission angedacht.	Prof. Dr. Friedrike Fless	Berlin	26.10.2022
Psychologische Hochschule Berlin (PHB)	Kommission für Ethik sicherheitsrelevanter Forschung KEF	Prof. Dr. Siegfried Preiser	Berlin	26.10.2022
Hochschule für Wirtschaft und Recht Berlin	Eine KEF ist vorerst nicht geplant.	Dr. Bettina Biedermann	Berlin	26.10.2022
Gesellschaft für Informatik	Noch nicht zugeordnet, wird ergänzt.	Stefan Ullrich	Berlin	26.10.2022
Universität Bielefeld	Kommission für Forschung und wiss. Nachwuchs	Prof. Dr. Christiane Fuchs	Bielefeld	06.03.2024
Ruhr-Universität Bochum	Kommission wird diskutiert.	Prof. Dr.-Ing. Günther Meschke	Bochum	01.08.2024
Technische Hochschule Georg Agricola	nicht vorhanden	Prof. Dr. Michael Prange	Bochum	26.10.2022
Rheinische Friedrich-Wilhelms-Universität Bonn	Kommission zur Beratung sicherheitsrelevanter Forschung mit erheblichen Gefährdungspotential	Dr. Ines Heuer	Bonn	26.10.2022
Deutsche Gesellschaft für Biophysik e. V.	Kommission ist vorerst nicht angedacht.	Prof. Dr. Thomas Gutsmann	Borstel	26.10.2022
Forschungszentrum Borstel, Leibniz Lungenzentrum	Die Einrichtung einer institutsübergreifenden KEF mit zwei weiteren regionalen Leibniz-Instituten (HPI und BNTM) erfolgte am 07.12.17.	Prof. Dr. rer. nat. Ulrich Schaible	Borstel	26.10.2022

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
Technische Hochschule Brandenburg	Ethikkommission	Prof. Dr.-Ing. Sören Hirsch	Brandenburg an der Havel	25.10.2022
Helmholtz-Zentrum für Infektionsforschung GmbH	Kommission für Ethik sicherheitsrelevanter Forschung ist etabliert.	Prof. Dr. Josef Penninger	Braunschweig	01.08.2024
Julius-Kühn-Institut (JKI), Bundesforschungsinstitut für Kulturpflanzen	in Aufbau	Dr. Andreas Willems	Braunschweig	26.10.2022
Leibniz-Institut DSMZ-Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH	Beauftragte für Ethik sicherheitsrelevanter Forschung	Prof. Dr. Jörg Overmann	Braunschweig	26.10.2022
Physikalisch-Technische Bundesanstalt	Kommission zur Bewertung sicherheitsrelevanter Forschung (und Dienstleistungen)	Barbara Tafel	Braunschweig	07.01.2025
TU Braunschweig	Ethikkommission im Sinne einer KEF etabliert	Prof. Dr. Peter Hecker	Braunschweig	26.10.2022
Leibniz-Institut für Präventionsforschung und Epidemiologie – BIPS GmbH	Kommission zur ethischen Beurteilung sicherheitsrelevanter Forschung ist etabliert.	Alexander Knaust	Bremen	11.01.2023
Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung	Risk Assessment Committee (RAC)	Dr. Klaus Grosfeld	Bremerhaven	26.10.2022
Technische Universität Chemnitz	Kommission für Forschung und Förderung des wissenschaftlichen Nachwuchses	Prof. Dr. Anja Strobel	Chemnitz	09.06.2023
Technische Universität Clausthal	Kommission für Verantwortung der Wissenschaft und gute wissenschaftliche Praxis	Prof. Dr. Diethelm Johannsmann	Clausthal-Zellerfeld	19.07.2024
BTU Cottbus-Senftenberg	Ethikkommission der BTU	Prof. Dr. Carsten Hartmann	Cottbus	01.08.2024

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
TU Darmstadt	Ethikkommission	Prof. Dr. Ulrich Brinkmann	Darmstadt	28.02.2023
GSI Helmholtz-zentrum für Schwerionen-forschung GmbH	Ad-Hoc Verfahren in Verdachtsfällen	Dr. Karin Füssel	Darmstadt	26.10.2022
Technische Hochschule Deggendorf	Gemeinsame Ethikkommis-sion der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Deggendorf	28.10.2022
Technische Universität Dortmund	Kommission wird diskutiert.	Prof. Dr.-Ing. Gabriele Sadowski	Dortmund	26.10.2022
Technische Universität Dresden	Kommission für Verantwor-tung in der Wissenschaft	Prof. Dr. Angela Rösen-Wolff	Dresden	05.12.2023
Heinrich-Heine-Universität Düsseldorf	Kommission zum Umgang mit sicherheitsrelevanter Forschung (KSF)	Prof. Dr. Dr. Andrea Icks	Düsseldorf	25.10.2022
Universität Duisburg-Essen	Kommission wird diskutiert.	Dr. Anke Hellwig	Essen	03.11.2022
Hochschule Esslingen	Ethikbeauftragte/r	Prof. Dr. Gabriele Gühring	Esslingen	01.08.2024
Europa-Universität Viadrina	Ethikkommission	Prof. Dr. Jan-Hendrik Passoth	Frankfurt (Oder)	12.08.2024
PRIF – Leibniz-Institut für Friedens- und Konflikt-forschung	Bei Bedarf Ad-hoc-Kommission	Dr. Una Jakob	Frankfurt am Main	01.08.2024
Johann Wolf-gang Goethe-Universität	Die Universität hat eine Zivil-klausel, die Eingang in die Grundordnung gefunden hat. Eine KEF gibt es derzeit nicht.	N.N.	Frankfurt am Main	01.08.2024
Georg-Speyer-Haus	Beauftragter für biologische Sicherheit; bei Bedarf Ad-hoc-Kommission	Dr. Stefan Stein	Frankfurt am Main	26.10.2022

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
Deutsche Industrievereinigung Biotechnologie im VCI e. V.	Vorstand der Deutschen Industrievereinigung Biotechnologie	Dr. Ricardo Gent	Frankfurt am Main	26.10.2022
Gesellschaft Deutscher Chemiker e. V.	"Ehrengericht"	Dr. Hans-Georg Weinig	Frankfurt am Main	11.11.2022
Dechema Forschungsinstitut (DFI)	Bei Bedarf Ad-hoc-Kommission	PD Dr.-Ing. Mathias Galetz	Frankfurt am Main	26.10.2022
TU Bergakademie Freiberg	Kommission für Verantwortung in der Forschung	Prof. Dr. Tobias Frieback	Freiberg	04.03.2024
Albert-Ludwigs-Universität Freiburg	Kommission für Verantwortung in der Forschung	Prof. Dr. Silja Vöneky	Freiburg	04.03.2024
Leibniz-Institut für Lebensmittel-Systembiologie an der Technischen Universität München	Ethikkommission der Fakultät für Medizin der Technischen Universität München	Dr. Dietmar Krautwurst	Freising	19.07.2024
Helmholtz-Zentrum Geesthacht, Zentrum für Material- und Küstenforschung GmbH	KEF	Dr. Iris Ulrich	Geesthacht	25.10.2022
Justus-Liebig-Universität Gießen	Ständige Kommission zu sicherheitsrelevanter Forschung	Dr. Gunther Gerlach	Gießen	25.10.2022
Georg-August-Universität Göttingen	Ethikkommission der Universität	Prof. Dr. Andreas Baur	Göttingen	01.08.2024
Deutsches Primatenzentrum GmbH – Leibniz-Institut für Primatenforschung	KEF	Prof. Dr. Stefan Pöhlmann	Göttingen	26.10.2022
Universität Greifswald	KEF-Satzung ab 01. August 2017 in Kraft	Prof. Dr. Micha H. Werner	Greifswald	26.10.2022
Friedrich-Loeffler-Institut (FLI)	Biorisk Ausschuss (IBC, Institutional Biorisk Committee)	Prof. Dr. Jens Peter Teifke	Greifswald	26.10.2022

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
Leibniz-Institut für Gemüse und Zierpflanzenbau	Bei Bedarf Ad-hoc-Kommission	Prof. Dr. Philipp Franken	Großbeeren	26.10.2022
FernUniversität in Hagen	Ständiger Beauftragter und Ad-hoc-Kommission bei Bedarf	Prof. Dr. Christian Beecks	Hagen	12.08.2024
Martin-Luther-Universität Halle-Wittenberg	Kommission für ethische Fragen in der Wissenschaft	Prof. Dr. Philipp Schreck	Halle	15.03.2024
Bernhard-Nocht-Institut für Tropenmedizin	Leibniz Centre of Infection – KEF aus BNITM, HPI, FZB	Prof. Dr. Stephan Günther	Hamburg	11.11.2022
Deutsches Elektronen-Synchrotron DESY	DESY-Kommission für Ethik in der Forschung	Prof. Dr. Dr. hc. Ulrike Beisiegel	Hamburg	25.10.2022
Technische Universität Hamburg-Harburg	Akademischer Senat und Studiendekanatsausschüsse	Prof. Dr. Andreas Timm-Giel	Hamburg	26.10.2022
Leibniz-Institut für Virologie	Leibniz Centre of Infection – KEF aus BNITM, HPI, FZB	Prof. Dr. Gülsah Gabriel	Hamburg	14.11.2022
Universität Hamburg	Kommission für Ethik sicherheitsrelevanter Forschung wird diskutiert.	Dr. Harald Schlüter	Hamburg	03.11.2022
Hochschule Hamm-Lippstadt	KEF wird diskutiert.	Prof. Dr. Klaus Pantke	Hamm	04.01.2023
Hochschule für Musik, Theater und Medien Hannover	Ständige Senatskommission für Ethikfragen	Prof. Dr. Eva Baumann	Hannover	27.03.2023
Stiftung Tierärztliche Hochschule Hannover	Kommission für Forschungsethik	Prof. Dr. Peter Kunzmann	Hannover	26.10.2022
Medizinische Hochschule Hannover	Senatskommission für Forschungsethik	Dr. Jens Bohne	Hannover	26.10.2022

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
Gottfried Wilhelm Leibniz Universität Hannover	Kommission für Verantwortung in der Forschung der Gottfried Wilhelm Leibniz Universität Hannover	Prof. Dr. Dietmar Hübner	Hannover	26.10.2022
Ruprecht-Karls-Universität Heidelberg	Kommission "Verantwortung in der Wissenschaft"	Prof. Dr. Andreas Dreuw	Heidelberg	12.08.2024
Deutsches Krebsforschungszentrum	Ausschuss für Biologische Sicherheit	Dr. Timo Kehl	Heidelberg	26.10.2022
Hochschule Heilbronn	Erweiterung der Ethikkommission wird diskutiert.	Prof. Dr. Alexandra Reichenbach	Heilbronn	03.11.2022
Hochschule Hof	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Hof	28.10.2022
Technische Universität Ilmenau	Forschungsausschuss der TU Ilmenau	Prof. Dr. Stefan Sinzinger	Ilmenau	25.10.2022
Technische Hochschule Ingolstadt	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Ingolstadt	28.10.2022
Friedrich-Schiller-Universität Jena	Kommission für sicherheits- und umweltrelevante Forschung	Prof. Dr. Thomas Pertsch	Jena	23.01.2025
Forschungszentrum Jülich GmbH	KEF	Prof. Dr. Bert Heinrichs	Jülich	24.02.2023
Technische Universität Kaiserslautern	Ombudsgremium für Ethik sicherheitsrelevanter Forschung (OEF)	Prof. Dr. Werner Thiel	Kaiserslautern	25.10.2022
Duale Hochschule Baden-Württemberg	Kommission zur Exportkontrolle	Prof. Dr. iur. Darius O. Schindler	Karlsruhe	01.08.2023
Karlsruher Institut für Technologie	Ethikkommission	Prof. Dr. Peter Nick	Karlsruhe	26.10.2022
Universität Kassel	Zentrale Ethikkommission	Prof. Dr. Gerrit Hornung	Kassel	26.10.2022

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
Hochschule Kempten	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Kempten	28.10.2022
GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel	Kommission wird diskutiert.	Daniela Schmitt	Kiel	09.06.2023
Fachhochschule Kiel	Ethikkommission	Herr Prof. Dr. Thomas Rinder	Kiel	25.10.2022
Christian-Albrechts-Universität zu Kiel	Ethikkommission im Sinne einer KEF wird diskutiert.	Prof. Dr. Anja Pistor-Hatam	Kiel	03.11.2022
Hochschule Koblenz	Kommission zur Sicherstellung ethischer Grundsätze und guter wissenschaftlicher Praxis	Prof. Dr. Holger J. Schmidt	Koblenz	10.12.2024
Universität Koblenz	Kommission für Ethik und doppelverwendungsfähige Forschung	Brigitte Braun	Koblenz	26.02.2025
Universität zu Köln	Kommission zur Begutachtung sicherheitsrelevanter Forschung mit erheblichem Gefährdungspotential (FEG)	Prof. Dr. Claus Cursiefen	Köln	10.12.2024
TH Köln	Kommission zur Verantwortung in der Wissenschaft (KVW)	Frau Prof. Dr. Dagmar Brosey	Köln	25.10.2022
Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR)	Mögliche Kommission wird derzeit diskutiert.	Dr. Dirk Zimper	Köln	03.11.2022
Universität Konstanz	Kommission für Verantwortung in der Forschung	Prof. Dr. Thomas Müller	Konstanz	01.08.2024
Hochschule Landshut	Geschäftsstelle GEHBa	Herr Dr. Martin Schmieder	Landshut	26.10.2022
Paul-Ehrlich-Institut – Bundesinstitut für Impfstoffe und biomedizinische Arzneimittel	Ad-hoc-Kommission für Ethikfragen im Bereich sicherheitsrelevanter Forschung	PD Dr. Stephan Steckelbroeck	Langen	25.10.2022

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
Universität Leipzig	Ethikrat	Prof. Dr. Anne Deiglmayr	Leipzig	12.08.2024
Universität zu Lübeck	Kommission für die Ethik sicherheitsrelevanter Forschung	Prof. Dr. Christian Herzog	Lübeck	23.02.2024
Leibniz-Institut für Neurobiologie Magdeburg (LIN)	Kommission für Ethik sicherheitsrelevanter Forschung	Dr. Constanze Seidenbrecher	Magdeburg	12.08.2024
Otto-von-Guericke-Universität Magdeburg	KEF im Gründungsprozess	Prof. Dr. Manja Krüger	Magdeburg	12.08.2024
Johannes Gutenberg-Universität Mainz	Implementierung einer KEF wird diskutiert.	Prof. Dr. Stefan Müller-Stach	Mainz	03.11.2022
GESIS – Leibniz-Institut für Sozialwissenschaften	Ethikkommission	Prof. Dr. Birgit Becker	Mannheim	12.08.2024
Universität Mannheim	Ethikkommission	Prof. Dr. Ralf Müller-Terpitz	Mannheim	26.10.2022
Philipps-Universität-Marburg	Kommission Forschung und Verantwortung	Prof. Dr. Ursula Birsl	Marburg	26.10.2022
Hochschule Mittweida	Ethikkommission	Herr Prof. Dr.-Ing. René Ufer	Mittweida	25.10.2022
Fraunhofer-Gesellschaft	KEF-Satzung verabschiedet, ad hoc KEF-Kommission etabliert	Dr. ing. Lothar Behlau	München	31.05.2024
Institut für Mikrobiologie der Bundeswehr	KEF	PD Dr. Roman Wölfel	München	25.10.2022
LMU München	Kommission wird diskutiert/ ist in Planung.	Prof. Dr. Thomas Klapötke	München	03.11.2022
Technische Universität München	Ausschüsse der Fakultäten	Prof. Klaus Mainzer	München	26.10.2022
Gesellschaft für Virologie (GfV)	DURC-Kommission der GfV	Dr. rer. nat. Linda Brunotte	Münster	27.10.2022

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
FH Münster	Ethikkommission	Herr Prof. Dr. Stephan Barth	Münster	27.10.2022
Westfälische Wilhelms-Universität Münster	Wird derzeit vom Ethikbeauftragten der WWU betreut; weitere institutionelle Ausgestaltung in Vorbereitung.	Prof. Dr. Franziska Dübgen	Münster	03.11.2022
Universität der Bundeswehr München	Kommission für Ethik sicherheitsrelevanter Forschung	Prof. Dr. Marina Kühn-Kauffeldt	Neubiberg	07.01.2025
Hochschule Neu-Ulm	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Neu-Ulm	28.10.2022
Helmholtz Zentrum München, Deutsches Forschungszentrum für Gesundheit und Umwelt	Kommission ist in Planung.	Dr. Eva Reischl	Neuherberg	03.11.2022
Evangelische Hochschule Nürnberg	Ethikkommission in Gründung	Prof. Dr. Arne Manzeschke	Nürnberg	12.08.2024
Technische Hochschule Nürnberg	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Nürnberg	28.10.2022
Friedrich-Alexander-Universität Erlangen-Nürnberg	Kommission für Ethik sicherheitsrelevanter Forschung (KEF)	Prof. Dr. Georg Schett	Nürnberg	25.10.2022
Deutsches Institut für Ernährungsforschung Potsdam-Rehbrücke (DIfE)	Keine permanente Kommission im Sinne einer KEF verankert, bei Bedarf Ad-hoc-Kommission.	Dr. Petra Wiedmer	Nuthetal	03.11.2022
Carl von Ossietzky Universität Oldenburg	Kommission für Forschungsfolgenabschätzung und Ethik	Prof. Dr.-Ing. Andreas Hein	Oldenburg	27.10.2022
Universität Osnabrück	Kommission für Forschungsethik	Prof. Dr. Peter Schneck	Osnabrück	27.10.2022
Universität Paderborn	Ethik-Kommission	Prof. Dr. Anette Buyken	Paderborn	17.01.2024

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
Universität Passau	Kommission für Ethik in der Forschung	Prof. Dr. Susanne Mayr	Passau	11.07.2023
FH Potsdam	Ethikkommission	Prof. Dr. Tobias Schröder	Potsdam	27.10.2022
Universität Potsdam	Ethikkommission	Prof. Dr. med. Dr. phil. Michael Rapp	Potsdam	27.10.2022
Helmholtz-Zentrum für Geoforschung – GFZ	Ethikkommission	Dr. Hildegard Gödde	Potsdam	04.02.2025
Leibniz-Institut für Astrophysik Potsdam	Einsatz einer Ad-hoc-Kommission bei Bedarf	Dr. Harry Enke	Potsdam	03.11.2022
Ostbayerische Technische Hochschule Regensburg	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Regensburg	28.10.2022
Universität Regensburg	Mandatserweiterung der bestehenden Ethikkommission der Universität Regensburg wird diskutiert.	Prof. Dr. Dr. André Gessner	Regensburg	03.11.2022
Technische Hochschule Rosenheim	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Rosenheim	28.10.2022
Universität Rostock	Senatskommission Forschung	Prof. Dr. Nicole Wrage-Mönnig	Rostock	05.03.2024
Universität des Saarlandes	Kommission für die Ethik sicherheitsrelevanter Forschung	Steven Einsiedler	Saarbrücken	12.08.2024
Universität Siegen	Rat für Ethik in der Forschung	Prof. Dr. Andreas Kolb	Siegen	12.08.2024
Universität Stuttgart	Kommission Verantwortung in der Forschung	Prof. Dr.-Ing. Peter Middendorf	Stuttgart	27.10.2022
Universität Hohenheim	Senatskommission Forschung	Prof. Dr. Julia Fritz-Steuber	Stuttgart	27.10.2022
Hochschule Trier	Kommission wird diskutiert.	Prof. Dr. Henrik te Heesen	Trier	01.08.2024
Universität Trier	Ethik-Kommission	Daniel Bauerfeld	Trier	27.10.2022

INSTITUTION	RESPONSIBLE COMMITTEE (OR STATUS OF COMMITTEE ESTABLISHMENT)	CONTACT	CITY	LAST UPDATED
Universität Tübingen	KEF	Prof. Dr. Peter Grathwohl	Tübingen	27.10.2022
Universität Ulm	Senatskommission Verantwortung in der Wissenschaft	Prof. Dr. Florian Steger	Ulm	27.10.2022
WHU – Otto Beisheim School of Management	Kommission für gute wissenschaftliche Praxis	Prof. Dr. Utz Schäffer	Vallendar	27.10.2022
Hochschule Weihenstephan-Triesdorf	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Schmieder	Weihenstephan	28.10.2022
Pädagogische Hochschule Weingarten	Bisher noch keine spezifische Kommission	Prof. Dr. Wolfgang Müller	Weingarten	27.10.2022
Technische Hochschule Wildau	Ethikkommission	Bernd Eylert	Wildau	05.03.2024
Hochschule Worms	Richtlinien zur Sicherung guter wissenschaftlicher Praxis verabschiedet und veröffentlicht. Zuständige Kommission etabliert, Mandatserweiterung für KEF in Diskussion.	Dr. Frank Möller	Worms	03.11.2022
Bergische Universität Wuppertal	Ethikkommission vorhanden, Erweiterung um den Aufgabenbereich einer KEF wird diskutiert.	Prof. Dr. Stefan Kirsch	Wuppertal	12.08.2024
Julius-Maximilians-Universität Würzburg	Kommission für Forschung und wissenschaftlichen Nachwuchs	Prof. Dr. Caroline Kisker	Würzburg	12.08.2024
Hochschule Würzburg-Schweinfurt	Gemeinsame Ethikkommission der Hochschulen Bayerns (GEHBa)	Herr Dr. Martin Schmieder	Würzburg	28.10.2022
Westsächsische Hochschule Zwickau	Ethikkommission	Prof. Dr. Torsten Merkel	Zwickau	27.10.2022

3. Joint Committee survey on the handling of security-relevant research 2022/23

Security-relevant research includes scientific research work that has the potential to produce knowledge, products or technologies that could be misused by third parties to harm human dignity, life, health, freedom, property, the environment or peaceful coexistence. This is labelled **as "of concern"** if misuse can occur **directly** and potential damage is **significant.**

All information is voluntary and treated confidentially. The information will be included in anonymised form in the overall results of a survey of all committees (commissioners) responsible for the ethical evaluation of security-relevant research in Germany. This means that no individuals, specific institutions or specific details of research projects are published.

Question 1
Name of the university / research institution

Question 2
Type of university / research institution

- ☐ University and university of applied sciences with the right to award doctorates
- ☐ Universities of applied sciences and universities without the right to award doctorates
- ☐ Fraunhofer Society
- ☐ Helmholtz Association
- ☐ Leibniz Association
- ☐ Max Planck Society
- ☐ Departmental research organisation
- ☐ Specialist organisation
- ☐ Industry
- ☐ Other _____

Question 3
Contact details of the contact person responsible for handling security-relevant research

Question 4
Does your institution have a committee (commissioner) that is responsible for the ethical evaluation of security-relevant research?

- ☐ Yes (continue with Question 6)
- ☐ No (continue with Question 5 and then with Question 36)

Question 5
Why does your institution not have a committee (commissioner) that is responsible for the ethical evaluation of security-relevant research?

Question 6
When was the committee (commissioner) responsible for the ethical evaluation of security-relevant research established?

Question 7
What is the name of the committee (commissioner) responsible for the ethical evaluation of security-relevant research?

Question 8
What type of committee (commissioner) is responsible for the ethical evaluation of security-relevant research at your institution?

- ☐ A permanent committee primarily responsible for the ethical aspects of security-relevant research
- ☐ A committee that additionally covers the ethical aspects of security-relevant research
- ☐ A committee without a fixed composition, which only convenes when security-relevant cases need to be assessed
- ☐ A committee used jointly with other research institutions
- ☐ A commissioner responsible for the ethical aspects of security-relevant research
- ☐ Other _____

Question 9
Are the statutes of the committee (commissioner) responsible for the ethical evaluation of security-relevant research at your institution available online?

- ☐ Yes, at the following address _____
- ☐ No

Question 10
Which specialist expertise/groups are represented in your committee?

- ☐ Law
- ☐ Ethics/Philosophy/Theology
- ☐ Students
- ☐ Administration
- ☐ Other subjects/disciplines

Question 11
How often did the committee responsible for the ethical evaluation of security-relevant research convene in 2022/23?

Question 12
Which topics have been discussed so far by the committee responsible for the ethical evaluation of security-relevant research?

- ☐ Security-relevant research projects
- ☐ Events to raise awareness of ethical aspects of security-relevant research
- ☐ Integrating security-relevant research in education and teaching
- ☐ Administrative processes
- ☐ Export control issues
- ☐ International cooperation with the following countries
- ☐ Other _____

Question 13
How would you rate the visibility of the committee responsible for the ethical evaluation of security-relevant research for members of your institution?
(0 = not visible at all; 100 = very visible, please tick)

0 10 20 30 40 50 60 70 80 90 100

Question 14
How many research projects were submitted to the committee or the commissioner responsible for the ethical evaluation of security-relevant research in 2022/23?

Question 15
How many of these research projects were discussed as potentially security-relevant in the context of a consultation process

Question 16
Please name the subject/discipline and explain the facts for the first potentially security-relevant research project concern (case 1).

Question 17
What vote did the committee give for case 1?

- ☐ Approved
- ☐ Approved with conditions
- ☐ Partially advised against
- ☐ Advised against

Question 18
Please describe the relevant aspects that led to the above vote.

Question 19–34
The same for cases 2–6 or more than six cases (please write in the second document "case description")

Question 35
In your estimate, what is the average duration of the procedure from the initial enquiry to the final advisory opinion?

Question 36
What measures does your research organisation undertake to raise awareness of security-relevant aspects of research?

- ☐ Employee training
- ☐ Checklist for assessing the security relevance of research projects (can you provide us with these?)
- ☐ Integration of security-relevant ethical aspects in teaching
- ☐ Public events/discussion forums
- ☐ Information on the website at the following address
- ☐ Actively contacting members of the institution (e.g. info mail)
- ☐ Other _____

Question 37
What measures are planned at your research institution to raise awareness of security-relevant aspects of research?

- ☐ Employee training
- ☐ Checklist for assessing the security relevance of research projects (can you provide us with these?)
- ☐ Integration of security-relevant ethical aspects in teaching
- ☐ Public events/discussion forums
- ☐ Information on the website at the following address
- ☐ Actively contacting members of the institution (e.g. info mail)
- ☐ Other _____

Question 38
Would you like to draw our attention to suitable teaching formats related to security-relevant research?

Question 39

How could the Joint Committee on the Handling of Security-Relevant Research support your research institution (e.g. suggestions for events, expansion of the website at www.sicherheitsrelevante-forschung.org, security-relevant topics requiring discussion)?

4. List of abbreviations

APRA	Asia-Pacific Research Area
ASPI	Australian Strategic Policy Institute
BAFA	Federal Office for Economic Affairs and Export Control
BBAW	Berlin-Brandenburg Academy of Sciences and Humanities
BCI	Brain-Computer Interfaces
BMBF	Federal Ministry of Education and Research
BWC	Biological Weapons Convention
CBWNet	The CBW (chemical and biological weapons) network for a comprehensive reinforcement of norms against chemical and biological weapons
CSC	Chinese Scholarship Council
DAAD	German Academic Exchange Service
DESY	German Electron Synchrotron
DFG	German Research Foundation
DLR	German Aerospace Centre
DURC	Dual Use Research of Concern
EEG	Electroencephalogram
EFI	Commission of Experts for Research and Innovation
EU	European Union
EU-KNOC	EU Knowledge Network on China
GeHBa	Joint Ethics Committee of the Universities of Bavaria
GfV	Society of Virology
GIGA	German Institute for Global and Area Studies
HRK	German Rectors' Conference
IAU	International Association of Universities
ICP	International Compliance Programme
INT	Institute for Technological Trend Analyses
IQIB	Institute for Qualifying Innovation Research and Consultancy GmbH
KEF	Committee for Ethics in Security-Relevant Research
AI	Artificial intelligence
KIWi	Competence Centre for International Academic Cooperation of the DAAD
MPG	Max Planck Society
MPI	Max Planck Institute
OECD	Organisation for Economic Co-operation and Development
SIGRE	Security and Integrity of the Global Research Ecosystem
WHO	World Health Organisation

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The Leopoldina originated in 1652 as a classical scholarly society and now has 1,700 members from almost all branches of science. In 2008, the Leopoldina was appointed as the German National Academy of Sciences and, in this capacity, was invested with two major objectives: representing the German scientific community internationally, and providing policymakers and the public with science-based advice.

The Deutsche Forschungsgemeinschaft is the self-governing organisation for science and research in Germany. It serves all branches of science and the humanities. In organisational terms, the DFG is an association under private law. Its membership consists of German research universities, non-university research institutions, scientific associations and the Academies of Science and the Humanities.

The Joint Committee for the Handling of Security-Relevant Research was established by the DFG and Leopoldina to increase awareness of the dual-use potential of research findings, foster responsibility in handling security-relevant research, and strengthen self-governance on this issue within the scientific community.

www.leopoldina.org | www.dfg.de

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