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Preface

The rapid global spread of the coronavirus SARS-CoV-2 has had a huge impact on all spheres of society within the shortest space of time and much about the virus remains shrouded in scientific uncertainty. The crisis has underlined the importance of free scientific research and free scientific exchange also in security-relevant fields of research of concern such as pandemic pathogens. Researchers are facing the challenge of analysing the highly dynamic developments with continuously updated data in the shortest possible time to provide a decision-making basis for urgently needed political measures at the global level.

In Germany, research freedom is protected by basic law and is a cornerstone for the progress and prosperity of our society. Research freedom, however, comes with a significant burden of responsibility as important and useful research findings can also be misused for harmful purposes. The Leopoldina and DFG work continuously to ensure compliance with ethical principles and the further development of mechanisms safeguarding a responsible handling of research freedom and research risks. The Leopoldina and DFG advocate raising awareness of the problems related to the possible misuse of research findings and technologies and minimising the associated risks, while at the same time avoiding disproportionate restrictions on research that pursues useful and peaceful objectives to further the wellbeing of society.

Weighing up the benefits and risks associated with research requires finely tuned responsibility and self-regulation. Researchers and research institutions need to be sensitised to the security-related risks of their work and advised on how to deal with possible risks. The DFG and Leopoldina have published general guidelines to this end called “Scientific Freedom and Scientific Responsibility – Recommendations for Handling Security-Relevant Research”. Self-governance in the sciences was placed centre-stage here, as it allows research risks to be handled in an appropriate way and allows for a flexible response. In 2015, the DFG and Leopoldina set up the Joint Committee on the Handling of Security-Relevant Research, which with the active support of its office is tasked with facilitating the implementation of the guidelines and further developing and strengthening self-governance in the field of security-relevant research.

Many German research institutions have set up committees for ethics in security-relevant research in line with the guidelines. This has created reliable structures and competencies to address the challenging ethical issues of security-relevant research projects and provide researchers with the advice they need. The committees should now work to strengthen their visibility, continuity and acceptance within the research institutions in order to establish themselves as an integral part of the respective organisations and successfully apply the experience they have gained.

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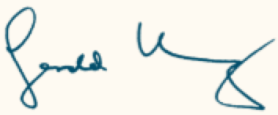

PROFESSOR GERALD HAUG
President of the German National Academy of Sciences Leopoldina

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President of the German Research Foundation

Contents

Summary

Compliance with ethical principles in security-relevant research is becoming increasingly important at both the national and international level. In particular, aspects of export control and the rising trend towards research collaborations with foreign partners are coming under greater scrutiny by German policymakers and research funding. Security-relevant research and the inherent risks are developing dynamically, for example through new synergies between different disciplines such as research on artificial intelligence (AI), engineering sciences and molecular biology. The Joint Committee on the Handling of Security-Relevant Research, an advisory body set up by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) and the German National Academy of Sciences Leopoldina, monitors these developments on an ongoing basis, identifies need for action and advises the boards of the DFG and Leopoldina on these issues. The Joint Committee also fosters a responsible approach to research freedom through close collaboration with the committees for ethics in security-relevant research (KEFs – German acronym).

This is the Joint Committee's third progress report. Chapter A lays out the background and developments leading up to the establishment of the Joint Committee in 2015. This initiative was partly inspired by the international debate on the opportunities and risks involved in experiments on zoonotic viruses (avian flu viruses) that can lead to viruses gaining new functions (gain-of-function experiments), such as easier transmission between mammals. Chapter A presents the "Recommendations for Handling Security-Relevant Research" and provides information on the status quo of the German and international debate in selected fields of security-relevant research. This includes work on pathogenic microorganisms, machine learning, AI and robotics. It also addresses the corresponding legal foundations of the federal states and universities, and the parameters for funding security-relevant research. The need for a responsible and regulated handling of security-relevant research risks is now firmly anchored in the DFG proposals preparation instructions and in the DFG Guidelines for Safeguarding Good Research Practice. Finally, Chapter A also addresses the relevant export control requirements laid down by the state and published, e.g. in the form of leaflets.

Chapter B focuses on the tasks and the objectives of the Joint Committee. The committee's mandate includes, for example, raising and refining awareness amongst researchers of the ethical aspects of security-relevant research and further developing and fostering a responsible approach to security-relevant research and the required self-governance within the research community. To this date, the Joint Committee has a list of more than 130 contacts from German research institutes, organisations, various scientific societies and an industry association, who are responsible for the handling of security-relevant research in their organisations. Almost 90 KEFs or corresponding officers have been established. The chapter also provides insight into the work and competencies of the KEFs based on the results of the surveys by the Joint Committee, and presents key questions arising from these for the ethical assessment of security-relevant research. These are questions (1) for researchers, which could require consultation with a KEF, (2) for dealing with a query by the KEFs and (3) for the final assessment and consultation by the KEFs. Between 2016 and 2019, the KEFs consulted on 59 potentially security-relevant cases. The advisory votes rejected the research in only five of these cases.

The surveys revealed that security-relevant work of concern is a rare exception in academic research, but that the KEFs deal with numerous partially overlapping security-relevant issues. These include the compatibility of research with the basic principles of the constitution, issues relating to research funding, data protection, export control, and risks in connection with military-related sponsors and cooperation partners. However, the surveys and research conducted by the Joint Committee also show that the work of the contacts and the KEFs are often still not institutionally anchored as an ongoing process. In many cases, mechanisms still need to be put into place to reinforce the visibility and acceptance of procedures for the handling of security-relevant research and to prevent the expertise gained in the handling of security-relevant research from being lost. The Joint Committee needs to support the KEFs in remedying these shortcomings.

Chapter C describes the participation of members and the office of the Joint Committee in public debates and further activities related to the handling of security-relevant research, as well as documenting the events that the Joint Committee has organised over the last two years. For example, it organised the discussion evening "Security instead of freedom – research between new findings and increased risks" as part of the Alliance of Science Organisations in Germany's campaign "Freedom is our System" marking the 70th anniversary of the German constitution and the scientific freedom it guarantees. The debate relating to AI focused on who is responsible should research findings have unforeseen harmful consequences and whether a personally responsible approach by researchers provides adequate restrictions. The international conference entitled "The mystery of risks – How can science help reconcile perception and assessment?" addressed the role of science and humanities in the assessment and evaluation of risks to society. Ahead of the conference, the Joint Committee also organised a workshop for international students on "Risk Governance and the Role of Science and Humanities". At the second KEF Forum held at the Friedrich-Loeffler-Institut on the island of Riems, members of the KEF discussed the cases of security-relevant research they had encountered and shared their experiences regarding the respective ethical assessment, evaluation and consultation.

Chapter D sets out the future tasks and objectives of the Joint Committee based on its work and experience so far. The focus of its work will be:

- Monitoring, maintaining contact, supporting and strengthening German research institutes in adopting a responsible approach to the security-relevant aspects of research through regular surveys, KEF forums, specialist events and information letters.
- Monitoring procedures and new developments in security-relevant research and concisely communicating the current state of knowledge to science, policymakers and the public right up to the international level.
- Support in providing professional further training courses and multimedia information material for the work of the KEFs and assistance in anchoring security-relevant aspects of research in education and in teaching to raise awareness on these issues.

A. Background

1. Scientific freedom and scientific responsibility

Research freedom as protected by the German constitution grants researchers the right to raise their own scientific questions and address these questions independently within the conditions laid out by the legal regulations. Freedom of research is fundamental to expanding human knowledge and ensuring social progress and prosperity. However, useful research findings and research methods can also be misused for harmful purposes. One example of this "dual-use dilemma" in research is the discovery of nuclear fission in the 1930s, which also led to the development and use of nuclear weapons of mass destruction. This triggered an intense debate on the responsibility of researchers that continues to this day and focuses regularly on the potential risks of security-relevant research projects alongside the expected benefits.[1] In 2012, research groups from the Netherlands and Japan/US published five genetic mutations that highly pathogenic influenza viruses type H5N1 ("bird flu" viruses) would have to undergo for airborne transmission between mammals to occur.[2] This caused great concern worldwide about the usefulness and risks associated with this security-relevant research.

> **BOX 1.** Based on the common understanding of "dual-use research of concern", the Joint Committee of the DFG and Leopoldina (Chapter B 1) defines security-relevant research projects of concern as projects that carry significant risks for the security of human dignity, life, health, freedom, property, the environment or peaceful coexistence. Security-relevant risks arise, in particular, in research which produces knowledge, products or technologies that could be misused directly by third parties.

The two research groups defended the importance of their work on the transmission of flu viruses, arguing that their findings made it possible to understand how the virus could develop into a potential threat for humans through spontaneous, naturally occurring mutations. They claimed that their findings made it much easier to rate the pandemic potential of new naturally emerging virus variations and to take more targeted measures to protect against them.[3] The global spread of the coronavirus pandemic in 2019 and 2020 once again demonstrates just how important it is to conduct timely research on highly pathogenic viruses and that research findings are shared as freely as possible in the context of security-relevant research of concern.

1 See, e.g., Russell-Einstein Manifesto (1955), available at: www.pugwash.de/rem.pdf; Göttinger Manifesto (1957), available at: https://www.uni-goettingen.de/de/54320.html (both last accessed: 9 September 2020).

2 See also 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.

3 Comparable discussions were held several years ago already on experiments to test the transmission of corona viruses. See www.nature.com/news/engineered-bat-virus-stirs-debate-over-risky-research-1.18787 (last accessed: 9 September 2020).

Critics of this type of research fear that the pathogens produced for research purposes could escape from the high-security laboratories into the environment through negligent conduct. These risks are addressed in numerous regulations intended to achieve optimal biological safety, or biosafety.[4] Another potential hazard is that the publication of such research findings makes knowledge available that may be misused for the purposes of bioterrorism attacks or biological warfare. A number of regulations on this issue, known as biosecurity, are in place to prevent the distribution of chemical and biological weapons. These include regular criminal law, the United Nations' Biological Weapons Convention and the regulations of the German Federal Office of Economics and Export Control (BAFA). Alongside preventative measures on the part of security agencies[5] and the work of law enforcement authorities, self-governance by the scientific community is also of great importance here (see Chapter A 3).

The dual-use dilemma extends far beyond the sphere of nuclear and pathogen research, affecting all scientific fields. Results from materials research and nanotechnology could contribute to the development of offensive weapons; research findings on automated industrial and domestic robots could be used for the construction of intelligent combat robots; analyses of molecular plant genetics could enable targeted attacks on seeds; scientific work on movement analysis and biometrics can be used by authoritarian regimes for comprehensive surveillance of people and thus restrict human rights; psychological, medical and neurobiological research could assist in the manipulation of persons up to and including aggressive interrogation methods and torture; the optimisation of the collection, matching and analysis of personal data could lead to a violation of personal rights and be used to manipulate public opinion; behavioural and social sciences research into the radicalisation of individuals into terrorists could create the basis for new terrorist recruiting strategies; linguistic research in speech recognition systems could also be used for illegal abusive communications monitoring; legal and philosophical publications could also be misused to justify human rights violations. The list is almost endless. (For detailed case studies of security-relevant work see Appendix 1). However, failure to carry out certain research can also be problematic from an ethical point of view if, for example, this hinders the development of treatments, vaccines and other protective measures and prevents important innovations for the common good, e.g. by generating jobs or by protecting the environment and the climate.

4 In particular, in Germany, the Biological Agents Ordinance (*Biostoffverordnung*), the Genetic Engineering Act (*Gentechnikgesetz*) and the Protection Against Infection Act (*Infektionsschutzgesetz*).

5 See comments made by the German Federal Office of Civil Protection and Disaster Assistance, Unit III.2 on CBRN protection, available at: www.bbk.bund.de/DE/AufgabenundAusstattung/CBRNSchutz/Biologie/biologie_node.html (last accessed: 9 September 2020).

2. Debate on security-relevant research in the German Bundestag

Following the debate on the research into avian flu in 2012, the German Ethics Council recommended measures to increase awareness of biosecurity issues within the scientific community as well as tighter legal regulation of so-called dual use research of concern (DURC) in Germany through a central DURC commission.[6] A corresponding motion submitted by the Alliance 90/The Greens was initially rejected by the German Bundestag although it did decide to monitor the largely self-governed handling of research risks by the German research sector as recommended by the DFG and Leopoldina (see Chapter B), and to review the issue again in the future.[7]

New developments particularly in artificial intelligence, automated systems and machine learning have led the German Bundestag to acknowledge a need for action and consultation in the last few years. As a result, it tasked the German Data Ethics Commission to develop ethical guidelines for the protection of the individual, the preservation of social cohesion, and the safeguarding and promotion of prosperity in the information age. The report of the Data Ethics Commission also points out the potential for misusing research in the field of big data and artificial intelligence, e.g. through deep fakes (an automated method to forge complex media such as photos or videos using deep learning algorithms) or the use of illegal surveillance.[8] The AI and State project group of the German Bundestag's Study Commission "Artificial Intelligence – Social Responsibility and Economic, Social and Ecological Potential" recommended evaluating research findings on artificial intelligence regarding the risk of misuse.[9]

In response to a minor interpellation on "Promoting artificial intelligence for the Bundeswehr"[10], the Federal Government stated that the Research Ministry only funds civilian research projects, while the Defence Ministry also funds military research projects. The response of the Federal Government continues: "Research institutions in Germany funded by the Federal Government, such as the Fraunhofer-Gesellschaft, the Helmholtz Association of German Research Centres, the Max Planck Society and the Leibniz Association, pursue a comprehensive approach to research that also takes account of the dangers and risks of technologies such as artificial intelligence."

6 The corresponding statement "Biosecurity – Freedom and Responsibility of Research" (2014) is available at: https://www.ethikrat.org/fileadmin/Publikationen/Stellungnahmen/englisch/opinion-biosecurity.pdf (last accessed: 9 September 2020).

7 On the extensive political debate in Germany see the Progress Report of the Joint Committee 2018, Chapter A 2. Available at: www.leopoldina.org/uploads/tx_leopublication/2018_GA_Taetigkeitsbericht_EN.pdf (last accessed: 9 September 2020).

8 Data Ethics Commission of the Federal Government (2019). Opinion of the Data Ethics Commission. Available at: www.bmi.bund.de/SharedDocs/downloads/EN/themen/it-digital-policy/datenethikkommission-abschlussgutachten-lang.pdf?__blob=publicationFile&v=4 (last accessed: 9 September 2020).

9 German Bundestag Commission Printed Paper 19(27)93. Available at: www.bundestag.de/resource/blob/672932/8dafccf73bce9d9560223d1683d82cb9/PG-2-Projektgruppenbericht-data.pdf (last accessed: 9 September 2020).

10 German Bundestag Printed Paper 19/19893. Available at: http://dip21.bundestag.de/dip21/btd/19/108/1910803.pdf (last accessed: 9 September 2020).

3. Recommendations of DFG and Leopoldina for handling of security-relevant research

In the opinion of the DFG and the Leopoldina, legal provisions offer only a very limited means of controlling the opportunities and risks associated with free research. Research methods and content are constantly changing and research findings, as well as their future application, tend to be almost impossible to predict. The DFG and Leopoldina continuously work to ensure that ethical principles and mechanisms for the responsible handling of freedom of research and research risks are developed by the scientific community.

A working group of the Leopoldina developed a set of general guidelines on handling security-relevant scientific research based on the "Guidelines and Rules on a Responsible Approach to Freedom of Research and Research Risks"[11]", which the Max Planck Society approved in 2010. These guidelines were published in 2014 under the title "Scientific Freedom and Scientific Responsibility – Recommendations for Handling Security-Relevant Research"[12]. The guidelines place great importance on instruments of self-governance within the scientific community given the familiarity of researchers with their subject and that it allows for a flexible response. In the first part of the recommendations, the DFG and Leopoldina urge researchers not to content themselves with just complying with legal regulations. Due to their basic right to freedom of research, their knowledge and their experience, researchers have a particular ethical responsibility that goes beyond their legal obligations. Every scientist must, therefore, be fundamentally aware of the danger of research misuse. In critical cases, these individuals must make a personal decision about what is responsible with regard to their research. In doing so, they need to weigh the opportunities offered by the research against the risks for human dignity, life and other important values. The recommendations specify these considerations in terms of necessary risk analysis, measures for reducing risk and evaluating the publication of research results. The primary goal is to carry out and communicate research and its results in a responsible way. In isolated cases, a responsible decision on the part of the researcher may also mean that a research project is temporarily suspended or indeed not carried out at all.

The second section of the recommendations is aimed at the research institutions that create framework conditions for ethically responsible research. They need to raise awareness of the problem, convey the required knowledge of legal constraints on research and support corresponding training measures for scientists.

Research institutions need to develop ethics rules for handling security-relevant research that go beyond compliance with legal regulations. Each institution should set up a special committee for ethics in security-relevant research (KEF - German acronym) to implement these rules and to advise its scientists.

11 Available at: www.mpg.de/197392/researchFreedomRisks.pdf (last accessed: 9 September 2020).

12 Available at: www.leopoldina.org/uploads/tx_leopublication/2014_06_DFG_Leopoldina_Wissenschaftsfreiheit_-verantwortung_bilingual.pdf (last accessed: 9 September 2020).

4. Legal framework and funding of security-relevant research

The misuse of research findings is pre-empted by a series of legal regulations, particularly by criminal law and the export regulations of the German Federal Office of Economics and Export Control (BAFA). The BAFA implements the authorisation requirements and procedures stipulated by the EU for all member states for the export of goods (e.g. chemicals, machines, technologies, materials and software) that have both civilian and military applications. This applies to the export of goods (e.g. laboratory equipment, test equipment, as well as tangible technology in emails or on data carriers or clouds) but also to the intangible transfer of knowledge (so-called "technical support"). In the academic sector, export control also applies to visiting scientists. In 2019, the BAFA published the "Export Control and Academia Manual" to clarify the scope of export control in academia and to raise awareness among researchers of their rights and obligations in this regard.[13] In Germany, security-relevant research in life sciences is also subject to the German Ordinance on Biological Substances, the German Genetic Engineering Law and the German Law on the Prevention and Control of Infectious Diseases designed to ensure biosecurity. International agreements such as the Biological Weapons Convention and the Chemical Weapons Convention which have been ratified by most countries around the world, including Germany, ban the production, storage, dissemination and application of chemical and biological weapons.

In Germany, the states of Bremen, Hessen, Lower Saxony, Thuringia and Schleswig-Holstein have already included a requirement for a responsible handling of security-relevant research in their higher education legislation. Bremen and Lower Saxony also require public debate on the issue. Lower Saxony and Schleswig-Holstein further require Senate Commissions for Research Ethics to be established.[14] Universities regularly hold internal discussions on whether specific security-relevant research projects or fields violate the applicable, sometimes very differently worded regulations and legally controversial self-governance obligations for exclusively civilian applications (civil clauses). In the context of dual use, German universities have for several years now increasingly focused on questions of the military association of foreign staff or cooperation partners and the potential targeted siphoning off of research findings and methods. In part, this also affects issues of foreign trade legislation and export restrictions (see also Chapter A 5.3).

13 Available at: https://www.bafa.de/SharedDocs/Downloads/EN/Foreign_Trade/ec_academia.pdf;jsessionid=3F48028740568CDA5E04F75B226D59E7.1_cid390?__blob=publicationFile&v=5 (last accessed: 9 September 2020).

14 A detailed presentation of the references made to the handling of security-relevant research in German state-level higher education legislation with corresponding references and quotations is available in Chap. B 4 of the Progress Report of the Joint Committee of 2018. Available at: www.leopoldina.org/uploads/tx_leopublication/2018_GA_Taetigkeitsbericht_EN.pdf (last accessed: 9 September 2020).

The DFG refers to the "Recommendations for Handling Security-Relevant Research"[15] on its website under the section "Principles of DFG Funding"[16] and in its instructions for funding proposals. The DFG asks applicants to check their projects for security-relevant aspects before submitting their funding proposal. If a direct risk is identified in that the project could produce knowledge, products or technologies that could be misused to deliberately cause significant damage, the applicants are asked to submit a statement on the risk-benefit ratio and possible measures to minimise these risks. If the research institution of the applicant has a KEF then the funding proposal must include a statement from the KEF. Projects with a security risk are also discussed in detail by the scientific panels of the DFG. The revised, binding "Guidelines for Safeguarding Good Research Practice" of the DFG also refer to the legal and ethical parameters 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 ethics 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."[17] The accompanying explanations on the DFG Guideline 10 expressly state that higher education institutions and non-higher education institutions are responsible for ensuring that their members' and employees' actions comply with legal requirements and promote this through suitable organisational structures.

The EU Framework Programme for Research and Innovation Horizon 2020 already requires funding proposals to include an ethics self-assessment of the potential risks of misuse of the research project that could pose a threat to human beings, animals and the environment. The corresponding guidelines also recommend establishing advisory bodies to deal with these ethical issues.[18] Research projects related to artificial intelligence are further required to follow the European "Ethics guidelines for trustworthy AI"[19] that are designed to minimise unintentional harm through pre-emptive security measures.

15 See: www.dfg.de/en/research_funding/principles_dfg_funding/security_relevant_research/index.html (last accessed: 9 September 2020).

16 Available at: www.dfg.de/formulare/54_01/54_01_en.pdf (last accessed: 9 September 2020).

17 DFG (2019). Guidelines for Safeguarding Good Research Practice. Code of Conduct. Available at: www.dfg.de/download/pdf/foerderung/rechtliche_rahmenbedingungen/gute_wissenschaftliche_praxis/kodex_gwp_en.pdf (last accessed: 9 September 2020).

18 See Chap. 4.2 and 10 in Directorate-General for Research & Innovation of the European Commission "Guidance – How to complete your ethics self-assessment" (Version 5.3 of 4 February 2019), available at: https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/ethics/h2020_hi_ethics-self-assess_en.pdf (last accessed: 9 September 2020).

19 See https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai (last accessed: 9 September 2020).

5. The international debate on security-relevant research

5.1 Life sciences

In the past few years, the international debates on security-relevant research in the life sciences outlined in Chapter A 1 have continued. As before, the discussions focus primarily on experiments in which pathogens gain new functions, on progress made in synthetic biology and the development of genetic engineering methods that enable so-called genome editing, particularly gene drives, that can be used to genetically modify the populations of wild animals.[20] Recently, for example, researchers were able to synthetically reconstruct the complete genome of the coronavirus SARS-CoV-2.[21] The synergy effects emerging from cooperation between biological research and artificial intelligence also harbour new, potentially security-relevant risks.[22]

An amendment of the UN Biological Weapons Convention[23] has been a topic of discussion for many years. During the international event of the Federal Foreign Office "Capturing Technology. Rethinking Arms Control" held on 15 March 2019 in Berlin, German Foreign Minister Heiko Maas advocated setting up an international advisory panel to improve the international control of biological weapons.[24] At the annual meeting of experts on the Biological Weapons Convention (BWC) on 31 July 2019 in Geneva, delegations from Germany, the Netherlands and Sweden proposed a comparable advisory mechanism for new security-relevant technologies relevant to the BWC.[25]

The Insect Allies Program of the US Defense Advanced Research Projects Agency (DARPA) has provided more than 27 million US dollars of funding for research on how insects can be used to transport plant viruses that can change the genetic make-up of crops on a large scale. A group of authors headed by Guy Reeves pointed out that the research findings of the projects funded by DARPA could be misused directly to produce biological weapons.[26]

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20 See e.g. Academies Science Advisor Council (EASAC) (2015). Gain of function: experimental applications relating to potentially pandemic pathogens (2015). National Science Advisory Board for Biosecurity (NSABB) (2016): Recommendations for the Evaluation and Oversight of Proposed Gain-of-Function Research; National Academies of Sciences, Engineering and Medicine (2016): Gene Drives on the Horizon: Advancing Science, Navigating Uncertainty, and Aligning Research with Public Values; National Academies of Sciences Engineering and Medicines (2017). Dual Use Research of Concern in the Life Sciences: Current Issues and Controversies; Standing Senate Commission for Fundamental issues in Genetic Research of the German Research Foundation (2018). Synthetic Biology – Current Situation, and National Academies of Sciences Engineering and Medicines (2018). Biodefense in the Age of Synthetic Biology.

21 Thao et al. (2020). Rapid reconstruction of SARS-CoV-2 using a synthetic genomics platform. Nature 582: 561–565.

22 O'Brien et al. (2019). Assessing the Risks Posed by the Convergence of Artificial Intelligence and Biotechnology. Health Security 18: 219–227.

23 Further information at: www.unog.ch/80256EE600585943/(httpPages)/A8850DE2E9D56A20C125825C003B0E88?OpenDocument (last accessed: 9 September 2020).

24 See www.auswaertiges-amt.de/en/newsroom/news/maas-conference-2019-capturing-technology-rethinking-arms-control/2199902 (last accessed: 9 September 2020).

25 See https://undocs.org/en/bwc/msp/2019/mx.2/wp.1 (last accessed: 9 September 2020).

26 Reeves et al. (2018). Agricultural research, or a new bioweapon system. Science 362(6410): 35–37. https://science.sciencemag.org/content/362/6410/35. The following page of the Max Planck Society website provides a short overview: https://www.mpg.de/12316482/darpa-insect-ally (last accessed: 9 September 2020).

5.2 IT research and robotics

The major advances in IT research, particularly in the field of deep learning and artificial intelligence (AI) are also increasingly being discussed in connection with the risk of misuse. One example is the report "The Malicious Use of Artificial Intelligence: Forecasting, Prevention, and Mitigation"[27]. published in February 2018 by a project group that included university researchers and developers from Microsoft and Google. The report sets out the growing potential for using AI to cause intentional harm. Robots, for example, could be modified for abusive purposes with relative ease. The authors describe several scenarios based on technologies that are already commercially available or will be in the foreseeable future. These include the potential of automated hacks and automated campaigns of misinformation and the use of automated drones or domestic robots for attacks. The project group recommends closer cooperation between policymakers and IT researchers on the security-relevant aspects of research, so that scientific knowledge can feed into the required political decision-making. Furthermore, in cases where the potential for malicious application is foreseeable, researchers should proactively involve the relevant bodies and identify and further develop best practices for the AI field of research.

In 2018, at a conference on neuronal information processes, Canadian researchers presented the so-called "Montreal Declaration" on using AI. It calls on researchers and companies that develop AI to comply with democratic and ethical standards and recommends restricting the public access to security-relevant algorithms: "It is necessary to develop mechanisms that consider the potential for the dual use – beneficial and harmful – of AI [artificial intelligence] research and AIS [artificial intelligent systems] development (whether public or private) in order to limit harmful uses. When the misuse of an AIS endangers public health or safety and has a high probability of occurrence, it is prudent to restrict open access and public dissemination to its algorithm."[28]

In April 2019, a group of experts of the European Commission presented ethical guidelines on dealing with artificial intelligence (AI), which were expanded in June 2019 to include an "Assessment List for Trustworthy Artificial Intelligence". The guidelines advocate risk-based AI governance.[29] Previously, the European Group on Ethics in Science and New Technologies (EGE) had published a statement on the potential for misuse of AI, robotics and autonomous systems, and called on those involved in the research and development of these systems to bring the ethical dilemmas of this research into public discourse.[30] Although the statement of the expert group on AI of the European Commission stipulated that AI should be used for the benefit of

27 Available at: https://maliciousaireport.com (last accessed: 9 September 2020).

28 The Montreal Declaration is available at: www.montrealdeclaration-responsibleai.com/the-declaration (last accessed: 9 September 2020).

29 See https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=68342 (last accessed: 14.12 2020).

30 See https://op.europa.eu/en/publication-detail/-/publication/dfebe62e-4ce9-11e8-be1d-01aa75ed71a1/language-en/format-PDF/source-78120382 (last accessed: 9 September 2020).

society,[31] the group, consisting of 52 representatives of the academic research sector, civil society and industry did not lay down any "red lines". The interdisciplinary working group "Responsibility in Machine Learning and Artificial Intelligence" of the Berlin-Brandenburg Academy of Sciences and Humanities meanwhile proposed a European certification procedure for AI that strikes a balance between the precautionary principle and the innovation principle.[32] The German Data Ethics Commission also strongly advocated a joint European path in the future discourse on ethics, law and technology.[33]

5.3 Export control

As well as emerging technologies and the new risks these may harbour, the European Commission's Export Control Forum, held in December 2019 in Brussels, also addressed the issue of how to manage export control in the academic sector.[34] It was suggested that the BAFA's "Export Control and Academia Manual" (see Chap. A 4) could serve as a yardstick for "EU Guidance for Academia" which is scheduled for the end of 2021 and will be prepared by the Technical Expert Group on Compliance Guidelines for Research Organisations (TEG-Research). The objective of the guidelines is to raise awareness at universities and research institutions across Europe about export control and support them in applying foreign trade legislation. In 2018, the European Studies Unit presented a statement outlining the international situation regarding export control at research institutions. The statement recommends setting up compliance offices at research institutions and sees an urgent need to raise awareness among researchers of the potential of misuse.[35]

Researchers have recently drawn attention to the fact that commercial research laboratories, particularly from the United States, are increasingly making automated laboratory cells (so-called cloud labs) available to users worldwide, who can order experiments online and then gain access to the findings or products. Although only confirmed company addresses can place orders, the experiments in question do not have to be justified. The researchers believe that uncontrolled access to high-tech equipment opens up a large potential for misuse, as it is unclear, for example, whether and how the production of dangerous pathogens and toxins is prevented. The cloud

31 See https://ec.europa.eu/commission/presscorner/detail/de/IP_19_1893 (last accessed: 9 September 2020).

32 The statement "Vertrauenswürdige KI? Vorausschauende Politik!" (Trustworthy AI? Pre-emptive policies!) is available at: www.bbaw.de/files-bbaw/user_upload/publikationen/BBAW__Vertrauenswuerdige-KI_Vorausschauende-Politik.pdf (last accessed: 9 September 2020).

33 Data Ethics Commission of the Federal Government (2019). Report of the Data Ethics Commission available at: www.bmi.bund.de/SharedDocs/downloads/EN/themen/it-digital-policy/datenethikkommission-abschlussgutachten-lang.pdf?__blob=publicationFile&v=4 (last accessed: 9 September 2020).

34 Programme available at: https://trade.ec.europa.eu/doclib/docs/2019/december/tradoc_158495.pdf (last accessed: 9 September 2020); video recording of the event available at: https://webcast.ec.europa.eu/export-control-forum-2019# (last accessed: 9 September 2020). The speech "EU compliance guidance for export controlled dual-use research" of Johan Evers starts after 3h 4 min (13.15 to 13.27 of the recorded time).

35 See http://www.esu.ulg.ac.be/49/pdf/daacwp/chaudfontaine_esu_2018_full.pdf (last accessed: 9 September 2020).

lab providers are cautioned to exercise self-governance and should be covered by export control regulations.[36]

In 2018 and 2019, the Australian Strategic Institute presented two reports, "Picking flowers, making honey – The Chinese military's collaboration with foreign universities" and "The China Defence Universities Tracker" that warn against the hidden influence of the Chinese military on international research, such as e.g. the development of hypersound weapons or navigation technologies. They also suggest that numerous Chinese researchers in cooperation partnerships or scientists working abroad are concealing their links to the Chinese military with the intention of siphoning off research findings for military application.[37]

5.4 Codes of conduct for research

The UNESCO Recommendation on Science and Scientific Researchers of 1974 was revised in late 2017. Alongside fair conditions for researchers and the free exchange of scientific data, UNESCO recommends that research and development should be carried out with a greater sense of responsibility towards mankind and the environment, and to ensure that societies make responsible use of newly acquired knowledge.[38]

In 2015, building on the Chemical Weapons Convention of 1993, an expert group of chemists from 24 countries presented ethical guidelines on the basis of the existing codes of research conduct.[39] These guidelines, called "The Hague Ethical Guidelines",[40] are directed at workers of chemical companies and from the academic sector and urge them to manage risks responsibly and prevent misuse. Risk awareness is to be increased within the chemical community so that chemical products or their intermediates are not applied as a weapon and compliance with the highest ethical standards is ensured.

The Fraunhofer-Gesellschaft and the Netherland Organisation for Applied Scientific Research (TNO) carried out the joint EU-funded project "Joining Efforts for Responsible Research and Innovation" (JERRI)[41] from 2016 to 2019. One of the project's aims was to develop new ethical guidelines for applied research. The outcomes included the implementation of a Fraunhofer Ethics Commission for Security-Relevant

36 The authors' contribution is available at: https://thebulletin.org/2019/07/laboratories-in-the-cloud/ (last accessed: 9 September 2020).

37 Both reports are available at: https://s3-ap-southeast-2.amazonaws.com/ad-aspi/2018-10/Picking%20flowers%2C%20making%20honey_0.pdf and https://s3-ap-southeast-2.amazonaws.com/ad-aspi/2019-11/The%20China%20Defence%20Universities%20Tracker_0.pdf (last accessed: 9 September 2020).

38 See Recommendation on Science and Scientific Researchers 13 November 2017. Available at: https://en.unesco.org/themes/ethics-science-and-technology/recommendation_science (last accessed: 9 September 2020).

39 In 2015, the OPCW drew up an overview of the codes of conduct in place across the world in public organisations and industry. Available at: www.opcw.org/fileadmin/OPCW/SAB/en/2015_Compilation_of_Chemistry_Codes.pdf (last accessed: 9 September 2020).

40 Available at: www.opcw.org/special-sections/science-technology/the-hague-ethical-guidelines (last accessed: 9 September 2020).

41 See www.jerri-project.eu (last accessed: 9 September 2020).

Research[42] and a Code of Conduct for the TNO.[43]

In some areas, industry has already agreed to comply with international codes of conduct in order to reduce the security-relevant risks of their research, e.g. for the synthesis of nucleic acids, for the general application of biotechnology, for engineering sciences and for the application of information technology.[44]

6. Approach of selected publishers and journals to security-relevant publications

In its instructions for authors, the publishing company *Plos One* alerts authors to the special aspects of dual use research of concern (DURC, Chap. A 1).[45] The editorial team of *Plos One* states that it is generally in favour of also publishing research findings from DURC. The DURC Committee set up specifically for this purpose advises the editorial team on any security-relevant risks and weighs them up against the potential benefits of publication. In the event that the proven risks outweigh the benefits, *Plos One* decides against publishing the findings.[46] In the process of publishing a study on the synthesis of a horsepox virus,[47] the DURC Committee comprising of an expert panel and the senior editors were asked prior to publication to assess the risk involving the extent to which the study could also be used for the synthesis of a human smallpox virus. The committee concluded that the study did not contain any new information that would enable the production of a human smallpox virus, but only featured methods, reagents and knowledge that had already been applied and published before in the synthesis of other viruses (e.g. influenza and polio viruses). It also concluded that the authors had complied with the relevant international regulations and presented their research findings to the international community before submitting them to conferences. As the committee saw the benefits of publication, particularly for the potential in developing vaccines, it unanimously decided in favour of publication.

The editorial team of the journal *Nature* has a team of experts it can consult with on planned publications that raise concerns in the area of biosecurity.[48] This can include both ethical and technical issues, such as access to data or material. Publishing house *Elsevier* does not define a specific procedure in its ethical guidelines on how to deal with security-relevant research but principally refers to good scientific practice.

42 See www.fraunhofer.de/en/about-fraunhofer/corporate-responsibility/research-and-development/ethics-committee-for-security-relevant-research.html (last accessed: 9 September 2020).

43 Available at: https://www.tno.nl/media/4460/tno_code_uk2.pdf (last accessed: 9 September 2020).

44 Further information in Chapter A 6 of the Progress Report of the Joint Committee of 2018. Available at: www.leopoldina.org/uploads/tx_leopublication/2018_GA_Taetigkeitsbericht_EN.pdf (last accessed: 9 September 2020).

45 See https://journals.plos.org/plosone/s/submission-guidelines (last accessed: 9 September 2020).

46 See https://journals.plos.org/plosone/s/ethical-publishing-practice (last accessed: 9 September 2020).

47 Noyce R.S., Lederman S., Evans D.H. (2018). Construction of an infectious horsepox virus vaccine from chemically synthesized DNA fragments. PLoS One 13(1):e0188453.

48 See www.nature.com/nature-research/editorial-policies/ethics-and-biosecurity (last accessed: 9 September 2020).

The guidelines state that the respective journals and editors need to safeguard ethical standards.[49] In the guidelines given to authors, reference is only made to managing security-relevant risks for specific journals. For example, the authors' guidelines for the journal *Virology* state that the chief editorial office needs to be alerted to any DURC risks.[50] This office will then decide on the further course of action, e.g. consulting further experts.[51] *Wiley* introduced "Best Practice Guidelines on Research Integrity and Publishing Ethics" in 2014. Should ethical questions arise, authors can send their queries to a centralised email address, where they are forwarded to the respective experts. The editors are expected to ask their authors to notify them of a potential misuse of their research findings when they submit their manuscript. [52] The Association for Computing Machinery (ACM) has a "Code of Ethics and Professional Conduct". The code refers explicitly to possible harm caused by the misuse of research. Researchers are requested to weigh up all possible risks before the project and mitigate them as far as possible.[53] The American Association for the Advancement of Science (AAAS), which publishes renowned journals such as *Science* and *Science Advances*, aims to sensitise researchers to the potential misuse of research.[54] It launched a survey in 2019 to gauge researchers' sense of responsibility and also wants to join the international debate.[55] *SAGE Publications* refers ethical considerations to the Committee on Publication Ethics (COPE), a cross-institutional committee for ethical issues in publishing. The COPE guidelines[56] do not refer directly to DURC or the possible misuse of research. For specific ethical issues in relation to the publishing process, *SAGE* has also set up a centralised email address that authors and editors can contact.

49 See www.elsevier.com/authors/journal-authors/policies-and-ethics (last accessed: 9 September 2020).

50 See www.elsevier.com/journals/virology/0042-6822/guide-for-authors (last accessed: 9 September 2020).

51 See www.elsevier.com/journals/virology/0042-6822?generatepdf=true (last accessed: 9 September 2020).

52 See https://authorservices.wiley.com/ethics-guidelines/index.html (last accessed: 9 September 2020).

53 See www.acm.org/code-of-ethics (last accessed: 9 September 2020).

54 See www.aaas.org/resources/social-responsibilities-scientists-and-engineers-developing-global-survey (last accessed: 9 September 2020).

55 See www.aaas.org/programs/scientific-responsibility-human-rights-law/ethics-activities (last accessed: 9 September 2020).

56 See https://publicationethics.org/guidance/Guidelines (last accessed: 9 September 2020).

B. Handling of security-relevant research at German research institutions

1. Tasks and objectives of the Joint Committee

For the long-term implementation of their joint "Recommendations for Handling Security-Relevant Research" (Chap. A 3), the DFG and the Leopoldina decided to set up the Joint Committee on the Handling of Security-Relevant Research in 2014. In accordance with the decisions made by the presidiums of both organisations, the Joint Committee has the following mandate:

> **BOX 2.** "[...] 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 – German acronym) 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 sharing experience and knowledge. The responsibility for individual cases under discussion shall lie with the research institutions at which the work is being 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 regularly, usually two times a year but at least once a year. Statements and other papers such as the regular progress reports compiled by the Joint Committee are published in coordination with the presidiums of the DFG and the Leopoldina.

The Joint Committee comprises twelve scientists from various disciplines and institutions appointed by the presidiums of the DFG and the Leopoldina in mutual agreement. At least one member must be an expert on ethical issues and one on legal issues. The Joint Committee is headed jointly by the vice president of the DFG and the Leopoldina or by representatives appointed by the presidiums.

The Joint Committee office is based in the Leopoldina Presidential Office. In addition to the office expenses borne by the Leopoldina, the Joint Committee receives funding from the DFG, the Fraunhofer-Gesellschaft, the Helmholtz Association, the Leibniz Association and the Max Planck Society based on a cooperation agreement.

Chairpersons

PROF. BRITTA SIEGMUND (from 1 July 2020), Vice President of the DFG
PROF. FRANK ALLGÖWER (until 30 June 2020), Vice President of the DFG
PROF. BÄRBEL FRIEDRICH, appointed representative of the Leopoldina Presidium

Other members

PROF. STEPHAN BECKER, Philipps-Universität Marburg, Institute of Virology
PROF. ALFONS BORA, Bielefeld University, Faculty of Sociology
PROF. JOHANNES BUCHMANN, Technical University of Darmstadt, Department of Computer Science
PROF. MAXIMILIAN FICHTNER, Helmholtz Institute Ulm for Electrochemical Energy Storage
PROF. KATHRYN NIXDORFF, Technical University of Darmstadt, Department of Biology
PROF. LARS SCHAADE, Robert Koch Institute Berlin
PROF. ULRICH SIEBER, Max Planck Institute for Foreign and International Criminal Law, Freiburg
PROF. JUDITH SIMON, Universität Hamburg, Professor for Ethics in Information Technology
PROF. KLAUS TANNER, University of Heidelberg, Faculty of Theology
PROF. JOCHEN TAUPITZ, University of Mannheim, Faculty of Law and Economics

Office

LENA DIEKMANN, Project Coordinator, German National Academy of Sciences Leopoldina
DR JOHANNES FRITSCH, Head of the Joint Committee Office, German National Academy of Sciences Leopoldina
DR ANITA KRÄTZNER-EBERT, Scientific Officer, German National Academy of Sciences Leopoldina

Contact at the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation)

DR KATARINA TIMOFEEV, DFG
DR INGRID OHLERT, DFG

The progress reports of October 2016[57] and October 2018[58] provided extensive information on the work of the Joint Committee and on the status of implementation of the recommendations at the time. The Joint Committee held its constitutive meeting in February 2015 and has since convened eleven times. Representatives of the KEFs, the German Ethics Council, from bioethics, virology, from industry, a student initiative and from relevant federal ministries and federal government offices have been among those invited to attend the meetings. In order to fulfil its role as a coordinating platform for pooling information and creating transparency on the handling of security-relevant research, the Joint Committee set up an extensive public internet platform that it regularly updates and expands.[59] Publications and further information (e.g. special topics and case studies, legal parameters, relevant aspects of research funding and education and teaching) related to security-relevant research are also available here. The website also includes a list of contact persons at German research institutions, research associations and science associations who are responsible for questions related to the handling of security-relevant research as well as the local committees responsible for the ethical assessment of security-relevant research.[60] The list (see also Appendix 2) enables the public and political decision-makers to keep track of the efforts of German research institutions and organisations to address security-relevant research risks.

In order to assist German universities, research institutions and research associations in setting up KEFs and to ensure that the statutory tasks and powers of these committees are as uniform as possible, the Joint Committee drew up a set of model statutes for KEFs and published these.[61] The model statutes define the issues which require regulation in the view of the Joint Committee but should then be adapted in detail to fit the respective conditions at each location. For example, Section 6 Initiating Proceedings (1) of the model statute defines the specific cases where the KEFs should become active: "(1) Members of the university/institute/association [Name] shall consult the KEF before conducting a research project where such research project is associated with considerable security-relevant risks for human dignity, human life, health, freedom, property, the environment and peaceful coexistence. Security-relevant risks arise in particular in research which will foreseeably produce knowledge, products and/or technology that could be directly misused by third parties."

57 Available at: www.leopoldina.org/uploads/tx_leopublication/2016_GA_Taetigkeitsbericht_EN.pdf (last accessed: 9 September 2020).

58 Available at: www.leopoldina.org/uploads/tx_leopublication/2018_GA_Taetigkeitsbericht_EN.pdf (last accessed: 9 September 2020).

59 See: www.leopoldina.org/en/joint-committee (last accessed: 9 September 2020).

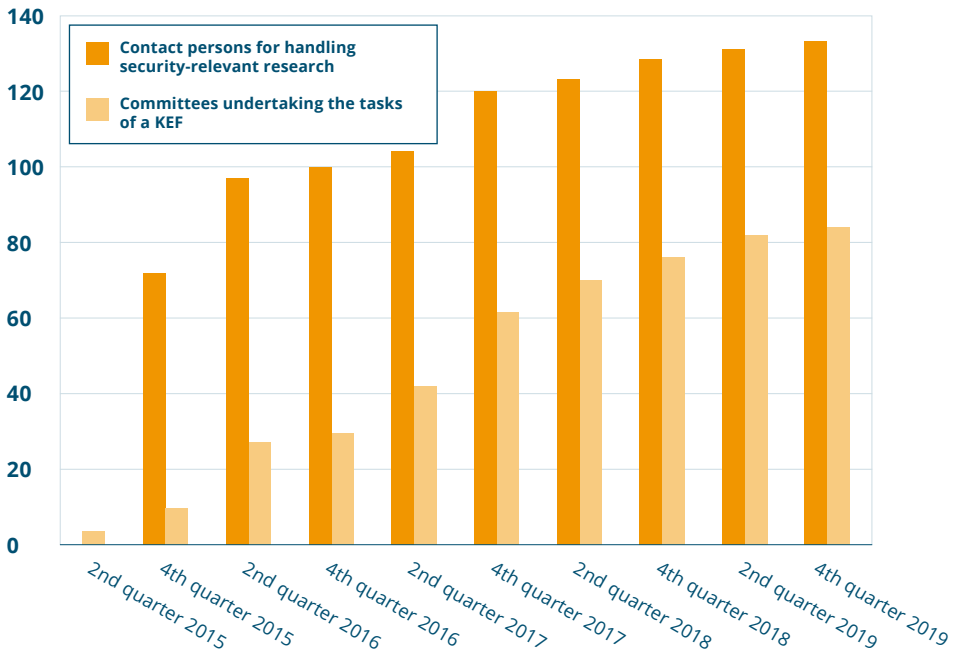
60 The list is available at: www.leopoldina.org/en/about-us/cooperations/joint-committee-dual-use/list-of-committees/ (last accessed: 9 September 2020).

61 The model statutes are available in the Appendix of the progress report from 2016 available at www.leopoldina.org/uploads/tx_leopublication/2016_GA_Taetigkeitsbericht_EN.pdf (last accessed: 14 December 2020).

2. Work of the committees for ethics in security-relevant research (KEFs)

As of 9 September 2020, the Joint Committee has received the names of 133 contact persons responsible for security-relevant research at German research institutions, research associations, science associations and one industry association. According to the information of the Joint Committee, 91 KEFs or comparable solutions have now been established across Germany. Figure 1 shows their growth since early 2015.

FIGURE 1



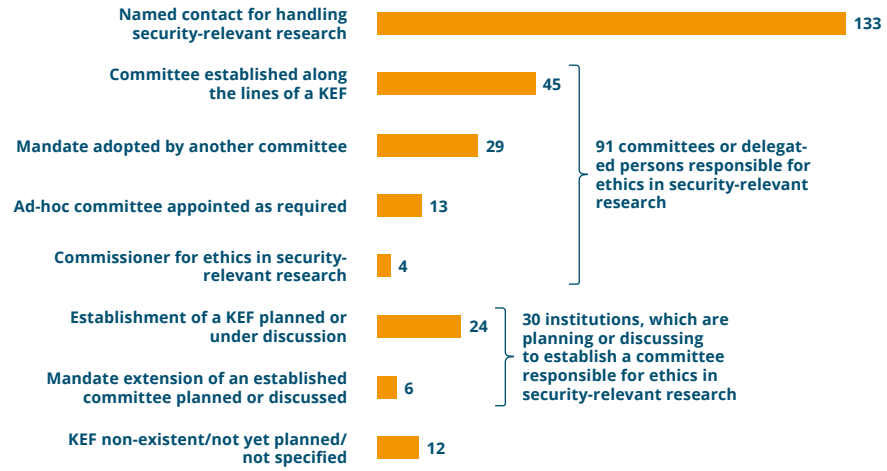
Growth over time of the number of contact persons named by German research institutions, research associations and science associations as responsible for the handling of security-relevant research and the number of committees for ethics in security-relevant research established from 2015 to 2020.

In order to receive up-to-date information on progress made in establishing KEFs or comparable solutions and to learn more about their particular working methods, composition, cases and issues, the Joint Committee conducts a survey among the contact persons every two years (see Appendix 3 for latest survey). The most recent survey[62], which covers the period from 2018 to 2019, was completed by 103 of the 133 contact persons overall.

62 The first written survey was conducted in late 2017.

The contact persons came from 66 universities and 33 non-university research institutions and departmental research institutes, while four contact persons came from other research institutions or science associations. Figure 2 shows the responses given to the question on progress made in establishing a KEF or comparable solution. Together with the answers in the questionnaires, the statistics also included the information that was already available on the website of the Joint Committee, which was provided mainly by the contact persons themselves.[63]

FIGURE 2



Response from contact persons responsible for the handling of security-relevant research on progress made in establishing a KEF or comparable solution received until 9 September 2020 by the Joint Committee (N = 133); further information and an updated response level is available at: www.leopoldina.org/nc/en/about-us/cooperations/joint-committee-dual-use/list-of-committees.

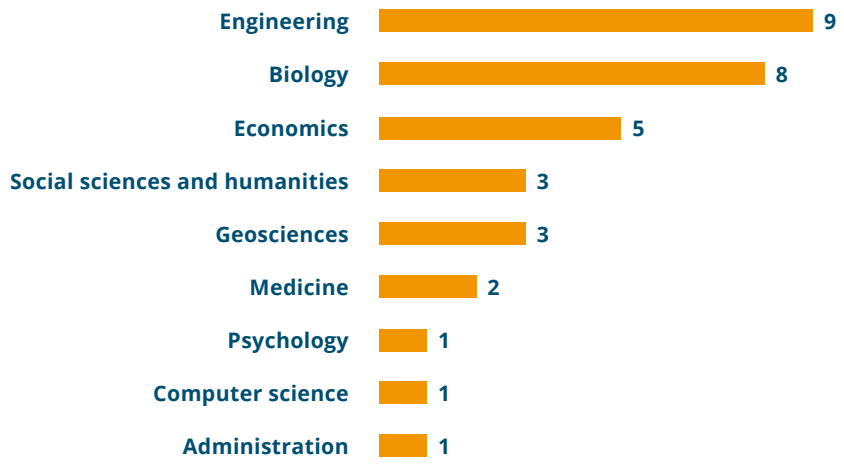
A total of 74 research institutions have so far established a permanent committee for ethics in security-relevant research. Slightly less than 50 percent of these committees have a wider mandate than that of a KEF. The University of Mannheim, for example, expanded its already existing ethics committee that focuses on psychological research and survey research to include aspects of security-relevant research.[64] In contrast to a newly established committee, this committee can benefit from the fact that working procedures are already in place and from the experience previously gained in evaluating ethical issues in research. The committee team is expanded when security-relevant cases are evaluated. At Technische Universität Dresden, the Senate Committee "Research and Young Scientists" can, when needed, call in ad-hoc experts

63 Available at: www.leopoldina.org/en/about-us/cooperations/joint-committee-dual-use/list-of-committees/ (last accessed: 9 September 2020).

64 See statutes of the Ethics Commission of the University of Mannheim of 15 December 2016. Available at: www.uni-mannheim.de/media/Universitaet/Dokumente/Organe_und_Gremien/Statut-Ethikkommision_2017.pdf (last accessed: 9 September 2020).

on security-relevant research. Humboldt-Universität zu Berlin has set up individual committees on ethics for all its faculties which are ready for consultation on demand. Thirteen research institutions use an ad-hoc committee to deal with ethics issues as they arise. Thirty institutions are either still discussing whether to establish a KEF or are planning to do so. The Leibniz Association has developed rules of procedure for a central Leibniz committee for ethics in research which started working in 2019. As well as providing advisory services to the Leibniz institutes, this KEF is in charge of assessing research projects where the clarification of security-relevant risks has "a demonstrable relevance beyond the individual case in question in a key field of research of the Leibniz Association".[65] The Leibniz institutes are also called upon to set up their own KEF where needed. Within the Helmholtz Association, a total of nine Helmholtz Centres have established KEFs. The Max Planck Society has set up one KEF for all 84 Max Planck Institutes. The Fraunhofer-Gesellschaft set up a central Fraunhofer Committee on Ethics in Security-Relevant Research in 2019.[66]

FIGURE 3



Number and professional affiliation of potentially security-relevant research projects discussed in 2018 and 2019 in the KEFs, according to the Joint Committee's survey (N= 33, see Appendix 3).

65 See www.leibniz-gemeinschaft.de/en/about-us/leibniz-integrity/research-ethics.html (last accessed: 9 September 2020).

66 See www.fraunhofer.de/en/about-fraunhofer/corporate-responsibility/research-and-development/ethics-committee-for-security-relevant-research.html (last accessed: 9 September 2020).

At least four research institutions have commissioners for ethics in security-relevant research instead of a committee who are available to researchers if they have questions regarding security-relevant research. Some institutions have decided to jointly operate a KEF. The Bernhard Nocht Institute Tropical Medicine, the Heinrich Pette Institute and the Research Center Borstel have established a joint committee. The Hanover University of Music, Drama and Media has agreed to consult the committee of the Hanover Medical School if required. The survey responses revealed that 13 committees responsible for the ethical issues of security-relevant research had met between 2018 and 2019 to discuss specific cases of security-relevant research. Some security-relevant cases were also discussed by the institutions' legal department, the office of the vice chancellor or the vice president for research. Overall, the survey shows that within this period a total of 33 potentially security-relevant research projects were addressed (Figure 3).

Taking into account the results of the Joint Committee's survey in late 2017, a total of 59 research projects were evaluated by the KEFs or comparable solutions between 2016 and 2019, although both surveys also revealed that security-relevant projects *of concern* as defined by the Joint Committee (Chap. A 1, Box 1) remain rare exceptions in the field of academic research. The KEFs almost exclusively addressed the compatibility of the research with basic constitutional principles or the basic rules of the respective research institution and dealt with issues of data security and export control. They evaluated the security-relevant risks in connection with research funding provided by sponsors with military associations and risks that could arise from cooperation with partnerships that have military associations.

Of the 33 security-relevant research projects discussed between 2018 and 2019, 30 were approved by the respective committees. In the vast majority of cases, a direct potential for misuse was not seen, either because the committee considered the project in question to involve purely basic research, the potential for misuse was deemed to be low, the project promised a clear benefit for civil society or the measures to minimise risks were considered adequate and easy to implement. In one research institution, security-relevant projects (e.g. research on high-performance processors, on the analysis of aerial photos and on automated person recognition) were checked by the department for purchasing and sales. Statements were procured from the cooperating institutions confirming that the projects were for basic research or research for civilian purposes. The respective cases were then discussed by the presidium. Other projects (e.g. automated driving or machine learning) were submitted to the legal department, as they included foreign trade issues, particularly regarding the formulation of contracts and visiting scientists. Local export officers were also contacted who then procured the respective zero notices from the BAFA.

Six of the cases discussed between 2018 and 2019 where only approved under certain conditions. For example, the committees recommended that the project leaders draw up a joint statement with their cooperation partners or a cooperation agreement stating that the research would only be conducted for peaceful and civilian purposes and that they would refrain from developing any military applications. The recommendation in a different case was to improve data protection. In another case, the experts requested the project to be resubmitted before being sent for publication so they could consult again in the event of an increase in virulence of the organisms used.

One project from the field of social sciences and the humanities and two projects from engineering sciences were given a negative vote by the committees between 2018 and 2019. In two projects, the reason for the decision was that a key team member of the planned project was directly connected to a military institution of an authoritarian regime or the funding party had definite military connections. The negative vote for the third project was based on the committee's belief that the project could have enabled the dissemination of anti-constitutional information.

Some institutions used the survey to express their wish for specialised training courses on the ethics of security-relevant research. Others expressed their hope that the event formats organised by the Joint Committee so far, including workshops, KEF Forums and specialist conferences, would continue. A further request was the option to receive competent consultation directly from the Joint Committee in particularly difficult cases. Additional feedback included the desire for more information material, reasoning aids, and a uniform checklist for evaluating security-relevant research. The Joint Committee has responded by using its experience and the response of the KEFs to develop "Key questions for the ethical assessment of security-relevant research" (see Chap. B 3.2).

3. Key questions and checklists for the ethical assessment of security-relevant research

3.1 Review of existing key questions and checklists

According to the latest survey of the KEFs (Chap. B 2) and telephone interviews, 14 research institutions use checklists or key questions in their application procedures to approve or consult on security-relevant aspects of research projects (see Appendix 3, Question 32). In the respective documents that are publicly accessible, different key areas depending on the profile of the research institution and the type of committee involved are covered. The focus of the application documents in the "traditional" ethics committees, whose mandate alongside medical and psychological queries has been extended to include security-relevant aspects of research, is still largely on the

wellbeing of test persons.[67] In the field of life sciences, in contrast, the corresponding key questions and checklists have a clear focus on biosafety and biosecurity.[68] For other institutions, such as the Technical University of Darmstadt[69] and the University of Göttingen[70] the focus is rather on the compatibility of the research project with the respective civil clause (Chap. A 4). Although some committees on ethics reported that their mandate had been expanded to include the handling of security-relevant research, no concrete references to this topic could be found in the respective publicly accessible application forms.

So far, no research institution seems to have developed key questions or checklists for the interdisciplinary ethical assessment of security-relevant research. According to the responses provided, the documents do however include recurring themes that play a decisive role in the assessment process. These include questions on:

- Violations against legal regulations, guidelines, codes of conduct
- Involved researchers and external sponsors, e.g. international and military cooperation partners
- Weighing up the risks and benefits, e.g. the probability that damage will be incurred, possible level of damage, other measures to minimise risks and the possible consequences of not conducting the research project
- The objectives and purposes of the research and the possible unintended use by third parties
- Classifying research as basic research or assessing the proximity to application and the corresponding direct potential for misuse

Based on these themes and the experience gained over the last five years in the handling of security-relevant research at German research institutions, the Joint Committee has developed the following "Key questions for the ethical assessment of security-relevant research" (Chap. B 3.2).

67 See Carl von Ossietzky Universität Oldenburg (2019). Accompanying overview form for applications. Available at: https://uol.de/fileadmin/user_upload/gremien/EK/2019-05-09-Vollantrag-EK.docx (last accessed: 9 September 2020).

68 See Robert Koch Institute (2013). Hausverfügung: Dual-Use-Potenzial in der Forschung - Verfahrensregel zur Vermeidung und Minimierung von Risiken. (Internal order: dual-use potential in research – code of conduct to avoid and minimise risks.). Available at: www.rki.de/DE/Content/Forsch/Dual-Use-Risiken/hausverfuegung.html (last accessed: 9 September 2020); Paul-Ehrlich-Institut (2018). Leitfaden für den Umgang mit potenziell sicherheitsrelevanter Forschung – Anhang 10 der Organisationsverfügung 2015-0 1-V03 „Grundlagen für wissenschaftliches Arbeiten und Handeln am Paul-Ehrlich-Institut" (Guideline for handling potentially security-relevant research – Appendix 10 of the Administrative Order 2015-0 1-V03 "Basic Principles for Scientific Work at the Paul-Ehrlich-Institut), (not available online); Hanover Medical School (2015). Questionnaire for DURC-relevant research (not available online).

69 Technische Universität Darmstadt (2019). Checkliste zur Selbsteinschätzung/Dokumentation eines Forschungsvorhabens in Bezug auf die Zivilklausel. (Checklist for the self-assessment / documentation of a research project in relation to the civil clause). Available at: https://www.intern.tu-darmstadt.de/gremien/ethikkommisson/formulare_8/index.de.jsp#text bild_1 (last accessed: 9 September 2020).

70 Georg-August-Universität Göttingen (2020). Hinweise zur Antragsstellung. (Tips for applications.) Available at: www.uni-goettingen.de/de/kurzhinweise+zur+antragsstellung/620559.html (last accessed: 9 September 2020).

3.2 Key questions for the ethical assessment 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 of 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 applies particularly to so-called "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.[71]

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".[72] They consult on issues of data security and foreign trade legislation (export control). The KEFs also assess the security-relevant risks connected to research funding from sponsors with military associations or with military non-disclosure, and security-relevant risks which could arise from cooperation with researchers with military associations or from authoritarian regimes.

The following key questions were developed by the Joint Committee on the basis of the responses received from the KEFs about their work between 2016 and 2019 and the published checklists and guidelines.[73] In the view of the Joint Committee, the answers of the researchers and the KEFs and the consequences drawn for the research in question should always bereached on a case-by-case basis, under consideration of individual framework conditions for research on site and the individual ethical assessment. The Joint Committee does not want to prescribe generally valid ethical criteria or "red lines" but primarily aims to sustainably strengthen the independent handling of security-relevant research risks in science.

71 Further information on security-relevant research and the work of the KEFs are included in the Progress Report of the Joint Committee, available at: www.leopoldina.org/en/about-us/cooperations/joint-committee-on-dual-use/dual-use-progress-reports/ (last accessed: 9 September 2020).

72 See "Guidelines for Safeguarding Good Research Practice" (DFG, Stand: 01.08.2019). Available at: www.dfg.de/download/pdf/foerderung/rechtliche_rahmenbedingungen/gute_wissenschaftliche_praxis/kodex_gwp_en.pdf (last accessed: 9 September 2020).

73 See "Code of Conduct: Working with Highly Pathogenic Microorganisms and Toxins", (DFG Senate Commission Basic Principles of Genetic Research 2013). available at: www.dfg.de/download/pdf/dfg_im_profil/reden_stellungnahmen/2013/130313_verhaltenscodex_dual_use_en.pdf (last accessed: 9 September 2020); Scientific Freedom and Scientific Responsibility – Recommendations for Handling-Security-Relevant Research (DFG and Leopoldina 2014). Available at: www.leopoldina.org/en/publications/detailview/publication/wissenschaftsfreiheit-und-wissenschaftsverantwortung-2014/ Aid to Fill Out the Civil Clause Checklist of the TU Darmstadt (Version of: 5 November 2014). Available at: https://www.intern.tu-darmstadt.de/gremien/ethikkommisson/formulare_8/index.de.jsp#text bild_1 (last accessed: 9 September 2020); Internal Guidelines of the Paul-Ehrlich-Institut for the Handling of Potentially Security-Relevant Research.

1. Key questions for researchers indicating that they need to consult a KEF

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 that cooperation partners involved in your research project will cause security-relevant risks in the above-mentioned meaning?
1.3 Does the research project conflict with legal regulations[74] and thus need to be referred to compliance office alongside a KEF?

2. Key questions for processing the query by the KEF

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[75] 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[76] available?
2.7 What are the potential harmful consequences[77] of not carrying out the research project?

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

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 Is 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?

74 E.g. regular criminal law, export control legislation and export provisions of the German Federal Office of Economics and Export Control (BAFA), the Biological Weapons Convention and the Chemical Weapons Convention, the protection of human rights, humanitarian international law, rules of war, prohibition of torture and violence, Biodiversity Convention.

75 To be considered here are e.g. the necessary capabilities, specialist knowledge and technical equipment for misuse.

76 E.g. measures of recovery and traceability and damage limitation.

77 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?

4. Integrating the ethical considerations of security-relevant research in education and teaching

Researchers can only make an adequate assessment of the security-relevant aspects of their work if they understand the problems involved and are aware of any potential risks. Surveys and studies by the National Research Council of the United States on life sciences have shown that the majority of researchers were not able to actively reflect on the security-relevant aspects of their work because they lacked the necessary awareness to do so.[78] The survey of the Joint Committee (Chap. B 2) also found that very few institutions include the topic of security-relevant research in their teaching. Many institutions would like the Joint Committee to provide relevant material and training to consolidate the topic in their courses.

In order to sensitise students to the ethical dimensions of security-relevant research at an early stage, higher education institutes and universities should incorporate the topic in their teaching and in the curricula of all relevant courses of study. This could be carried out as follows: 1. Bachelor's degree courses could include interdisciplinary security-relevant aspects of research in general lectures on "good scientific practice" and on basic issues of ethics in science. 2. Masters' degree courses could then include seminars on the specific ethical and security-relevant aspects of their own subject, both on the theoretical level and using case studies (see Appendix 1). 3. PhD candidates, in particular, as well as postgraduates and staff involved in research could additionally be instructed on the specific risks of their research in group seminars, further training measures, summer schools or graduate schools.

The Technical University of Dortmund has already included a mandatory module on ethics in its masters' degree programmes in bioengineering and chemical engineering. This module teaches the basics of practical philosophy as part of professional training and focuses on conflict decisions. Codes of conduct from the chemical industry are discussed and current ethical topics in the technical sphere are debated.[79] The Institute of Philosophy at the University of Potsdam offered a seminar entitled "Research Ethics" in its winter semester 2019/2020, which also addressed the conflict between research freedom and security concerns. The module included questions for individual researchers, the scientific community and science as a whole.[80]

The Hamburg University of Technology offers its Bachelor's and Master's students a wide range of courses on responsible conduct and ethics in engineering. In the winter semester 2019/2020, it held the seminars "Responsible Conduct in Technology and

78 National Research Council (2010): Challenges and Opportunities for Education about Dual Use Issues in the Life Sciences. Available at: www.nap.edu/catalog/12958/challenges-and-opportunities-for-education-about-dual-use-issues-in-the-life-sciences (last accessed: 9 September 2020).

79 See https://www.bci.tu-dortmund.de/cms/Medienpool/Lehre_Studium/Modulhandbuecher/MHB_PO_2019_nov.pdf (last accessed: 9 September 2020).

80 See https://puls.uni-potsdam.de/qisserver/rds?state=verpublish&status=init&vmfile=no&moduleCall=webInfo&publishConfFile=webInfo&publishSubDir =veranstaltung&veranstaltung.veranstid=77068&expand=158634 (last accessed: 9 September 2020).

Science", "Ethics for Engineers", "Ethics and Science" and "Technological Impact Assessment (TFA) and Technological Development Research".[81]

The Department of Biology of the Julius-Maximilian-Universität of Würzburg has scheduled a seminar on "Legal and ethical issues in the biosciences" for the summer semester of 2020. One session will be entitled "Ignorance is no protection" and will focus on biosecurity aspects, among other things. Further seminar units address issues such as new methods in genetic engineering and neuroenhancement.[82]

The Department of Computer Science of the Technical University of Munich ran the seminar "Ethics for nerds" in the winter semester 2019/20.[83] The seminar discussed issues including the risks of IT research, including deep fakes (see Chap. A 2) and modern weapon systems. On its website, the German Informatics Society presents case studies on ethical problems that can arise in IT research. A detailed description of each case is followed by ethical questions that could e.g. be discussed by students in seminars.[84] The Department of Computer Science at Universität Hamburg has a separate "Ethics in Information Technology" unit providing a wide range of courses.[85]

Several institutions have created self-training material for students, PhD candidates and researchers to work through by themselves. The University of Bradford, for example, offers a modular Education Tool on bioethics, which provides extensive information on DURC and biosecurity and presents several case studies on the misuse of biological research. It also includes detailed introductory texts. At the end of each module there are questions for the participants to answer.[86] The University of Bath provides a more interactive course with an online training module on the online platform FutureLearn. The six-week course includes short videos featuring interviews with experts, discussions, texts and quizzes.[87] The Friedrich-Loeffler-Institut has a training course on its website with 42 slides on the topics of DURC and biosecurity.[88] The Joint Committee has also made sets of slides available on its website for education and training purposes. These present the mandate and the work of the Joint Committee along with explanations of the relevant terms and parameters and detailed case studies.[89]

81 See Modulhandbuch Nichttechnische Ergänzungskurse im Bachelor im Wintersemester 2019/20 https://studienplaene.tuhh.de/po/Ueberfachlich/mhb_NTWBS_kh_w19_v_0_de.pdf (last accessed: 9 September 2020); Modulhandbuch Nichttechnische Ergänzungskurse im Master im Wintersemester 2019/20 https://studienplaene.tuhh.de/po/Ueberfachlich/mhb_NTWMS_kh_w19_v_0_de.html (last accessed: 9 September 2020).

82 See https://www.biozentrum.uni-wuerzburg.de/biocareers/schluesselqualifikationen/lehrveranstaltungen-an-der-fakultaet-fuer-biologie (last accessed: 9 September 2020).

83 https://www.in.tum.de/caps/lehre/ws19/seminare/ethics/ (last accessed: 9 September 2020).

84 See https://gewissensbits.gi.de/ (last accessed: 9 September 2020).

85 See www.inf.uni-hamburg.de/en/inst/ab/eit/teaching.html (last accessed: 9 September 2020).

86 See www.brad.ac.uk/acad/sbtwc/dube/resource/index.html (last accessed: 9 September 2020).

87 See https://www.futurelearn.com/courses/biosecurity (last accessed: 9 September 2020).

88 See www.openagrar.de/servlets/MCRFileNodeServlet/openagrar_derivate_00021573/FLI_DURC101_Engl.pdf (last accessed: 9 September 2020).

89 See https://www.leopoldina.org/fileadmin/redaktion/Ueber_uns/Kooperationen/Slides_security-relevant_risks_in_research.pptx (last accessed: 9 September 2020).

C. Events and other activities of the Joint Committee

1. Discussion evening: Security instead of freedom – research between new findings and increasing risks

On 1 April 2019, the Joint Committee held a discussion evening in Berlin entitled "Security instead of freedom – research between new findings and increased risks" as part of the Alliance of Science Organisations in Germany's campaign "Freedom is our system"[90] marking the 70th anniversary of the German constitution and the scientific freedom it guarantees.[91] The event focused on topics such as who is responsible when research findings in the field of artificial intelligence (AI) have unintended harmful consequences and whether self-regulated restrictions for researchers are sufficient to prevent dystopian scenarios of malicious use.

Following an introduction on the work of the Joint Committee by Johannes Fritsch, science fiction author Andreas Brandhorst presented a dystopian scenario on AI in which he postulated that mankind was already on the brink of destruction and in danger of losing control of its own technology. In the concluding panel discussion, chaired by science journalist Verena Gonsch, Andreas Brandhorst and Joint Committee member Jochen Taupitz discussed the general risks of scientific progress for society. Taupitz referred to the great value of scientific freedom and argued in favour of making the most of the opportunities presented by research. To prevent malicious use, he said restrictions should rather be placed on the application of the findings, e.g. within the framework of criminal law. While Andreas Brandhorst warned against the dangers of overlooking and underestimating the potential for malicious use that is a byproduct of the rapid technological developments of the last 25 years, Jochen Taupitz recommended strengthening self-governance in science, which he regards as a highly effective tool. The mixed audience participated enthusiastically in the discussion. One IT scientist claimed that AI applications are a long way off from being "intelligent" and that researchers prefer to use terms such as "machine learning" or "pattern recognition" in this context. He emphasized that AI has not yet reached the point where it can make independent decisions or manipulate its environment. A medical ethicist recommended the approach taken in medical research, which focuses more on the benefits of new developments rather than on speculative risks.

90 The website of the campaign is available at: https://wissenschaftsfreiheit.de (last accessed: 9 September 2020); also available there are the 10 principles for the freedom of science. The fourth principle states: "Free science is not above the law. Legal and ethical limits and restrictions placed on research will be scrutinised in light of social developments and discussions, such as when animal testing, issues of human genome research, or artificial intelligence are involved. When conducting ethically sensitive research, scientists must always carefully weigh the opportunities against the risks their activities entail. Scientific institutions support these processes with ethics commissions and advisory structures."

91 More information on the event is available at: www.leopoldina.org/ueber-uns/kooperationen/gemeinsamer-ausschuss-dual-use-2/dual-use-veranstaltungen/dual-use-sicherheit-statt-freiheit (last accessed: 9 September 2020).

2. Student workshop and international conference: The mystery of risks – How can science help reconcile perception and assessment?

The Leopoldina's international conference format "Crossing Boundaries in Science" aims to identify research areas at an early stage that are particularly dependent on interdisciplinary collaboration. The second conference in the series was organised by the Joint Committee with the financial support of the Alfried Krupp von Bohlen und Halbach Foundation. It was entitled "The mystery of risks – How can science help reconcile perception and assessment?" and was held from 4 to 6 July 2019 in Potsdam.[92] Among the key issues addressed was the role of science in assessing and evaluating risks that are relevant to society but tend to be generally misperceived and what can be done the improve the situation.

In the run-up to the conference, the Joint Committee, together with Filippa Lentzos from King's College London, held the workshop "Risk Governance and the Role of Science and Humanities" to raise awareness of the ethical aspects of security-relevant research among students from Germany, Austria, Belgium, China and the United Kingdom. The workshop also prepared students for the contents of the conference so that they could participate in the discussions and report on the lectures afterwards as part of the official conference programme.

The speakers at the conference addressed issues including the social construction of risks and the heterogeneous and subjective perception of them. Another question was whether the precautionary principle curbs scientific progress. The misperception of risks was then discussed among scientists from sociology, economics, psychology, medicine, meteorology and biology and other fields. In his keynote lecture, Ortwin Renn focused on systemic risks related to natural events, environmental threats, financial crises and cyber risks. Following his introduction to these types of risks, which tend to be under or overestimated by the general public, other speakers elaborated on them in greater depth. The social construction of risks plays a large role here, particularly as they tend to be rated on the basis of emotions rather than facts. This explains why a large part of society wrongly regards terrorism as a greater risk than car accidents. The task of science, the speakers explained, is to try and clear up these misperceptions by providing clear and objective information on such risks.

92 More information on the event is available at: www.leopoldina.org/ueber-uns/kooperationen/gemeinsamer-ausschuss-dual-use-2/dual-use-veranstaltungen/dual-use-the-mystery-of-risks (last accessed: 9 September 2020).

3. Forum for the committees for ethics in security-relevant research (KEFs)

The objective of the second KEF Forum[93] of the Joint Committee on 2 September 2019 held on the island of Riems was to facilitate communication and exchange of experience among the KEFs. The idea was to examine specific security-relevant research projects that the KEFs had already conclusively consulted on and discuss related topics such as export control.

After a tour of the high-security facilities of the Friedrich-Loeffler-Institut (FLI) by the FLI President Thomas Mettenleiter, the Joint Committee chairpersons Bärbel Friedrich and Frank Allgöwer gave an introduction into the problematic issues of security-relevant research, the legal framework for research and the work of the Joint Committee. A representative of the DFG, responsible for dual use issues in funding allocation, explained the funding guidelines and requirements of the DFG regarding DURC. Last year, for example, the DFG received a funding application for a research project from the field of materials research. As the project was linked to a military research institution in China, the local KEF was asked to provide a statement, which ultimately gave the go-ahead for the project under some minor conditions including a usage agreement.

A representative of the University of Greifswald and the chair of the Biorisk Committee of the FLI presented the work of the Biorisk Committee. The committee has been focusing on the ethical considerations around work to produce synthetic filoviruses, which are classified at the highest biosecurity level 4. The key question is whether unknown viruses, which may have a very high-risk potential and of which we only know the genome sequence from the tissue of dead bats, may be "awakened to life". After weighing up the security-relevant concerns of the project, the committee decided to allow this kind of filovirus to be synthetically produced and analysed so that we can learn more about the naturally occurring variations of the virus. However, the committee also requested another ethical assessment on the potential for misuse prior to publication of the project's findings.

A member of a university-based KEF presented its consultation procedures on two research projects that would be carried out with funding from the US Ministry of Defense in one case and from a foundation with military ties in the other. In the first case, the KEF issued an obligation to publish the findings in order to ensure that findings of military relevance would not be kept secret. In the second case, the project was rejected on account of late submission and a poor risk-benefit analysis.

The scientific director of the Leibniz Institute DSMZ (German Culture Collection of Microorganisms and Cell Cultures) presented the work of the two commissioners for ethical aspects of security-relevant research at DSMZ. The commissioners hold training courses for employees and visiting scientists and review orders related to

93 More information on the event is available at: www.leopoldina.org/ueber-uns/kooperationen/gemeinsamer-ausschuss-dual-use-2/dual-use-veranstaltungen/dual-use-2-kef-forum (last accessed: 09.09.2020).

pathogenic agents. They said that this complex procedure was not suitable for a KEF to manage as an ad-hoc response was often required. DSMZ has developed an individual Code of Conduct for this purpose that has been adopted across the Leibniz Association. Since February 2019, the Leibniz Association also has a Committee for Ethics in Research that is responsible for all Leibniz institutes and addresses overarching security-relevant issues that cannot be solved by a regional KEF.

The general discussion at the end of the KEF Forum showed that the growing number of applications to the KEFs with an international perspective and questions regarding export control and compliance with the regulations of the BAFA (Chap. A 4) present major challenges to the research institutions. If this trend continues, they will probably need to establish export commissioners and compliance offices. In some fields of research, a marked lack of awareness of the potential for malicious application of research findings and methods has been noticed, as ethical aspects have only rarely featured in study courses until now. The Association of North German Universities is already responding with a vibrant discussion on developing specific teaching methods and content on this subject.

4. Participation of the Joint Committee in public debates and other events on handling security-relevant research

Between October 2018 and September 2020, the Joint Committee members and office staff actively participated in public debates and other events on the handling of security-relevant research with the following contributions:

- Lecture at the networking event of the German Data Forum (RatSWD) on 9 November 2018 in Berlin
- Presentation of the Joint Committee's progress report to the Permanent Senate Commission on Genetic Research of the DFG on 13 December 2018 in Bonn
- Meeting of the Joint Committee on 16 January 2019 in Berlin
- Participation in the annual conference of the "Working Group on Disarmament and Non-Proliferation of Biological and Chemical Weapons" on 29 January 2019 in Berlin
- Sharing experience with a diplomatic delegation from Bahrain at the Federal Foreign Office on 7 March 2019 in Berlin
- Lecture at the "2nd Annual Biorisk Management Symposium – BIORIM 2019" on 2 April 2019 in Tunis
- Lecture at the international conference "Rethinking Arms Control" of the Federal Foreign Office on 15 March 2019 in Berlin

- Organising the discussion evening “Security instead of freedom” on 1 April 2019 in Berlin as part of the campaign of the Alliance of German Scientific “Freedom is our system”
- Lecture at the senate meeting of the German Rectors’ Conference on 25 June 2019 in Berlin
- Organising the student workshop “Risk Governance and the Role of Science and Humanities” on 4 July 2019 in Potsdam
- Organising the international conference “The mystery of risks – How can science help reconcile perception and assessment?” on 4 – 6 July 2019 in Potsdam
- Status report on the handling of security-relevant research in German science at the expert meeting MX2 on the United Nations Biological Weapons Convention on 31 July 2019 in Geneva
- Organising the second KEF Forum on 2 September 2019 at the Friedrich-Loeffler-Institut on the island of Riems
- Meeting of the Joint Committee on 3 September 2019 in Greifswald
- Participation in a panel discussion “The future of science” at the closing event of the campaign “Freedom is our system” on 26 September 2019 in Berlin
- Lecture at the conference “Science Peace Security ’19”, 27 – 29 September 2019 in Darmstadt
- Conducting a written survey of the KEFs on their work during 2018 – 2019 (see also Appendix 3)
- Lecture at the workshop “Securing the Biological Weapons Convention regime: preparing for the next steps” of the Academic Network for European Security Studies, 16 – 17 December 2019 in St. Petersburg, Russia
- Meeting of the Joint Committee on 10 February 2020 in Berlin
- Participation in the annual conference of the “Working Group on Disarmament and Non-Proliferation of Biological and Chemical Weapons” on 12 February 2020 in Berlin
- Participation in the video conference “Technical Expert Group on compliance guidelines for research organisations” of the European Commission on 24 June 2020
- Impulse statement in video conference of the World Health Organization “Consultation on Dual Use Research and Dual Use Research of Concern” on 6 July 2020
- Publication of the conference volume “The mystery of risks — How can science help reconcile perception and assessment?” on 4 December 2020
- Organising the event “Opportunities and Risks of Chemical Research” on 7 September 2020 in Frankfurt am Main (postponed due to the coronavirus pandemic to spring 2021).

D. Results and future tasks of the Joint Committee

The observance of ethical principles in security-relevant research is becoming an increasing priority at both the national and international level. This is reflected in the growing number of programmes and bodies dedicated to addressing these issues (see Chap. A 2, A 5 and A 6). The aspects of export control and research collaboration with foreign partners (Chap. A 4) are gaining particular attention from German policy-makers and research funding. Security-relevant research and the associated risks are developing at a dynamic pace, with additional momentum through new synergies between different disciplines such as AI research, engineering sciences and molecular biology (Chap. A 5). In line with its mandate (Chap. B 1), the Joint Committee will continue to monitor security-relevant research, identify potential areas for action and advise the DFG and Leopoldina on these issues.

1. Long-term strengthening of self-governed handling of security-relevant research

The work of the Joint Committee, particularly its efforts to strengthen the self-governed handling of security-relevant aspects of research at German research institutions (Chap. B 2), is highly valued by the presidiums of the DFG and Leopoldina. Non-university research organisations, too, endorse its work. Alongside Leopoldina and DFG, the Fraunhofer-Gesellschaft, the Helmholtz Association, the Leibniz Association and the Max Planck Society are all encouraging their members to implement the objectives of the Joint Committee. They have expanded their management procedures for security-relevant research and are supporting the office of the Joint Committee on the basis of a cooperation agreement.

As described in Chapter B 2, the Joint Committee has gathered a list of more than 130 contact persons over the last five years who are responsible for the handling of security-relevant research at German research institutions, organisations, science associations and an industry association. More than 90 committees or commissioners have been appointed as responsible for the ethical assessment of security-relevant research. However, the surveys and research of the Joint Committee have also revealed some shortcomings. Many research institutions still lack mechanisms to ensure the acceptance and visibility of the KEFs and to secure the continuity of the relevant procedures. The latter point is crucial to ensure that the expertise gained in the handling of security-relevant research does not get lost, for example when there is a change of staff in the vice chancellery or vice presidency for research and teaching, or if there is a change in the legal framework at universities. This means that even once KEFs have been established nationwide, it will still be a key task of the Joint Committee to monitor the professional handling of security-relevant research at German research institutions. The Joint Committee will also continue to serve as the contact point for queries and as a platform for the structured exchange of information among the KEFs. To achieve this, the Joint Committee will maintain contact e.g. through info mails and surveys (Chap. B 2) with the contact persons and KEFs, hold KEF Forums (Chap. C 3) and events on current topics (Chap. C 1 and C 2) and regularly update and expand its pro-

fessional and already very extensive public online platform[94] (Chap. B 1). Holding the student workshop (Chap. C 2) directly before the international conference proved to be an effective method of raising awareness of the ethical aspects of security-relevant research among young scientists and of giving them insights into the tasks of the Joint Committee and the KEFs. Specialist events such as the event "Freedom and responsibility in the IT sciences" and the planned event on the opportunities and risks of chemical research contribute to increasing awareness of security-relevant research areas in the scientific community through the involvement of the corresponding DFG expert groups.

The Joint Committee will also examine ways it can support the professional training and further training courses on the ethical aspects of security-relevant research requested by the contact persons and KEFs, and how it can best contribute to drawing up best practices for KEFs that go beyond the guidelines for the ethical assessment of security-relevant research (Chap. B 3.2). To this end, it will analyse the positioning, organisation and procedures of the various KEFs that have been established so far.

2. Monitoring and needs-based advisory services for the KEFs

Between 2016 and 2019, the KEFs or comparable bodies addressed at least 59 security-relevant cases (Chap. B 2). Only five of these cases were given a negative vote. The surveys showed that security-relevant research of concern as defined by the Joint Committee (Chap. A 1, Box 1) remains the rare exception in academic research, although there are numerous overlaps with other security-relevant issues. As outlined in Chapter B 2 and Chapter B 3, the KEFs are increasingly addressing the compatibility of research with constitutional principles or the basic regulations of the respective research institution and with the "DFG Guidelines for Safeguarding Good Research Practice". They deal with questions related to data protection and export control. The KEFs have also been asked to assess the security-relevant risks of research projects funded through sponsors with military ties or involving military secrecy, as well as security-relevant risks that arise from collaboration with researchers with military ties or from authoritarian states.

The Joint Committee is available to advise the KEFs on the challenging assessment of these issues, particularly when they fail to reach agreement on controversial security-relevant research projects.

In such cases, the Joint Committee can provide contacts to suitable experts to advise them or set up regional forums where KEFs can exchange knowledge and experience. The Joint Committee will continue to collect the experience gained from the work of the KEFs and use it to prepare e.g. further sample texts or general guidelines (Chap. B 3).

94 See www.leopoldina.org/en/joint-committee (last accessed: 9 September 2020).

At least 30 German research institutions are still discussing suitable procedures for the handling of security-relevant research at side or are still in the process of setting up a KEF (Chap. B 2). It should be possible to close this gap in the foreseeable future. Communication between contact persons and the Joint Committee office frequently reveals that the prospect of setting up a KEF is initially regarded as an additional bureaucratic burden and obstacle for academic research. In many of these cases, in-depth discussions and the events held by the Joint Committee have allowed the contact persons to see the advantage of having a KEF as an advisory service for researchers and as an ethical safeguard and backing for their research projects. Other advantages include fostering the ability to reflect on security-relevant and ethical issues, an increase of transparency in research, and the role of the KEF as a crisis management tool in the event that a research project unfolds unexpected potential for malicious use. The Joint Committee and its office will continue to work towards the establishment of further KEFs or comparable solutions at the remaining 100-odd relevant German research institutions (above all universities of applied sciences) and offer advisory services where needed.

In line with its mandate (Chap. B 1), the Joint Committee will recommend the establishment of an ad-hoc working group to the Leopoldina presidium in matters of overriding relevance. In close collaboration with the Joint Committee, this working group will then conduct an in-depth risk-benefit assessment and draw up a statement with recommendations on the further course of action. Here too, the Joint Committee will carefully analyse emerging security-relevant research areas to identify any need for action.

3. Measures to raise awareness for security-relevant aspects of research

The designation of numerous contact persons and committees as responsible for the ethical aspects of security-relevant research and the discussions this has triggered at the research institutions can already be regarded as an advancement in raising awareness for security-relevant aspects in research. In the Joint Committee's latest survey (Chap. B 2), however, more than half of those surveyed rated the visibility of the KEF at their own institution on a scale of 0 (not visible at all) to 100 (very visible) as 50 or even much lower (see also Appendix 3, Question 14). If researchers are not aware of the ethical dimensions of security-relevant research and the procedures that apply at their institution, they will hardly consult the KEF in potentially security-relevant cases. Individual discussions with researchers have also revealed that some of them do not want to consult their local KEF because they were worried that it would disproportionately influence the content of their research. The Joint Committee will therefore continue to focus particularly on providing support to raise awareness and clarify the issues involved, including through KEF forums, subject-specific events and student workshops, by providing suitable event concepts, contacts to suitable speakers and by developing additional communication materials to support the work of the KEFs.

As set out in Chapter 4, the DFG refers to the handling of security-relevant research on its website and in its guidelines for submitting applications and requests applicants applying for funding to check their project in this regard and to submit a statement on the risk-benefit ratio and measures to minimise risks in the event that the project has security-relevant risks. With these measures, the DFG is also contributing to raising awareness for security-relevant research among researchers. The Joint Committee will support the DFG in the analysis and assessment of the submitted projects. The DFG can further develop its guidelines so that these can be implemented as required and achieve the greatest possible acceptance. The reviewed DFG Guidelines for Safeguarding Good Research Practice also explicitly refer to the responsibility of the university and non-university research institutions to ensure compliance with regulations by their members and associates in security-relevant research and to foster this with suitable organisational structures.

As education has a decisive influence on young researchers, the increasing integration of security-relevant aspects in all relevant courses of study at universities is a key step in raising awareness (Chap. B 4). The Joint Committee will work to foster this process through the mobilisation of the contact persons and the KEFs and by providing new teaching materials on the subject. Regular further training options on the handling of security-relevant research could also be established in future for students and researchers, beyond the KEFs.

4. Further cooperation projects of the Joint Committee

The Joint Committee intends to increase its focus on researchers working in industry and, for this purpose, is seeking dialogue with industry associations such as the Association of German Engineers (VDI), the German Association of Biotechnology Industries (DIB) and the German Chemical Industry Association (VCI). However, the procedures successfully used in the academic sector for the handling of security-relevant research have so far not proven particularly suitable for the private sector. The Joint Committee continues to be in regular contact with science associations such as the German Chemical Society, the Society for Virology and the German Informatics Society.

The approach of extensive self-governance in the area of security-relevant research as advocated by the Leopoldina and the DFG is also attracting increasing international attention. The head of the Joint Committee office presented this approach at a forum of the National Ethics Councils of Europe in 2017, and in 2018 and 2019 at the annual Meeting of Experts on the Biological Weapons Convention of the United Nations. The work of the Joint Committee was also discussed as a model with diplomatic delegations from Tunisia, Bahrain and Australia. It is important to maintain the international exchange on topics such as export control in science and on ethical approval as a condition for international funding programmes. For this purpose, the Joint Committee will work towards strengthening its international collaboration with partners such as the European Commission and the United Nations as well as its communication with the Federal Foreign Office, the Federal Ministry for Education and Research, the Federal Ministry for Economic Affairs and Energy, the Federal Office of Economics and Export Control and the Robert Koch Institute. Issues arising in the area of IT research and robotics (Chap. A 5.2) and in international research collaboration with countries such as China, Russia and the United States (Chap. A 5.3) require particular attention and monitoring.

The EU member states are currently drawing up joint guidelines to improve compliance among academic research institutions with the EC Dual-Use Regulation[95] (Chap. A 5), and at the UN level, efforts are underway to develop a more binding code of conduct for the biosciences by linking it to the Biological Weapons Convention. In both areas, the Joint Committee will work on the one hand to ensure compliance with these regulations and, on the other, to prevent any disproportionate restrictions on scientific freedom.

95 Council Regulation (EC) No. 428/2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items. Available at: https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:32009R0428 (last accessed: 9 September 2020).

Appendix

1. Case studies of security-relevant research of concern

Case Study 1: Is the production of synthetic, infectious smallpox viruses an instruction manual for constructing biological weapons?[96]

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 that new vaccines could then be developed using this procedure. The main risk of the project is that the technology can be used for the production of human pathogenic smallpox viruses. As the smallpox virus has been eradicated since the 1980s and good vaccines have long been developed, the viability of the researchers' argumentation is questionable. On the other hand, as the project requires an extremely high level of expertise and technology, the experiment cannot be readily copied.

96 See Noyce, R. S., Lederman S. and Evans, D. H. (2018). Construction of an infectious horsepox virus vaccine from chemically synthesized DNA fragments, PLoS One, 13(1):e0188453.

Case study 2. Can AI methods to identify and rectify software vulnerabilities make things easier for criminal hackers?[97]

The proposed research project aims to systematically identify vulnerabilities in computer programs, particularly in the operating systems of wireless LAN routers, smartphones and laptops using AI methods and to develop automated defensive measures. The results of this research project would come in useful everywhere where these computer programs need to be monitored and updated regularly. At the same time, the results would allow the identification and exploitation of these vulnerabilities in numerous devices that are not regularly monitored and updated. A notable example in this context is the ransomware WannaLaugh. 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.

Case study 3. Is the detection of the sexual orientation of humans from facial images using deep learning algorithms a tool for illegal invasions of privacy?[98]

This research project wants to further develop a deep learning algorithm to identify patterns in facial images. The project plans to train the algorithm using photos of open homosexuals and heterosexuals so that it can analyse other portrait photos to predict sexual orientation. The benefit of the project according to researchers is to find out how deep learning algorithms connect data and what reference points it selects to make predictions. Purported additional benefits are furthering our understanding of the physiological origin of human sexual orientation and the limits of human perception. The risk of malicious application lies in the possible illegal acquisition of sensitive personal data using the biometrics of individuals, for example in countries in which homosexuality is criminalised. This research also opens the doors to racial profiling and is reminiscent of racial hygiene research under National Socialism using physiognomies. Highly developed deep learning algorithms of this kind could also be used to group people according to their consumer or voting behaviour or their criminal history.

97 See report "The Malicious Use of Artificial Intelligence: Forecasting, Prevention, and Mitigation". Available at: https://arxiv.org/pdf/1802.07228 (last accessed: 9 September 2020).

98 See Wang, Y. and Kosinski, M. (2017). Deep neural networks are more accurate than humans at detecting sexual orientation from facial images, PsyArXiv.

2. List of contact persons and committees responsible for the ethical aspects of security-relevant research

The list is sorted according to the respective location (as of 14 December 2020). The current list is available at: https://www.leopoldina.org/en/about-us/cooperations/joint-committee-dual-use/list-of-committees/. The contact persons are responsible for the entries themselves.

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
RWTH Aachen	Rektoratskommission zur Aufklärung wissenschaftlichen Fehlverhaltens	Herr Univ.-Prof. Dr. med. Dr. med. dent. Dr. phil. Dominik Groß	Aachen	23.04.2020
Universität Augsburg	Ethikkommission	Herr Prof. Dr. Werner Schneider	Augsburg	17.02.2020
Otto-Friedrich-Universität Bamberg	bestehende Ethikkommission übernimmt Aufgaben einer KEF	Herr Prof. Dr. Thomas Weißer (Laubach)	Bamberg	27.11.2019
Universität Bayreuth	Bestehende Ethikkommission wurde um den Aufgabenbereich einer KEF erweitert	Herr Prof. Dr. Klaus Nagels	Bayreuth	25.09.2019
Stiftung Preußischer Kulturbesitz	Kommission vorerst nicht geplant		Berlin	29.04.2020
Max-Delbrück-Centrum für molekulare Medizin	Kommission wird diskutiert	N.N.	Berlin	15.04.2020
Humboldt-Universität zu Berlin	Individuelle Kommissionen der Fakultäten	Herr Prof. Dr. Peter Frensch	Berlin	15.04.2020
Berlin-Brandenburgische Akademie der Wissenschaften	Kommission vorerst nicht geplant	Herr Dr. Wolf-Hagen Krauth	Berlin	01.04.2020
Bundesinstitut für Risikobewertung	Kommission vorerst nicht geplant. Fragen zu sicherheitsrelevanter Forschung werden in Fachgruppenbesprechungen adressiert.	Herr Prof. Dr. Karsten Nöckler	Berlin	06.03.2020

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Weierstraß-Institut für Angewandte Analysis und Stochastik	Kommission für Ethik sicherheitsrelevanter Forschung etabliert seit Januar 2018	Herr Dr. Andreas Rathsfeld	Berlin	21.02.2020
Robert Koch-Institut	Bei Bedarf Ad-hoc-Kommission	Frau Dr. Iris Hunger	Berlin	21.02.2020
Physikalisch-Technische Bundesanstalt	Ethikkommission der PTB	Herr Prof. Dr. Tobias Schaeffter	Berlin	21.02.2020
Helmholtz-Zentrum Berlin für Materialien und Energie GmbH	Bei Bedarf wird eine Ad-hoc-Kommission eingesetzt	Herr Dr. Ralf Feyerherm	Berlin	20.02.2020
Deutsches Archäologisches Institut	vorerst keine Ethikkommission angedacht	Frau Prof. Dr. Friedrike Fless	Berlin	18.02.2020
Psychologische Hochschule Berlin (PHB)	Kommission für Ethik sicherheitsrelevanter Forschung KEF (eingerichtet am 10.11.2015 durch Beschluss des Akademischen Senats der PHB)	Herr Prof. Dr. Siegfried Preiser	Berlin	17.02.2020
Hochschule für Wirtschaft und Recht Berlin	Eine KEF ist vorerst nicht geplant.	Frau Dr. Bettina Biedermann	Berlin	17.02.2020
Technische Universität Berlin	Kommission wird diskutiert/ ist in Planung	Frau Prof. Dr.-Ing. Christine Ahrend	Berlin	03.12.2019
Wissenschafts-gemeinschaft Gottfried Wilhelm Leibniz	Leibniz-Kommission für Ethik der Forschung	Herr Dr. Johannes Bronisch	Berlin	07.03.2019
Freie Universität Berlin	Ethikausschuss	Herr Prof. Dr. Klaus Mühlhahn	Berlin	04.03.2019
Charité – Universitätsmedizin Berlin	Einrichtung einer KEF / Integration in die bestehende Ethikkommission in Vorbereitung	Herr Prof. Dr. Christian Drosten	Berlin	18.02.2019

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Nationale Akademie der Wissenschaften Leopoldina	Gemeinsamer Ausschuss zum Umgang mit Sicherheitsrelevanter Forschung	Herr Dr. Johannes Fritsch	Berlin	10.01.2019
Gesellschaft für Informatik	Noch nicht zugeordnet, wird ergänzt.	Herr Stefan Ullrich	Berlin	17.03.2017
Akkon-Hochschule für Humanwissenschaften	Die Etablierung einer Kommission wird diskutiert.	Herr Prof. Dr. Henning G. Goersch	Berlin	15.01.2017
Universität Bielefeld	Aufgaben der KEF werden von der Kommission für Forschung und wiss. Nachwuchs übernommen; entsprechende Verfahrensregelungen wurden am 28.7.2017 vom Rektorat beschlossen	Herr Prof. Dr. Martin Egelhaaf	Bielefeld	18.02.2020
Technische Hochschule Georg Agricola	Nicht vorhanden	Herr Prof. Dr. Michael Prange	Bochum	15.04.2020
Ruhr-Universität Bochum	Kommission wird diskutiert	Herr Prof. Dr.-Ing. Andreas Ostendorf	Bochum	18.02.2020
Rheinische Friedrich-Wilhelms-Universität Bonn	Kommission zur Beratung sicherheitsrelevanter Forschung mit erheblichen Gefährdungspotential	Frau Dr. Ines Heuer	Bonn	22.04.2020
Deutsche Gesellschaft für Biophysik e.V.	Kommission ist vorerst nicht angedacht	Herr Prof. Dr. Thomas Gutsmann	Borstel	18.02.2020
Forschungszentrum Borstel, Leibniz Lungenzentrum	Die Einrichtung einer institutsübergreifenden KEF mit zwei weiteren regionalen Leibniz-Instituten (HPI und BNTM) erfolgte am 07.12.17.	Herr Prof. Dr. rer. nat. Ulrich Schaible	Borstel	20.12.2017
Julius-Kühn-Institut (JKI), Bundesforschungsinstitut für Kulturpflanzen	im Aufbau	Herr Dr. Andreas Willems	Braunschweig	03.04.2020

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Leibniz-Institut DSMZ – Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH	Das DSMZ verfügt über zwei Beauftragte für Ethik sicherheitsrelevanter Forschung, die entsprechende Fälle ad hoc und unverzüglich mit der Geschäftsleitung diskutieren, so dass eine zeitnahe Entscheidung ermöglicht wird	Herr Prof. Dr. Jörg Overmann	Braunschweig	19.02.2020
TU Braunschweig	Ethikkommission im Sinne einer KEF etabliert	Herr Prof. Dr. Peter Hecker	Braunschweig	22.01.2020
Helmholtz-Zentrum für Infektionsforschung GmbH	Kommission für Ethik sicherheitsrelevanter Forschung ist etabliert.	Herr Prof. Dr. Dirk Heinz	Braunschweig	05.09.2018
Leibniz-Institut für Präventionsforschung und Epidemiologie - BIPS	Bei Bedarf Ad-hoc-Kommission	Frau Dr. Frauke Günther	Bremen	18.02.2020
Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung	Risk Assessment Committee (RAC)	Herr Dr. Klaus Grosfeld	Bremerhaven	03.04.2020
Technische Universität Chemnitz	Erweiterung der Ethikkommission Human- und Sozialwissenschaften um den Aufgabenbereich einer KEF ist angedacht	Herr Prof. Dr. Jörn Ihlemann	Chemnitz	18.02.2020
Technische Universität Clausthal	Senatskommission für Forschungsethik und -folgenabschätzung	Herr Prof. Dr. Diethelm Johannsmann	Clausthal-Zellerfeld	20.08.2020
BTU Cottbus-Senftenberg	Ethikkommission der BTU	Herr Dr. Rico Ganßauge	Cottbus	18.01.2019
GSI Helmholtzzentrum für Schwerionenforschung GmbH	Ad-Hoc Verfahren in Verdachtsfällen	Frau Dr. Karin Füssel	Darmstadt	14.04.2020
TU Darmstadt	Ethikkommission (satzungsgemäßes Verfahren, auf der Basis einer Zivilklausel)	Frau Prof. Dr. Petra Gehring	Darmstadt	18.02.2020

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Technische Universität Dortmund	Kommission wird diskutiert	Frau Prof. Dr.-Ing. Gabriele Sadowski	Dortmund	18.02.2020
Technische Universität Dresden	Senatskommission Forschung und wissenschaftlicher Nachwuchs, die den Bereich sicherheitsrelevante Forschung mit abdeckt und ad hoc durch Expertinnen und Experten erweitert werden kann	Herr Prof. Dr. Gerhard Rödel	Dresden	23.02.2018
Heinrich-Heine-Universität Düsseldorf	Kommission in Planung	Herr Prof. Dr. Peter Westhoff	Düsseldorf	03.04.2020
Friedrich-Alexander-Universität Erlangen-Nürnberg	Dual Use Kommission	Herr Prof. Dr. Günter Leugering	Erlangen	19.02.2020
Universität Duisburg-Essen	Kommission wird diskutiert	Frau Dr. Anke Hellwig	Essen	11.03.2020
Hochschule Esslingen	Ethikbeauftragte/r	Herr Prof. Dr. Sascha Röck	Esslingen	31.03.2020
Georg-Speyer-Haus	bei Bedarf Ad-hoc-Kommission	Herr Dr. Stefan Stein	Frankfurt	06.12.2017
Europa-Universität Viadrina	Ethikkommission	Herr Prof. Dr. Wolff Heintschel von Heinegg	Frankfurt (Oder)	26.03.2018
Gesellschaft Deutscher Chemiker e.V.	Bereits seit Gründung des Vereins gibt es ein „Ehrengericht“, welches bei Verstößen gegen die GDCh-Satzung und den Verhaltenskodex der GDCh aktiv werden kann.	Herr Dr. Hans-Georg Weinig	Frankfurt am Main	19.02.2020
Dechema Forschungsinstitut	keine permanente Kommission im Sinne einer KEF verankert, bei Bedarf Ad hoc-Kommission	Herr PD Dr. Mathias Galetz	Frankfurt am Main	18.02.2020
Leibniz-Institut Hessische Stiftung Friedens- und Konfliktforschung (HSFK)	Ethik-Leitlinie	Frau Dr. Una Jakob	Frankfurt am Main	14.08.2019

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Johann Wolfgang Goethe-Universität	Die Universität hat eine Zivilklausel, die Eingang in die Grundordnung gefunden hat. Eine KEF gibt es derzeit nicht.	Frau Dr. Kerstin Schulmeyer-Ahl	Frankfurt am Main	22.02.2019
Deutsche Industrievereinigung Biotechnologie im VCI e.V.	vorläufig der Vorstand der Deutschen Industrievereinigung Biotechnologie	Herr Dr. Ricardo Gent	Frankfurt am Main	28.02.2018
TU Bergakademie Freiberg	Rektoratskommission Forschung	Herr Prof. Dr. Rudolf Kawalla	Freiberg	19.02.2020
Albert-Ludwigs-Universität Freiburg	bislang keine Kommission eingerichtet	Herr Prof. Dr. Gunther Neuhaus	Freiburg	19.02.2020
Max-Planck-Gesellschaft zur Förderung der Wissenschaften e.V.	Kommission für Ethik sicherheitsrelevanter Forschung (KEF), zuständig für alle Max-Planck-Institute	Herr Prof. Dr. Dr. h.c. mult. Ulrich Sieber	Freiburg im Breisgau	16.03.2017
Leibniz-Institut für Lebensmittel-Systembiologie an der Technischen Universität München	Ethikkommission der Fakultät für Medizin der Technischen Universität München, Ismaninger Straße 22, 81675 München	Herr Dr. Dietmar Krautwurst	Freising	05.10.2017
Helmholtz-Zentrum Geesthacht, Zentrum für Material- und Küstenforschung GmbH	KEF	Frau Dr. Iris Ulrich	Geesthacht	20.02.2020
Justus-Liebig-Universität Gießen	Ständige Kommission zu sicherheitsrelevanter Forschung	Herr Dr. Gunther Gerlach	Gießen	05.09.2016
Universität Greifswald	KEF Satzung ab 01. August 2017 in Kraft	Herr Prof. Dr. Micha H. Werner	Greifswald	19.02.2020
Friedrich-Loeffler-Institut (FLI)	Biorisk Ausschuss (IBC, Institutional Biorisk Committee)	Herr Prof. Dr. Jens Peter Teifke	Greifswald-Insel Riems	19.02.2020
Leibniz-Institut für Gemüse und Zierpflanzenbau	Bei Bedarf Ad-hoc-Kommission	Herr Prof. Dr. Philipp Franken	Großbeeren	22.11.2017

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Georg-August-Universität Göttingen	2015 gegründete Ethikkommission der Universität (gem. der Leitlinie LHK Niedersachsen)	Herr Prof. Dr. Peter-Tobias Stoll	Göttingen	06.07.2020
Deutsches Primatenzentrum GmbH - Leibniz-Institut für Primatenforschung	Kommission für Ethik sicherheitsrelevanter Forschung	Herr Prof. Dr. Stefan Pöhlmann	Göttingen	23.01.2020
FernUniversität in Hagen	Ständiger Beauftragter und Ad-hoc-Kommission bei Bedarf	Herr Prof. Dr. Jörg Keller	Hagen	03.12.2018
Martin-Luther-Universität Halle-Wittenberg	Kommission für ethische Fragen in der Wissenschaft	Herr Prof. Dr. Wolfgang Paul	Halle	19.02.2020
Technische Universität Hamburg	Akademischer Senat und Studiendekanatsausschüsse	Herr Prof. Dr. Andreas Timm-Giel	Hamburg	19.02.2020
Deutsches Elektronen-Synchrotron DESY	DESY-Kommission für Ethik in der Forschung	Herr Prof. Dr. Ralf Röhlsberger	Hamburg	18.02.2020
Bernhard-Nocht-Institut für Tropenmedizin	Die Mandatserweiterung einer bestehenden Kommission zur Identifikation von DURC erfolgte am 07.10.17. Die Einrichtung einer institutsübergreifenden KEF mit zwei weiteren regionalen Leibniz-Instituten (HPI und FZB) erfolgte am 07.12.17.	Herr Prof. Dr. Stephan Günther	Hamburg	28.02.2018
Heinrich-Pette-Institut, Leibniz-Institut für Experimentelle Virologie	Richtlinien zur Sicherung guter wissenschaftlicher Praxis verabschiedet und veröffentlicht. Die Einrichtung einer institutsübergreifenden KEF mit zwei weiteren regionalen Leibniz-Instituten (BNTM und FZB) erfolgte am 07.12.17.	Frau Prof. Dr. Gülsah Gabriel	Hamburg	08.09.2017
Universität Hamburg	Kommission für Ethik sicherheitsrelevanter Forschung wird diskutiert	Herr Dr. Harald Schlüter	Hamburg	10.02.2016

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Hochschule Hamm-Lippstadt	KEF wird diskutiert	Herr Prof. Dr. Dieter Bryniok	Hamm	15.04.2020
Stiftung Tierärztliche Hochschule Hannover	Kommission für Forschungsethik	Herr Prof. Dr. Peter Kunzmann	Hannover	21.02.2020
Medizinische Hochschule Hannover	Senatskommission für Forschungsethik, etabliert seit August 2016	Herr Dr. Jens Bohne	Hannover	19.02.2020
Hochschule für Musik, Theater und Medien Hannover	Ständige Senatskommission für Ethikfragen	Herr Prof. Dr. Eckart Altenmüller	Hannover	19.02.2020
Gottfried Wilhelm Leibniz Universität Hannover	Kommission für Verantwortung in der Forschung der Gottfried Wilhelm Leibniz Universität Hannover	Herr Prof. Dr. Dietmar Hübner	Hannover	21.05.2019
Ruprecht-Karls-Universität Heidelberg	Kommission "Verantwortung in der Wissenschaft" am 21.03.2017 beschlossen	Herr Prof. Dr. Jörg Pross	Heidelberg	19.02.2020
Deutsches Krebsforschungszentrum	Der bestehende Ausschuss für Biologische Sicherheit am DKFZ wurde um den Aufgabenbereich einer KEF erweitert	Herr Dr. Timo Kehl	Heidelberg	11.11.2019
Technische Universität Ilmenau	Forschungsausschuss der TU Ilmenau	Herr Prof. Dr.-Ing. Günter Schäfer	Ilmenau	20.02.2020
Friedrich-Schiller-Universität Jena	Kommission eingerichtet	Herr Prof. Dr. Georg Pohnert	Jena	20.02.2020
Forschungszentrum Jülich GmbH	Das Forschungszentrum Jülich hat 2013 eine Arbeitsgemeinschaft »Wissenschaft und Ethik« ins Leben gerufen, die sich mit praktischen Fragen der Ethik in der Wissenschaft beschäftigt.	Herr Dr. Jens Jäger	Jülich	10.10.2018
Technische Universität Kaiserslautern	Ombudsgremium für Ethik sicherheitsrelevanter Forschung (OEF)	Herr Prof. Dr. rer. nat. Arnd Poetzsch-Heffter	Kaiserslautern	13.03.2018

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Karlsruher Institut für Technologie	Ethikkommission	Herr Prof. Dr. Peter Nick	Karlsruhe	20.02.2020
Universität Kassel	Zentrale Ethikkommission	Herr Prof. Dr. Gerrit Hornung	Kassel	17.05.2019
GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel	Kommission wird diskutiert	Herr Dr. Warner Brückmann	Kiel	04.09.2018
Christian-Albrechts-Universität zu Kiel	Ethikkommission im Sinne einer KEF wird diskutiert	Frau Prof. Dr. Anja Pistor-Hatam	Kiel	15.05.2018
Universität Konstanz	Kommission für Verantwortung in der Forschung	Herr Prof. Dr. Malte Drescher	Konstanz	20.02.2020
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)	Mögliche Kommission wird derzeit diskutiert	Herr Dr. Dirk Zimper	Köln	24.04.2020
Universität zu Köln	Kommission zur Begutachtung sicherheitsrelevanter Forschung mit erheblichem Gefährdungspotential (FEG) eingerichtet	Herr Prof. Dr. Hans-Günther Schmalz	Köln	03.04.2020
Paul-Ehrlich-Institut – Bundesinstitut für Impfstoffe und biomedizinische Arzneimittel	Ad-hoc-Kommission für Ethikfragen im Bereich sicherheitsrelevanter Forschung (Bestellung erfolgt fallspezifisch durch die Institutsleitung)	Herr PD Dr. Stephan Steckelbroeck	Langen	21.02.2020
Universität Leipzig	Der bestehende Ethikbeirat wurde um einen Arbeitskreis „Dual-Use“ erweitert	Herr Prof. Dr. Erich Schröger	Leipzig	27.07.2020
Universität zu Lübeck	Es ist geplant, die Kommission für Ethik und Verantwortung in der Forschung um den Aufgabenbereich einer KEF zu erweitern	Herr Prof. Dr. Christoph Rehmann-Sutter	Lübeck	20.02.2020
Otto-von-Guericke-Universität Magdeburg	KEF im Gründungsprozess	Frau Prof. Dr. Monika Brunner-Weinzierl	Magdeburg	15.04.2020

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Leibniz-Institut für Neurobiologie Magdeburg (LIN)	Kommission für Ethik sicherheitsrelevanter Forschung	Frau Prof. Dr. Constanze Seidenbecher	Magdeburg	14.12.2018
Universität Koblenz-Landau	derzeit keine entsprechende Kommission an der Universität Koblenz-Landau vorhanden	Herr Dr. Axel Koch	Mainz	29.04.2020
Johannes Gutenberg-Universität Mainz	Implementierung einer KEF wird diskutiert	Herr Prof. Dr. Stefan Müller-Stach	Mainz	27.02.2018
Universität Mannheim	Das neue Statut der Ethikkommission der Universität Mannheim deckt sicherheitsrelevante Fragestellungen der Forschung ab und sieht für die Behandlung sicherheitsrelevanter Fragestellungen eine erweiterte Zusammensetzung der Ethikkommission vor.	Herr Prof. Dr. Ralf Müller-Terpitz	Mannheim	20.02.2020
GESIS – Leibniz-Institut für Sozialwissenschaften	Ethikkommission	Frau Prof. Dr. Marita Jacob	Mannheim	02.10.2018
Philipps-Universität Marburg	Kommission Forschung und Verantwortung	Frau Prof. Dr. Ursula Birsl	Marburg	29.11.2018
Institut für Mikrobiologie der Bundeswehr	Zusammen mit dem Institut für Pharmakologie und Toxikologie und dem Institut für Radiobiologie der Bundeswehr wurde eine gemeinsame KEF eingerichtet.	Herr PD Dr. Roman Wölfel	München	08.06.2020
LMU München	Kommission wird diskutiert/ ist in Planung	Herr Prof. Dr. Thomas Klapötke	München	20.04.2020
Fraunhofer-Gesellschaft	KEF-Satzung verabschiedet, ad hoc KEF-Kommission etabliert	Frau Cornelia Reimoser	München	16.01.2019
Technische Universität München	Bei Bedarf befassen sich einschlägige Ausschüsse der Fakultäten mit der Thematik	Herr Prof. Klaus Mainzer	München	28.11.2017
Gesellschaft für Virologie (GfV)	DURC-Kommission der GfV	Frau Dr. rer. nat. Linda Brunotte	Münster	29.04.2020

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Westfälische Wilhelms-Universität Münster	wird derzeit vom Ethikbeauftragten der WWU betreut; weitere institutionelle Ausgestaltung in Vorbereitung	Frau Prof. Dr. Franziska Dübgen	Münster	17.04.2020
Helmholtz Zentrum München, Deutsches Forschungszentrum für Gesundheit und Umwelt	Kommission ist in Planung	Frau Dr. Eva Reischl	Neuherberg	24.07.2020
Deutsches Institut für Ernährungsforschung Potsdam-Rehbrücke (DIfE)	keine permanente Kommission im Sinne einer KEF verankert, bei Bedarf Ad hoc-Kommission	Frau Dr. Petra Wiedmer	Nuthetal	18.02.2020
Technische Hochschule Nürnberg	Ethikkommission in Planung	Herr Prof. Dr. Tilman Botsch	Nürnberg	30.04.2020
Evangelische Hochschule Nürnberg	Ethikkommission in Gründung	Herr Prof. Dr. Arne Manzeschke	Nürnberg	29.11.2015
Carl von Ossietzky Universität Oldenburg	Kommission für Forschungsfolgenabschätzung und Ethik	Herr Prof. Dr.-Ing. Andreas Hein	Oldenburg	08.02.2019
Universität Osnabrück	Kommission für Forschungsethik hat sich konstituiert als Erweiterung der bestehenden Forschungskommission.	Herr Prof. Kai-Uwe Kühnberger	Osnabrück	21.02.2020
Universität Paderborn	Ethik-Kommission	Herr Prof. Dr. Peter F. E. Sloane	Paderborn	19.11.2019
Universität Passau	Kommission für Ethik in der Forschung	Herr Prof. Dr. Jan Hendrik Schumann	Passau	18.09.2019
FH Potsdam	Ethikkommission in der Neuaufstellung	Herr Prof. Dr. Tobias Schröder	Potsdam	16.04.2020
Universität Potsdam	In der bestehenden Ethikkommission wurde ein Ausschuss für sicherheitsrelevante Forschung implementiert	Herr Prof. Dr. med. Dr. phil. Michael Rapp	Potsdam	21.02.2020

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Helmholtz-Zentrum Potsdam Deutsches GeoForschungs-Zentrum	Bei Bedarf wird eine Ad-hoc-Kommission gebildet.	Herr Marco Kupzig	Potsdam	19.02.2020
Leibniz-Institut für Astrophysik Potsdam	Einsatz einer Ad-hoc-Kommission bei Bedarf	Herr Dr. Harry Enke	Potsdam	22.11.2017
Universität Regensburg	Mandatserweiterung der bestehenden Ethikkommission der Universität Regensburg wird diskutiert	Herr Prof. Dr. Dr. André Gessner	Regensburg	21.02.2020
Universität Rostock	Senatskommission Forschung übernimmt die Aufgaben einer KEF	Herr Prof. Dr. rer. nat. Udo Kragl	Rostock	21.02.2020
Universität des Saarlandes	Kommission für die Ethik sicherheitsrelevanter Forschung	Frau Dr. Verena Krenberger	Saarbrücken	10.12.2019
Universität Siegen	Rat für Ethik in der Forschung konstituiert am 01. Juni 2016	Herr Prof. Dr. Holger Foysi	Siegen	21.02.2020
Universität Stuttgart	Kommission Verantwortung in der Forschung (Satzung und Richtlinie vom Senat am 18.1.2017 beschlossen)	Herr Prof. Dr.-Ing. Peter Middendorf	Stuttgart	20.09.2018
Universität Hohenheim	Senatskommission Forschung übernimmt ad hoc die Aufgaben einer Ethikkommission	Frau Prof. Dr. Julia Fritz-Steuber	Stuttgart	09.08.2018
Hochschule Trier	Kommission wird diskutiert	Herr Prof. Dr. Stefan Diemer	Trier	21.02.2020
Universität Trier	Ethik-Kommission	Frau Katharina Brodauf	Trier	22.01.2020
Universität Tübingen	KEF-Kommission eingerichtet	Herr Prof. Dr. Peter Grathwohl	Tübingen	21.02.2020
Universität Ulm	Senatskommission Verantwortung in der Wissenschaft	Herr Prof. Dr. Florian Steger	Ulm	22.07.2020
WHU - Otto Beisheim School of Management	Die Kommission für gute wissenschaftliche Praxis wurde um den Aufgabenbereich einer KEF erweitert	Herr Prof. Dr. Utz Schäffer	Vallendar	06.03.2018

INSTITUTION	COMPETENT COMMITTEE (OR STATE OF COMMISSION ESTABLISHMENT)	CONTACT	CITY	LAST CHANGED
Pädagogische Hochschule Weingarten	bisher noch keine spezifische Kommission	Herr Prof. Dr. Wolfgang Müller	Weingarten	13.09.2019
Technische Hochschule Wildau	Ethikkommission konstituiert am 2. Nov. 2015	Frau Anna Grebinyk	Wildau	24.10.2019
Hochschule Worms	Richtlinien zur Sicherung guter wissenschaftlicher Praxis verabschiedet und veröffentlicht. Zuständige Kommission etabliert, Mandatserweiterung für KEF in Diskussion.	Herr Dr. Frank Möller	Worms	21.02.2020
Bergische Universität Wuppertal	Ethikkommission vorhanden, Erweiterung um den Aufgabenbereich einer KEF wird diskutiert	Herr Prof. Dr. Michael Scheffel	Wuppertal	21.02.2020
Julius-Maximilians-Universität Würzburg	Kommission für Forschung und wissenschaftlichen Nachwuchs übernimmt Aufgaben einer KEF	Herr Prof. Dr. Hermann Einsele	Würzburg	29.04.2020

3. Joint Committee questionnaire on the handling of security-relevant research (of 27 November 2019; the response fields have been deleted to save space)

Security-relevant research of concern comprises scientific research work that has the potential to produce knowledge, products or technologies that could be directly misused by third parties to cause significant damage to human dignity, life, health, autonomy, property, the environment or peaceful coexistence.

All information is voluntary and treated confidentially. The information feeds into the overall survey results of all committees (commissioners) in Germany responsible for the ethical assessment of security-relevant research in anonymised form. This means that no names of individuals or specific institutions or specific details about the assessed research projects will be published.

Question 1
Name of university / research institution

Question 2
Type of university / research institution

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

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

- ☐ Yes (continue with Question 6)
- ☐ No (continue with Question 5 and then with Question 32)

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

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

Question 7
What is the title of the committee (commissioner) that is responsible for the ethical assessment of security-relevant research?

Question 8
What type of committee is responsible for the ethical assessment of security-relevant research at your institution?

- ☐ Permanent committee exclusively responsible for the ethical aspects of security-relevant research
- ☐ Previously established committee that also covers the ethical aspects of security-relevant research
- ☐ Ad-hoc committee convened when security-relevant cases need to be assessed
- ☐ Commissioner responsible for the ethical aspects of security-relevant research
- ☐ Other

_____

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

- ☐ Yes, at the following address (continue with Question 11)

_____

- ☐ No (continue with Question 10)

Question 10
Why are the statutes not available online?

Question 11
Which subject areas/groups are represented in your committee?

- ☐ Law
- ☐ Philosophy/theology
- ☐ Students
- ☐ Administration/management
- ☐ Other subject

_____

Question 12
How often did the committee responsible for the ethical assessment of security-relevant research convene in 2018 and 2019 overall?

Question 13
Which topics have so far been discussed by the committee responsible for the ethical aspects of security-relevant research?

- ☐ Security-relevant research projects
- ☐ Events to raise awareness of ethical aspects of security-relevant research
- ☐ Administrative procedures
- ☐ Integrating the ethics of security-relevant research in education and teaching
- ☐ Other

_____

Question 14
How would you rate the visibility of your committee on ethical aspects of security-relevant research for members of your institution? (0 = not visible at all; 100 = very visible, please tick)

Question 15
How many research projects were submitted to the committee or commissioner responsible for the ethical assessment or security-relevant research in 2018 and 2019?

Total research projects _____
of which, number of security-relevant research projects _____

Question 16
From which departments/areas of research were the security-relevant research projects? In case your institution dealt with more than 5 security-relevant research projects, please use the space for further comments at the end of the survey.

Question 17
Please give details of Case 1 (and then for each case up to Case 5).

Question 18
What vote did the committee give for Case 1 (and for each case up to Case 5)?

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

Question 19
Please outline the relevant factors that resulted in the above-specified vote.

Question 32[99]
What measures does your research institution undertake to strengthen awareness of security-relevant research aspects?

- ☐ Staff training
- ☐ Checklist for assessing research projects
- ☐ Integration in teaching
- ☐ Public events / discussion rounds
- ☐ Information on the website, at the following address:

  _____
- ☐ Actively contacting institution members about this issue (e.g. info mail)
- ☐ Other

  _____

Question 33
What measures is your research institution planning to increase the awareness of security-relevant aspects of research?

- ☐ Staff training
- ☐ Checklist for assessing research projects
- ☐ Integration in teaching
- ☐ Public events / discussion rounds
- ☐ Information on the website, at the following address

  _____
- ☐ Actively contacting members of the institution about this issue (e.g. info mail)
- ☐ Other

  _____

Question 34
How could the Joint Committee on the Handling of Security-Relevant Research support your research institution? What are your suggestions for our future work? Would you like to draw our attention to any other security-relevant issues?

99 Questions 20 to 31 are repeats to cover Cases 2 to 5.

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The Leopoldina originated in 1652 as a classical scholarly society and now has 1,600 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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