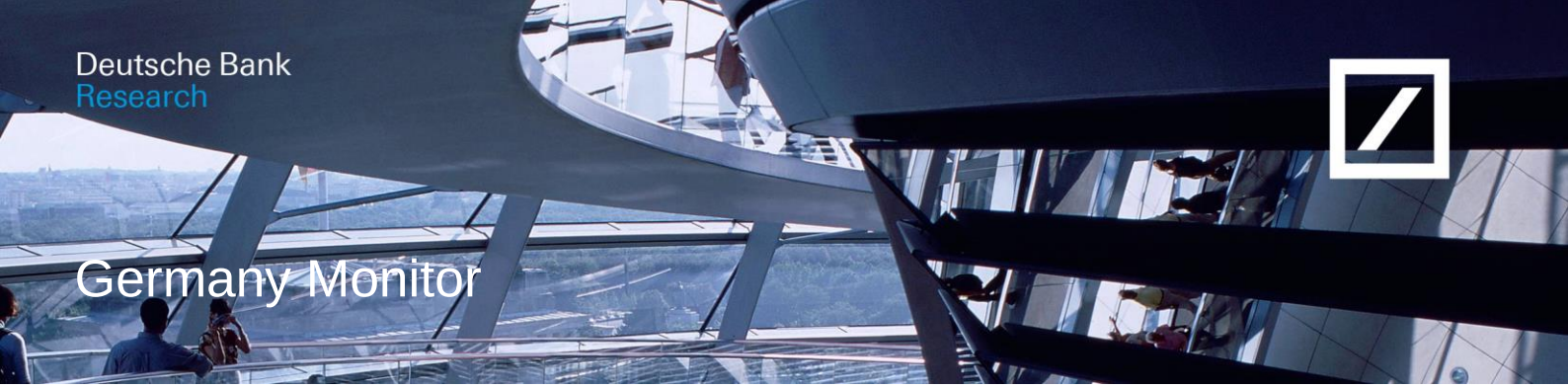

Digital awakening for Germany

Digital Strategy of the Federal Government 2022-2025

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The new Digital Strategy for Germany sets the framework for government policy at the federal level in three key areas of action:

1. A networked and digitally sovereign society

2. An innovative economy, work, science & research

3. A learning, digital state

The leitmotif of the coalition agreement is "Dare more progress". The strategy picks up where many initiatives of previous governments left off, albeit incrementally rather than radically. In addition, digital policy is linked to comprehensive social and environmental policy components. Digital sovereignty, cybersecurity and defence are further focal points.

The budget for implementing the Digital Strategy has yet to be agreed. A concept is currently being developed that will be integrated into the federal budget for 2023 in November 2022.

With its Digital Strategy, the German government is working to further develop Germany as an attractive business location. This includes strengthening Germany as a financial center, an open data policy, the promotion of new business models and start-ups, and modern public digital services.

German digital policy must be seen in the context of EU digital policy. Several important legislative initiatives are currently underway to further regulate the digital space, bringing with them a wide range of economic impacts and new obligations for companies in the EU – including an AI law and a data law, as well as Gaia-X as a European cloud model.

Overall, the strategy is a good, if belated, start. It is not a grand strategy, but rather a reform program that in many respects builds on the unfinished initiatives of previous governments. Whether the goals can be achieved depends on how effectively the remaining three years until 2025 are used for implementation.

Table of Contents

1. The German Digital Strategy with three central fields of action

With its Digital Strategy, the German government has defined the overarching framework for government policy at the federal level for digital policy during the current legislative period.[1] These three central fields of action are:

— A networked and digitally sovereign society

— An innovative economy, working world, science & research

— A learning, digital state

This is the first time that a Digital Strategy has been adopted by the entire German government in a cabinet resolution. In each of the four previous governments under Dr. Angela Merkel, the Federal Ministry of Education and Research (BMBF) had developed research-centric high-tech strategies. As a consequence of the sometimes incomplete implementation of important earlier digital policy initiatives, the current federal government has appointed Dr. Volker Wissing to head the renamed Federal Ministry for Digital and Transport (BMDV). An interministerial coordination round is intended to resolve antagonisms between the various ministries more quickly at the state secretary level and move the work program forward.

The Digital Strategy is divided into 25 digital policy action areas with 18 lighthouse projects. The lighthouse projects are prioritized based on their leverage for creating a broad range of new opportunities and business models. The lighthouse projects are unevenly distributed across the 25 digital policy action areas, with some digital policy areas (e.g., digital government, education, and international relations) receiving two lighthouse projects. Of these 18 lighthouse projects, three have the highest priority as they are seen as cross-cutting across all 25 digital policy areas. These are:

— Access to high-speed internet and nationwide digital infrastructures based on fibre optic backbones and high-performance mobile communication networks

— Technical standards such as 5G/6G with software-defined networks facilitating new social and economic opportunities like the Internet of Things

— Digital identities linked to electronic personal identity documents[2] (e.g., on smartphones) to apply for digital administrative services and perform internet transactions easily and securely

On September 23, 2022, both the Digital Strategy[3] and the federal government's gigabit strategy[4] were debated in the Bundestag. As with an earlier draft of the Digital Strategy in spring 2022, the opposition criticized the vague goals and a lack of attribution of responsibilities. In the meantime, responsibilities have been clarified and the individual departments have introduced their own projects with a total of 134 individual tasks. However, not all of the tasks have metrics for implementation, and some of the responsibilities are unclear and distributed among several departments, which does not make it any easier to monitor and track the success of the Digital Strategy.

At the end of the legislative period in 2025, the impact of the Digital Strategy for "a comprehensive digital awakening" for Germany (Digital Strategy 2022:3) is to be analyzed and presented transparently to the public.

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1 The Digital Strategy was adopted by the federal cabinet at a cabinet retreat at Meseberg Castle on August 31, 2022 and published on the same day.
2 The Federal Ministry of the Interior offers the Bund ID. Currently, it can only be used to apply for digital public services and as an electronic mailbox for correspondence with some public authorities. https://id.bund.de/de/eservice/konto
3 Bundestag Printed Matter 20/3329; https://dserver.bundestag.de/btd/20/033/2003329.pdf
4 Bundestag Printed Matter 20/2775; https://dserver.bundestag.de/btd/20/027/2002775.pdf

2. Strategic perspectives for the Digital Strategy

The following sections outline some strategic perspectives for German digital policy.

2.1 Promotion of Germany as a business location

Among the EU-27 countries, Germany is the largest economy and the largest market with a GDP contribution of EUR 3.57 tr in 2021. The Digital Strategy aims to increase Germany's attractiveness as a business and industrial location. The Digital Strategy contains a clear commitment by the German government to expand Germany as a leading financial center. In Germany, the digitization and modernization of BaFin as the regulatory authority for the financial industry is planned. Young companies in the digital finance industry (FinTechs) are also to be promoted in order to strengthen Germany as a business location with financial innovations. The Digital Strategy also mentions European supervision in the crypto sector.

The majority of German companies are small and medium-sized enterprises (SMEs) and, taken together, they play an essential role in the economy, both for employment and for innovation. The Digital Strategy calls for an increase in the level of digitization among German SMEs.

The Digital Strategy mentions an open data space to enable Industry 4.0 and the resulting application scenarios. Since the presentation of Industry 4.0 in 2011 at the Hannover Messe (trade fair), the topic has branched out worldwide to Smart Manufacturing with smart factories and the Industrial Internet of Things (IIoT). Today, it is seen as the future for all areas of manufacturing and increasingly for digital service delivery. There are a number of initiatives on best practices and implementation of Industry 4.0 concepts. The creation of a legal framework for “real labs” to test innovative technologies under real conditions is seen as a priority of the Digital Strategy. Even if industry-specific peculiarities have to be taken into account, this can be useful to accelerate product development and shorten the time to market.

The transformation of public administration into effective and innovative units in a learning, digital state is to be massively supported by the Digital Strategy. The Online Access Act (OZG) of 2017 obliged the federal government, the states and the municipalities to also offer their administrative services electronically via administrative portals by the end of 2022 at the latest and to link these together to form a portal network. The coalition agreement (2021:12) stipulates that the Online Access Act (OZG) be further developed with sufficient follow-up funding to support "clear standardization and unification of IT procedures according to the one-for-all principle (EfA)" in the area of public administration. Only with access to sufficient data sets in open data spaces can companies develop new business models with innovative digital products and services. Data is an important ingredient for strengthening start-up ecosystems, for example in areas such as digital mobility, digital health and digital energy. A lighthouse project is planned for each of these three areas.

2.2 Critical key technologies and AI

Artificial intelligence (AI) is a cross-cutting technology, as it is relevant to all digital policy areas. In the field of AI, the Digital Strategy is a continuation of existing measures. For example, the German AI strategy[5] was adopted by the previous government in November 2018. The Digital Strategy states in this

[5] https://www.bmwk.de/Redaktion/EN/Artikel/Technology/artificial-intelligence.html

regard that the German government's AI strategy is to be further developed with the participation of all departments and implemented by the departments.

Since many SMEs are just starting to deal with AI, two lighthouse projects will be newly introduced or an existing project in the area of business and AI will be expanded.

Business and AI: Lighthouse projects 1

1. Center for Trusted Artificial Intelligence:
   Education about AI and algorithmic systems

   The expansion of the ZVKI strengthens consumer sovereignty through education about AI and algorithmic systems. It will become a place for debate on societal issues related to the use of AI and support the development of a voluntary certification system for trustworthy AI applications.

2. KIKStart – AI for SMEs and start-ups:
   Development of applications for data and AI

   This program combines funding to support SMEs and start-ups in the development of data and AI applications. On the supply side, it provides support for software development, especially by start-ups. On the demand side, the program aims to lower technological barriers to entry and strengthen the widespread use of AI and data applications in SMEs. Specially tailored matchmaking programs help build cross-sector data spaces.

Source: Lighthouse projects (2022)

AI solutions can only be successfully developed and optimized on the basis of a sufficient supply of data. Access to data is therefore an important prerequisite for the success of researchers, developers of digital products and ultimately for the successful use of AI.

2.3 Data policy and data economy

A functioning data economy is crucial for Germany's future as an information society. Data is an essential ingredient for the introduction and operation of artificial intelligence (AI). The vision of open access to data in the data economy and the use of data for digital services on the internet was proposed by Tim Berners-Lee in his concept of the "Web of Data". This so-called "Semantic Web" was taken up by the scientific community and led to the standardization of the technical standards OWL and RDF by the World Wide Web Consortium (W3C) in 2009. In the meantime, these concepts have been further developed by industry, e.g., as knowledge graphs and ontologies, and are now part of high-performance search technologies on billions of web servers. A next step could be an EU-wide common data platform[6] as a counterbalance to the supremacy of US and Chinese big tech companies. The Digital Strategy mentions Gaia-X as a European platform concept based on the principles of the EU GDPR, which is currently being developed in cooperation with industry. The Gaia-X data infrastructure is intended to connect cloud and edge offerings via open source applications and interoperable standards.

In Germany, there is currently no public data institute that could improve the use of data through networked data rooms in science and research, business, administration and society. The Federal Ministry of Economics and the Federal Ministry of the Interior are currently developing a concept for such a data institute, which will then be discussed among all ministries. The Open Data Institute (ODI)[7] in the United Kingdom, which was founded as a non-profit private limited company in 2012 by Sir Tim Berners-Lee and Sir Nigel Shadbolt, could serve as a model in this regard. Deutsche Bank AG has been a member

[6] https://diginomica.com/could-sir-tim-berners-lee-one-day-unite-europe-shared-data-platform
[7] https://theodi.org/

of the ODI[8] network of over 2,000 network partners since 2015. A data institute could play an important role for Germany in developing an open data culture.

2.4 Cybersecurity threats and critical infrastructure

Geopolitical tensions and the ongoing Russian invasion of Ukraine with some of the worst cyberattacks ever have raised awareness of the scale of cybersecurity threats. Attacks on private and public organizations by hacker gangs linked to hostile state actors are causing enormous damage to organizations due to compromised credentials, ransomware payments, data loss, and theft of intellectual property and identities.

One of the goals of the Digital Strategy is therefore to adapt the cybersecurity requirements for critical infrastructures to the current threat situation. However, in view of the cyber activities of adversarial states, it seems incongruous that technologies from companies in adversarial states continue to be used in central digital infrastructures and encryption and advertised to end users, while the German Federal Office for Information Security (BSI) is pushing to clean up infected systems.[9]

The Digital Strategy (2022:46-47) also includes goals for the digital transformation of the police and justice system. With approximately 320,000 police officers and employees organized in 16 state police organizations and four federal police agencies (Federal Police, Federal Criminal Police Office BKA, Customs Criminal Police Office, Police at the Parliament), the associated IT infrastructure is heterogeneous.[10] Initially, the State Criminal Police Offices (LKA) and, at the federal level, the Federal Criminal Police Office (BKA) are responsible for prosecuting and combating cybercrime. The Digital Strategy reaffirms the importance of the P20/20 program[11], which continues to consolidate and innovate police procedures and IT systems on the basis of uniform standards and to digitally network the police in Germany and with international partner organizations.

The Digital Strategy envisages (2022:48) that the BSI will be further expanded to become the central authority for IT security in Germany with greater independence. Supporting this and based at the BSI is the National Cyber Defence Center (Cyber-AZ) in Bonn as a cooperation, communication and coordination platform for the German (security) authorities. Likewise, the "Cybersecurity Strategy for Germany 2021" – in line with the National Security Strategy – is to be further developed and digital sovereignty in cybersecurity strengthened.

Safety: Lighthouse Project 2

Digital and secure classified communications for government and businesses (AA)

The digital data exchange system Platform for Interagency Classified Information (R-VSK) helps to make bureaucratic processes more efficient. It is used to exchange information with international organizations (I-VSK) and companies with very high protection needs (F-VSK). It is a driver of standardization within NATO

Source: Lighthouse projects (2022)

[8] https://theodi.org/organisation/deutsche-bank-ag/
[9] https://www.bsi.bund.de/EN/Themen/Verbraucherinnen-und-Verbraucher/Informationen-und-Empfehlungen/Cyber-Sicherheitsempfehlungen/Infizierte-Systeme-bereinigen/infizierte-systeme-bereinigen_node.html
[10] ttps://www.bmi.bund.de/DE/themen/sicherheit/programm-p20/programm-p20-node.html
[11] The reform program for the information architecture of the police in the context of homeland security ("Saarbrücken Agenda") was adopted in November 2016.

2.5 Digital Space in the EU and the German Digital Strategy

Current German policy must be seen in the context of the EU's efforts to create a common digital space and the EU's goals for the "digital decade".[12] In an environment shaped by the Russian attack on Ukraine and related economic sanctions, rising energy costs, inflation, and supply chain disruption, resilience is a critical factor. At the EU level, EUR 127 billion has been earmarked for this purpose in the national recovery and resilience plans for reforms and investments in the digital sector.[13]

Numerous ground-breaking legislative projects with significant economic impact and new obligations for companies are currently being discussed at EU level.

— Through the "Digital Services Act" and the "Digital Markets Act": digital platforms and services are to be held more accountable.

— The "Artificial Intelligence Act" (EU AI Act) will regulate the use of AI applications.

— The "EU Data Act" is intended to supplement the EU Data Protection Act (EU GDPR) with a modern legal framework for the data economy. In particular, it is intended to enable better usability and economic utilisation of data. This primarily concerns data use between companies (B2B, business-to-business) and between companies and the state (B2G, business-to-government).

— "NIS 2.0 Directive": The planned Network and Information Systems Security Directive (NIS 2.0) is intended to ensure a high common level of cyber security throughout the European Union.

While many of the digital policy initiatives both in EU countries and at the EU level refer to digital sovereignty, it is equally important to understand the risks of such policies.[14] For example, the further development of the digital economy requires to strike a balance between national security concerns and commerce when protecting data. New digital business models are typically designed to grow through access to data and catering for global markets. Otherwise, start-ups will seek more advantageous locations if conditions are putting them in weaker positions as compared to their competitors.

In the coming months, important decisions will be made on these key digital issues. Germany will have to contribute its positions at various levels and in various consultation and decision-making bodies in order to coordinate German interests with those of the other EU countries and in a trialogue with the EU Commission, the Council of Ministers, and the EU Parliament.

3. Budget and success controlling

3.1 Digital Budget

Only when a digital budget is made available in the federal budget can important digital projects be implemented across departments. A concept for this is currently being developed so that it can be voted on in the Bundestag during budget discussions in November 2022. Without such an additional central digital budget, which is also mentioned in the coalition agreement (2021:12), there is a risk of gridlock, as no overarching digital measures could then be implemented

[12] https://ec.europa.eu/eurostat/de/web/products-eurostat-news/-/ddn-20220805-2
[13] https://digital-strategy.ec.europa.eu/en/policies/desi Germany will invest more than 30% of its funds from the Recovery and Resilience Facility (RRF) in achieving the goals of digital transformation.
[14] https://www.hinrichfoundation.com/global-trade/digital-trade/

before January 1, 2024. Furthermore, an interministerial coordination body has been set up at state secretary level to drive forward the implementation of the Digital Strategy.

The final section of the Digital Strategy document describes the monitoring of the Digital Strategy. The impact is to be subjected to an independent scientific analysis and published transparently.

3.2 The EU's Digital Economy and Society Index (DESI)

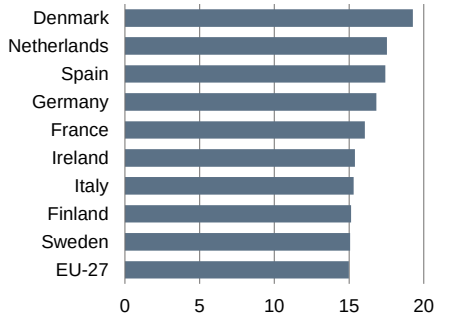
The German government supports initiatives at EU level to create a common digital space. This should be seen in the context of the EU's goals for the "digital decade".[15] Measurable targets for digital transformation by 2030 have been set by the EU in a "Digital Compass"[16] based on four cornerstones: skills, digital transformation of businesses, secure and sustainable digital infrastructures, and digitization of public services. Progress towards these 2030 targets is measured by a monitoring system based on the Digital Economy and Society Index (DESI).[17] The European Commission has published an annual assessment of the progress made by EU member states since 2014 with the DESI reports based on data from the previous year. The DESI is explicitly used in the Digital Strategy to measure the achievement of the goals of the German Digital Strategy by whether a position among the top 10 is achieved. In the latest ranking, DESI 2022, Germany holds the 13th rank among 27 countries down from 11th in 2021. In the following, the four dimensions of DESI as a composite index are discussed briefly. Each dimension is weighted 25% and, accordingly, the following diagrams present the country performance benchmarks (EU Commission 2022) out of 25 points for each dimension.

In terms of connectivity, Germany ranks fourth among the top 10 EU member states, though with a score of 16.83 out of 25, just above the EU-27 average of 14.98.

A sharp increase in 5G coverage has improved Germany's position with a 5G coverage of 86.5% of households in 2022 up from only 17.8% in 2021. There is still improvement as more than 10% of German households – mainly in rural areas – do not have 5G coverage. The urban-rural digital divide and the lag in fibre coverage (at 15.4%) are both addressed by the Digital Strategy and the gigabit strategy of the Federal Ministry for Digital and Transport from July 2022.

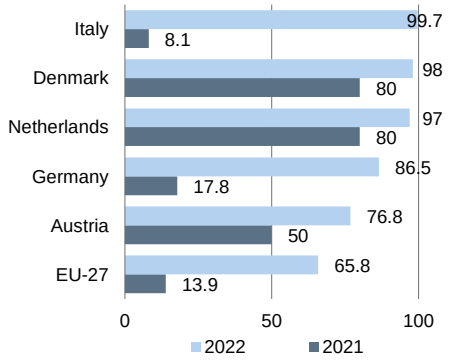
With regards to digital skills of individuals, Germany scores only 16th of 27 (DESI 2022) with a score below the EU-27 average with mixed results as the level of basic digital skills and basic digital content creation skills are also slightly below the EU average. However, the percentage of information and communications technology (ICT) specialists is higher than the EU average.

Connectivity 3



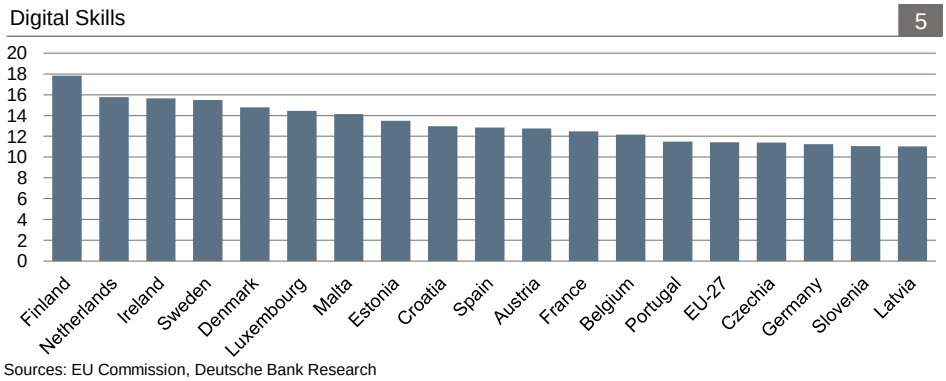
Sources: EU Commission, Deutsche Bank Research

5G Coverage 4



Sources: EU Commission (2022), Deutsche Bank Research

Digital Skills 5

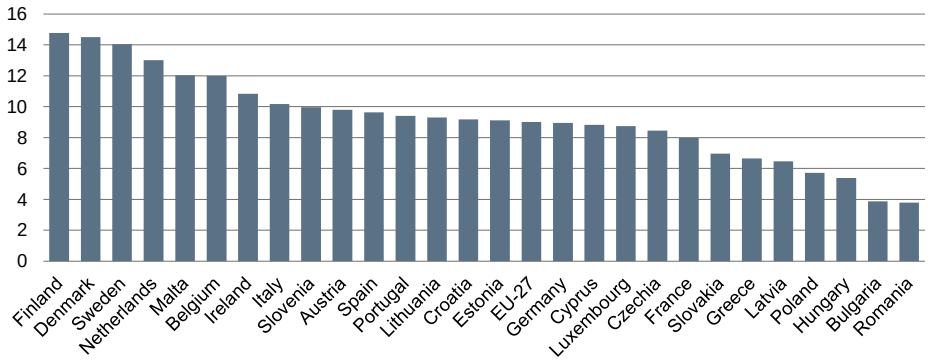


Sources: EU Commission, Deutsche Bank Research

[15] https://ec.europa.eu/eurostat/de/web/products-eurostat-news/-/ddn-20220805-2
[16] https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade#ecl-inpage-kyvdstob
[17] https://digital-strategy.ec.europa.eu/en/policies/desi

Regarding the integration of digital technologies by enterprises, Germany ranks 16th with a score of 8.95 just below the EU-27 average of 8.95. The evaluation of DESI (2022) shows room for improvement with regard to the acceptance and uptake of digital technologies by small and medium-sized enterprises (SMEs).

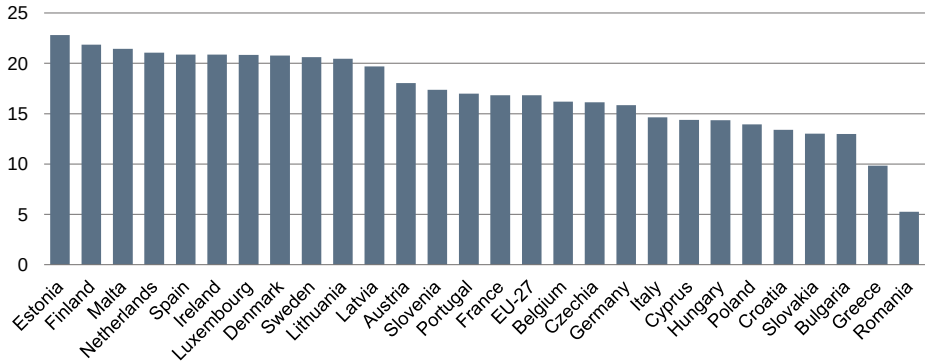
Digital Transformation of Businesses 6



Sources: EU Commission, Deutsche Bank Research

With regards to digital public services, Germany scores in 2022 only 18th out of 27 and is with 15.85 points below the EU average of 16.84. When – in a thought experiment – eliminating the fourth index component, digital public services, and calculating DESI only with the other three components with a weighted average of 33.33% each, the results were different as Germany would then have reached a rank within the top 10 both for 2021 and 2021. This means, that the current state of digital transformation of public administration and e-government services is the weakest link for Germany's position and deserves the special attention this wide area receives in the Digital Strategy with the learning, digital state being one of its three key pillars.

Digital Public Services 7



Sources: EU Commission, Deutsche Bank Research

4. Outlook and evaluation

In an era that has been dubbed Europe's digital decade[18] and in which technology is evolving at a rapid pace, it is crucial that the political and regulatory framework allows for a certain degree of technological openness that does not unduly slow down or even hinder innovative and entrepreneurial action. The next decade offers great opportunities, both in terms of technologies and new AI-based business models. Nanotechnology, smart chips and AI solutions, the Internet of Things, and the emergence of quantum computing can provide a multitude of opportunities across industries. Potentially, this can become a new economic and technological miracle in a smart society. The leitmotif of the current German government's coalition agreement (2021), "Dare more progress," is a call for Germany (and Europe) to use the digital transformation and new technologies to find solutions to the challenges of the 21st century.

The Digital Strategy is not a grand strategy document, but rather a cross-departmental work program to catch up on many unfinished tasks of previous governments. The overarching vision of a transformation to a social-ecological market economy is set out in the coalition agreement (2021). While the Digital Strategy has been criticized in some commentaries for being too unambitious, the tasks formulated are transformative and can improve the framework conditions to drive the digital transformation forward in all areas. For example, civil society, business, education, research and science should be enabled to make better and easier use of the opportunities presented by digital transformation and the new technologies that are shaping a new age. To be successful, it needs the contribution of German SMEs, large companies and start-ups, as well as business-friendly framework conditions.

The Digital Strategy sets out Germany's strategic goals for the coming years. The vote in the Bundestag on the introduction of a central additional digital budget (coalition agreement, 2021:12) in the federal budget for 2023 is a crucial next step in implementing the Digital Strategy. Only when the budget is made available can important projects be driven forward. For many digital policy areas such as digital government services, healthcare, digital energy and mobility solutions, as well as infrastructure and technical standards, it is crucial that the tasks of the Digital Strategy are implemented.

Overall, the Digital Strategy sets the right priorities to remove some bottlenecks that are slowing down the digital transformation in Germany. In particular, the three high-priority initiatives have the potential to generate further positive network spillover effects for the other policy areas and projects. First, better access to fast internet connections with high bandwidth based on glass fibre backbones and high-performance mobile networks in both urban and rural areas will create social and economic opportunities as well as save time and effort for millions of people and businesses. Secondly, the introduction of technical standards such as 5G/6G and software-defined networks will allow Germany to develop the Internet of Things. Thirdly, digital identities linked to electronic personal identity documents that can be used also on smartphones will support a new era of e-governance and e-commerce. As some of the underlying projects have been running for many years it should increase the chances to complete them in a reasonable time. The increased public interest in digital transformation, the emergence of innovation pockets across all levels of German government[19] and the use of agile methods in public administration are encouraging and should decrease the risk of non-completion or dropping of

[18] https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en
[19] Mergel, Ines (2021).

federal initiatives given fiscal pressures. Private businesses and industry including start-ups can support the Digital Strategy by harnessing their innovative power in a vibrant ecosystem in Germany and Europe. Procurement by public authorities and public-private partnerships are ways to foster support for digital initiatives. On the other hand, regulatory action must be reconciled with technology-open, business-friendly framework conditions. Equally important are the acceptance and commitment of citizens, who will determine the success of digital services and initiatives through their investments in lifelong learning and private infrastructure.

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