Erster deutscher Staatenbericht (2025)
zur UNESCO-Empfehlung von 2021 zur

Ethik der Künstlichen Intelligenz

Künstliche Intelligenz (KI) ist inzwischen Teil unseres Alltags. Sie wird von Menschen entwickelt und genutzt und ist zugleich von Menschen gestaltbar. Für die verantwortungsvolle Gestaltung einer Welt mit KI ist es notwendig, sich weltweit auf Regeln zu einigen. Solche Regeln sollten sicherstellen, dass KI-Systeme ausschließlich zum Wohle des Menschen eingesetzt werden und Menschenrechte und Grundfreiheiten nicht verletzen.

Vor diesem Hintergrund hat die UNESCO im Jahr 2021 die Empfehlung zur Ethik der Künstlichen Intelligenz verabschiedet. Als Organisation der Vereinten Nationen für Bildung, Wissenschaft und Kultur ist die UNESCO auch für die Entwicklung ethischer Leitlinien zu Fragen des technologischen Fortschritts zuständig. Die UNESCO-Empfehlung von 2021 ist der erste weltweit gültige völkerrechtliche Text zur Ethik der KI. Im Gegensatz zu einer Konvention muss eine Empfehlung nicht direkt in nationales Recht der Mitgliedsstaaten umgesetzt werden, allerdings müssen die Regierungen regelmäßig in Form von Staatenberichten über den Stand der Umsetzung berichten.

Der Verabschiedung der Empfehlung ging ein zweijähriger Erarbeitungs- und Abstimmungs-prozess voraus, in dem zunächst eine Gruppe internationaler Expertinnen und Experten einen Textentwurf erarbeitete, in den auch die Vorstellungen der UNESCO-Mitgliedstaaten sowie zahlreicher Personen aus Wissenschaft und Zivilgesellschaft einflossen. Dieser erste offizielle Textentwurf konnte im Herbst 2020 von den Regierungen der Mitgliedstaaten kommentiert werden. Ein entsprechend überarbeiteter zweiter Entwurf bildete dann die Grundlage für die zwischenstaatlichen Verhandlungen im Frühjahr und Sommer 2021. Nach mehr als hundert Verhandlungsstunden konnten sich die Staaten auf den endgültigen Text der UNESCO-Empfehlung einigen, der dann von der UNESCO-Generalkonferenz im November 2021 im Konsens verabschiedet wurde. Inhaltlich zeichnet sich die Empfehlung aus durch die Betonung der Menschenrechte, die Verknüpfung von ethischen Leitlinien mit konkreten Handlungsempfehlungen, den besonderen Fokus auf marginalisierte und vulnerable Gruppen und das Verständnis, dass die Gestaltung der Rahmenbedingungen für KI keine rein politische, sondern eine gesamtgesellschaftliche Aufgabe ist.

Für den ersten Staatenbericht, der im Februar 2025 eingereicht wurde, haben sich Bund und Länder bei der Beantwortung eines UNESCO-Fragebogens abgestimmt und dabei auch Beiträge von Fachleuten einbezogen. Die Deutsche UNESCO-Kommission hat den Prozess koordinierend unterstützt. Die Antworten auf diesen Fragebogen werden in der Folge graphisch aufbereitet vorgestellt.

1. PROMOTING THE ETHICS OF AI IN YOUR COUNTRY, THROUGH THE 2021 RECOMMENDATION

1.1 Has the 2021 Recommendation on the Ethics of Artificial Intelligence been promoted and/or shared with appropriate ministries and institutions as well as affiliated organizations in your country?

Yes, the following ministries and authorities have either been actively involved in promoting the 2021 Recommendation and/or have been informed of the Recommendation and have taken it into account where appropriate:

- Federal Chancellery
- Federal Ministry for Economic Affairs and Climate Action
- Federal Ministry of the Interior and Community
- Federal Foreign Office
- Federal Ministry of Justice
- Federal Ministry of Labour and Social Affairs
- Federal Ministry of Food and Agriculture
- Federal Ministry for Family Affairs, Senior Citizens, Women and Youth
- Federal Ministry of Health
- Federal Ministry for Digital and Transport
- Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection
- Federal Ministry of Education and Research
- Federal Ministry for Economic Cooperation and Development
- Office of the Federal President

1.2 Is the 2021 Recommendation available in the national language(s) of your country?

Yes, in German.

1.3 Have there been awareness raising activities such as seminars, workshops, conferences or other campaigns/ events related to the 2021 Recommendation, organized or foreseen to be organized by the end of 2025 in your country by national authorities or entities?

Yes, the following events and awareness raising activities were organised by the German Commission for UNESCO:

- 1 Dec. 2021: Online event "The new UNESCO Recommendation on the Ethics of AI – Where does Germany stand?" with around 100 participants from politics, academia and civil society
- 25 May 2022: Online workshop "AI as an Opportunity for More Gender Equality – Approaches for Policy and Administration" with around 40 experts from politics, academia and civil society (workshop focussing on the implementation of the Gender Chapter of the Recommendation in Germany)
- 28 Sep. 2022: Presentation of the UNESCO Recommendation of the Ethics of AI at the Committee on Education, Research and Technology Assessment of the German Bundestag, Berlin, Germany

- 3 Nov. 2022: Workshop "Fostering Ethical AI in Africa - What Role Can German Research and Development Cooperation play?" with around 30 experts from politics, academia and civil society in Bonn, Germany (workshop focussing on the implementation of the International Cooperation Chapter of the Recommendation in Germany)
- 5 Dec. 2022: Online Event (in cooperation with the Korean National Commission for UNESCO) "First Informal Information-Sharing Seminar for National Commissions for UNESCO on the Implementation of the UNESCO Recommendation on the Ethics of Artificial Intelligence" with around 100 representatives from National Commissions for UNESCO worldwide
- 23 June 2023: Online event "Ethical AI in Europe" with around 140 experts from politics, academia and civil society (in cooperation with the National Commissions for UNESCO of Austria, Switzerland and Luxemburg and with a focus on synergies between the UNESCO Recommendation, the EU AI Act and the Council of Europe Framework Convention on Artificial Intelligence)
- 6 Dec. 2023: Lunch Lecture "AI and Global Justice" with around 30 experts from politics, academia and civil society, Bonn, Germany
- 9 Feb. 2024: Online Event (in cooperation with the Korean and the Slovenian National Commissions for UNESCO) "Second Informal Information-Sharing Seminar for National Commissions for UNESCO on the Implementation of the UNESCO Recommendation on the Ethics of Artificial Intelligence" with around 90 representatives from National Commissions for UNESCO worldwide
- 2023-2024: Workshop Series "Effects of AI on Art, Culture and the Creative Industry" (workshops focussing on the implementation of the Culture Chapter of the Recommendation in Germany):
    - 23 Oct. 2023: "AI in Arts and Culture – Opportunities and Risks" with around 80 experts from politics, academia and the cultural sector
    - 21 March, 2024: "How is (generative) AI Changing Work in the Cultural Sector?" with around 100 experts from politics, academia and the cultural sector
    - 16 May 2024: "Protecting an Promoting the Diversity of Cultural Expressions in the Context of AI" with around 120 experts from politics, academia and the cultural sector (in cooperation with the National Commissions for UNESCO of Austria, Switzerland and Luxemburg)

Furthermore, the German Commission for UNESCO has regularly presented the UNESCO Recommendation on the Ethics of AI as speaker at external events and has published the following publications to raise awareness of the Recommendation:

- 2022: The UNESCO Recommendation on the Ethics of Artificial Intelligence – Conditions for the Implementation in Germany; Instead of implementing a RAM, the German Commission for UNESCO commissioned as early as end of 2021 (directly after the adoption of the Recommendation) an academic study on the status quo of AI ethics in Germany in five selected policy fields of the UNESCO Recommendation (author: Prof. Dr Matthias C. Kettemann from the University of Innsbruck). The focus areas of the study were Ethical Impact Assessment, Ethical Governance and Stewardship, Data Policy, Development and International Cooperation and Gender. (Publication also available in German)
- 2023: German translation of the UNESCO-Recommendation on the Ethics of AI, 2023: Translation of the UNESCO Comic strip Inside AI: An Algorithmic Adventure (published together with IRCAI and UNESCO)

- 2023: [Brochure The UNESCO Recommendation on The Ethics of AI: Shaping the Future of Our Societies](#) (publication also available in German; published together with the National Commissions for UNESCO of the Netherlands and Slovenia)
- 2024: Policy Paper on [Approaches to an ethical development and use of AI in the Cultural and Creative Industries](#)

The Federal Foreign Office has intensely advocated for AI standards through its AI and Data Lab and through its [Data Innovation Lab](#). By testing and refining various policy and creative data and AI solutions to advance foreign policy, the Data Innovation Lab provides a testing ground for innovative collaboration and tech discovery, promoting ethical practices, and supporting multilateral processes. Besides background talks on AI challenges and the publication of policy papers, the Data Innovation Hub organises various events, such as:

- 27 November 2023: "GenAI in Government and Policymaking" (Data Talk)
- 15 February 2024: "Navigating the AI Ethics Landscape: Guidelines for Practitioner"
- 1 July 2024: "AI and Elections - insights from the EU Elections and beyond"

In addition to initiatives focused on ethical AI in Germany, the German government, through the Federal Ministry for Economic Cooperation and Development (BMZ), is integrating ethical AI training and support into its international initiatives. Through the BMZ initiative "FAIR Forward – Artificial Intelligence for All" awareness raising sessions on responsible AI assessments (see 1.4) were conducted to operationalize and implement the AI ethics principles as defined by the Recommendation:

- 6 June 2024: Training session on the Responsible AI Assessments for African mentors on responsible AI for the African track of the "Scaling the Responsible AI Solutions" call, implemented by ACTS and CEIMIA on behalf of IDRC and GPAI;
- 28 October 2024: At the "AI for Development" conference by DevelopMetrics in Barcelona: "Implementing Responsible AI Assessments: A Novel Methodology for Ethical AI in International Development";
- December 2024: Training session on the Responsible AI Assessments for African mentors on responsible AI for the AI4D-SRAIS Mentorship Project, implemented by ACTS on behalf of IDRC.

Other examples of relevant events on topics related to the UNESCO Recommendation on the Ethics of AI in 2024 include:

- 16-20 Sep. 2024: "Future Skills for Future Generations" (under the auspices of the Federal Ministry of Education and Research and the Conference of Education Ministers)
- 19 Sep. 2024: "Resources, Reforms and New Collaborations: What Does it Take to Enable Civil Society Participation in Standardisation?" (co-financed by the Federal Ministry of Labour and Social Affairs)
- 19 Sep. 2024: "Digital Ethics Summit" (co-organised by the *Länder* Government of North Rhine-Westphalia)
- 30 Sep.-1 Oct. 2024: "Scaling AI Assessments Tools, Ecosystems and Business Models" (co-supported by the Federal Office for Information Technology)
- 8 Oct. 2024: "Artificial Intelligence in the Workplace: Workshop for Works and Staff Councils" (co-financed by the Federal Ministry of Labour and Social Affairs)
- 21-22 Oct. 2024: "Digital Summit of the German Federal Government"

- 13 Dec. 2024: "AI in the Classroom – Ethical Questions on ChatGPT and Similar Applications" (organised by the German Ethics Council)

1.4 Does your government currently have plans to implement the 2021 Recommendation, through establishing a national AI Ethics Commission or through other measures?

Germany has not established a central national AI Ethics Commission. However, there is quite a number of bodies at the national level dealing with specific aspects of AI ethics and there are many commissions within specific institutions (e.g. universities).

Below are some examples of institutions (or specific working groups within institutions) that either deal with AI ethics on a regular basis or have been set up specifically to deal with this topic:

- The German Advisory Council on Global Change has worked extensively on the topic of an ethical digital future, e.g. in its flagship report from 2019: Towards Our Common Digital Future
- In 2023, the German Ethics Council published an opinion paper on AI ethics
- Several universities and research institutions have established committees or working groups that are dedicated to AI ethics, e.g.,
  - The Ethics Committee for AI and related fields at the Technical University of Munich
  - The GenAI Taskforce, also at the Technical University of Munich,
  - The AI Ethics Lab of Technical University Berlin
  - The Ethics Team at the German Research Center for Artificial Intelligence (DFKI)
  - The German Research Foundation has published Guidelines for Dealing with Generative Models for Text and Image Creation
  - The Leibniz Association, an association of research institutions, has published a Recommendation on Good Scientific Pracitices when using AI to provide guidance to its researchers, with strong ethical dimensions. All member institutes of the Association are encouraged to establish ethics committees that pay specific attention to AI ethics.

In addition, the Recommendation on the Ethics of AI is also being implemented through "other measures". Below are some examples of these other measures, taken mainly by ministries:

Through the initiative "FAIR Forward - Artificial Intelligence for All", the Federal Ministry for Economic Cooperation and Development (BMZ) is operationalising the Recommendation and supporting capacity building in this area. FAIR Forward aims to promote a more open, inclusive and sustainable approach to AI at the international level. To achieve this, it works with seven partner countries: Ghana, Indonesia, India, Kenya, Rwanda, South Africa and Uganda. Based on the Recommendation, FAIR Forward, together with AI inclusion experts from sub-Saharan Africa and Asia Pacific, developed and tested in six of its partner countries a holistic, systematic methodology to identify, assess and mitigate potential risks in AI-related activities (The "Responsible AI Assessment").

The tool has two parts:

- Responsible AI Assessment Part A (Step-by-Step Guide)
- Responsible AI Assessment Part B (Qualitative Guide)

The main objective of the Responsible AI Assessments is to support the identification and mitigation of risks in AI-related activities throughout the lifecycle of an AI system, i.e. from the design phase, through data collection, to model development and deployment. In addition, the Responsible AI Assessments provide a valuable mechanism to support awareness raising and capacity building of local AI developers and policy partners in FAIR Forward partner countries on how to translate the principles of AI ethics as defined in the Recommendation into concrete practices for responsible AI development.

The Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ) has established the funding line "KI für Gemeinwohl" ("AI for Common Good"), which aims at implementing and modeling projects that leverage AI to address pressing societal challenges while ensuring ethical compliance. This initiative supports the development of AI systems that promote inclusivity, sustainability, and fairness in line with the principles outlined in the UNESCO Recommendation. The program focuses on projects that foster equality, societal cohesion, and the public good, e.g. in areas such as family support, senior citizen care, youth engagement, and inclusion of women entrepreneurs. By encouraging the responsible use of AI, the funding line aims to increase trust in AI technologies while mitigating potential biases and ethical risks.

1.5 Has your country participated in any UNESCO organized events on the Ethics of AI, such as the annual Global Forum on the Ethics of AI?

Yes, the German Commission for UNESCO, in cooperation with the Slovenian and the Korean National Commissions for UNESCO, organised a seminar for National Commissions for UNESCO worldwide on the outcomes of the Global Forum 2024 and the implementation of the Recommendation on 9 Feb. 2024.

1.6 Has your country worked with UNESCO on implementing the monitoring and evaluation tools of the 2021 Recommendation, the Readiness Assessment Methodology (RAM) or the Ethical Impact Assessment (EIA)?

Neither.

1.7 If your country has conducted a Readiness Assessment, which issues the RAM brought to your attention that called for specific action?

Not applicable.

1.8 If your country conducted a Readiness Assessment, how are you planning to implement the recommendations of the RAM?

Not applicable.

1.9 If you have not yet implemented the tools mentioned in the previous question, is your country interested in undergoing such exercise together with the secretariat?

No.

1.10 What external factors have impacted or could potentially impact the effective implementation of the 2021 Recommendation on the Ethics of Artificial Intelligence in your country?

Due to the dynamic development of AI technologies, new technical trends and relevant regulatory initiatives are constantly emerging, impacting the implementation of the 2021 Recommendation.

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2. DEVELOPING AN ENABLING POLICY ENVIRONMENT FOR ARTIFICIAL INTELLIGENCE

2.1. In your country, which ministry(ies) is/are responsible for AI governance? Please elaborate on the composition of the teams

The following ministries are responsible for regulatory AI governance:

- Federal Ministry for Economic Affairs and Climate Action
- Federal Ministry of Justice

The following ministries are in charge of the German AI Strategy:

- Federal Ministry of Education and Research
- Federal Ministry for Economic Affairs and Climate Action
- Federal Ministry of Labour and Social Affairs

The following ministries are responsible for AI governance in specific areas:

- Federal Ministry of the Interior and Community
- Federal Ministry of Food and Agriculture
- Federal Ministry for Family Affairs, Senior Citizens, Women and Youth
- Federal Ministry of Health
- Federal Ministry for Digital and Transport
- Federal Ministry of Education and Research
- Federal Ministry for Economic Cooperation and Development
- Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection

2.2. Does your country have a National AI Strategy?

Yes, the German government's AI Strategy was published in 2018 and was updated in 2020. The documents and updates on the implementation of the strategy can be found here.

In 2024, the OECD conducted a review of the general German AI ecosystem commissioned by the Federal Ministry of Labour and Social Affairs, the Federal Ministry of Education and Research and the Federal Ministry for Economic Affairs and Climate Protection. The publication examines Germany's AI Strategy, but goes well beyond the analysis of the policy

framework, covering for example AI and environmental sustainability or AI in public administration.

2.3. Does your country have binding laws or regulations mentioning AI, algorithms or machine learning?

Yes, one of the most important AI governance laws is certainly the European Union's Artificial Intelligence Act (Regulation (EU) 2024/1689), which came into force on 1 August 2024.

Other EU laws that also apply in Germany are:

- The Digital Services Act (Regulation (EU) 2022/2065)
- The Digital Markets Act (Regulation (EU) 2022/1925)
- The Medical Device Regulation (Regulation (EU) 2017/745) [Accompanied by the Medical Device Law Implementation Act ("Medizinprodukterecht-Durchführungsgesetz ", MPDG), which explicitly includes the evaluation of software algorithms.]

As of March 2025, this will also include the EU Regulation on the European Health Data Space (EHDS).

In addition to EU law, there are many national laws in Germany that directly or indirectly regulate AI, algorithms or machine learning. Examples of these laws are:

- The Bundesdatenschutzgesetz (Federal Data Protection Act)
- The German Betriebsverfassungsgesetz (Works Constitution Act) refers to AI in sections regarding employee's protection (notably sections 80 (3), 90 (1) and 95).
- The German 'Social Security Code (SGB) Fifth Book (V) - Statutory Health Insurance' also refers to AI in § 303e regarding the use of AI in health care (no official English translation available). Additionally, acc. to § 25b allow statutory health insurers to may carry out data-based evaluations to protect the health of an insured person and inform the insured person of the results of this evaluation.
- In addition, there are regulations such as the Stock Exchange Act (Börsengesetz, BörsG) or the Act to Prevent Dangers and Abuses in High Frequency Trading (Hochfrequenzhandelsgesetz, HFT Act), in which terms such as "computer algorithm" or "algorithmic trading technology" have been used since 2007 (BörsG) / 2013 (HFT Act).
- The Road Traffic Act (Straßenverkehrsgesetz, StVG) also regulates a very important AI application, namely "motor vehicles with autonomous driving function", without using terms such as AI or algorithms.

2.4. Does your country have a data protection law?

Yes, the main legal basis for data protection in Germany is the EU General Data Protection Regulation (GDPR). Other laws play a supporting or concretising role, such as the Federal Data Protection Act ("Bundesdatenschutzgesetz") or the data protection laws of the *Länder**
(e.g. Baden-Württemberg State Data Protection Act, LDSG BW).

*Explanation: *Länder* are the federate states that compose the Federal Republic of Germany. The Federal Republic of Germany consists of 16 *Länder*.

2.5. Do you have a national data sharing framework?

Yes, the data sharing framework in Germany is determined by the European Data Strategy from 2020 and the German National Data Strategy from 2023. The relevant legal acts governing and as such aiming to increase data sharing are, in particular, the EU Data Governance Act and the EU Data Act. This specific legal framework is embedded in the broader regulatory context (GDPR, competition law) as well es civil law (contract law). As of March 2025, the framework on EU level will also include the EU Regulation on the European Health Data Space (EHDS) (link of publication not yet available), which tasks the EU Member States with creating a national as well as EU wide system for making electronic health data available.

Germany has been funding the creation of the "Nationale Forschungsdateninfrastruktur" ("National Research Data Infrastructure", NFDI) since 2019. The Federal Government and the 16 *Länder* contribute up to 90 million Euro annually to the NFDI based on a cooperation agreement that currently runs until the end of 2028. The aim of NFDI is to systematically manage scientific and research data, provide long-term data storage, accessibility and reuse as well as data services, and trainings on data literacy. The work of the NFDI is done in 27 consortia (26 disciplinary and one basic services consortia). In the consortia more than 400 national stakeholders from higher education and research institutions, research data centers, academies and research museums cooperate with each other. The NFDI association (e.V.) coordinates the work of the NFDI and has its offices in Karlsruhe. It currently has more than 300 members. The NFDI is also the main national (in-kind) contribution to the building of the European Open Science Cloud (EOSC) at European level. It is currently preparing to become the EOSC national node for Germany.

Relevant links:

- National Research Data Infrastructure (NFDI)
- Bund-Länder-Vereinbarung zur NFDI (Agreement between the Federal Government and the *Länder* on NFDI)
- European Open Science Cloud
- EOSC EU node

The National Digital Strategy 2022, which serves all data labs established at the federal level, sets PLAIN (Platform Analysis and Information System) as a standard to facilitate the handling of big data and AI tasks at the federal level. PLAIN serves as one of the sovereign private cloud environments operated by the Federal Government.

2.6. Does your country have open government data policies?

Yes, there are various EU-based (e.g. OD-PSI Regulation) and national (e.g. Open Data Law, Open Data Strategy, Federal Freedom of Information Act) open data policies that apply in Germany. Open data is publicly available through the GovData portal, which includes administrative data from Germany's federal, *Länder* and local governments. Germany has long been committed to open government data, with a first feasibility study dating back to 2012.

2.7. Does your country have laws or policies regarding procurement of AI systems or products/services that include AI components?

Yes, the general procurement obligations apply. In addition, when procuring an AI system, the system must be in conformity with the EU AI Act and other regulatory requirements.

2.8. Is there any legal obligation on the government to inform the public when they are subjected to the use of AI systems that profile or make decisions about them in the provision of public services?

Yes, Article 50 of the EU AI Act establishes transparency obligations for providers and deployers of certain AI systems. According to Art. 50 para 1 of the EU AI Act, providers of an AI system must ensure that AI systems that are intended to interact directly with natural persons are designed and developed in such a way that the natural persons concerned are informed that they are interacting with an AI system, unless this is obvious from the point of view of a natural person who is reasonably well informed, observant and circumspect, taking into account the circumstances and the context of use.

In addition, and without prejudice to Art. 50, Art. 26 (11) of the EU AI Act requires the deployers of high-risk AI systems referred to in Annex III that take decisions or assist in taking decisions relating to natural persons to inform the natural persons that they are subject to the use of the high-risk AI system. This does not apply to high-risk AI systems used for law enforcement purposes. In these cases, Article 13 of Directive (EU) 2016/680 shall apply.

2.9. Is there a law or policy highlighting monitoring, redress, and remedy mechanisms against harms caused by AI systems?

Yes, the EU AI Act includes monitoring and remedy mechanisms as part of the AI governance structure. In addition, civil law and liability law continue to apply.

2.10. Does a liability regime for AI harms currently exist in your country?

Yes, the general civil liability regime under German law is technology-neutral and applies to harms caused by AI as well as to damage caused in any other way. On the European Union level negotiations on the EU AI Liability Directive continue. The Proposal by the European Commission and additional documents can be found here.

2.11. Is there a government strategy / program to improve digital skills in the public sector?

Yes, the Federal Data Strategies (2021, 2023) outline strategic goals to improve digital skills in the public sector. Data Labs which have been established in all ministries at the federal level play a key role in public sector upskilling on data-related skills. Various ministries offer specific workshops on data literacy to its staff.

There are also many relevant initiatives at level of the *Länder*, for example the Interministerial Working Group in Brandenburg.

In addition, the GovTech Campus Germany was initiated jointly by the Federal Government, the *Länder* and players from the technology scene, research/science and civil society. The main goal of the Campus is to connect federal, *Länder* and local governments with the most innovative players in technology, civil society, the open source community and applied research.

3.   SOCIAL AND CULTURAL ASPECTS OF AI

3.1.   Has your country enacted any law or policy to reduce the digital gender gap?

Yes. Although there is no common, dedicated framework, there are many initiatives in Germany that address the digital gender gap and related issues, often implicitly. To increase the representation of women in STEM fields, the "STEM Action Plan 2.0" prioritises the promotion of girls and women as a cross-cutting initiative, integrated in all support measures and throughout the educational pathway. These efforts begin in pre-school, extend to initiatives like the annual Girls' Day - an event that last year enabled over 135,000 girls to explore careers in which women are still under-represented - and continue with programs that increase the visibility and recognition of women in STEM fields. Another example is the funding line "MissionSTEM - Women shaping the future", which the Federal Ministry of Education and Research (BMBF) launched in 2021 and which aims to sustainably strengthen women's academic STEM potential. This initiative focuses on attracting and retaining young women in academic STEM professions. In addition, the BMBF has published two calls in 2019 and 2023 to fund junior research groups on AI led by female scientists. 29 groups are currently being funded. BMBF is also dedicating a public event on International Women's Day 2025 to the topic of the gender gap in AI.

As part of its efforts to close the digital gender gap and promote equitable and inclusive AI technologies, the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ) has established the funding line "KI für Gemeinwohl" ("AI for Common Good"). This initiative supports projects that focus on leveraging AI for societal benefit while ensuring inclusivity, fairness, and equal participation. The funding line encourages innovative projects that address the ethical and societal challenges of AI, with a strong emphasis on fostering participation of underrepresented groups, including women, in both the development and use of AI technologies. By supporting such initiatives, "KI für Gemeinwohl" actively contributes to the reduction of structural inequalities and the empowerment of women in digital and technological domains.

3.2.   Has your country enacted any law or policy related to enhancing diversity in the AI workforce?

Yes, the current focus of the German government, as defined in the National AI Strategy, is on training and recruitment in the field of AI as well as on strengthening the AI skills of the population. Diversity aspects play an important role in each of these activities, but are not brought together in a separate strategy.

3.3.   Is there online content and data available to train AI systems in all your country's official languages?

Yes, with regard to German as the only official language in Germany, there is enough data available to train AI systems.

However, at the level of the *Länder*, some have additional official languages (e.g. Frisian in Schleswig-Holstein or Sorbian in Saxony). For these and other (non-official) languages and dialects, there is unfortunately not enough data to train AI systems in a way that would allow for a comprehensive use.

3.4. Are there any measures put in place or surveys conducted in the country with regard to assessing the level of trust of the public in AI technologies?

Yes, funded by the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ), the project "Digitales Deutschland - Monitoring zur Digitalkompetenz der Bevölkerung" (Digital Germany - Monitoring the Digital Literacy of the Population) developed an instrument for a representative survey of the population between the ages of 12 and 99 on competencies and selected attitudes towards AI. For example, the latest results from 2023 show that:

- Most people in Germany have a good or at least satisfactory understanding of what AI is
- When asked whether people see AI as more of an opportunity or a risk, the results are quite mixed, with most people seeing AI as potentially both
- 48% of respondents are confident that they can identify risks themselves when using AI systems (in 2021 it was only 27%)

Insights into the results on the state of knowledge regarding AI systems in the target groups of parents, senior citizens and migrants provides issue 7 of the digital magazine "Kompetent – Wissen, fühlen, Handeln im digitalen Wandel" (Competent - Knowing, Feeling and Taking Action in the Digital Transformation) from the project Digitales Deutschland (Digital Germany).

The project Meinungsmonitor KI (AI Opinion Monitor) of the University of Düsseldorf and the CAIS (Centre for Advanced Internet Studies), has developed a set of indicators which analyse public opinion on the use of AI in the labour, market as well as public acceptance of AI in different social areas, such as the public, health and industrial production sector.

A Digital Pact for Old Age, initiated by the BMFSFJ in 2021, aims at strengthening social participation at all levels in order to bridge the digital divide between the generations and within the group of older people. The aim is to promote self-determined and independent living in old age. The Digital Pact for Old Age focuses on increasing digital confidence by expanding and improving digital skills in all areas of life. All German *Länder* joined the initiative on 7 December 2023.

3.5. Do you have in place any policy for addressing the impact of AI on the environment and on sustainability?

Yes, the EU AI Act addresses the impact of AI on the environment and on sustainability. Providers of general-purpose AI (GPAI) must disclose to authorities information on the computing resources required to train and run their models. Furthermore, providers should provide information on their energy consumption, including estimated emissions.

In addition, the Federal Ministry for the Environment and Consumer Protection (BMUV) set up the funding initiative "AI lighthouse projects for the environment, climate, nature and resources" in 2019 to promote projects that use AI to tackle environmental challenges and serve as models for green, climate-friendly and nature-compatible digital technologies. Over the past 5 years, a total of 53 lighthouse projects with a budget of around EUR 72.4 million have been approved, addressing issues such as biodiversity, water management, climate change adaptation, marine protection, sustainable consumption, sustainable tourism, resource efficiency, and circular economy. Recently, the BMUV launched a new funding initiative for digital projects with a lighthouse character that use AI to advance natural

climate change mitigation. This includes applications that aim to avoid or reduce greenhouse gas emissions by protecting ecosystems, or to record, protect and promote biodiversity, or to contribute to climate adaptation.

In 2022, the BMUV established an application laboratory for artificial intelligence and big data (AI Lab) at the Federal Environment Agency. The AI Lab officially began operations in October 2023. The AI Lab develops specific applications that will improve the diverse work of the BMUV and the institutions under its jurisdiction – from species protection to radiation protection, from nuclear safety to climate change adaptation and environmental monitoring.

The BMUV also supports the ECO AI Lab, which serves as both a physical and virtual hub for civil society actors to support them in developing data-driven and AI-based solutions to address environmental challenges.

In addition, the BMUV has launched the [Green-AI Hub SME initiative](#): The "Green-AI Hub Mittelstand" paves the way for the use of AI for resource efficiency and material savings in small and medium-sized enterprises. It develops practical, solution-oriented, and on-site prototype solutions for sustainable economic growth together with SMEs.

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4. SCIENTIFIC AND EDUCATIONAL ASPECTS OF AI

4.1. Please provide data about Research and Development expenditure on AI, including gross expenditure on research and development on natural sciences and engineering, and/ or estimate of government funding for Research and Development in AI.

To date, EUR 3.5 billion has been allocated to the federal ministries for the implementation of the AI Strategy in the years 2019-2025. R&D is a key area of the strategy. However, the strategy does not provide a breakdown of the funds allocated to each of its key areas. In 2022-2025, the Federal Ministry of Education and Research (BMBF) will invest EUR 1.6 billion in AI-related activities.

The Federal Ministry of Health (BMG) is contributing to the implementation of the AI Strategy with 38 health-related research projects totalling more than EUR 180 million. These research projects will provide a scientific basis for the future use of AI in healthcare. Among other things, they will identify the opportunities and potential risks involved, the stakeholders that need to be involved and the regulatory framework that needs to be put in place in order to create a future-proof learning healthcare system.

4.2. Please provide data about AI-related research in your country, this may include for example the number of AI ethics or generally AI-related publications or patents per capita, or conferences that took place in the country, or number of interdisciplinary research centres on AI per capita.

In 2023, researchers in Germany have published approx. 31,000 articles in the field of AI. With this, Germany ranks fifth worldwide (behind CHN, USA, IND, and UK), see [OECD Artificial Intelligence Review of Germany](#). As part of its AI strategy, the German government is permanently funding six centres of excellence for AI research, together with the *Länder* in which the centres are located.

4.3. Please provide data on AI talent in your country, this may include for example number of AI researchers (computer scientists, data scientists, roboticists, AI ethics researchers) per capita.

As AI researchers are mainly funded by the *Länder* and the large research organizations (Max Planck Society, Helmholtz Association, Fraunhofer Society, Leibniz Association), aggregated figures on the total number of AI researchers are not available. The Centres of Excellence for AI research comprise over 2,000 researchers. The BMBF also funds 165 AI professorships and more than 50 junior research groups as part of the AI Strategy. The total AI research landscape in Germany is probably much larger.

The [Plattform Lernende Systeme](#) – Germany's Platform for Artificial Intelligence – lists more than 300 university departments, research institutions, and other actors in the research system in Germany that deal with AI-related issues. It also provides access to other national AI data, for example on federal and *Länder* policy and study programmes.

4.4. Does your country have any laws or policies to integrate AI or other digital tools into the education system?

Yes, in Germany, a federal country with 16 *Länder*, such laws and policies are the responsibility of the individual *Länder*. All *Länder* have dealt intensely with AI in education and have introduced compulsory digital literacy courses in which AI-related skills are regularly taught in their education systems. Many have also passed specific laws or implemented initiatives, e.g. [Bavaria](#) or [North Rhine Westphalia](#).

Since higher education institutions in Germany benefit from a high degree of constitutionally protected autonomy with regard to their research and teaching activities, there are no federal or state laws to integrate AI tools into higher education. However, in 2020, the Federal Government and the *Länder* launched the joint initiative "AI in Higher Education", which aims to support AI excellence in higher education and research. More information can be found [here](#).

In addition, in October 2024, the Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* published the [Handlungsempfehlung für die Bildungsverwaltung zum Umgang mit Künstlicher Intelligenz in schulischen Bildungsprozessen](#) ("Recommendations for action for the education administration on dealing with artificial intelligence in school education processes").

4.5. Does your country have any law/policy about the use and integration of generative AI in the education system?

Yes, see response to 4.4. All of the above-mentioned policies and initiatives also refer to the use of generative AI in the education system.

4.6. Please provide data about curriculum content related to AI and AI ethics throughout the education system, for example, number of tertiary education programs dedicated to AI, machine learning or data science per capita, or educational programs that include both technical and ethical aspects of AI.

In Germany, a federal country with 16 *Länder*, education policies are the responsibility of the latter. In addition, universities are free in designing their curricula. The Federal Government does not monitor available education programs in detail.

The OECD has recently conducted a [study](#) which provides these figures. The following are some of the key findings of the report:

- As of December 2022, German universities offered 50 full AI degree programmes, 20 bachelor's and 30 master's degrees. In absolute terms, Germany stands out as the second largest provider of full AI degree programmes in Europe. However, on a per capita basis, the provision is relatively lower.
- An additional 150 AI professorships were established between 2018 and 2023.
- AI education in universities consists mostly of full-degree AI programs.
- There are many compulsory human-centered AI courses, but no full degree for human-centered AI. That said, an increasing number of AI courses are being offered outside of computer science departments at universities (mostly in philosophy).

4.7. Are there in your country courses about AI ethics or the technical aspects of AI aimed at the general public?

Yes, since 2019, the Federal Government has supported the establishment of an open, non-profit digital learning platform dedicated exclusively to the topic of artificial intelligence. The "KI-Campus" ("AI Campus") offers courses covering all aspects of AI, including AI ethics. More information is available [here](#).

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5. ECONOMICAL ASPECTS OF AI

5.1. In your country, what is the estimated contribution of AI to the economy (as a share of GDP and/or in USD)? Please provide the best available data about the market value or turnover of AI companies.

It is important to note that the actual quantification of the contribution of AI is complex and depends on various factors. It is estimated that generative AI alone will boost Germany's GDP growth by 0.4-0.7% p.a., resulting in additional GDP of up to EUR 220 billion. According to the German ifo Institute, the majority of companies expect positive productivity effects from AI, with estimated productivity increases of 8% for their own company and 12% for the economy as a whole over the next five years.

5.2. In your country, what is the number of AI companies per capita, or percentage of AI companies relative to the total number of companies?

The definition of an "AI company" is difficult. AI is increasingly becoming a commodity, and the diffusion of AI throughout the economy is growing rapidly. According to the Federal Statistical Office of Germany, in 2023, 12% of all German companies were using AI. By 2024, this figure has risen to 20%. The German ifo Institute, on the other hand, calculates a higher share, stating that 27% of companies will be using AI in June 2024, an increase from 13.3 % in June 2023.

5.3. In which sectors do AI companies mainly operate? (If this data is not available, please provide a proxy measure such as which sectors are hiring people with AI skills).

AI is used in all sectors. The most widespread use of AI can be observed in the sectors "Information and Communication" (61%) and "Professional, scientific and technical services"

(42%). In the real estate and housing sector, a share of 21% of all companies use AI. For a more detailed breakdown of AI use by sector, see 5.4.

5.4. What is the level of usage of AI in the private sector and public sector? Please provide AI adoption rate by sector and / or details of specific implementations in the public sector.

According to the Federal Statistical Office, the share of companies using AI by sector in 2024 is as follows:

- Construction: 10%
- Energy and water supply, waste disposal, etc.: 18%
- Information and communication: 61%
- Manufacturing: 16%
- Real estate and housing sector: 21%
- Trade, maintenance and repair of motor vehicles: 16%
- Transport, warehousing, postal, courier and express services: 11%
- Professional, scientific and technical services: 42%
- Other commercial services: 19%

5.5. How much does your government spend on incentivizing AI (including grants, loans and tax incentives)?

Since the publication of the national AI Strategy in 2018, the Federal Government has allocated an additional EUR 3.5 billion to the field. This is in addition to the regular budgets for projects. The exact amount is difficult to determine, as many projects use AI but are not registered as regular "AI projects".

5.6. What is the amount of private investment in AI in your country? This could include statistics such as stock market value, VC funding, Foreign Direct Investment (FDI), or Business Expenditure on R&D (BERD).

VC investment in German AI start-ups in 2023 was around EUR 2-3 billion. Cumulatively, more than USD 16 billion in VC has been invested in Germany since 2012.
At the AI Action Summit in Paris in February 2025, the European AI Champions Initiative, a private sector initiative, announced investment plans of around EUR 150 billion in Europe over the next five years, supported by providers, investors and industry - including many German companies.

6. TECHNICAL AND INFRASTRUCTURAL ASPECTS OF AI

6.1. Please provide data about the degree of connectivity in your country, such data may include for example: share of the population using the internet, average fixed broadband download speed, share of population covered by at least a 3G mobile network, share of population with access to mobile subscription, or share of population with access to electricity.

- Share of the population using the internet: 96% in Nov 2024 ([Source](#))

- Average fixed broadband download speed: 94,8 Mbit/s in Jan 2025 (Source)
- Share of population covered by at least a 3G mobile network: 85% in 2023 (Source)
- Share of population with smartphone: 82,2% in 2023 (Source)
- Share of population with access to electricity: 100% (Source)

6.2. Is your country involved in standardization (both technical and ethical) of AI and digital technologies? (ISO/IEC, IEEE7000, etc.)

Germany was the first country in the world to publish a "Standardization Roadmap on AI". A first version has already been published in 2020; a second, updated and extended version in 2022. Germany is also very active in international AI governance and standardisation bodies. A German AI expert from the Association for Electrical, Electronic & Information Technologies ("Verband der Elektrotechnik Elektronik Informationstechnik", VDE) chairs the Joint Technical Committee 21 (JTC21) on AI of the European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC). The JTC21 was mandated (together with European standardisation organisation ETSI) to develop harmonised European standards to implement the EU AI Act.

In addition, there are also standardisation initiatives driven from research such as CERTAIN or industry such as ETMI and many others.

6.3. What is the number of data centres in your country per capita? If data centres do not exist within the country, where is the closest one?

The German government has no scientifically valid information on the number of data centres in Germany. However, a study by Bitkom estimates that there were around 3,000 data centres in Germany in 2022. Bitkom defines data centres as such if the power of the entire data centre exceeds 40 kW. This would mean 0.0000355 data centres per capita in Germany (with a German population of 84.48 million).

Another study by the German Data Centre Association (GDA) estimates that there were around 2,000 data centres in Germany in 2024. The GDA defines data centres as such if the IT power of the entire data centre exceeds 50 kW. This would mean 0.0000237 data centres per capita in Germany (with a German population of 84.48 million).

6.4. Does your country have a policy for AI-driven cloud computing?

No, there is no policy for AI-driven cloud computing that is active or in the process of being adopted in Germany.

6.5. Are there any laws or policies providing a comprehensive framework for consistent data management and publication?

Yes, the German government intends to establish an independent data institute. The respective procurement process is underway. Due to the ongoing procurement process, it is not possible to provide further details at this time.

Impressum

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