Digital Strategy

Creating Digital Values Together

Contents

1. Brief overview

The strategy pools the Federal Government's policy priorities for the digital transformation as a cross-cutting issue. Accordingly, it forms the overarching framework for digital policy in the period until 2025.

Based on a brief description of the initial situation, it defines the vision for digital progress in the current decade – divided into the following action areas: 'Connected and digitally sovereign society', 'Innovative economy, work, science and research' and 'Learning and digital government'. In order to achieve this vision, priority is to be attached to projects in the areas of modern, efficient and sustainable networks and availability of data and data instruments, uniform international technical standards as well as secure and user-friendly digital identities and modern registers, because implementation of these projects is likely to have the biggest multiplier effect.

Germany's technological and digital sovereignty is the guiding principle for the Federal Government's digital and innovation policy and contributes to the overarching objective of European strategic sovereignty. Technological and digital sovereignty is indispensable if we want to strengthen our capability to act and reduce dependencies. This in turn is essential for competitiveness and innovative capacity as well as resilience. Accordingly, in order to achieve technological and digital sovereignty, we are aiming to promote innovation in a targeted manner, improve expertise in key technologies such as software development and microchips, sensors, artificial intelligence, quantum computing, communication technologies, roll out an advanced digital infrastructure, systematically promote open-source approaches as well as establishing the regulatory framework. We are also particularly prioritizing the strategic issues of cyber security, disinformation and platform regulation.

On this basis, the strategy provides an overview of the main digital policy projects to be implemented by the individual government departments under their own responsibility. To this end, 18 lighthouse projects are supplemented by short stories to illustrate how the digital transformation can help civil society, industry, the scientific and research communities and government to actually improve the citizens' lives.

Each chapter ends with a list of the outcomes to be achieved by 2025. Particularly important objectives are:

- equipping at least one half of all landlines with fibre optics and providing universal mobile network coverage with uninterrupted wireless voice and data services for all end users – if possible by 2026;
- establishing an interoperable education ecosystem facilitating non-discriminatory and accessible digital education to be actively used by people during all phases of their lives;
- achieving a share of at least 80 percent of all persons covered by statutory health insurance schemes using the electronic patient record and establishing the e-prescription as the standard way of prescribing medicine, thus laying the foundation for better, digital healthcare;
- establishing a modern legal framework for the successful development of a data-driven economy and the improved use of data by means of interconnected data spaces in science and research, industry, administration and society;

- strengthening the startup ecosystem and supporting SMEs and startups in the use of AI applications and the development of data-driven business models;
- strengthening the skills base for the digital transformation and more diversity in the digital sector;
- further improving the compatibility of written form requirements with electronic forms of communication; facilitating the use of electronic signatures;
- achieving a comprehensive digital transformation of administrative services so that government services can be efficiently used online and regardless of location, including using government digital IDs;
- strengthening our digital sovereignty, for instance by promoting innovation in a targeted manner, improving expertise in key technologies and promoting open source;
- applying a transparent and democratic multi-stakeholder approach in European and international cooperation to ensure a reliable framework at all levels of the digital world, technical unity of the internet and a global digital order on the basis of human rights and fundamental freedoms, democracy, the rule of law and the protection of privacy.

2. Current situation

Germany needs a comprehensive digital transformation. As Europe's industrial driving force and one of the strongest economies in the world, but also as a social market economy with the ambition to achieve equitable participation, we believe that digitalization is of crucial importance for future-proofing our nation. Therefore we want to be at the forefront of international development, setting the pace for innovation and growth through digitalization. However, we currently only rank 13th out of 27 EU Member States in the European Digital Economy and Society Index (DESI, 2022 Report). While we rank well above the EU average in terms of digital infrastructure ('Connectivity', ranking 4th), we are below the EU average in the dimensions of skills and skilled workers ('Human Capital', ranking 16th), digital transformation of businesses ('Integration of Digital Technology', ranking 16th) and 'Digital Public Services' (ranking 18th). We cannot and must not be satisfied with this if we want to continue playing in the top league of international competition. With this Digital Strategy and the implementation of the planned measures, we want to reach the top ten.

By stepping up its digital policy efforts, Germany is in line with the European launch of the Digital Decade and the associated ambitious targets for 2030. At least 80 percent of the population, the Digital Compass suggests, are to have basic digital skills by then, and the number of ICT specialists is to rise to 20 million in the EU. The digital transformation of businesses is also to increase verifiably: 75 percent of businesses are to work with clouds, AI or big data applications, 90 percent of small and medium-sized enterprises (SMEs) are to reach at least a basic level of digital intensity and the number of unicorns (startups worth more than EUR 1 billion) is to double. In the area of infrastructure, the EU does not limit itself to gigabit for all households, but wants to achieve a 20 percent EU share of the production of cutting-edge semiconductors, 10,000 climate-neutral edge nodes and the first computer with quantum acceleration in the EU by 2025. All essential administrative acts are to be made digitally accessible to citizens. Therefore, all citizens will need appropriate internet access and secure identification numbers and channels.

These figures show that all Member States are interested in better harnessing the potential of digitalization to improve the cohesion of our society, promote public welfare and increase the performance of industry, the scientific and research communities and government. In particular, it is important to create scope for civil society, industry and the science, education and research communities to develop and realize new ideas as well as technological and social innovations. This can only be successful if people trust digital services. To achieve this, we must strengthen the digital sovereignty of each and every individual and offer more flexibility in all areas of the digital sphere, while also better controlling and securing data and processes that require protection. At the same time, the digital transformation must be designed in such a way that everyone can benefit from it – regardless of age, gender, disability, social situation and ethnic background. One question that arises is how digitalization can be shaped in a social, economically viable and, in particular, ecologically sustainable way? The United Nations' 17 Sustainable Development Goals (SDGs) are guiding principles, informing the Federal Government's policies and also the Digital Strategy. In concrete terms, this means using digitalization as a driver of ecological, economic and social sustainability without ignoring its potential to have the opposite effect.

The comprehensive digitalization of government, economy and society also makes them targets for spying, interference and disruption, e.g. by adversarial states and cyber criminals. The 'new era' associated with the war in Ukraine is a wake-up call to also consider building up resilience and damage mitigation capabilities, in addition to improving our ability to counter cyber threats.

The digital transformation is a cross-cutting issue. We will only achieve the key objectives together. The digital strategy is therefore to be understood as an umbrella strategy that provides the overarching framework for digital policy in Germany. It provides a course book for all government departments to develop specific strategies and measures within their respective portfolios. The steps defined in this document are primarily a commitment for the Federal Government. The Federal Ministry of Finance (BMF), the Federal Ministry for Digital and Transport (BMDV), the Federal Ministry for Economic Affairs and Climate Action (BMWK) and the Federal Chancellery (BKAmt) will elaborate a concept for the Digital Budget, as envisaged in the coalition agreement, to implement key projects of the digital strategy. This will be coordinated within the Federal Government and a transparent procedure will be ensured. As part of this concept, any needs that go beyond the measures already funded will also be identified on the basis of the adopted Digital Strategy.

With this strategy, we want to improve the framework conditions and help ensure that the digital transformation can be shaped in the spirit of a sustainable, diverse, inclusive and democratic society in a gender-equitable and non-discriminatory manner, and that civil society, industry and the education and scientific communities in particular can take advantage of the opportunities offered by digitalization and implement digital change with a human focus. The government will provide support within the means at its disposal and focus its efforts on serving as a role model for the necessary digital transformation.

3. Vision and projects with a multiplier effect

The strategy describes the vision for the current decade on the basis of three overarching areas for action in order to show how we plan to take Germany forward as part of the digital transformation, during this parliamentary term and beyond.

Connected and digitally sovereign society

Germany will have made significant progress in shaping the digital society, will harness the potential of digitalization for an open and inclusive society and will rank among the top 10 in the DESI ranking. People will be at the centre of digitalization.

By the end of 2025, half of all households and businesses will have fibre-optic connections. In mobile communications, nationwide coverage with uninterrupted wireless voice and data services for all end users will be reached by 2026, if possible. The **rollout of fibre-optic networks and mobile communications** will continue to progress rapidly, creating a high-performing, sustainable and secure basis for overall digital development in Germany. By 2030, we will have nationwide, energy- and resource-efficient fibre-optic connections to the home. By 2030, state-of-the-art mobile communications standards will be available wherever people live, work or travel.

All educational institutions, such as day-care facilities, schools, universities, vocational training and continuing education institutions, but also non-formal and informal educational centres, will make greater use of the potential of digitalization for **better education and more equal opportunities**. They will be connected to fast networks, effectively improve the digital skills of teachers and learners during all phases of life, use innovative digital tools and ensure a fundamental understanding of the potential and opportunities as well as the necessary awareness of risks.

With inclusive digital spaces, we will contribute to **living together in a democratic and equitable coexistence**. By weighing up opportunities and risks and taking vulnerable groups into account, it will be possible to ensure that platform operators' business models are accepted by users, which will contribute to their sustained success.

The improvements and innovations in **continuing (vocational) education**, such as digital advisory services and education and training platforms, will allow people to make use of individual employment opportunities and also open up new perspectives in a changing world of work.

Diverse, transparent and inclusive lifelong learning opportunities will create the foundation for participation and resilience of all citizens, regardless of age, gender, disability, social situation and ethnic background. The potential of digitalization enabling access to information and communication will allow a more self-determined life in cities and rural areas. Digital tools will be used to reduce barriers and thus discrimination against persons with disabilities; exclusion risks will be actively counteracted. The digital participation of persons with disabilities will be considered and implemented in all areas of life. This will ensure **self-determination and social inclusion**. Gender equality will be realized in all services.

Comprehensive availability of digital data will be achieved in **healthcare and nursing**, contributing to better and more efficient care as well as better cooperation with the research community. This will facilitate coordination between physicians, nurses and other healthcare

professionals by enabling them to access the latest health information at all times. At the same time, the protection of sensitive, personal health data will be fully guaranteed. Health research will be strengthened and research findings will benefit innovative therapies and medicines, improving prospects for all patients. This will include measures to strengthen the patient's right to autonomy. Digital solutions will enable particularly the growing group of elderly people to live longer, more self-determined lives and remain in their own homes or familiar surroundings.

As digitalization can be used broadly, new and modern solutions and approaches will be developed to address the challenges in rural areas. Digital applications will make an important contribution here – especially in improving public services. Digitalization in the areas of education, child and youth welfare, work, health, care, mobility, local services, culture and media, civic engagement and volunteering will improve living and working conditions in urban and rural areas and thus contribute to a **convergence of living standards**.

In the **mobility sector**, digital platforms will enable intermodal services that provide suitable and cost-effective solutions for every need – even for international travel. Germany is a hub of innovation for automated, autonomous and connected driving and is also to be one in other areas of transport digitalization. Vehicles equipped with such technology will relieve drivers of routine tasks and improve the traffic flow and road safety or make mobility possible in the first place. Railways and railway stations will use AI to improve route and track planning, and passengers will be able to access reliable, free Wi-Fi on all trains. Information on cycle lanes and parking as well as other modes of transport will also be available digitally. Mobility will thus become more comfortable, safer as well as more efficient, inclusive and sustainable.

Building Information Modelling (BIM) as well as Digital Twins will become more and more widespread in the construction industry and ensure greater efficiency in the planning, construction and management of structures. The Federal Government will serve as a pioneer, using BIM for the construction of transport infrastructure as well as buildings. Inspired by Smart Cities and Smart Regions model projects, local authorities throughout Germany will increasingly recognize and harness the potential of digitalization for sustainable, future-oriented and accessible urban and spatial development and for a convergence of living standards in rural and urban areas.

The opportunities inherent in the digital transformation will be used intelligently to ensure equal access as well as user-friendly and **secure digital services**. Risks to civil liberties, individual rights, self-determination, protection of personal data, privacy and health will be identified at an early stage and countered effectively and appropriately. Fundamental rights will be consistently protected, also in the digital space. From the outset, digital services and technology will be consistently designed to be accessible, user- and privacy-friendly as well as secure by design, thereby ensuring that people can confidently handle their own data across domains on the basis of strong and modern data protection. In doing so, it will be necessary to weigh up the legitimate concerns of data protection and data security on the one hand and other elementary legal interests (e.g. protection of life and health) on the other.

In the digital space, **our citizens** will be better **protected**, as will be our democracy, civil rights and liberties. On the one hand, we will consistently tackle the spread of illegal and criminal web content and, for example, use the potential of AI to counter disinformation campaigns. At the same time, it will be ensured that freedom of expression also prevails online and risks of

surveillance will be systematically minimized, for example by means of a right to encryption or banning social scoring systems. There will be more protected virtual spaces under public law where children and young people, girls and women and vulnerable groups can exchange views and position themselves in their diversity without regard to gender stereotypes.

Innovative economy, work, science and research

Digital policy will establish an important framework for **Germany as a competitive business site**. It will be possible to set up businesses quickly, easily and digitally, regardless of location. Venture capital will be available, for women and men alike, in sufficient amounts and serve as a catalyst. Deep-tech spin-offs from the scientific and research community lead to promising unicorns. By significantly improving the tax framework for employee share ownership and enabling employees to participate more in the success of their company, we will strengthen Germany as a location for startups. The economy will grow successfully with the help of digitalization and will have a stronger focus on sustainability. Digital technologies will increase the efficiency of environmental technology and make it future-proof. They will help restructure the energy supply and support the evolution towards a viable and sustainable agriculture and food industry and a circular economy that protects natural resources. They will boost regional value chains as well as more climate- and environmentally-friendly mobility. The digital transformation itself will also be implemented in a sustainable and climate-friendly way through energy- and resource-efficient and innovative technologies (Clean & Green Tech) and closed loop material cycles. Digital technologies will also be analysed holistically in order to avoid any social and environmental rebound effects that may arise. A focus on corporate digital and social responsibility will be taken to support this approach. When compared internationally, corporate digital and social responsibility will be a defining guideline of the German digital economy.

The transfer of **science and research** into practice will increase in leaps and bounds. Research will progress digitalization in various ways: digital methods and applications will enable new scientific approaches and ground-breaking findings; research will provide data while driving the development of digital solutions and data-driven business models in all areas for action. The research community will also accompany the digitalization process itself, enabling evidence-based regulation, among other things.

Data will be made widely available by and also for research to leverage its innovation potential. To this end, a science- and innovation-friendly data ecosystem will be developed. Access to data and services via open and uniform interfaces will be significantly expanded and improved. The interoperability of data, especially measurement and research data, will be ensured by means of international standards. This will serve as an important basis for the development of innovative business models: for civil society actors, startups, SMEs and industry creating value through digital and social innovation.

The usability of data will also improve significantly in science and research. Excellent universities and research institutions will gain new insights from smart analyses of data. With their data services, they will be important partners for government and businesses. They will drive innovative development, including through successful transfers and spin-offs.

In Germany and Europe, **artificial intelligence (AI) and robotics** will be approached with a focus on people and thus on the common good. They will be researched and developed in a

responsible, technology-neutral and innovation-friendly manner. We will have processes in place to continue to harness their opportunities for science, industry, government, society and sustainability time and again, learn to understand the new risks to individuals and society, and make them manageable.

When it comes to the **Internet of Things (IoT) and key technologies** such as AI, automated and autonomous systems, robotics, quantum computing, microelectronics, 5G/6G and cyber security, the German scientific community will be among the best of the world. The transfer between the scientific community and industry will be significantly improved. In this area, we will focus on key technologies as well as on the development of the respective economic, scientific and social ecosystems and on the transfer of the results into applications and services in industry, society and government. We will take a people-centred approach to this.

The **digital transformation of work** will be designed for all and in a safe and respectful manner. The basis for action will be that data and digital technologies are used in a responsible, non-discriminatory way. Modern regulations on employee data protection will protect the privacy of those affected and create legal certainty for employers and employees. This will enable us to harness the potential of new technologies in the best possible way.

With numerous measures, we will significantly improve the **skills base** in the digital sector, although the challenge of ensuring that skilled labour is available in IT professions will remain great across all industries and will continue to require additional efforts. Germany's digital businesses will be attractive employers for high potentials, also compared with the international competition. The digital sector will become more diverse. There will be significantly more women working in IT professions than there are today. In particular, excellent higher education and vocational training and transparent digital continuing education courses will make it easier for government and businesses to meet the qualification needs of their employees and to find qualified specialists who will be able to work remotely thanks to the widespread availability of high-capacity digital infrastructure. In addition, changes in entry and residence requirements will facilitate immigration of foreign IT specialists.

At the **European level**, a clear and reliable regulatory framework covering all levels of the digital world (networks, services, data and applications), including AI and platforms, will ensure a user- and competition-friendly environment that will guarantee growth and innovation for a strong economy as well as high consumer protection and environmental standards, secure digital participation and establish Europe's digital sovereignty. Europe will also be able to maintain its position in international competition because European competition law will be continuously updated for the digital age and European companies will enjoy a fair regulatory framework and competitive opportunities without new market barriers or digital protectionism.

Learning, digital government

Government will be consistently approached from the user's perspective and it will ensure equal participation of all people through digital, barrier-free services. This will apply to the whole process – from consultation and application to notification. With the introduction of the **digital identity** and the implementation of the **once-only principle** (also in the European context), key milestones will be reached in this regard. Citizens as well as legal entities and associations with legal capacity will thus be able to use government services remotely, electronically and

efficiently. The **Online Access Act (*Onlinezugangsgesetz*)** will be further developed. By developing expertise, staff and capacities as well as prioritizing the use of open source software and the mandatory use of open standards, government will also place a stronger focus on digital sovereignty. For the digitalization of government, it is and will continue to be important that a legally watertight and clear framework for the use of digital applications be continuously defined.

Digitally and practically viable legislation is the basis for digitalization. The digitalization perspective will be included in processes right from the beginning. A **digital check** will ensure that draft legislation is digitally suitable in terms of the process. Written form requirements will no longer be in conflict with digitalization. Digital procedures will ensure efficient and accelerated planning and approval processes and significantly advance infrastructure modernization.

Government itself will become more digital. The learning, digital government will confidently use digital platforms and diverse digital tools including AI, better evaluate its own data and use the insights gained to take decisions and prepare them in an evidence-based manner. It will strengthen the digital skills of government employees in the long term and takes the pressure off them.

As the Federal Government, we also want to work together in a modern and digital way. We will pursue the goal of a modern leadership and management culture and ensure that digital solutions are in place. For example, we will focus on collaboration across departmental boundaries, using contemporary digital tools such as messengers and applications for cloud-based document and task management that have been specially adapted for and will be operated by the Federal Government.

Particularly in times of growing uncertainty, the government will guarantee **protection and security** for citizens as well as for the economy. Together with our partners, we will significantly improve our cyberspace threat prevention, early warning and defence capabilities. The work of police and customs authorities will be more efficient and targeted thanks to the harmonization and modernization of police IT architecture. The digital transformation of the Bundeswehr will ensure reliable defence at all times, including during challenging, volatile threats.

International data policy

The basis of any successful digital policy is a **global, open, free and secure internet**. Germany will be working on this continuously through international coordination and cooperation, applying a transparent and democratic multi-stakeholder approach to internet infrastructure management and the development of technical standards for operating the internet. Our active participation in international bodies, standardization processes and multi-stakeholder forums, such as the Internet Governance Forum, will be the foundation for our digital sovereignty. The transatlantic partnership will be strengthened by the Trade and Technology Council (TTC); the commitment to more democracy on the internet will prove to be successful and a free, open and global internet will provide spaces for secure and carefree participation of all social groups across national borders.

Germany will work towards a **rules- and value-based exchange of data with trust** between democratic states and impress with its open, transparent administrative action – especially in contrast to repressive regimes. The key aspects of Germany’s commitment will be the technical unity of the internet as a universal resource and the establishment of a global digital order as an

internationally coordinated framework for the use of the internet, especially in the areas of human rights, cyber security and rules for the digital economy. The fact that this order must be based on the fundamental principles of human rights and fundamental freedoms, democracy, the rule of law and the protection of privacy is non-negotiable.

In view of the Internet Governance Forum's mandate, which expires in 2025, and the upcoming decisions on the future structure of internet governance, Germany will intensify its **digital policy cooperation** with those countries that are in favour of the multi-stakeholder governance model or can be persuaded to adopt it.

Overall, Germany will be working closely with like-minded partners worldwide, including within the framework of the European Union, the G7, the OECD, the Global South and in bilateral cooperation formats, to advance the digital transformation. Combined, this will strengthen Germany's and Europe's digital sovereignty in international partnerships.

Projects with a multiplier effect

To achieve this vision, we will prioritize those projects that are expected to have the greatest multiplier effect across all government departments in the context of our digital policy goals. In doing so, we will implement the following general strategic measures:

* Modern, **high-capacity and sustainable networks** and the **availability of data and data tools** are prerequisites for digital services and their use. We will continue to advance the gigabit rollout together with the private sector and to connect different data spaces across domains, as well as provide more government data and relevant tools, both for digital value creation and policymaking, while maintaining a high level of data protection.
* International uniform **technical norms and standards** will enable interoperability and the scaling of solutions through their market-opening effect. They will help to develop innovations into marketable products. Therefore, on the one hand, it is crucial that the projects described in this Strategy are standards-based, technology-neutral, interoperable as well as legally certain and technically secure. On the other hand, it will be equally important to exert greater influence on the creation of future international technical standards. International co-design of standards will be an essential component of an active economic and digital policy and will also be considered more from a foreign policy perspective. To this end, we will also provide greater support for the filling of vacancies in international bodies.
* **Secure and user-friendly digital identities and modern registers** will be a prerequisite for digital services provided by all levels of government, in education and training and in business and society. Where necessary, they will enable secure identification and settlements in online services, and be a key prerequisite for further digital value creation. After all, establishing identity beyond doubt is the basis of any trust relationship, which is the foundation of any electronic business and administrative processes. It will therefore be a core government task to provide secure means of identification. It must be ensured that the solutions will be interoperable across Europe and quickly available. The basis for acceptance and trust is that both IT security and data protection will be taken seriously and that it will not be possible to create user profiles. With the data protection cockpit, individuals will in future be able to receive information on their personal data and corresponding data exchanges between authorities on the basis of modernized registers.

These priorities will be important for all projects and measures to be implemented independently by each government department. We will also prioritize the strategic topics of digital sovereignty, key technologies, artificial intelligence, cyber security, disinformation and platform regulation in the coming years. These are cross-cutting issues that impact all chapters of the Digital Strategy or are explicitly addressed in the individual sections.

We want to use the Digital Strategy to progress the fundamental transformation towards a learning, digital government that works proactively for citizens. To this end, we will support the Strategy from the outset with a regular and comprehensive impact assessment and continuously evaluate the effectiveness and efficiency of the measures. We will thereby create an important tool to be able to assess whether the implemented measures will achieve the desired goals and, if not, to make adjustments.

As a result, our digital transformation will be a success, realigning processes on the basis of simple and efficient digital procedures and enabling us to strengthen Europe’s digital sovereignty.

4. Areas of action

In the following, we will present key measures for three areas for action to show how we intend to give new impetus to the digital society with people at its centre: (1) connected and digitally sovereign society, (2) innovative economy, work, science and research, and (3) digital government. Each government department will implement these measures under its own responsibility and within the scope of the funds available in its budget and financial planning. At the same time, concrete examples will be used to illustrate how government, civil society, the business sector and the scientific community use the digital transformation to make life simpler, more efficient, safer and more social. When implementing the strategy, the constitutional division of powers between the Federal Government and the federal states will be taken into account.

4.1. Connected and digitally sovereign society

Digital infrastructure

An efficient and sustainable digital infrastructure is fundamental for the digital transformation. Based on the Gigabit Strategy developed jointly with the federal states, local authorities and the telecommunications industry, we are taking measures to ensure that the infrastructure is upgraded faster. The Federal Government’s overriding goal for a modern Germany is to provide nationwide, energy- and resource-efficient fibre-optic connections to the home and the latest mobile communications standard wherever people live, work and travel - also in rural areas. These objectives are to be reached by 2030.

- By simplifying and digitalizing approval procedures, we are ensuring that upgrade projects get off to a faster start.
- We are strengthening the use of alternative installation techniques by advancing the standardization of low-depth installation techniques and developing a concept for the use of over-ground installation.
- With the Gigabit Register, we are creating a central access portal that provides relevant information – for planning infrastructure upgrades and on the current and future level of telecommunications coverage.

- With the mobile communications funding programme, we are closing gaps in coverage where no commercial rollout will take place.

Our benchmarks for 2025:

➔ Approval procedures for the construction of telecommunications infrastructure have been accelerated and digitalized.
➔ At least half of all landlines are provided with fibre optics, and – implementing the Gigabit Strategy – uninterrupted wireless voice and data services in mobile communications are in place for all end users on a nationwide level – if possible by 2026 – and the necessary workers and specialists are available.
➔ The use of alternative installation techniques has been strengthened significantly.
➔ The Gigabit Register has created more transparency with regard to the information relevant for the gigabit rollout.
➔ Gaps in mobile coverage have been closed through mobile communications funding.

Life-long learning

The spread of digital technology changes life as a whole and requires different skills and qualification profiles. Digital skills improve autonomy, social participation and cohesion, but also individual employability and prosperity. To ensure the innovative capacity of our country as well as the sovereignty of all age groups with regard to the digital world, we need higher and more targeted investment in training, initial and continuing education as well as a special focus on informal learning and education courses.

- We will make the Digital Pact for schools sustainable. For this purpose, we will work with the federal states to take stock of the results achieved to date and survey further needs to make sure that we can conclude a Digital Pact 2.0 during this parliamentary term to run until 2030. In doing so, processes are to be made much simpler and more flexible.
- With the STEM Action Plan 2.0, we are creating access to education in STEM subjects by providing targeted support along the entire education chain. We are undertaking activities to spark interest in vocational education in or studying STEM professions, particularly among the target group of girls and women, who have so far been underrepresented in STEM professions, and are thereby contributing to maintaining our skills base. This includes teaching digitalization-related skills already in early childhood and school education.
- We will lobby the federal states to strengthen digital and financial literacy.
- With initiatives such as the Girls' Day and YouCodeGirls, we are developing programmes to overcome gender stereotypes in career guidance. This way, we are encouraging young women at an early point in their education in digitalization, information technology and programming. By doing so, we are contributing to a sustained increase in the percentage of women in IT professions.
- Through the German Forum for Higher Education in the Digital Age, we are promoting networking, skill building and strategy development for digital higher education across universities and federal states.
- We will support skill building in cutting-edge fields such as artificial intelligence and continue to develop the AI Campus as the learning platform for artificial intelligence.

- As part of the National Skills Strategy, we are strengthening the culture of continuing education and are working to ensure that continuing education becomes a natural part of working life.
- In a longevity society, old-age learning is of particular importance for older people, too. This is why we also want to help older people to become more confident in handling digital technology.
- Together with our partners, we are shaping and driving forward the education policy process for the development of a Digital Learning Space with a National Education Platform (NBP). In conjunction with the ‘Education in Gaia-X’ domain, we will therefore facilitate individualized virtual educational pathways across the different educational fields – also as part-time programmes for professionals. The NBP will connect educational institutions, providers and content creators to form an interoperable, accessible education ecosystem.

Digital Learning Space: Finding continuing education courses for the work of tomorrow

Henrietta works in a mechanical engineering company. Her work has already become much more digital in recent years, but even more so during the pandemic. Technical documentation can be accessed online and increasingly contains interactive elements; courses training customer employees to program the latest generation of CNC machines with remote maintenance functions take place in digital learning spaces. Henrietta is impressed by the collaborative technical discussions that also take place here immediately, even across companies.

She thinks that these exchanges benefit everyone and build loyalty among customers and their employees to their company. She also comes to see this as an attractive professional perspective and decides to obtain professional qualifications in this field.

As in the last few years, she uses the National Education Platform as a networking infrastructure when looking for information on how digital media are used in the field of continuing education. This allows her to navigate the Digital Learning Space with a single sign-on (SSO), use her wallet as a repository and manage her data in a self-sovereign manner. To refine the search results to fit her knowledge and needs in the best possible way, when using the various services provided in the Digital Learning Space, she opens her up-to-date skills profile in the learning wallet and shares the knowledge that is particularly important for professional qualifications to search the NBP using the catalogue function.

The services found include analogue, virtual-only and hybrid continuing education courses. Her attention is drawn to the 'Zusammen-Lernen-Jetzt' agency, which provides a hybrid moderation skills training using the peer instruction approach. The course not only networks colleagues to teach one other digital skills, it also shares subject-specific cases and experiences for online discussion in the professional community. This group's blog already has a large number of followers, including many former course participants who still actively post and comment. She joins.

Three years later, Henrietta is now working at Stahl-Hart AG in Bielefeld. She still feels very enthusiastic about how active an exchange with professional colleagues can be, even across companies. And the moderation skills training was absolutely worth it: For two years now, she has been moderating an international online group on automated manufacturing systems. This reference and skill gave her an advantage, not least when she applied for the job.

And yesterday, the current and former 'Zusammen-Lernen-Jetzt' participants met in-person in a beer garden – thanks to the shared calendar. As always, everybody had a great time!

- We are continuing to regularly monitor digital literacy skills in the population, linking research and practical development and developing targeted measures for groups at greater risk of being digitally left behind.

Our benchmarks for 2025:

➔ The Digital Pact for schools has been designed sustainably and a Digital Pact 2.0 has been agreed.

➔ With the STEM Action Plan 2.0, we have expanded STEM education opportunities for children and young people with around 60 regional STEM clusters in rural areas and are providing further incentives for cooperation schemes between schools and extracurricular bodies.

➔ We have established a STEM Campus that supports the stakeholders in the extracurricular STEM education landscape in obtaining professional qualifications, e.g. with digital continuing education courses and toolboxes.
➔ Initiatives such as YouCodeGirls have successfully supported a wide range of female users in acquiring coding skills and encouraged them to choose IT careers.
➔ We have established an interoperable education ecosystem facilitating non-discriminatory and accessible digital education to be actively used by people during all phases of their lives. The overarching goal is interoperability across subjects and sectors. For this purpose, we will develop corresponding indicators.
➔ Regular monitoring shows improvements in the digital skills of the population, especially among the digitally disadvantaged groups.
➔ The results of the monitoring activities have served as a basis for the development of targeted training schemes to teach digitally disadvantaged groups.
➔ All current and relevant studies and models on media and digital literacy of the German population have been compiled in a database and research gaps have been closed by conducting additional empirical studies.

Health and long-term care

We want to use the opportunities presented by the digital transformation for human health in an ethically responsible manner and contribute to Germany being in the vanguard when it comes to digital health. Health-insured persons are to fully benefit from this, regardless of their individual situation. Therefore, the digital transformation is also to contribute to reducing health inequalities. By making all digital applications accessible, we are ensuring that they can be used by all health-insured persons, patients and employees in the healthcare system. By means of consistent digitalization, we are driving forward the modernization and networking of the healthcare sector. In this way, we are improving healthcare for patients as well as the working conditions for nurses and healthcare professionals. We are also leveraging scope for efficiency for sustainable healthcare financing. A resilient healthcare system builds, among other things, on strong health research and requires a high degree of digitalization. Digitalization is a prerequisite for internationally competitive and excellent research in the field of public health and life sciences, as well as for the rapid exchange of findings and innovations between the research community and healthcare sector.

- In 2022, we will launch a participative strategy process to develop a strategy for the digital transformation of healthcare and long-term care. In doing so, we will particularly focus on finding solutions for problems with the provision of healthcare as well as on the user perspective. Therefore, in dialogue with all relevant stakeholders, we will draw up a shared vision for the healthcare system of the future.
- With the electronic patient record, we will digitize patient data that has so far existed or been generated in different places (e.g. practices and hospitals and public health services). To enable patients and healthcare providers to benefit from the special potential of the electronic patient record as soon as possible, we will facilitate the provision and usage of the electronic patient record. This will further increase the benefits and usage across the population.

- Since, starting in 2023, it will be possible to donate data on a voluntary basis within the framework of the electronic patient record, the research community and therefore society as a whole will benefit from the use of data in order to improve healthcare.

Electronic patient record - centrepiece of digitally connected healthcare

Since she was diagnosed with diabetes 18 years ago, Elif has been receiving treatment at several medical practices and hospitals. For quite some time, it was difficult to keep track of all the medical findings, medical reports and laboratory results.

However, Elif now has an electronic patient record. All the information related to her condition – including the data from her diabetes app – is clearly presented and can be found quickly via a search function.

The daily blood sugar levels are automatically saved in the electronic patient record and sent to her primary physician. Elif regularly exchanges information with her doctor about the course of the treatment in a video consultation or via messenger. The most important data on the treatment process is documented in the electronic patient record.

This data is also used by the outpatient care service provider that has been treating Elif's wound on her foot for the last six months. The wound is healing poorly and requires specialized care with coordination between the doctor and the nurses. Via the electronic patient record, all parties involved have access to the latest wound care notes. The necessary material is ordered directly from the pharmacy or medical supply store via electronic prescriptions.

One time, when Elif self-injects too much insulin, the emergency services have to be called. Fortunately, Elif has authorized her nephew to access her data as a healthcare proxy, so he can provide the essential health-related data stored in the electronic patient record as well as her medication plan to the emergency physician for quick and targeted first aid. The hospital receives information on her condition even before she is admitted.

When she is discharged, all documents are sent to the right bodies in digital format: Elif's primary care physician receives the discharge papers, and the long-term care service provider receives the care transition documents. In addition, she can conveniently assign her discharge prescription to a pharmacy of her choice.

Elif hopes that her medical history can help other people. This is why she has shared the data in her electronic patient record for research purposes. With her support, researchers are now working on new therapeutic approaches for diabetics.

This is what Elif tells her support group. Thanks to the regular exchange, Elif is kept abreast of new developments and can also give advice herself. Jasmin, who has gone blind from diabetes, doubts whether she can use the electronic patient record. They try it out together. Thanks to the accessible design of the app, Jasmin finds her way around easily. Medical findings and recommendations for treatment can be read out to her. This makes everyday life easier and Jasmin keeps track of her data herself.

- In the first instance, we will gradually introduce the e-prescription to replace the current paper prescription, which is mandatory for prescription medication in the statutory health insurance system.
- We will future-proof gematik, the National Digital Health Agency, which is responsible for the central platform for digital applications in the German healthcare sector (telematics infrastructure).

- We are strengthening the networking of health authorities across all levels and further expanding interoperability in the healthcare sector.
- To improve the control and prevention of infectious diseases, we are gradually expanding the German Electronic Reporting and Information System (DEMIS) for infection control to be applied in healthcare facilities and the public health services.
- In long-term care, we are laying the foundations for fully electronic billing in the outpatient sector and are promoting telecare trialling.
- We support long-term care facilities with a funding programme for the acquisition of digital and technical solutions to reduce the workload of nursing staff.
- We are laying the groundwork for patient rights to interoperability and data sovereignty for an effective improvement in healthcare. This way, it can be ensured that data is accessible.
- We are promoting a scheme to use and share digitized health data in an intelligent and responsible way, also across institutions, to significantly improve patient care and research and are committed to evolving the legal framework for the use of health-related data in a way that is compatible with research interests. In doing so, we are building on the experience of the University Medicine Network and the Medical Informatics Initiative.
- We are shaping the European Health Data Space and developing an interoperable health data ecosystem with a decentralized research data infrastructure. For instance, health-related data required evolve healthcare and for research can be made available and be linked.

Our benchmarks for 2025:

➔ At least 80 percent of all persons covered by statutory health insurance schemes have an electronic patient record and the e-prescription has been established as the standard way of prescribing medicine (‘model 16’ paper prescription to serve as a fall-back option only).
➔ The healthcare system makes better use of the potential of the digital transformation, making sure that everyone, especially vulnerable sections of the population, can benefit comprehensively from better healthcare.
➔ Data availability in healthcare has improved and an improved data basis is available for research, quality assurance and healthcare improvement.
➔ Releasing electronic patient record data adds real value for physicians, patients and scientists.
➔ The digital transformation and robotics have appreciably supported and reduced the burden on the healthcare system, which will benefit patients, their families and nursing staff.
➔ Together with the other EU Member States, we are establishing a Health Data Space that meets European security standards and facilitates cross-border healthcare and health research.

Mobility

Digital connectivity and automation help to create an efficient, safe, inclusive and high-capacity mobility system, which is flexible and adapts to the overall need for passenger and freight transport. The mobility of the future is becoming increasingly digital. It creates user-friendly, accessible, smart and tailor-made mobility services, enables social and cultural participation, and contributes to achieving our climate change mitigation and sustainability goals.

- We are continuing to promote automated, autonomous and connected driving with the aim of making it an integral part of the mobility system. In this way, we are further expanding Germany's position as a centre of innovation and securing the competitiveness of the German automotive industry in the international context.
- We are ensuring greater efficiency on the railways. The Capacity Planning and Allocation of the Future project is developing a basis for digitally optimized capacity utilization on the railways. This will make an important contribution to strengthening rail, implementing the nationwide integrated regular interval timetable (*Deutschlandtakt*) and achieving the Federal Government's climate change goals. The future digital schedule and capacity management processes will be customer-friendly, fast and efficient, and will help optimize the use of limited infrastructure capacities. Using predictive maintenance proactively prevents technical defects in vehicles and tracks. This increases the capacity, reliability and attractiveness of rail transport.
- Together with the aviation industry and other stakeholders, we will develop a concept by the end of the year for integrating and digitalizing handling processes at airports to make them safer, more efficient, faster and more convenient by leveraging technological innovations such as the use of biometric data.
- To ramp up the market for electric vehicles, we are pressing ahead with the rollout of charging infrastructure on the basis of the Charging Infrastructure Masterplan. The digital provision of data on locations, charging prices, usage options and accessibility is being considered with the aim of delivering a reliable charging network to all users at all times.
- We are supporting the development of a future-oriented mobility data ecosystem in compliance with privacy laws by linking the Mobility Data Space (MDS) with the National Access Point for mobility data (Mobilithek). This way, we are laying the groundwork for digital applications and innovative business models in the mobility sector and beyond.
- In the future, we want to further expand the cross-sectoral interoperability of the MDS. For this purpose, we want to connect data spaces from other industries and sectors with the MDS.

Expanding the mobility data ecosystem

Marita lives in Eberswalde (Brandenburg) and would like to visit her grandparents in Kastellaun (Rhineland-Palatinate) during the winter holidays. To travel from her home to Kastellaun, she uses various means of transport, ranging from an e-scooter to bus, train and even car sharing. Instead of booking each means of transport separately and comparing timetables, she uses smart applications based on data from different mobility providers. They give her everything she needs to book her journey 'à la carte' (schedules, connections, prices etc.) in line with her specific needs.

Marita uses smart systems to reach her destination safely. When she is driving through the Hunsrück region using a shared car, it warns her about icy roads on the hilltops because it is supplied with dynamic weather data. So *she drives carefully, but when she still accidentally drives through a small pothole, she smiles to herself. Nothing has happened and she knows that her car will send this impact to a data pool. She read that in the rental agreement and she agreed to it of her own accord. This data is analysed for the highway authorities to make sure that damage to the road can be identified and repaired as soon as possible.*

- We are speeding up procedures by reducing planning periods and by digitalizing the application and participatory procedures under planning law in the field of transport and offshore projects via the Federal Government sectoral planning portal.
- We will establish standards for digital project and risk management, especially for large-scale projects, to make it easier to manage costs and the various processes (including schedules, contract management, subcontracting, etc.).

Our benchmarks for 2025:

➔ By improving the availability of mobility data from the MDS and the Mobilithek, we have succeeded effectively strengthening the development of new data-based mobility solutions by increasing the number of companies that are actively involved in the MDS fivefold, from currently 50 to 250 companies.
➔ All executive agencies of the Federal Ministry for Digital and Transport are active providers of data to the Mobilithek, more than 1,000 organizations provide data through the Mobilithek, delivering 80 million data packages per month with a total volume of more than 60 terabytes, and serving more than 10,000 data subscriptions.
➔ Automated, autonomous and connected driving has taken the leap from pilot projects and projects into practical application in everyday life, after we completed the legal requirements with the ordinance implementing the Act on Autonomous Driving. At the same time, we want to start a scientific assessment of the legal framework governing autonomous driving by the end of 2023 to address any need for amendments to the legal framework.
➔ Our commitment at European level has led to further harmonization of autonomous vehicles and establishment of an EU scheme on the approval of volume production to ensure a general and scalable increase of vehicles being operated in regular public road transport, allowing more vehicles than previously possible (1500 vehicles at EU level and 250 vehicles at national level per type per year or Member State).
➔ By means of applications, nationwide where possible, linking public transport services with other (shared) transport services is easy and customer-friendly.
➔ We have developed a digitalization plan for handling processes at airports.
➔ Digital capacity management and predictive maintenance contribute to more efficient, reliable and attractive rail transport.
➔ By the end of 2022, the joint sectoral planning portal of the Federal Railway Authority (EBA), the Federal Maritime and Hydrographic Agency (BSH), the Federal Trunk Road Authority (FBA) and the Federal Waterways and Shipping Agency (GDWS) has been put into operation and has been supplemented by a digital objection management system by the end of 2023, which has made it possible to reduce the average duration of the procedure.

Construction, Smart Cities and Smart Regions

By offering digital models for planning, controlling the construction process and transferring building data for subsequent operation, Building Information Modelling (BIM) ensures greater efficiency throughout the entire life cycle of structures. Digital simulations and studies of variants enable, among other things, early sustainability considerations and the evaluation of CO_2 balances, thus forming the basis for greater economic efficiency and climate compatibility. All market stakeholders should be able to participate in the digital transformation. Particular account

is taken of the many small and medium-sized enterprises (SMEs) in the value chain of the German construction sector.

Local authorities are playing a key role for urban and spatial development. The Federal Government is creating the conditions for mastering the different urban and spatial development goals efficiently and sustainably by using intelligent data integration. This requires uniform standardization and the harmonization of processes.

- We are continuing to drive forward the introduction of BIM as the standard for the construction of federal transport infrastructure and buildings and are promoting innovative projects on digital planning, construction and operation.
- With the Federal Government's BIM portal, we are establishing a platform to clearly and precisely define the requirements for digital construction using BIM.
- With BIM Germany – Centre for the Digital Transformation of Construction, we are promoting the use of BIM and digital methods in Germany, providing technical advice to involved practitioners and supporting the development of national and international standards in coordination with the national standards organization.
- Based on the Smart City and Smart Regions model projects, we are enabling digital solutions for better participation, planning and visualization of planning decisions and strengthening networking and knowledge transfer between local authorities.
- We are supporting local authorities in holistic digitalization approaches, promoting dialogue and networking among stakeholders and providing knowledge and information.

Connected Urban Twins – your city in the digital space

Lisa and Tarek have lived in the city for a long time. Very hot summers, but also heavy rainfalls, have become significantly more frequent in their neighbourhood in recent years. Like many others, they are worried about the future. They learn about a series of workshops organized by the municipal administration where they can contribute ideas on microclimate and landscape planning for their district using a Digital Twin.

Urban Digital Twins bundle many and varied data to form a realistic, digital image of the city. This is not only used for visualization but also enables the simulation of what-if scenarios.

In a workshop, the municipal administration shows Tarek, Lisa and other citizens a 3D city model of their home town on a touch table. Starting from an overview map, Lisa can zoom right into her street. With other participants, she discusses where new city trees could be placed to provide additional shade in the summer. Virtual reality glasses show Tarek in an interactive, true-to-life view where flooding could occur during heavy rainfall. Urban planner Sina presents her ideas for possible precautionary measures. During the workshop, all participants can mark places on the map and add comments with further ideas.

These and other applications illustrate how Urban Digital Twins make complex urban contexts comprehensible even to non-experts. New opportunities for urban community participation allow for a more informed basis for discourse and ultimately for faster and rethought urban development decisions.

- Building on the experience gathered in the Smart Cities model projects, we will develop a Smart City step-by-step plan. We will transform the Smart Cities Model Projects Coordination and Transfer Office into a centre of excellence for Smart Cities that is to effectively support local authorities in their Smart City approach.

Our benchmarks for 2025:

- ➔ The establishment of BIM as the standard for all modes of transport as well as for housing and building construction has made significant progress and has laid the foundations for improved economic efficiency and life cycle assessment in the planning, construction and operation of building and infrastructure projects.
- ➔ The 2025 milestones of the BIM Masterplan for federal buildings have been achieved and federal building construction has become a role model for the application of the BIM method also for private developers.
- ➔ At least one central cloud-based collaboration platform has been successfully established for the federal construction sector.
- ➔ The Federal Government's BIM portal is being used across all modes of transport and the Digital Twin vision is being applied to many areas of infrastructure management.
- ➔ The Smart Cities model projects have provided innovative and transferable digital solutions for urban development policy tasks and have been supplemented by an approach for Smart Regions.
- ➔ The Smart City step-by-step plan has been developed and the Smart Cities Model Projects Coordination and Transfer Office, as the centre of excellence for Smart Cities, is effectively supporting local authorities in shaping the digital transformation.

Digital civil society

Civil society plays a central role in shaping the digital society. We therefore want to link up infrastructures, funding programmes, initiatives, projects and communities to create a strong foundation for the public benefit – across all sectors: for democratic participation, for the digital sovereignty of society, for the environment and the climate, for peaceful coexistence.

But the digital space not only enables new formats of democratic participation and debate. Developments such as hate speech, disinformation and digital violence are threats to our fundamental rights that we must counter vigorously – yet again, together with civil society organizations.

- With the *Civic Coding – Innovation Network AI for the Common Good* initiative, we are strengthening data and AI skills of civil society, bundling funding programmes and support measures, providing support for the realization of digital projects and promoting social, participatory and sustainable technology design. We are supporting the networking of (civil society) actors and are enabling the trialling of digital technologies through platforms and meeting spaces such as the *Civic Innovation Platform* and the *AI Ideas Workshops for Environmental Protection*. Within the scope of a *Civic Data Lab*, we are committed to creating data spaces for the common good together with civil society organizations.

Harnessing AI technologies for societal and social progress

Tim is very skilled with tools and makes great wooden toys for children. He works in a small handicraft business and gets along well with Bahira, his Syrian colleague. Bahira has learned German very well in the last months and assists the team of the personnel office. But when it comes to dealing with authorities, she feels very helpless and does not understand how to apply for benefits. Tim also has difficulties with officialese and normally asks his friend Justus for advice. Together with Maja, Justus founded a startup a few months ago. Both are well versed in the possibilities of AI and have already programmed some applications.

They are thinking about how they can harness technology to help Tim and Bahira. They would like to talk to a government agency to understand how official texts are created. Maja has heard about the Civic Innovation Platform where very different people work together to develop AI applications for everyday problems. She posts her idea of an AI application that translates forms and official texts into plain language on the platform. She does not have to wait long before a municipal office contacts her that would like to collaborate on this application. Tim and Bahira are excited about the app resulting from this collaboration and use it to navigate the municipal office's website and compile the necessary documents. Justus and Maja are now thinking about what their next AI application might look like and have contacted the Association of Visually Impaired People via the platform. Maja already has an idea for voice-controlled GPS.

- We are strengthening digital skills and commitment against hate on the internet. With the Live Democracy! federal programme, we are specifically supporting civil society organizations whose projects aim to strengthen and empower citizens to recognize disinformation and effectively counter hate on the internet.
- By adopting an Act against Digital Violence, we will remove legal hurdles for persons affected, such as gaps in information rights. We are establishing the legal framework for electronic reporting procedures and private proceedings and will enable account blocking by judicial order. We will promote advisory services for victims of digital violence.
- We will support digital volunteering, make it more visible and strengthen it legally. We will better involve civil society in digital policy projects and support them, especially in the areas of diversity and civic tech.

Our benchmarks for 2025:

➔ The *Civic Coding* initiative has contributed to boosting data and AI skills in civil society, has promoted new alliances between actors and has provided impetus for new AI projects oriented towards the common good. We will provide proof of this using appropriate indicators.

➔ The 28 model projects focusing on digital matters that were funded under the federal Live Democracy! programme and the measures of the Network of Excellence against Hate on the Internet have been successfully completed, are supporting those affected by hate and incitement on the internet and are strengthening civil society actors in promoting the digital skills of citizens for commitment against hate speech on the internet;

➔ The Act against Digital Violence and the corresponding advisory services have provided effective support to those affected to defend themselves against digital violence, and suitable monitoring indicators have been developed.

Protection and expertise in the digital space

The use of consumer data is of great economic importance, but also carries the risk of data being commercialized and consumers' fundamental rights being undermined. A modern data economy that is in line with fundamental European values can therefore only be considered and implemented in combination with a strong protection of consumers' rights in the digital space. The General Data Protection Regulation (GDPR), which sets good international standards, serves as our basis and starting point.

- We are strengthening digital consumer protection, especially in the fair, neutral and user-friendly design of user interfaces and with regard to misleading or deceptive web design. We will promote measures and projects aimed at ensuring that digital services and offers be consistently secure, user- and privacy-friendly by design and facilitate the enforcement of consumer rights.
- We are strengthening education in the use of AI systems, informing consumers about their rights and aiming to create or further expand advisory and information centres on AI for civil society, for example by expanding the Centre for Trustworthy Artificial Intelligence for civil society.

Strengthening consumer sovereignty in dealing with AI systems

Mani studies computer science and often observes that dangerous content spreads very quickly on the internet. He has also noticed that all of his friends seem to act in parallel worlds on the internet because different content is displayed to all of them. Contents change abruptly with the emotional state of people. Mani wants to understand the reasons for this and learns about the Centre for Trustworthy AI and the wealth of information that has been developed there in recent years on the societal impact of algorithms. Here, Mani also finds specific information on what he can do about potential disadvantages caused by the use of algorithms.

- We are increasing our efforts to address the issue of power structures in the digital transformation and are dealing intensively with new perspectives and approaches such as feminist digital policy in order to better understand the risks and dangers of the digital transformation.
- We are monitoring the data market and are taking regulatory action where necessary to ensure a data-based economy that is fair for consumers and are keeping in mind that the data economy must serve the common good.

Our benchmarks for 2025:

➔ Advisory and information centres on AI for civil society and administration have been created or expanded, the Centre for Trustworthy Artificial Intelligence, for example, has been established for civil society in Germany as a place of debate on societal questions about AI and algorithmic systems and enables consumers to find information about their rights. To this end, the size of the network is to be doubled.

Culture and media

The digital transformation of the cultural sector enables innovative ways to make culture accessible to a broad audience and offers new opportunities for participation and interaction. At the same time, digital technologies open up effective ways to preserve and safeguard cultural assets. The war in Ukraine shows the extent to which culture as an identity-forming force is the target of aggression. For this reason, the digitalization of cultural artefacts is of paramount importance in the context of cultural heritage protection measures.

The media are undergoing profound transformation processes in the course of digitalization. They need new business ideas and models in order to prevail in the long term in an increasingly diverse and constantly changing competition for attention and advertising revenues. Fair competitive conditions, independence from the government and a functioning market (free of monopolies) are the prerequisites. At the same time, the services offered by quality media – including digital media – are an indispensable contribution to effectively counteracting disinformation on the internet and providing orientation in the flood of information.

- We are launching the Culture Data Space project and are helping to set up a supraregional IT infrastructure to enable decentralized, secure and sovereign data exchange in the cultural sector. The improved availability and interconnection of cultural data will encourage the creation of digital services and business models.
- We are developing the German Digital Library, the national online platform for the presentation of cultural heritage and knowledge, as a place that is attractive to users and connects digital services from German cultural and knowledge institutions across all sectors (archives, libraries, museums, media libraries).
- We are continuing to work intensively on fair conditions of competition for quality media in Europe. In the negotiations on the European Media Freedom Act, we are advocating media independence and the absence of government control, also in the context of the European regulation of digital transformation processes and requirements for the media market.

Culture Data Space

Amira works in the press and public relations department of a municipal theatre near Munich. Her task is to publish the theatre schedule in the local press and in the cultural magazines of the town and Munich. It annoys her that all providers have their own input masks, so she has to sit for two days to enter the data. In the future, the theatre schedule will be transferred directly from the theatre's website to the Smart Theatre Services module of the Culture Data Space, and cultural platforms or newspaper event calendars will be able to access the data and embed it on their websites. By linking data from cultural institutions with real-time information from public transport or even weather services, they can present local cultural attractions in a tailored way. Amira can use the time saved to prepare a high-reach social media campaign for the next premiere.

Her friend Claudia, who lives in the catchment area of two major cities, loves the theatres of both cities. Using the machine-readable theatre schedules of the Culture Data Space, her local city magazine has developed an app that links cultural data with mobility data in real time, showing Claudia only events that will allow her to catch the last bus home in the evening.

Arne is a huge Wagner fan and spends much of his free time watching various productions of his favourite pieces. It takes him a lot of time to check the opera houses' schedules on the internet to put together his annual itinerary. Thanks to the machine-readable theatre schedules, he now has an app that shows him all productions of the 'Ring des Nibelungen' sorted by region. They can be linked with hotel and mobility data, enabling him to conveniently put together his itinerary, ticket bookings and overnight stays.

Amira's cousin Jasmin is blind and loves theatre performances with audio description. She enjoys travelling around Germany with her friend Rainer, who is a wheelchair user, to experience a modern production with audio description. In the past, Rainer had to search the internet for a long time to find a show they could both go to without any problems. Because websites often were not accessible to Jasmin, he had to do the searching. The theatre schedules of the Culture Data Space are now accessible to people with disabilities and also include a separate category describing the accessibility of each production. In this way, Jasmin and Rainer can quickly find productions across Germany they can visit as they meet the criteria of 'Accessible to mobility-impaired persons' and 'Audio description'. And the best is: Jasmin can now find and book a new theatre show on her own and surprise Rainer with it.

Our benchmarks for 2025:

- ➔ We have launched the Culture Data Space project, incorporating existing activities of cultural institutions, civil society and the cultural and creative industries, by proving the feasibility of a data space application on the basis of the use cases Connected Cultural Platforms, Smart Museum Services, Smart Theatre Services and Smart Music Services in an initial phase until mid-2023.
- ➔ Based on a relaunch to be completed by the end of 2022, we have developed the German Digital Library into a portal that makes Germany's cultural heritage even more intuitive to experience.
- ➔ We have launched a funding programme to strengthen media literacy by the end of 2023, which is to increase digital skills in society, help people recognize quality media and, in particular, combat disinformation on the internet.

➔ We have created a stable and fair competitive framework that enables the necessary transformation of media services and allows quality journalism to persist in its diversity and independence after the transformation.
➔ We have been able to provide targeted support for the protection of cultural assets in Ukraine through the digitalization of cultural and archival materials.

Participation, equality and digital accessibility

Full participation, gender equality and digital accessibility are quality features of a modern country and a benefit for everyone. Digital innovations have great potential to provide orientation, facilitate the communication of knowledge and make people's everyday lives easier, safer, more sustainable, more accessible and more social. At the same time, digitalization must be designed in a way that guarantees protection against the exploitation of weaknesses and vulnerable groups. In particular, these vulnerable groups include children and young people, women, elderly people, people with disabilities, LGBTQI+ and persons with migratory backgrounds.

- We are ensuring that even children and young people can participate in a safe digital environment and protected digital spaces and take advantage of the opportunities this provides. To this end, we are systematically driving forward the current legal reforms – including with the newly established Federal Agency for the Protection of Children and Young People in the Media.
- With the Growing up with Media initiative, we are promoting digital skills from an early age, also involving parents and professionals.
- We are working together with the federal states, local authorities and independent organizations to develop a joint strategy for cooperation on digitalization in child and youth welfare and are improving access to child and youth welfare services, e.g. by developing digital applications and support systems for youth welfare offices.
- We are developing innovative Digital Family Assistants around families, equal partnership and family benefits, which are to pave the way for a modern and user-friendly information service by the Federal Government (Family StartApp, Family chat bot).

Digital Family Assistants

Mathilda and Ali are a young couple who have been working in their jobs for several years. She is self-employed and he is an employee. They recently learned that Mathilda is pregnant and are now looking forward to having their first child. Both of them care about their careers and want to share the responsibilities as partners. But searching for reliable information is tedious for them. What government benefits are they entitled to and where can they apply? Who will take parental leave for which periods and how will this affect their old-age pensions? With each answer they get, it becomes more and more difficult for both to keep track of the relevant facts and get to the same level of information.

But fortunately, there are the Digital Family Assistants. The couple just has to provide a few answers to questions about their personal situation to get information about the most important issues. They learn what benefits they are entitled to and where they can digitally apply for them. Useful practical tips illustrate how they can pursue their career paths and continue to earn their own money while also having a family, just as they both imagine it to be. Everything is now put into in a manageable and logical order, and they are reminded of application deadlines and pending decisions. They also receive suggestions for counselling centres. With their user-friendliness and attractive design, innovative tools are assisting many young couples and parents like them and help both partners to stand on their own feet economically and share their tasks in line with their wishes.

- Under the umbrella of the Digital Pact for the Elderly, we are linking up successful projects and initiatives throughout Germany for teaching digital skills to older people. In this way, we are creating a broad societal alliance to strengthen digital participation.
- With the Together through Innovation research programme, we are developing interactive technologies for improving health and quality of life, including robots providing assistance, innovative solutions offering closeness and interpersonal communication over a distance or virtual reality applications for people with limited participation opportunities.
- With the AI Compass Inclusive project, we want to inform, advise and support people with disabilities, vocational rehabilitation service providers, companies and other stakeholders in a low-threshold, needs-oriented and practical way in the testing and introduction of AI-supported assistance technologies with the aim of allowing people with disabilities to better participate in working life. Among other things, a database of corresponding technologies is being built up for this purpose.
- With the planned evolution of the Act to Strengthen Accessibility, we will improve digital accessibility, further reduce existing barriers and thus expand participation opportunities for people with disabilities.
- The advisory work of the Federal Agency for Accessibility will be expanded.

Our benchmarks for 2025:

➔ The Federal Government, federal states, local authorities and independent organizations cooperate on the basis of a joint strategy for digitalization in child and youth welfare.

➔ The Federal Government's efforts to stimulate and promote activities in the child and youth welfare sector for strengthening the digital skills of young people and professionals have increased considerably and digital tools contribute to more qualified advisory activities and greater use of child and youth welfare services.

➔ 10 percent of (expectant) families make use of information services and the Digital Family Assistants.
➔ The digital participation of older people or people with disabilities has been effectively strengthened. This is to be achieved with 20 partners offering 350 services in various projects at over 200 locations.
➔ Thanks to the AI Compass Inclusive project, vocational rehabilitation institutions better know and use AI-based assistance technologies.
➔ Digital accessibility has been improved.
➔ The Federal Agency for Accessibility has been expanded and more consultations for authorities and companies have been carried out.

4.2. Innovative economy, work, science and research

Data economy

Creating an attractive, secure and agile data economy is one of the Federal Government's strategic priorities. It lays the foundations for future competitiveness and helps effectively harness the potential of data to improve everyone's lives. We need a comprehensive and open data ecosystem as part of a strong European single market for data. Establishment of data infrastructures such as data platforms and data spaces must continue apace in all sectors. Data availability and data use must be strengthened across sectors, also as a foundation for innovative AI applications.

- Together with industry, the scientific community and civil society in Germany, we want to work specifically towards seamless connectivity of data islands. To this end, we will continue to develop the data strategy.
- In Gaia-X, a cross-sectoral, European, open, innovative ecosystem for data-driven business models and products is being created. It is based on a data infrastructure that connects cloud and edge services via open source applications and interoperable standards and also networks them into the scientific community. We are supporting this development because it ensures digital sovereignty for users through transparency and self-determination.
- We will connect various data spaces across domain boundaries. The goal is to create a cross-sectoral digital data ecosystem in which stakeholders can share data without sacrificing data sovereignty and data protection. To this end, we are supporting the development of a universal global data standard and establishing strategic international partnerships for this purpose.
- A data institute will drive data availability and standardization, establish data custodian models and licences. In this way, we are improving data availability throughout Germany practically and in line with demand and strengthening data-based science, research, business, society and administration.
- With the EU Data Act, we want to promote innovation-friendly data law for fair data access and use in Europe, and make improvements in particular for SMEs and consumers, incentivize collecting and sharing data, and make it easier to switch providers of cloud services.
- By introducing a data act, we are laying the legal groundwork required for these measures at national level.

- We are continuing to implement the AI strategy for responsible AI development and use by supporting the networking of AI stakeholders to form an AI ecosystem and advancing transfers from research to application and commercial use.
- We are also championing an EU Regulation on Artificial Intelligence that is innovation-friendly and -enabling, yet also protects fundamental rights and ensures a high level of safety and security.
- We are establishing AI service centres to promote AI use, including its use in small and medium-sized enterprises, and making Germany and Europe a leading hub of AI in science and industry.

KIKStart (AI for SMEs and startups)

We are bringing data and AI applications to the German economy on a wide scale, with a particular focus on startups and SMEs.

Paul is driving to his medium-sized company, which bottles locally produced juices in returnable bottles. He is particularly looking forward to work today because they are putting a new system into operation. It will allow the company to produce better and faster. The filling lines now have Digital Twins, digital versions of each line that reacts in exactly the same way as the real one. This means that technical problems and time to repair or replacement can be predicted more accurately and downtime for machine retooling can be reduced. With automated image processing, damage to the containers is detected just as quickly as rejects after filling. This marks the successful conclusion of a six-month project. Paul's company was supported by the AI startup founded by Natascha, which helped retrofit the equipment with sensors. The additional data they provide is used to feed the Digital Twins. Using the camera images, the system can instantaneously detect quality defects because it has been specially trained on these products. At first, Paul was sceptical, but he was able to see for himself the benefits of data-based production on a demonstrator and also experiment with real machines at a Federal Government-funded SME Digital Centre near him. Natascha's startup is Gaia-X certified and uses Gaia-X-compliant cloud computing power and data.

Our benchmarks for 2025:

- ➔ Data from different data spaces in industry, science, administration and society can be combined based on user interests.
- ➔ More sample applications that illustrate the technological and economic benefits of Gaia-X have been implemented.
- ➔ A data institute has been established to drive availability and standardization of data in Germany and to establish data custodian models and licences.
- ➔ The competition regulations on data access, data portability and interoperability have been evolved and provide the framework for successful development of the data economy.
- ➔ The range of applications and the transfer of AI into practice have been increased, for example through the AI service centres for science and industry.

Science and research

Science and research play a key role in leveraging the potential of digitalization for a connected society, an innovative economy and a sustainable future. Only with excellent research in universities, companies and non-university research institutions can Germany play a leading role in the race for the best digital solutions. Establishing a comprehensively networked, sustainable data culture in science and research is a key task for the years to come. On the one hand, this task includes comprehensively and sustainably harnessing research data for science, business and society in order to generate new innovation potential from it and, on the other, making data widely available for research purposes. On this basis, research plays a key role in supporting the digital transformation.

- We are developing and systematizing research data resources in the National Research Data Infrastructure (NFDI) by establishing a decentralized and networked data space to sustainably secure and harness research data.
- We are establishing the German Agency for Transfer and Innovation (DATI) to promote technological and social innovations, particularly at Universities of Applied Sciences (HAWs) and small and medium-sized universities, in collaboration with startups, SMEs and social and public organizations, among others.
- We are evolving the Agency for Breakthrough Innovations (SPRIND) on the basis of the coalition agreement with the aim of being able to promote disruptive innovations even more quickly and flexibly. We are backing spin-offs from research and scientific institutions with spin-off research initiatives.
- We are networking science and industry, in particular through Gaia-X as an innovative knowledge and technology transfer toolkit, and through interoperability between data spaces.
- We are creating data access rights for research (research clauses) to facilitate research in the interest of a comprehensive, sustainable and value-oriented data culture.
- We are already improving data skills at all career levels in the scientific community within the Exploration of Universe and Matter (ErUM) framework programme with the ErUM Data action plan and would like to implement this across all scientific fields with a financial assistance programme within the scope of our Research Data action plan.
- We are enhancing our data processing capabilities by expanding the digital infrastructure for high-performance computing and supercomputing.
- In addition, we will use the strategy for the future to evolve research and innovation policy in order to protect natural resources, ensure Germany’s international competitiveness, strengthen societal resilience and safeguard technological sovereignty.
- For a forward-looking, crisis-proof and modern healthcare system, we will drive the development of new technologies in biotechnology and applied life sciences research, as well as digital health innovations and inter-institution sharing of health-related data for research.

Our benchmarks for 2025:

➔ A Research Data Act has comprehensively improved and simplified access to research data for public and private research and research clauses have been introduced.

➔ The NFDI has established itself as *the* network in the German scientific landscape, and research data is more accessible for use in new business models, innovations and modern government.

➔ Networking between the scientific community and industry has been strengthened, giving researchers better access to data from industry.
➔ Data skills have improved across all career levels in the scientific community.
➔ We can provide computing power in the exascale range.
➔ A data infrastructure for inter-institutional sharing of health-related data has been established at university hospitals as hubs that dovetail cutting-edge research and healthcare.

Development as a competitive business location

An internationally competitive industry and a strong SME sector that actively harness the opportunities of digitalization for growth and sustainability are just as crucial for innovations, economic momentum and future-proof jobs as innovative and dynamic self-employed individuals and startups. Together, they need the flexibility to trial innovations and a modern digital regulatory policy for fair competition.

- Based on the goals of the Startup Strategy, we will consistently and appreciably improve the conditions for startups in Germany. With the Future Financing Act, we are mobilizing private capital and using it to leverage growth financing.
- We are empowering SMEs and supporting the secure digital transformation with the SME-Digital funding priority and the Digital Now investment grant programme.
- We will turn Germany into one of the leading locations for companies in the digital finance industry (including FinTechs, NeoBrokers and InsurTechs). To achieve this, we are relying on effective and rapid approval procedures, legal certainty for digital technologies and IT and cyber security enhancements.
- We want digital financial services to work without media fragmentation. We want to support this step by establishing a regulatory framework.
- Digital financial markets also include digitalized supervision of financial services. BaFin, the Federal Financial Supervisory Authority, is therefore evolving its methods and supervisory culture, in particular by digitalizing its processes and applying modern technologies in supervision to increase the speed and quality of supervisory decisions.
- We want to make Germany more attractive as a location for financial innovations and crypto tokens. To this end, clear and legally watertight tax regulations are still required to avoid barriers to development. We want to further encourage financial supervision to fully incorporate new, innovative business models, even those with complex structures. We are advocating for European oversight in the crypto sector to promote uniform standards within Europe, also taking sustainability aspects into account.
- We are creating a DataSpace Industrie 4.0 to develop data-based business models in industry (e.g. for greater resilience and sustainability) and to increase efficiency and flexibility in production. To this end, we are evolving the Industry 4.0 platform and supporting the cross-sectoral ‘Manufacturing-X’ initiative as a key measure for digitalizing supply chains. We are developing a concept to promote research and development projects as well as the broad transfer of technologies and applications to small and medium-sized enterprises.
- We also want to use the opportunities offered by public procurement to prioritize innovative solutions, thereby creating real opportunities and growth potential for German and European innovations based on research and development. That will strengthen digital sovereignty along the entire innovation chain through to practical applications.

- We will submit a bill that puts in place a uniform and innovation-friendly framework for real-world laboratories and allows innovations to be tested.
- We ensure functioning competition through modern digital regulatory policy for digital markets. This is as much about preventing anti-competitive concentrations of market power as it is about effectively preventing specific practices that are particularly dangerous for fair and contestable markets. To this end, we are also strengthening private enforcement of rights in the digital sector and authorizing the Federal Cartel Office to take investigative measures under the Digital Markets Act.

Our benchmarks for 2025:

➔ The measures combined in the Startup Strategy have been implemented, strengthening the startup ecosystem and boosting entrepreneurship.
➔ The level of digitalization among German SMEs, for example measured based on the SME Digitalization Index, has improved significantly.
➔ Germany has become a more attractive location, especially for young companies in the digital finance industry.
➔ The open DataSpace Industrie 4.0 has enabled around 10 new data-based application scenarios.
➔ Modern regulatory frameworks have been created for real-world laboratories and, as a result, testing of innovations under real-world conditions makes a greater contribution to digital and sustainable change.

Key technologies for German and European digital sovereignty

As a foundation for digital sovereignty, the research, application and rollout of key technologies are consistently being driven forward, with human needs in mind at all times. This focuses on developing strong economic, scientific and societal ecosystems as well as translate research results into practice. We also think of digital sovereignty in the context of the European Union, because the potential of the Digital Single Market and its economies of scale can only be fully tapped if the EU Member States work in concert.

- We are building skills in key technologies such as AI, microelectronics, 5G/6G, automated and autonomous systems, robotics, quantum computing and cyber security, and holistically strengthening the associated ecosystems.
- By implementing the AI strategy, we will make ‘Artificial Intelligence (AI) made in Germany’ a globally recognized quality label. We are building on the strong position of German research and Industry 4.0 in this segment.
- We are strengthening the microelectronics ecosystem along the entire value chain in Germany and Europe through the Key Digital Technologies Partnership and by implementing the IPCEI Microelectronics and Communication Technologies. We are also advancing the European Chips Act, with which we aim to support investment in state-of-the-art semiconductor manufacturing equipment, semiconductor technologies and applications.
- We are enabling data-driven business models through cloud edge infrastructure using the IPCEI Next Generation Cloud Infrastructure and Services - Industrial Cloud. We are targeting spillover effects into other industries and Member States.
- We are supporting enabling technologies in particular, as well as the open source ecosystem and especially with a Sovereign Tech Fund (STF).

- In foreign and economic policy, we will focus to a greater extent on our technological dependency. We are currently developing an industrial strategy in which supply chains also play a role.

Our benchmarks for 2025:

➔ We are one of the leading European nations in AI research, among the top five countries in the world in terms of transfer and have succeeded in significantly boosting software development in Germany.
➔ We are reducing unilateral international dependencies and preventing bottlenecks with trustworthy and sustainable microelectronics.
➔ We are facilitating the necessary new, high-capacity and secure communication infrastructures in a hyperconnected society through research and development on secure and trustworthy communication technologies of the future (6G, quantum communication).
➔ We have strong ecosystems for quantum technologies in the European bloc and are among the world leaders for quantum sensors and quantum computing in research and industry.
➔ We have secured the open source-based infrastructure through the STF, improved the range of open source technologies and potentially increased the number of companies in the segment.
➔ As part of our foreign and economic policy, we have been monitoring international supply chains and paying closer attention to the resulting dependencies.

Qualification and strengthening the skills base

Digital structural change is a great opportunity, which we will tackle optimistically, pragmatically and in a socially sustainable manner, giving both companies and employees an even better outlook. Rapid digitalization is contributing to persistent and cross-sectoral shortages of IT professionals. Especially in the increasingly location-independent digital sector, German companies have to compete against other countries for high potentials. A shortage of skilled labour must not be allowed to slow the digital transformation. Securing a supply of specialists is first and foremost the responsibility of the private sector. The Federal Government Skilled Labour Strategy provides a supporting framework.

- We are strengthening training, initial and continuing education to give employees the digital literacy they need to tackle the new world of work and overcome complex challenges. In this context, we are ambitiously pursuing the National Skills Strategy (NWS). Continuing education is to become a natural part of working life and a culture of continuing education is to be permanently mainstreamed in companies, educational institutions and society.
- We are enhancing the visibility of the diverse stakeholders, services and funding opportunities in the continuing vocational education segment and supporting the development of the National Online Continuing Education Platform (NOW!) by the Federal Employment Agency. As a central online portal for continuing vocational education in Germany, NOW! is to be dovetailed with the National Education Platform, which spans all educational sectors.

National Online Continuing Education Platform (NOW!)
Making it easier to find more continuing education suitable for the work of tomorrow

Elena works in a small company in the event industry. During the COVID-19 pandemic, her work has had to become much more digital, as she has been organizing and running hybrid and virtual events instead of face-to-face formats. She has struggled to get used to this. As a result, Elena is increasingly worried about whether she will be able to keep up professionally in the future.

She decides to take a continuing education course to improve her digital skills. By chance, she learns of an online service provided by the Federal Employment Agency through an ad. The National Online Continuing Education Platform (NOW!) helps her find a suitable qualification measure. On the platform, she also learns that she is eligible for a grant for the continuing education course, and she can apply for it directly online.

Elena successfully completes the course and has now significantly expanded her professional horizons and is better positioned for the future.

- We are strengthening gender equality in the labour market as a universal principle, including in previously male-dominated occupations, and laying the foundations for greater labour force participation by ensuring a good work-life balance.
- We will identify new channels/networks for calls for tenders to reach underrepresented target groups such as women and persons with migratory backgrounds.
- Under the Federal Administration umbrella brand, we will make the Federal Administration more attractive as an employer on the labour market in order to attract high potentials to work in government and administration.
- Germany must be an attractive immigration country, also compared with other countries, especially for IT specialists. We will improve the framework conditions for immigration so that foreign specialists and their families enjoy living and working in Germany and also stay here.
- We are developing the Consular Services Portal to digitalize legal and consular processes to make administrative services for visa and passport applications and issuance crisis-resilient and customer-friendly. In this way, we are promoting a modern image of Germany abroad and increasing our attractiveness for highly qualified specialists.

Our benchmarks for 2025:

➔ The central Continuing Education Platform (NOW!) has been developed to help those interested in continuing education to find suitable continuing education and consulting services as well as funding opportunities.
➔ It is easier for companies to find suitable services to meet the qualification needs of their employees and future-proof themselves.
➔ The percentage of women in computer science and the digital economy has been increased significantly.
➔ The percentage of female entrepreneurs in the digital sector has increased significantly, among other things through improved access to funding, better networking and female role models.
➔ The Federal Administration umbrella brand has made the government more attractive as an employer, and this can be substantiated by an increase in applicant numbers.

➔ Foreign professionals can apply for visas online, which helps make Germany more attractive for highly qualified professionals.

New work

In a constantly changing digital economy, the organization and culture of work are also changing. In order to maximize the opportunities offered by flexible working models, the platform economy, AI and data-driven innovations for the new world of work, we must establish a framework that focuses employment relationships on the needs of employees and companies, as well as on what is needed to deliver quality work.

- We are developing a practical, modern legal framework for mobile work that takes into account employees' and companies' desire for flexibility and facilitates a fair balance of interests between the employees' and companies' concerns.
- We will pave the way to harnessing the potential of new technologies for a modern world of work in a legally watertight manner, while also preserving fundamental rights, with modern regulations on employee data protection.
- We will safeguard the innovative potential of platforms and protect employee rights by reviewing the national legal framework and constructively supporting the EU Commission's initiative to improve working conditions on platforms.
- We are supporting innovative data use models in companies. These models help increase employees' and companies' digital and data sovereignty while ensuring data protection (e.g. by assessing data custodian models in businesses).
- With the AI Observatory, we are analysing and influencing the impact of AI on work and society to support a human-centric introduction and application of AI in Germany.
- We are helping to transfer positive examples of human-centric, innovative rollout and application of AI in companies, especially SMEs, via the New Quality of Work Initiative (INQA).
- We are supporting companies, in particular SMEs and their employees, as well as (solo) self-employed persons in the digital transformation with tailored analyses, consulting and innovative consulting services via Future Centres that are established and operate nationwide.

Our benchmarks for 2025:

➔ A modern legal framework for mobile work has been established, taking equal account of the employees' and companies' desire for flexibility.
➔ The rules for employee data protection have proven themselves in operational practice and, as far as all involved are concerned, contribute to greater legal certainty.
➔ At least 10 good practice examples of a human-centric, innovative rollout and application of AI in companies, especially SMEs, have been transferred in article form via the portal of the New Quality of Work Initiative (inqa.de).

Protection of the climate, environment and resources

Digitalization creates new opportunities to protect the climate, the environment and resources. Digital technologies offer considerable potential in the fight against the climate crisis, the loss of biodiversity and the pollution of nature by harmful substances and waste. Environmental data

and artificial intelligence can be used to make environmental policy measures more efficient. We will use these tools to evolve our country sustainably – from restructuring our energy supply, to the transition to a climate-neutral economy and to closing material cycle loops. It is also important that we use digitalization as a whole to achieve environmental sustainability in a simpler and more cost-efficient way.

At the same time, it is important that we digitally transform our society with a greater overall emphasis on sustainability. It is important to harness the opportunities associated with new technologies, identify risks and put in place an appropriate regulatory framework. Among other things, we are focusing on sustainability by design, on innovative processes and energy-efficient software design. We want to monitor the rapidly growing ecological footprint of digital technologies such as certain crypto assets and devise further measures to reduce it.

- With an online portal that will be accessible to the public for the first time in 2023, we will provide central access to environmental data and information available throughout Germany. In this way, we are enhancing transparency on the condition of our environment and improving opportunities for social participation in environmental protection and nature conservation.
- We will evolve the regulatory framework and standards for smart metering systems, taking into account data protection and IT security, in order to reduce red tape and speed up the rollout. With the 450 MHz frequencies, we are putting in place digital infrastructure that will enable private households and companies to actively participate in the transformation of the energy system using digital technologies.
- With the Digital Sustainability Innovations initiative, we are creating a new funding priority at the intersect of digitalization and sustainability.
- We are promoting digitally automated control of energy demand in industry, establishing an important prerequisite for a reliable and affordable supply of climate-neutral energy.

SynErgie – energy flexibility in industry

Pablo is riding his e-bike to work on a sunny morning. He switches the engine up a level, because he is cycling into a headwind. When he arrives, he plugs his e-bike into the charging station and checks a screen in the corridor as he passes. He sees that the solar cells on the company's roof are generating a lot of electricity – and because the sun is shining and the wind is blowing all over Germany today, the electricity from the mains socket is also particularly clean and cheap. The e-bikes and electric cars in the parking lot are now being charged automatically and the machines are humming in the factory hall.

Once he arrives in his office, the first thing Pablo does is check which car parts are to be made today. His computer shows him that the automated software has created a plan. All machines should produce as much as possible now, because the electricity price is low and the power supply operator even pays for the particularly high consumption of electricity that night between 10:00 p.m. and 6:00 a.m. Pablo thinks for a moment:

"It's good that the machines work automatically and the colleagues from the night shift only have to bring the car parts into the warehouse with the electric forklift twice more than usual." He clicks the green button and the software does the rest autonomously.

Pablo looks at his watch and smiles. He's about to have a meeting with his boss and she's always in a good mood when they get paid to use electricity and the products' carbon footprint is low – that makes everyone happy, including the customers.

- We are laying the groundwork for enhanced use of waste heat from data centres and for energy and environmental management systems, and are driving forward the use of environmentally and climate-friendly cooling methods, especially water cooling.
- We are regulating efficiency requirements for data centres and developing indicators to incentivize competition and maximize efficiency of the operators.
- We will continue to develop and expand financial assistance programmes for the environment, climate, nature protection and resource conservation (such as the AI lighthouses) in order to leverage the potential of digital solutions in green ICT/clean IT, among others, and to promote transfers from research to practical application.
- We are informing consumers how they can reduce their energy consumption when using digital platforms and devices.
- We are making the durability and repairability of a product a conspicuous feature of the product characteristics (right to repair). We are ensuring access to spare parts and repair instructions. Manufacturers are required to provide updates during the standard service life.

Our benchmarks for 2025:

➔ Approx. 300 different data sources (federal authorities, environmental administrations of the federal states, local authorities, industry, the scientific community, NGOs and associations) have been integrated into the online portal for environmental data, enabling us to improve data availability for business models, research and non-profit purposes.

➔ The use of smart metering systems in private households and companies has increased significantly and contributes to the transformation of the energy, mobility and heat systems as well as to more efficient energy consumption.

➔ The waste heat from data centres is better utilized and the use of environmentally and climate-friendly cooling methods has improved. To achieve this goal, we will adapt procurement guidelines and, as part of the process of enshrining municipal heat planning in legislation, assess an entitlement for water-cooled data centres to feed-in heat if this is ecologically expedient.
➔ Establishment of an energy efficiency register for data centres has incentivized competition among data centre operators to provide maximum energy efficiency.
➔ Energy-efficient software development methods and efficient AI development and transfer methods have been established.
➔ We are advancing energy- and resource-efficient digital solutions in information and communication technologies (ICT) with research and development activities in the green ICT/clean IT segment.

Sustainable agriculture and resilience in rural areas

Digitalization plays a major role in future-proofing our agriculture sector and rural areas. It is rural areas that produce the diverse range of food we consume, renewable resources and the majority of renewable energy. Digital technologies can make agriculture more sustainable, animal-friendly, resource-efficient, economical and thus more resilient. In this way, they help ensure that we have what we need to live and lay the foundations for the future of our economy. They also help us to improve protection of consumer and animal health, thus also making a significant contribution to greater food safety. Digital opportunities make rural areas economically more attractive and more liveable, helping balance living standards. The major prerequisites for this are a high-capacity digital infrastructure for citizens, companies and administration and better transfer of information and ideas.

- We are enhancing sustainability in agriculture by trialling and developing digital technologies on experimental fields, supported by a wide range of information.
- We will develop specific proposals for digital technologies to serve and monitor animal health and welfare in an expert group.
- We will facilitate free access to the public data required by the agriculture sector in appropriate quality and in a timely manner for authorized users.
- In Regions of the Future and various model projects, new digital approaches are being developed and tested in practice to enhance regional value chains in rural areas and make the living and working environment more attractive.
- By networking and building AI and data capabilities in the agrifood system, we are ensuring free knowledge transfer between research and practice.

Sustainable digitalization in the agriculture sector and rural areas

The Müller family farms cattle, grows grain and fresh vegetables and also generates renewable energy on their farm. The family now has many digital helpers to support them and make the farm more sustainable and animal-friendly. The cows go to the milking robot whenever they want to and not at predetermined times. Milk quality is monitored in real time. The cows wear digital neck and ankle bands like smartwatches. These send the latest health data on the cows to the farmer's smartphone. On the cereal and vegetable side, camera- and satellite-guided hoeing equipment is used to eliminate weeds, and crop protection products are deployed with utmost precision only where absolutely necessary. The family uses the biogas produced from the cow manure to heat its own farm as well as the new housing development in the village, and feed electricity into the mains grid. The electricity from the photovoltaic system on the barn and above the vegetable field is used to supply the nearby business park with solar power, as well as the farm's own electric charging station for the farm shop customers and the electric tractor. Everything is controlled digitally to optimize the balance of energy supply and demand.

Before the farmer purchased the appropriate equipment, she did her research on the Federal Ministry of Food and Agriculture's digital experimental fields. This enabled her to inquire about the advantages and disadvantages of the latest digital technology and choose the right equipment for her needs.

Thanks to the improved mobile communications and internet connectivity in rural areas, the Müller family no longer markets their products exclusively locally via their farm shop, they also deliver products ordered on the homepage three times a week to residents in the surrounding villages. The region's businesses have joined forces digitally to market their products on the digital regional marketplace, which was developed as part of the Businesses/Regions of the Future project. As a result, they can offer a wider range of products and make shopping trips unnecessary, benefitting the region and enabling persons with reduced mobility to have fresh food delivered right to their door.

Our benchmarks for 2025:

- ➔ The use of digital technologies in the agriculture sector has increased and is effectively improving efficiency, sustainability and animal welfare.
- ➔ The number of people reached by knowledge transfer measures in the digital transformation of agriculture has increased quantifiably.
- ➔ An inter-institutional centre of excellence has been established for AI and big data applications in agrifood systems.
- ➔ The number of machine-readable datasets published on agricultural topics has increased significantly.
- ➔ With the federal states, we have begun to sustainably upgrade the central IT architecture to improve data management for protection of consumer and animal health (coordination, planning and implementation).
- ➔ The target attainment for the rollout of fibre-optic and mobile communications has also improved coverage in rural areas in particular.

4.3. Learning, digital government

Digital administration

A focus on the users is our overarching principle in the digitalization of administrative action. Digital administrative services must be as simple, accessible, secure and transparent as possible for all citizens and companies who must be able to use them whenever and wherever

they like. Digital services must also make the users' lives noticeably easier. In order for the administration to meet these requirements, the necessary conditions must be put in place at all levels.

- As a basis for digital transformation in the federal authorities, we are continuing to drive forward IT consolidation at the Federal Government level with a view to harmonizing services and operations.
- In addition, we also want to bring about a digital cultural change by integrating issues like change management and organizational development in the federal administration, because digitalization of government and administration will not be successful without digitally competent staff. To this end, the Federal Digital Academy was founded, which will offer additional new qualification formats for federal employees in the future and thus also promote interdepartmental learning. In concrete terms, this means ensuring a new form of digital collaboration within the Federal Government and overcoming the old silo thinking of the individual government departments. To support this, we will establish the interdepartmental *GovLabDE* platform for collaboration on highly complex projects, where we will permanently provide and pool resources, infrastructure, methods and specialist expertise.
- We will continue to evolve the Online Access Act and establish the digitalization of administration as a permanent task. In doing so, we will take care to meet accessibility standards. We will further consolidate the structures established throughout Germany in the course of the implementation of the Online Access Act so that they are viable in the long term.
- Together with the federal states, we are putting in place the technical, legal and organizational conditions to ensure that citizens and companies have to enter or submit information and evidence (e.g. a birth certificate) only once when dealing with public authorities. Together with the federal states, we will ensure that particularly relevant decentralized and central registers at the federal, state and local levels are adapted in accordance with the requirements of the Register Modernization Act so that, at the request of the applicant, the authorities can reuse and exchange data held in registers in compliance with data protection and data economy requirements (once-only principle). The constitutional implementation of the Register Modernization Act is our utmost priority here.
- Modernizing administration to consider government as a service provider must go hand in hand with the usability of digital identities and register modernization. We will therefore remove obstacles to digitalization such as written form requirements by means of a blanket clause, standardize terms and enshrine proactive administrative action in law through automated procedures that do not require applications.
- We will establish a portal network in which portals, online services, basic services and other IT components for the provision of administrative services interact in a modular fashion and across all federal levels. To this end, we will coordinate the necessary common standards and interfaces and make them binding.
- We will continue to expand the Federal Government's administrative portal (Federal Government Portal) as a central access point and source of information for federal, state and local government administrative services and ensure that applications for all relevant services under the Online Access Act can be processed directly via the Federal Government Portal.

- As far as possible, rules and regulations should be enforceable digitally, without media fragmentation. Laws must be conceived and drafted from a digital perspective. To this end, laws will in future be checked for digital suitability and fitness for implementation by means of a digital check in the run-up to a legislative procedure.
- We will simplify the use of the online ID card by bringing it to the smartphone. We are evolving the government-provided digital ID and the federal user account in a user-friendly way and facilitating connection of the existing functions to an ecosystem of digital identities. If desired, it should also be possible to integrate other personal data defining a digital identity such as driving licences, educational qualifications or access authorizations issued by entities other than the government. Due to the numerous possible fields of application, we are working together in agile inter-departmental and cross-authority project teams and innovation units to develop and implement these projects.

Ecosystem of digital identities

Climate activist Ella moves out of her parents' house. She starts studying at the Faculty of Agricultural and Environmental Sciences in Rostock. Her parents Milena and Björn are farmers in the Parchim district and are just starting their second business. They sell subscriptions for sustainably grown cut flowers and deliver them to customers throughout Germany.

After Ella has found a room in a shared flat, she registers her new address electronically using her digital ID on her smartphone. It is important to Ella that the digital ID system takes data protection seriously and does not allow a user profile of her to be created. She also uses the digital ID to log in to the platform of a nationwide network for climate change mitigation. Her bank also lets customers open an account quickly and easily using a digital ID.

A little later, Ella enters her bank account number in her 'BAföG' student loan programme application. It is Friday and she is on the train on her way to her parents' house when she remembers that she still has to submit the application. She has all the evidence she needs because all the certificates are stored on her smartphone. For authentication, Ella again uses her digital ID and uploads the evidence. While her daughter is still on the train, Milena completes the process by uploading the evidence required from parents and she also registers her new business online with the competent authority. Done!

- With the Digital Pension Overview, we enable citizens to digitally access information about their individual old-age pension as a one-stop shop service. This service is intended to improve the population's awareness of their own pensions.
- With the introduction of AI systems in the employment administration and social services, processes will become more efficient and thus faster and more accessible for citizens. In the AI network of the employment administration and social services, authorities support each other with regard to human-centric implementation.
- The Z-EU-S IT funding portal provides project representatives, public administration staff (local authorities, job centres, employment agencies, ministries, etc.) and citizens with fully electronic access to funding from the European Social Fund at the federal level. From the application through the call for funds to the final audit, everything is done in one portal.
- With the digital application for the citizens' minimum income, we want to ensure that citizens have uncomplicated online access to the basic income as part of the further development of basic benefits for jobseekers.

- **Digital fiscal administration:** We will systematically drive forward digitalization of the taxation procedure and ensure that tax regulations can generally also be implemented digitally. In the fiscal administration, we will make it easier for taxpayers to comply with their tax obligations by introducing digital processes such as pre-completed tax returns and Easy Tax. The aim is to make the entire interaction between taxpayers and the tax authorities digital where possible.
- For companies and SMEs in particular, we will also significantly reduce fiscal red tape with the help of improved interfaces, standardization and the sensible use of new technologies. Standard procedure for business-related administrative services should be that they can be handled digitally and via one-stop shops. The aim is to modernize and accelerate tax audits. A central organizational unit will be set up at federal level to ensure that the fiscal administration can keep up with the digital transformation and to noticeably reduce fiscal red tape.
- As soon as possible, we will introduce a uniform nationwide electronic reporting system that will be used for preparing, verifying and forwarding invoices. In this way, we will significantly reduce the susceptibility of our VAT system to fraud and, at the same time, modernize the interface between the administration and businesses and free it from red tape. Building on the measures taken in the last parliamentary term, we will do everything we can to prevent fraudulent dividend arbitrage trading schemes. To ensure that this is fraud-proof, we want to make even greater use of new technological opportunities.

Donating easily and securely!

Anna is a volunteer. She would like to donate money to a non-profit, charitable or church organization. But she doesn't know which organizations are allowed to accept donations for the causes she would like to support. She obtains information online from the Register of Charities. The information available includes not only the name and address of the association whose work she would like to support financially but also its officially approved bank account details. This way Anna can be sure that her money will be used for the cause she wants to support and that the tax office will take the donation into account in her income tax return as a tax-deductible.

- We systematically promote and use data on public procurement to create transparency, facilitate access for interested economic operators and as a basis for strategic as well as sustainable procurement. This includes a national publication service and the use of uniform data standards.
- We will make available information on funding opportunities on a comprehensive online portal where those interested in funding can search, find and apply for suitable funding and interact with the funding agency.

Our benchmarks for 2025:

➔ As part of IT consolidation at the Federal Government level (services consolidation programme), the existing range of cross-cutting, basic and infrastructure services has been harmonized, optimized and consolidated as far as possible at the Federal Government's IT service provider.

➔ As part of IT consolidation at the Federal Government level (operations consolidation programme), work has begun on merging the data centres of the federal authorities into the master data centres of the Federal Government's IT service provider.

➔ Each Federal Ministry has taken organizational change management measures for the targeted support of digital culture change in its executive agencies.
➔ The interdepartmental *GovLabDE* platform has been established for collaboration on highly complex projects and provides effective support for the federal administration.
➔ The federal, state and local governments have put in place the conditions for implementing the once-only principle for the top registers identified by the IT Planning Council and, as a result, citizens applying for administrative services no longer have to submit evidence already furnished to the authorities.
➔ As a result of the implementation of the Online Access Act, the services prioritized within the Federal Government have been digitalized throughout Germany and services offered on the platform are continuously being harmonized. The lessons learned when implementing the Act at the federal and state levels have been included in an Online Access Act 2.0.
➔ The identity card and driving licence are also available as digital credentials for use with mobile devices.
➔ In at least five sectors of the economy, a government-provided digital ID can be used as a company-independent identity for identification.
➔ The Z-EU-S IT funding portal is used by at least 15,000 project representatives, public administration employees and citizens.
➔ A national publication service is operational and can be used to make available freely accessible data on public procurement contracts in Germany from a single source.
➔ A portal for funding opportunities is online, replacing the Federal Government's funding database and serving as the single point of contact for those interested in funding and the agencies providing funding. Our aim is to simplify and accelerate the entire funding process.
➔ We have reached the top ten in the DESI ranking of administrations.

Open data and data skills in public administration

Up-to-date, accessible and well-structured or even interlinked and reusable machine-readable data is a basic prerequisite for pioneering data use, but also an important basis for data work focusing on the common good, for informing the public and for developing innovative digital solutions in industry and civil society.

- By implementing the Open Data Strategy, we are improving the availability of administrative and research data so that they can be better used by civil society, industry, the scientific community and the administration itself.
- Establishing open data processes along the lines of data protection procedures in the federal authorities will also ensure the provision of open data in the long term.
- We will introduce a legal entitlement to open data.
- By establishing, evolving and permanently maintaining data laboratories in all Federal Government departments, we are further strengthening the administration's data skills and providing suitable tools and resources for data analysis.

Our benchmarks for 2025:

➔ All government departments have fulfilled their statutory open data obligations and have widely publicized the benefits of the data available in their areas of responsibility.

➔ Society, industry, the scientific community and the administration have access to significantly more and higher-quality data as open data for digital value creation.
➔ Federal authorities have implemented processes that integrate the provision of open data into daily work routines.
➔ All government departments have established and are permanently maintaining data laboratories.

Digital judiciary

The digital transformation of the judiciary is crucial to developing a range of attractive and future-oriented services, thereby strengthening it as one pillar of the rule of law.

- With the Digital Pact for the Judiciary, we are creating new nationwide digital legal services in a coordinated approach and improving work processes within the federal and state judiciary. In the future, the Federal Government will assume more responsibility for the technical side of the digitalization of the judiciary, thereby also strengthening its expertise on digitally suitable legislation. In this way, we will be paving the way for better laws, more efficient procedures and modern, citizen-friendly access to law.
- Innovative services will be made available to the judiciary by the Federal Government developing them or coordinating and supporting their development by the federal states. In the judiciary, people will continue to take centre stage, both in front of and behind the bench. Nevertheless, the potential of artificial intelligence will increasingly be used to support people.
- In addition, we will promulgate laws and statutory instruments electronically in the future and make federal legal information more easily accessible to the public and the research community in digital formats via a central portal.

Digitalized judiciary – for greater efficiency and easier access

Sascha is on holiday and very unhappy. There is no water in the pool and no light in his hotel room. On his way home, he starts searching the internet and finds reliable information on the e-justice portal about the ways in which he can assert his rights as a result of shortcomings during his holiday. Using an online tool on the portal, he writes a letter of complaint to the tour operator. When the latter refuses to refund part of the travel price, Sascha files a complaint online, which is pretty easy because the complaint tool guides him through all the relevant questions and he can identify himself with his digital ID. He electronically attaches his photos and videos of the problems he encountered to his complaint. The subsequent court proceedings are also conducted completely digitally. Sascha receives notifications on the status of the proceedings on his smartphone. In the proceedings, another hotel guest is heard as a witness via video conference. Sascha watches the questioning on his laptop computer. Soon after, the court sends Sascha its judgement digitally. As his complaint has been successful, he receives a refund from the tour operator shortly after the court's decision without having had to appear in court personally.

Our benchmarks for 2025:

➔ Legislative arrangements have been made for the trialling of fully digital civil proceedings and the trialling of fully digital civil proceedings has started at individual pilot courts.

➔ A minimum viable product (MVP) is available and usable throughout Germany at the end of 2023 for a software providing judicial services in a digital legal application office and the first judicial services are already being provided in a digital legal application office.
➔ Legislative arrangements have been made for the digital audio and video recordings of criminal trials with automated transcripts.
➔ The uniform national video portal of the judiciary can be used throughout Germany for video hearings and online judicial appointments from 2024 at the latest.
➔ Laws and regulations are promulgated electronically.
➔ An interface has been created for the controlled handover of judicial data to enable AI-powered cloud-based judicial services.
➔ We have developed a strategy for a future nationwide judiciary cloud.

Digital police

In the Police 20/20 programme, we are working together with the federal and state police forces and the customs authorities to harmonize and modernize police IT systems and procedures. In this way, we will increase the security of citizens and shape the future of the German police.

- We will ensure that future police IT is simple, user-friendly and always state-of-the-art in terms of technology and IT security. By harmonizing the police information architecture, we will enable digital and seamless networking of police forces with their national and international partners, standardized situation reports and situation centres.
- In keeping with the regulatory framework, we will grant every police officer access to the information required to perform their duties, anytime and anywhere. With the help of modern access and authorization concepts, we will simultaneously strengthen data protection through technology.
- In the future, we will develop relevant police IT services only once and make them available to requesting agencies. Data will also be collected only once in the future. In this way, we are laying the groundwork for better intelligence and enabling the police to respond faster.

Our benchmarks for 2025:

➔ A common data warehouse is available, in which data, functions and applications for police processing as well as basic services are centrally pooled.
➔ Consolidated police case processing procedures (e.g. a uniform case processing system as well as interim case processing systems) deliver initial data to the data warehouse.
➔ A seamless exchange of data between the police at the federal and state levels and the judiciary is possible, which, among other things, satisfies the legal requirement for the introduction of electronic files in criminal cases.

Digital sovereignty of public administration

In order to ensure control over its own IT and, in particular, to be able to guarantee information and data protection, public authorities must become more independent of individual providers and products. We will therefore support the digitalization of the administration via an open and competitive market.

- Together with the federal states and local authorities, we will minimize dependencies on technology providers with the help of open source, open interfaces and open standards and develop a multi-cloud structure. To this end, we are implementing Germany's Government Cloud Strategy.
- By founding the Centre for Strengthening the Public Administration's Digital Sovereignty (ZenDis), we are establishing an overarching organizational unit to ensure the availability of high-capacity open source solutions. Our activities in this field include supporting the further development of the sovereign workplace and establishing it more firmly.
- We are strengthening digital sovereignty, cyber security and crisis resilience by evolving national crypto technologies in the form of highly secure communications to protect the secrets of government and industry, using and further developing the inter-departmental classified information communication project. We are thus enabling faster, virtual coordination on sensitive issues.

Digital communication of classified information – sovereignty for government and businesses

The Russian war of aggression against Ukraine has brought Europe closer together. Annika must coordinate with her colleagues in the other European capitals as quickly as possible and prepare informed decisions by the heads of government. A secure exchange of classified information is crucial for her. European governments can quickly coordinate their reactions to global political situations digitally and securely via audio and video.

Evolving communication of classified information is also extremely helpful for industry. Jona, for instance, the managing director of company X, would like to provide services to an authority for a project classified as confidential. By means of communication of classified information, he can coordinate with the authority without having to make a time-consuming trip to the authority's premises. There is no need to go through the difficult task of agreeing meeting dates, which means that the project can start considerably earlier.

- With the Platform Analysis and Information Systems (PLAIN), we have created a standard for the sovereign and protected processing of big data problems in the Federal Government, with the goal of improving the information basis for political decisions.
- Secure and reliable government IT in the face of physical or virtual threats can be guaranteed through multiple and independent IT infrastructure provision. To further improve geographic redundancy, we are working on the creation of a digital data embassy ('Digital Embassy') of the Federal Government abroad – based on an agreement under international law.

Our benchmarks for 2025:

➔ The multi-cloud structure has been realized as part of Germany's Government Cloud Strategy.

➔ We have founded ZenDiS and, in collaboration with the federal states, are able to deliver sovereign workplaces.

➔ We have established a high availability and high security cloud infrastructure and made it accessible for use via public provider networks.

➔ We ensure that medium-sized businesses have access to cost-effective IT services offering a very high level of protection.

➔ We have made PLAIN available to the entire federal administration as a standard for AI-based data analysis that can be used without thematic restrictions.
➔ The digital data embassy has been set up.

Cyber security

Government action in the field of cyber security mainly comprises domestic cyber policy, foreign cyber policy and cyber defence. Cyber security is an integral part of the digital transformation of civil society, industry and government and is linked to national and international security policy. It makes a substantial contribution to the government's overall capability to act and resilience.

- We are evolving the cyber security strategy for Germany, thus creating a modern, cross-departmental framework for the Federal Government's activities.
- Given the fact that digitalization and interconnection are progressing, we will adapt the cyber security requirements to be met by critical infrastructures. One of our goals here is to ensure that untrustworthy companies are not involved in the upgrading of critical infrastructures.
- We are using the Federal Government's existing cross-departmental toolkit for early crisis detection and strategic forecasting to anticipate threats from cyberspace and develop options for action at an early stage. We are continuing to rely systematically on PREVIEW and the underlying PLAIN platform.
- We are creating a legal basis for the National Cyber Response Centre and developing it further, thus permanently strengthening inter-departmental and nationwide cooperation in cyber security and enabling the consolidation of information to produce a common and comprehensive cyber security situation report.
- We are significantly intensifying federal cooperation in cyber security by developing the Federal Office for Information Security (BSI), transforming it into the central agency in the field of IT security and making it more independent.
- By commissioning research from the Agency for Innovation in Cybersecurity and harnessing the results, we are specifically strengthening digital sovereignty in cyber security.
- We are introducing a right to encryption, effective vulnerability management with the aim of closing security gaps, as well as 'security-by-design/default' standards. The government, too, must be obliged to offer the option of genuine encrypted communication. Manufacturers are liable for damages negligently caused by IT security gaps in their products.
- We are working with and supporting the business community with appropriate measures to increase cyber security in companies and creating a consistent framework for the secure use of digital products and services.

Our benchmarks for 2025:

➔ The Cyber Security Strategy has evolved in line with the National Security Strategy and progress has been made in modernizing government network infrastructure and in improving self-protection within the framework of federal information security management.
➔ The cyber security requirements to be fulfilled by critical infrastructures correspond to the current level of threat.
➔ PREVIEW makes an effective contribution to anticipating threats from cyberspace and developing options for action at an early stage.
➔ The National Cyber Response Centre has been evolved.
➔ Federal cooperation in cyber security has improved with the BSI as the central agency.

➔ Recommendations for action on cyber security in companies have been developed.

Defence

Future-proof national and alliance defence requires defence capabilities in all domains and also, to counter threats in cyberspace, a continued digital transformation of the Bundeswehr and in particular of the armed forces.

- We are ensuring robust and resilient networking of digitalized armed forces to give them the forces and capabilities required for defence against current and future threats in all domains (land, air, sea, cyberspace, information domain and space). To this end, we are continuously expanding the digital capabilities of the armed forces.
- To keep pace with the speed of innovation in new technologies, we are continuing to work hard on digitalizing processes to improve the operational readiness of the armed forces. This includes promoting a digital mindset among all employees.
- At the same time, we are facilitating innovative and value-oriented use of our data, also across borders with national and multinational partners.
- We are promoting ideas and innovations, particularly in the area of evolving and disruptive technologies, and strengthening the multilateral innovation landscape through our participation in NATO and EU initiatives such as the Defence Innovation Accelerator of the North Atlantic (DIANA), the NATO Innovation Fund (NIF) and the Hub for European Defence Innovation (HEDI).

Use of big data and data analytics on the battlefield

Digitalization and AI are opening up new capabilities and opportunities for the armed forces. This is true for training and manoeuvres as well as in actual combat, for example when our armed forces are deployed in support of our allies who feel threatened by a military conflict.

Reconnaissance is a good example to illustrate how digitalization and AI as well as the resulting additional information can be of assistance. AI can assist in the efficient and effective surveillance of threatened national borders. As a result, the extent of a potential threat can be assessed more easily and faster in the run-up to a crisis. Battle groups in a conflict, for instance, are able to reconnoitre enemy activities effectively and quickly if, for example, reconnaissance systems collect and exchange information on enemy contact reports. Here, objects detected can be identified in a matter of seconds through AI, thereby transforming data into mission-relevant information. Secure digital transmission channels ensure that the information obtained in this way is made available to the military command in real time. This kind of reconnaissance and evaluation does not only improve the quality and speed of information assessment but also makes it less dangerous and reduces the number of staff needed.

A Bundeswehr equipped with such technology is operational also on the digitalized battlefield and, in terms of communications, data processing and data exchange, is able to ensure connectivity with allied nations.

Our benchmarks for 2025:

➔ We have provided initial capabilities to deploy the seamless battlefield information and communications network for the force to accelerate decision-making during military exercises and operations by means of rapid access to information.

➔ We have built capacity and skills to analyse data more quickly on the battlefield using AI, thus increasing effectiveness on the battlefield.

International aspects

Successful digital transformation on a global scale with a focus on people is key if we want to achieve our global decarbonization goals, mitigate the effects of the COVID-19 pandemic, fight hunger and poverty, strengthen consumer protection, reduce discrimination, prevent conflicts and foster stability and promote and ensure equality and inclusion. In the geopolitical race, Germany and Europe are called upon in particular to develop a human-centric digital policy meeting European standards that can be used to shape digital transformation.

The rapid development of digital technologies and business models based on them, the increasing concentration of market power in a small number of digital corporations and the growing misuse of these technologies by governmental and non-governmental actors call for a human-centric, value-based regulation of new technologies and digital markets that stimulates innovation while ensuring secure, non-discriminatory and self-determined use of digital technologies.

In all relevant multilateral and multi-stakeholder forums, Germany is advocating a digital world that is based on the fundamental principles of human rights and fundamental freedoms, democracy, the rule of law and the protection of privacy in order to enable all people to use websites and digital services safely and without discrimination.

- We are helping to reduce digital fragmentation and accelerating the implementation of the United Nations Sustainable Development Goals with digital solutions.
- We are supporting the implementation of the Global Digital Compact.
- Together with our national representation in international standardization organizations, we are championing the development of international standards based on the Digital Principles.
- We are promoting the harmonization of international legislative processes to also increase our partner countries' data sovereignty.
- With the GovStack project, we are supporting better digital services for citizens worldwide within the framework of the United Nations, thus strengthening digital sovereignty and the individual responsibility of governments for e-government solutions.

GovStack - Digital administrative services as a modular system

Adaku Obiaka works in the public administration in Nasarawa State, Nigeria, and is committed to digitalizing key services for citizens to facilitate equal access to education and social security benefits. Applications and payments for issuing important documents such as birth certificates etc. are top of her agenda. She convinces the relevant authorities to use the basic digital applications developed as part of the GovStack initiative, ensuring that costs can be cut considerably compared to the development of a new digital application system. In the future, those responsible in Nasarawa will regularly use the GovStack toolkit to meet their digital requirements. The toolkit contains tried-and-tested open-source building blocks for a wide range of digital applications. This enables them to integrate secure and interoperable applications into their websites and allow citizens to participate digitally.

- We are significantly increasing our involvement in existing internet governance processes and multilateral and multi-stakeholder forums (such as IGF, ICANN, ITU, WSIS, UN, OEWG, G7, G20, OECD, OSCE, WTO, GPAI, Human Rights Council, Freedom Online Coalition).
- We are endorsing the further development of the Transatlantic Trade and Technology Council (TTC) and are committed to concluding as soon as possible a new agreement that is in keeping with the fundamental rights and aims to establish a secure legislative regime governing transatlantic data traffic.
- We are expanding our dialogue and cooperation with the states that are important political, economic and regulatory actors in the digital sphere – bilaterally as well as in cooperation with the European Union. We are involving the business community, the scientific and technological communities and civil society in these digital dialogues.
- We are pursuing an active digital foreign policy.
- With our partners, we are committed to deploying their own independent digital infrastructure to strengthen their digital sovereignty. To this end, we are also getting more involved in European digital policy projects such as the EU Global Gateway Initiative.
- We will develop a strategy for international digital policy.

Our benchmarks for 2025:

➔ We have effectively strengthened the digital sovereignty of our partners – especially outside Europe.
➔ We have helped overcome digital divides and facilitate inclusion through digital participation.
➔ We have presented a strategy for international digital policy.

5. Monitoring

Monitoring of the Digital Strategy is supported and controlled by a round table of state secretaries chaired by the Federal Ministry for Digital and Transport. The Digital Council has an advisory function. On the basis of a continuous, comprehensive monitoring process, the supporting and steering activities of the round table of state secretaries are prepared and ensured. We will coordinate both horizontally between the government departments and

vertically between the European level, the Federal Government, the federal states and local authorities, involving also industry and society, in such a way that we develop a common understanding and join forces to pursue our vision. By focusing on the above-mentioned strategic projects with a multiplier effect and by establishing a continuous coordination process, our digital transformation can be successful, meaning that processes will be realigned on the basis of simpler and more efficient digital procedures.

In doing so, we want to adopt new, agile approaches together and are deliberately using the support of the Federal Government's Digital Service. We are considering projects and processes from a digital and sustainable perspective from the outset in order to facilitate digital inclusion. In monitoring and evolving this strategy, we want to enable a forward-looking culture of error and learning that systematically uses the lessons learned from errors to improve our approaches with the aim of optimizing the outcome. We are strengthening agile working and interdisciplinary networking to overcome silo thinking and open up new possibilities for creative and better solutions through interdisciplinary collaboration.

The goals set out in the Digital Strategy represent a commitment made by the Federal Government and are to be achieved wherever possible by the end of this parliamentary term. An independent scientific analysis will evaluate the impact of the strategy and the outcome will be shared with the interested public.