EUROPEAN
COMMISSION

Brussels, 17.6.2026
SWD(2026) 155 final

PART 11/27

COMMISSION STAFF WORKING DOCUMENT

Digital Decade 2026 country report

Accompanying the document

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

State of the Digital Decade 2026: Closing structural gaps and mobilising investments for 2030 and beyond

{COM(2026) 288 final} - {SWD(2026) 154 final} - {SWD(2026) 156 final} - {SWD(2026) 157 final}

European Commission

DIGITAL DECADE COUNTRY REPORT 2026

Germany

Germany

Contents

Executive summary

Overall, Germany has strong assets in digitalisation, including a leading position in **high-tech sectors** such as **semiconductors** and **quantum technology**. However, persistent **structural challenges** – particularly in **connectivity** and **digital public services –** have constrained more substantial progress for many years. With the establishment of the new Ministry for Digital Transformation and Government Modernisation, some momentum for change has been generated, and several promising initiatives are being launched to address these challenges. However, it remains to be seen whether these efforts will translate into lasting structural improvements.

The persistent structural weaknesses limit the potential leverage that digitalisation can provide for **competitiveness**. Efficiency gains and reductions in administrative burden are often hindered by complex systemic issues (e.g. linked to fragmented responsibilities and implementation modes), which have been identified but not yet resolved. While gradual improvements are underway, they are so far too slow and limited in scale to generate substantial impact. Given the challenging economic situation overall, faster and more profound adjustments are needed to boost competitiveness and productivity.

At the same time, Germany remains among the **leading EU Member States in several high-tech domains**. It is the largest data centre as well as microelectronics location in the EU and plays a major role in semiconductor research and manufacturing. Germany also demonstrates a leading position in quantum technologies, supported by advanced research capabilities, cutting-edge infrastructure (e.g. exascale supercomputer JUPITER) and, to date, comparatively high levels of public funding.

Germany in the Digital Decade

Germany shows a substantial level of ambition in its contribution to the Digital Decade having set 9 national targets (out of a possible 14), 89% of which align with the EU 2030 targets. Germany has also set a target of 75% for the combined adoption of technologies by businesses, in line with the target at EU level. In its national roadmap, Germany provided 8 trajectory points for 2025 (out of 14 analysed). The country is following them moderately well with 50% considered on track. Germany addressed 86% of the 7 recommendations issued by the Commission in 2025, either by implementing significant policy changes (14%) or making some changes (72%) through new measures. According to the national roadmap, by the end of 2026, 66% of the measures will come to an end. The total public budget associated to these measures is EUR 15.33 billion, representing 33% of the total public budget outlined in the roadmap.

According to the special Eurobarometer on 'the Digital Decade' 2026, 84% of Germans consider that digital policy should be a very high or high priority for the EU in shaping our future in Europe. They also think that, in the next ten years, the EU should cooperate with Member States to reinforce cybersecurity and protection from online threats (92%), promote digital education and skills programmes (91%) and build an independent European digital infrastructure (broadband, 5G, cloud computing, semiconductors (85%)). In addition, 87% of German respondents think that the EU should reduce its dependence on digital technology from third countries, and 89% that the EU should prioritise investments in digital infrastructure and services that are developed and controlled in Europe. Meanwhile, 57% would be willing to switch to an EU-based digital service provider even if it means slightly higher costs.

Funding for digital and multi-country projects

Germany allocates 46% of its total recovery and resilience plan to digital (EUR 12.8 billion). In addition, under cohesion policy, EUR 2.4 billion, representing 12% of the country's total cohesion policy funding, is dedicated to advancing Germany's digital transformation.

Germany is a member of the Local Digital Twins towards the CitiVERSE EDIC, and a member of the Digital Commons EDIC. The country participates directly in the IPCEI on Microelectronics and Communication Technologies (IPCEI-ME/CT) and in the IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI-CIS). Germany is also a participating state in the EuroHPC Joint Undertaking (JU) and the Chips JU.

Digital Decade KPI (1)	Germany				EU		Digital Decade target by 2030	
	Last available data (2)	DESI 2026 (year 2025)	Annual progress	National trajectory 2025 (3)	DESI 2026	Annual progress	DE	EU
Fixed Very High Capacity Network (VHCN) coverage	77.4%	79.9%	3.2%	-	85.5%	3.7%	100.0%	100%
Fibre to the Premises (FTTP)	36.8%	44.0%	19.6%	50.0%	74.1%	7.1%	100.0%	-
Basic 5G coverage	99.1%	99.5%	0.4%	-	96.8%	2.6%	100.0%	100%
Edge Nodes (estimate, new methodology)	-	1948	-	-	7451	-	-	10000
SMEs with at least a basic level of digital intensity *	61.4%	73.6%	9.5%	82.0%	71.4%	11.0%	91.0%	90%
Cloud *	38.5%	46.0%	9.3%	-	46.7%	9.5%	-	75%
Artificial Intelligence	19.8%	26.0%	31.5%	-	20.0%	48.0%	-	75%
Data analytics *	37.1%	37.7%	0.8%	-	39.9%	9.5%	-	75%
AI or Cloud or Data analytics *	58.0%	63.2%	4.4%	24.0%	63.2%	7.5%	75.0%	75%
Unicorns	66	74	12.1%	-	324	10.2%	-	500
At least basic digital skills *	52.2%	59.6%	6.8%	60.0%	60.4%	4.3%	80.0%	80%
ICT specialists	5.1%	5.5%	7.8%	5.0%	5.0%	2.0%	5.3%	~10%
e-ID scheme notification		Yes						
Digital public services for citizens	78.9	78.1	-1.0%	80.0	84.6	2.8%	100.0	100
Digital public services for businesses	77.5	77.8	0.3%	82.5	88.6	2.7%	100.0	100
Access to electronic health records	87.0	87.7	0.9%	100.0	86.5	4.6%	100.0	100

(1) Indicators full description, metadata and sources in the DESI 2026 methodological note
(2) Last available data is DESI 2025 (reference year 2024) except for indicators marked with a star * for which it is DESI2024 (reference year 2023)
(3) National trajectory value for 2025, if set by the country in its Digital Decade national roadmap

A competitive, sovereign and resilient EU based on technological leadership

In the area of **connectivity**, fibre rollout has accelerated in recent years and differences between urban and rural rollout levels are narrowing, but regional disparities persist. Germany still scores second-to-last on fibre coverage in the EU and has relatively low take-up rates, with a particular challenge in establishing 'last metre' connection, i.e. bringing fibre that is already available in close proximity to additional households. Germany is working on improving the framework conditions limiting rollout, including with adjustments to its national laws. It remains to be seen whether these measures will be sufficient to overcome structural challenges, such as fragmented stakeholder interests and deployment landscape. At the same time, preparatory work for copper switch-off is ongoing. In **5G**, Germany performs below the EU average in the mid-band spectrum (3.4-3.8 GHz), which is crucial for delivering both broad coverage and high capacity.

At the business level, companies perceive gaps in their **uptake of advanced technologies**, such as artificial intelligence (AI), and there especially within the manufacturing sector. The usage of digital technologies is often focused on productivity gains, while applications related to innovation and business model transformation remain less common. Moreover, implementation challenges such as limited human and financial resources, shortcomings in data processing and regulatory complexity persist. Against this background, Germany has continued to implement European Digital Innovation Hubs (EDIHs) and the *Mittelstand-Digital* funding priority to support SMEs in their digital transformation efforts. It also hosts two of the 19 European AI Factories, driving advancements in AI application in different industrial sectors. In the area of **start-ups**, measures to reduce administrative burden are being prepared, while efforts to improve access to funding for tech start-ups are ongoing.

Despite Germany's strong position in **quantum** research and infrastructure, its performance remains relatively modest in more commercialisation-oriented quantum technology activities. This is reflected in limited planned private investment, partly due to the technology's early stage of development. Against the background of increasing **cyber threats** and gaps in companies' preparedness, public support measures for businesses continue, but have not been expanded accordingly.

Protecting and empowering EU people and society

The level of **basic digital skills** of the population is very close to the EU average, and the Digital Pact 2.0 will continue to support the digital transformation of the education system. Although Germany's share of ICT specialists exceeds the EU average, ICT specialist shortages remain a constraint for the German economy. Demand is also rising for highly skilled professionals in areas such as AI, quantum technologies and semiconductors. It remains to be seen whether the speed and scope of ongoing and planned measures (e.g. National Skills Strategy, Skilled Labour Strategy, Work and Stay Agency) will be sufficient to address these shortages, as well as structural issues such as complex administrative procedures to attract and retain ICT talents.

Comparatively low availability and use of **digital public services** have been among the key challenges in Germany over recent years. Decentralised rollout is hindered by technical, organisational and political challenges, aggravated by fragmented responsibilities across different levels of government. The new Ministry for Digital Transformation and Government Modernisation has created some momentum to change dynamics, including moving from the 'one for all' (*Einer für Alle, EfA*) principle towards more standardised solutions, and launching some pilot projects to deliver a few quick positive signals and demonstrate the potential of cross-level collaboration. In this context, increasing interoperability across the fragmented IT landscape will be key, as it is also a prerequisite for the functionality of the **EUDI Wallet**. This is especially relevant given that eID uptake remains very low, while the EUDI Wallet could help address some of the challenges currently associated with **eID** usage.

Recommendations

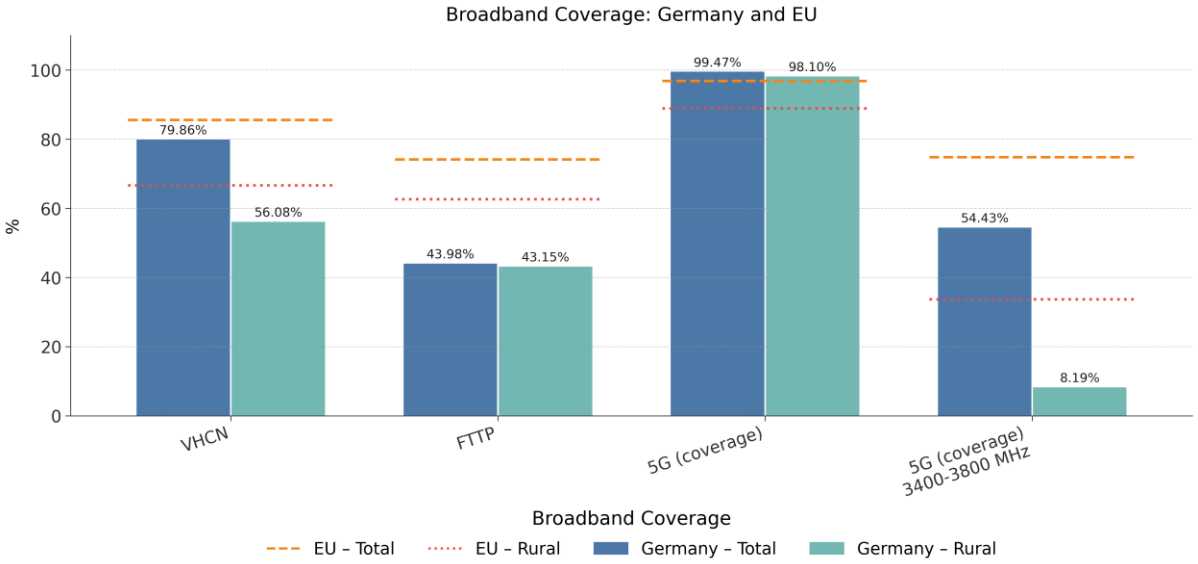
- **Digital public services:** Accelerate and expand the nationwide rollout of digital public services and uptake of eID by enhancing interoperability and ensuring end-to-end digitalisation, including through greater use of standardised digital building blocks and improved connectivity between IT systems. Systematically address structural implementation barriers, including by strengthening collaboration and ensuring a more coherent allocation of resources and responsibilities across levels of government, as well as intensifying cross-border collaboration. Improve the user-friendliness of digital public services and simplify and promote eID usage, including by making it easier to (re)activate eID cards.
- **Connectivity:** Accelerate the rollout of very high-capacity networks, especially fibre optic infrastructure, with a focus on connecting end users and reducing regional disparities in coverage. Improve framework conditions for fibre deployment, including by strengthening efforts to streamline and standardise rollout procedures and fostering the copper networks switch-off. Promote take-up, including by increasing awareness of the benefits of fibre connectivity. Improve availability and coverage in the 5G mid-spectrum band (3.4-3.8 GHz) and take advantage of the upcoming expiry of rights of use to implement pro-investment conditions.
- **Uptake of advanced technologies, especially AI:** Accelerate the adoption of advanced technologies, such as AI, across businesses, including by fostering deeper integration of digital technologies to support innovation and business model transformation. In the field of AI, support the deployment of innovation infrastructures for businesses, such as AI Factories, AI Testing and Experimentation Facilities and European Digital Innovation Hubs (EDIH). Promote AI uptake in strategic sectors, such as manufacturing, supporting the EU's Apply AI Strategy's actions.
- **ICT specialists:** Increase the supply of ICT specialists by attracting more young people into ICT-related studies and careers, including through further development of existing and planned measures. Strengthen efforts to attract and retain ICT talent by streamlining administrative procedures and enhancing collaboration. Ensure a sufficiently large pool of highly skilled professionals in cutting-edge technologies to support innovation and their continued development.
- **Quantum technologies**: Leverage the country's strong position in quantum technologies with adequate funding, including by ensuring continued public financial support and by incentivising private investment, in particular into the German quantum startup landscape. Accelerate commercial uptake by reinforcing technology transfer mechanisms between the country's research base and industry. Intensify cross-border collaboration and contribute to building a European quantum supply chain.
- **Cybersecurity:** Improve cybersecurity resilience for private and public entities, including by raising awareness of existing support and complementing it with targeted measures to improve preparedness for the evolving threat and technology development landscape.

A competitive, sovereign and resilient EU based on technological leadership

Building technological leadership: digital infrastructure and technologies

Connectivity infrastructure

Performance assessment



Germany achieved very high capacity network (VHCN) coverage of 79.86% in 2025, below the EU average (85.54%). The annual growth rate was 3.2%, lower than the EU's growth rate of 3.7%. In rural areas, VHCN coverage reached 56.08%, also below the EU average (66.66%), but with a higher growth rate (24.1% vs. EU's 7.7%). Germany did not provide a national trajectory point for 2025 in its Digital Decade national roadmap.

Germany's fibre-to-the-premises (FTTP) coverage reached 43.98% in 2025, considerably below the EU average of 74.13%. However, its annual growth rate of 19.6% exceeded the EU's growth rate of 7.1% (2024: Germany 36.78% and EU average 69.24%). In rural areas, FTTP coverage stood at 43.15%, also below the EU average of 62.61%, but with a higher growth rate (27.2% vs. EU's 6.5%). Germany is lagging behind compared to its national trajectory presented in the Digital Decade national roadmap.

Germany achieved basic 5G coverage of 99.47% in 2025, above the EU average of 96.79%, but performs below the EU average in 5G coverage in the 3.4-3.8 GHz band. The 3.4-3.8 GHz mid-band is crucial because it provides a good balance between coverage and high capacity. This makes it a cornerstone for advanced 5G use cases that can be replicated as reference models across sectors and socio-economic drivers. These include applications in manufacturing, such as industrial Internet of Things (IoT), or healthcare, for example telemedicine. In rural areas, Germany's overall 5G coverage reached 98.1% in 2025, again above the EU average of 88.88%. Germany's 5G coverage in the 3.4–3.8 GHz band was at 54.43% in 2025, considerably below the EU average of 74.75%. Germany's annual growth rate of 10.0% was slightly lower than the EU's growth rate of 10.6% (2024: 49.5% vs EU's 67.6%). In rural areas, Germany's 5G coverage in the 3.4–3.8 GHz

band reached 8.19% in 2025, remaining also considerably below the EU average of 33.71%. Germany's annual growth rate of 23.0% was lower than the EU's growth rate of 32.9% (2024: 6.66% vs EU's 25.36%). Against this backdrop, migrating private networks to the recently harmonised 3.8–4.2 GHz band could help improve the availability of mid-band spectrum for high-quality public 5G networks. Moreover, the upcoming spectrum licence expiry in 2030 presents an opportunity to establish pro-investment conditions[1]. The country did not provide a national trajectory point for basic 5G coverage for 2025 in the Digital Decade national roadmap.

With the exception of overall 5G coverage, Germany achieved lower coverage rates than the EU across all key performance indicators. The gap is particularly pronounced for fibre and 5G coverage in the 3.4–3.8 GHz band. Despite fibre rollout accelerating in recent years and differences between urban and rural rollout levels narrowing, Germany still scores second-to-last on fibre in the EU.

The table below provides an overview of VHCN, FTTP and basic 5G coverage across NUTS-2 (nomenclature of territorial units for statistics) regions in Germany, which is the relevant level for regional polices. It shows that **fixed broadband coverage is very mixed across German regions** for VHCN coverage especially in rural areas and for FTTP coverage overall and in rural areas.

[1] Pro-investment conditions include longer licence durations to strengthen investment certainty, coverage obligations to accelerate deployment and reasonable spectrum prices that preserve capital for network rollout.

Germany

	VHCN coverage		FTTP Coverage		5G Coverage	
	Overall	Rural	Overall	Rural	Overall	Rural
National coverage	79.86%	56.08%	43.98%	43.15%	99.47%	98.10%
Arnsberg	81.59%	73.58%	32.20%	37.96%	99.45%	95.81%
Berlin	95.82%		45.12%		100.00%	
Brandenburg	67.02%	34.03%	43.36%	29.03%	99.48%	98.55%
Braunschweig	88.85%	79.63%	67.04%	72.80%	99.24%	97.65%
Bremen	97.64%		68.73%		100.00%	
Chemnitz	57.74%	27.63%	28.44%	19.89%	99.48%	98.23%
Darmstadt	82.23%	59.12%	38.06%	48.64%	99.69%	97.56%
Detmold	85.71%	78.17%	59.73%	72.58%	99.83%	99.47%
Dresden	68.52%	34.43%	33.01%	33.96%	99.67%	98.82%
Düsseldorf	84.87%	81.81%	37.03%	77.32%	99.98%	99.94%
Freiburg	74.18%	59.43%	32.15%	37.18%	97.56%	93.67%
Gießen	67.29%	61.47%	33.43%	49.06%	98.68%	97.13%
Hamburg	96.82%		77.05%		99.99%	
Hannover	91.55%	81.04%	61.72%	68.85%	99.83%	99.29%
Karlsruhe	80.63%	58.44%	26.20%	31.51%	99.31%	97.66%
Kassel	75.21%	65.69%	44.99%	53.66%	98.03%	96.04%
Koblenz	74.60%	62.97%	38.16%	33.75%	98.93%	97.68%
Köln	81.77%	60.17%	51.06%	53.32%	99.83%	98.45%
Leipzig	82.68%	61.89%	37.02%	61.09%	99.92%	99.45%
Lüneburg	85.31%	74.01%	72.04%	68.55%	99.38%	98.83%
Mecklenburg-Vorpommern	79.13%	63.09%	48.52%	56.40%	99.57%	99.10%
Mittelfranken	74.86%	47.10%	32.68%	24.93%	99.75%	98.92%
Münster	89.90%	85.34%	62.73%	84.74%	99.95%	99.80%
Niederbayern	57.74%	37.16%	29.75%	25.69%	99.38%	98.95%
Oberbayern	81.70%	50.76%	47.43%	31.39%	99.74%	98.84%
Oberfranken	66.87%	38.18%	24.15%	16.50%	99.63%	99.02%
Oberpfalz	69.33%	49.66%	35.32%	27.60%	99.54%	98.93%
Rheinhessen-Pfalz	82.10%	58.66%	33.93%	40.09%	98.77%	96.05%
Saarland	74.45%	65.56%	28.09%	34.80%	99.21%	98.22%
Sachsen-Anhalt	66.39%	46.97%	46.98%	43.14%	99.42%	98.69%
Schleswig-Holstein	93.12%	85.31%	72.12%	82.25%	99.70%	98.89%
Schwaben	72.14%	50.84%	27.54%	30.11%	99.44%	98.33%
Stuttgart	80.29%	61.31%	37.38%	29.86%	99.47%	97.50%
Thüringen	58.81%	34.60%	23.13%	26.54%	98.76%	97.35%
Trier	65.00%	50.52%	46.16%	48.40%	98.01%	96.83%
Tübingen	66.65%	37.38%	16.66%	14.19%	98.28%	96.39%
Unterfranken	67.18%	42.66%	30.70%	21.91%	99.08%	98.01%
Weser-Ems	87.68%	76.45%	75.25%	71.89%	99.68%	99.14%

Policy context and assessment of recommendations

In its Coalition Agreement, the German Government aims to 'significantly advance its digital infrastructure through nationwide FTTH deployment reaching every household', although no specific timeline is provided. Fibre rollout has accelerated in recent years. However, progress has largely focused on 'homes passed' (i.e. fibre located in close proximity to homes) rather than on full connections, particularly in commercial deployments. By mid-2025, the number of 'homes passed' increased from around 7 million in 2020 to approximately 24.6 million. Of these, about 10 million are 'homes connected' (i.e. able to subscribe to a fibre service), while roughly 6 million are actively using fibre services ('homes activated'), corresponding to a moderate take-up rate of around 25%.

While differences between urban and rural rollout levels are narrowing, regional disparities persist (see also table above). Northern *Länder,* such as Schleswig-Holstein and Lower Saxony, are more advanced in fibre rollout, with FTTP coverage often ranging between 65% and 95%. By contrast, in other regions – especially in the south – coverage often remained below 35% in 2025 (see also table

above). These differences may partly reflect more favourable geographic conditions and population density in leading regions, which improve the economic viability of the rollout.

Broadband rollout is constrained by lengthy approval procedures, diverging stakeholder interests, a fragmented deployment landscape, and incomplete rollout documentation. These factors limit economies of scale and make deployment resource-intensive, contributing to the gap between homes passed and homes connected. Deployment in the last metres is often impacted by diverging interests between property owners, who want to choose their telecom operator, and telecom operators, which require a critical mass of connections to ensure commercial viability. Delivering connectivity over the final metres remains challenging, partly due to limited documentation, which constrains the implementation of new connections. Improvements in areas such as rollout documentation are expected through regulatory harmonisation, including through the Gigabit Infrastructure Act. Moreover, the 2025 amendment to the national Telecommunications Act has further prioritised broadband rollout by designating it a matter of overriding public interest. This is expected to accelerate approval procedures. Market conditions for deployment (e.g. availability of financing) have become more challenging, further exacerbated by a highly fragmented deployment landscape. A report indicates that around 300 companies are deploying networks, many of which operate in small areas and contribute only marginally to overall rollout (around 200 companies account for just 3% of total deployment). This suggests a need to develop more scalable deployment models.

Publicly funded deployment is expected to continue at broadly current levels, alongside strengthened stakeholder engagement through a network deployment dialogue. Under the funding programme *Gigabitförderung 2.0*, 390 infrastructure projects with a total volume of EUR 1.8 billion were approved in 2025, supporting approximately 440 000 new connections. For 2026, EUR 1.3 billion in federal funding is planned. Over recent years, total public funding has amounted to around EUR 2 billion in public funding per year, including contributions from the *Länder*. Federal funding to date amounts to EUR 20 billion and has supported approximately 3 850 rollout projects providing around 4.7 million connections. In addition, a stakeholder dialogue on the digital infrastructure rollout was launched in October 2025, involving representatives from *Länder*, municipalities and industry. A Memorandum of Understanding is expected to be finalised in June 2026 to define measurable rollout targets and monitoring indicators. This exchange is set to continue on a regular basis.

No copper network switch-off has taken place in Germany to date. However, preparatory work is ongoing. In September 2025, the German Government published key elements of a comprehensive concept for copper-to-fibre-migration for consultation. In January 2026, the *Bundesnetzagentur* (the national regulatory authority) proposed a regulatory concept outlining the conditions under which copper networks may be switched off, while ensuring competition and a rules-based approach.

Demand for fibre connections remains moderate, as reflected in the gap between homes passed and homes connected. A Deloitte survey indicates that a significant share of households (at least 39%) would keep their existing connection even if fibre were available, while only around one quarter (27%) would actively opt for fibre. Key drivers for switching include reliability/connection stability, higher speeds, and good value for money/competitive pricing. Limited demand can partly be explained by the continued performance of existing copper-based networks (e.g. VDSL/cable networks), which often seem to meet current user needs. In addition, perceived high costs, limited awareness of the added value, and concerns about switching processes (e.g. service interruptions) act as barriers to adoption.

Against this background, Germany has launched an information campaign on fibre *'Das beste Internet'*. The campaign aims to inform the public about the benefits of fibre connectivity and to

encourage take-up where infrastructure is already available. Linked to some of the challenges mentioned above, the campaign targets property owners and tenants in particular. Early indications suggest increasing public awareness and consumer interest. However, the campaign remains limited in scope, with a focus on digital distribution channels. The campaign is set to continue, taking its initial results into account. In addition, the Gigabit Office has launched a website to support end users in choosing the most suitable internet connection, with a focus on fibre.

2025 recommendation on connectivity: Accelerate infrastructure roll-out of very high-capacity digital networks, especially fibre optics.
Germany made some efforts to address the recommendation through new policy actions in 2025. Some regulatory adjustments have been implemented or are underway to address some of the structural challenges identified, such as the 2025 amendment to the Telecommunications Act and the ongoing harmonisation of national law with the Gigabit Infrastructure Act. Additional new measures include the launch of a stakeholder dialogue on broadband rollout and an information campaign on fibre ('*Das beste Internet*'). Moreover, Germany continues its constant rollout funding with a federal budget of EUR 1.3 billion for 2026 (EUR 1.8 billion in 2025 for around 440 000 new connections) and additional investments from *Länder*.

Semiconductors

Germany is the largest microelectronics location in the EU and contributes significantly to semiconductor research and manufacturing. According to the national microelectronics strategy, the country accounts for roughly 30% of Europe's wafer capacity, the foundation of microelectronics manufacturing. The microelectronics sector contributes approximately 4% directly and 15% indirectly to Germany's GDP. Germany also holds 5.6% of global semiconductor patents, though its international ranking has declined from 4th (2001–2003) to 6th (2019-2021). Semiconductors are widely used in German industry: a 2025 Bitkom survey of companies in manufacturing and ICT services sectors found that 91% use semiconductors, with 80% of these companies considering them essential to their operations. Therefore, supply chain stability is a key concern, with 64% of companies considering long-term purchase guarantees through strategic partnerships with international manufacturers to be important.

Activities in Germany are characterised by strong capabilities in chip manufacturing, in particular related to power electronics and sensors. The country maintains a strong position in machinery for semiconductor production, showing an export surplus in these technologies based on data from 2023. The country's capabilities support industrial applications, especially in more mature types of chips, including in sectors such as automotive and energy, where potential for market growth is relatively limited. However, two German companies provide essential parts for the machines used to produce cutting-edge chips (i.e. for EUV lithography systems).

Areas of relative weakness include chips design and manufacturing of memory chips to store information as well as logic chips to process information (including for advanced applications such as AI). Although these are common challenges across Europe, the comparatively high market growth in these segments suggests potential relevance for Germany to further develop its capabilities in these areas, including to support the completion of value chains for AI innovation infrastructure such as AI Factories.

Challenges for the industry include high energy costs and the availability of skilled personnel. By 2027, according to the national microelectronics strategy, the sector anticipates a need for 20 000 to

30 000 additional technically trained professionals[2]. Moreover, the Skilled Labour Monitoring through 2029 highlights electrical engineering, including microelectronics, as a sector with potential skilled labour shortages. As in other sectors, recruiting talent from outside the EU is considered resource-intensive by the industry, highlighting the importance of simplified procedures as well as efforts to develop the domestic workforce.

Germany is implementing measures to address some of the weaknesses and challenges of its semiconductor ecosystem. The Microelectronics Strategy, published in 2025, focuses on workforce development (training, attracting foreign workers), research (especially in chips design), technology transfer 'from lab to fab', and further improving Germany's attractiveness for semiconductor manufacturing. A broader objective of this strategy, as well as part of the *Hightech Agenda* on microelectronics, is to reduce existing dependencies and position Germany as a key player in segments of the global semiconductor value chain. Moreover, the German Chips Competence Centre, launched in 2025, aims to increase capabilities in areas such as chips design and assembly technologies. The centre is also part of the German *Hightech Agenda* and is co-funded by the Chips Joint Undertaking.

Other significant projects include the Important Project of Common European Interest (IPCEI) on Microelectronics and Communication Technology. Launched in 2023, the project has now entered full implementation mode, with some technological applications – including in the area of 6G – having been developed. Moreover, Germany supports the set-up of two new semiconductor manufacturing facilities in Dresden (EUR 495 million) and Erfurt (EUR 128 million). The facilities are part of the 'first-of-a-kind' (FOAK) initiative, aiming at increasing the EU's autonomy and technological leadership in semiconductor technologies. These initiatives respectively aim to adapt production capacities to dual use purposes (e.g. defence and critical infrastructure applications) and to offer manufacturing services that are not yet fully available in Europe, including innovative packaging processes, particularly relevant for applications in the automotive and medical sectors.

Edge nodes

Performance assessment

According to the Edge Node Observatory, Germany is estimated to have deployed a total of 1 948 edge nodes by 2025. This represents the highest number among all Member States, with the total number of edge nodes across all Member States estimated at 7 451. Due to a change in methodology, this number cannot be compared to previous estimations.

Policy context and assessment of recommendations

Edge nodes form part of Germany's computing infrastructure, and some measures are being implemented to support their further deployment. Currently, around 8% of Germany's total data centre capacity is attributed to edge nodes. The National Data Centre Strategy, published in March 2026, also includes efforts to strengthen edge computing, in connection with technologies such as AI and cloud computing. In this context, Germany intends to make use of European initiatives and collaborations, including IPCEIs. Edge computing is already being developed within projects under the IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI-CIS), covering application areas ranging from industrial SMEs and aviation to integration with technologies such as AI and quantum computing. Another recent milestone under Germany's participation in IPCEI-CIS is the announcement by five telecom operators that they have successfully federated their edge environments into a

[2] Estimation based on announced and planned investments, entails direct and indirect jobs.

European Edge Continuum. This enables access to resources from multiple operators through a single-entry point, while extending each operator's reach. The federated edge environment also allows applications to be deployed across nodes from different operators.

Quantum technologies

Germany demonstrates a leading position in quantum technologies, underpinned by advanced research capabilities, cutting-edge infrastructure and, so far, comparatively high levels of public funding. Key assets include the two quantum computers JADE and Euro-Q-Exa, developed within the EuroHPC Joint Undertaking and the High Performance Computer and Quantum Simulator Hybrid (HPCQS) initiative. These quantum computers provide cutting-edge quantum computing resources which enable complex quantum computations with applications in areas such as drug design, cybersecurity and FinTech. In addition, the exascale supercomputer JUPITER, inaugurated in 2025, represents a major milestone in European computing capabilities. As the fastest supercomputer in Europe and ranking 4th on the June 2025 TOP500 list, it enables large-scale AI model training and supports applications such as climate modelling and energy system optimisation.

Germany ranks among the global leaders in quantum research. In 2025, 14% of quantum-related patent applications were made by Germany (111 applications), which made it rank second globally, only behind the United States (21% share, based on 167 applications). Patent activity in quantum technologies has increased significantly over the past decade, with a nearly sevenfold rise in Germany's patent applications. However, no German company ranks among the global top 5 in quantum technology patents and no German research institution is among the global 10 top performers in quantum computing patents, indicating a comparatively decentralised innovation landscape.

Public investment is a central element in Germany's quantum ecosystem. Estimations covering January 2023 to April 2025 show that Germany announced approximately EUR 3 billion in public funding, making it the third-largest public investor, after China and the United States. This budget mainly stems from the Quantum Technologies Conceptual Framework, running from 2023 until the end of 2026. The framework aims to make quantum technologies usable for the economy, creating framework conditions for the ecosystem and supporting targeted technology development for future applications. Key measures include collaborative research projects involving academic and industrial partners, as well as the Quantum Computer Demonstration Setups initiative, which is developing early-stage quantum computing systems based on a range of technological platforms.

Moreover, quantum technologies are also one of the six key technologies of Germany's *Hightech Agenda*, published in 2025. The agenda builds on the objectives of the Quantum Technologies Conceptual Framework by adding further priorities, action points and milestones, including in areas such as quantum computing, quantum sensing, quantum communication, with measures such as education and training for quantum specialists. For each of the six key technologies, technology roadmaps were published in Mai 2026. They guide the implementation of measures, integrate existing initiatives into the *Hightech Agenda*, and support their monitoring through defined milestones. The total budget of the *Hightech Agenda* amounts to EUR 18 billion; however, it remains to be seen to what extent this funding represents additional resources beyond existing budgets to support strategic technologies.

Despite these strengths, the overall level of private-sector engagement remains relatively limited compared with more mature technologies. This can be largely attributed to the current low technology readiness level. Industrial-scale applications of quantum technologies are generally not expected before 2030, at the earliest, when advances such as error-corrected quantum systems and

integration with AI may become more viable. At least until then, the field is expected to remain research-intensive.

Consistent with this, awareness and engagement among companies are still relatively low. A ZEW survey suggests that a significant proportion of firms report no or limited familiarity with quantum technologies (65% of ICT companies and 80% of manufacturing companies), and only a small minority are actively working with them (less than 1% for ICT as well as for manufacturing companies). Planned private investment is also modest, even among firms that are already aware of the field, again reflecting the still low level of technological maturity.

From an international perspective, Germany's position in the quantum technology company landscape is moderate. For instance, it accounts for a 7% share of companies seeking to commercialise quantum computing, considerably behind the United States (36%). Finally, a McKinsey report shows that the number of quantum technology start-ups in Germany remains relatively low (11 start-ups) compared with other leading countries (US: 77, Canada: 29, UK: 26, Japan: 14, France: 11), indicating a less developed start-up ecosystem in this field.

Supporting EU-wide digital ecosystems and scaling up innovative enterprises

SMEs with at least basic digital intensity

Performance assessment

Germany is at 73.55% of SMEs with at least a basic level of digital intensity after an annual progression of +9.5% between 2023 and 2025, standing above the EU average of 71.39% (with annual growth rate of 11.0%). In 2023, the figure for Germany was 61.38%, which was also higher than the EU average of 57.9%. The country is lagging behind compared to its trajectory presented in the Digital Decade national roadmap.

Regarding SMEs with a very high digital intensity, Germany is at 9.49% after annual progression of +40.3% between 2023 and 2025, which is higher than the EU average of 9.07% (with annual growth rate of 43.9%). In 2023, Germany's figure was 4.82%, also above the EU average of 4.38%.

Policy context and assessment of recommendations

Despite their solid level of digitalisation compared to the EU level, businesses perceive gaps in their digital performance. Based on a DIHK (German Chambre of Industry and Commerce) survey, companies assess their level of digitalisation as moderate overall, with an average self-evaluation of 2.8 on a scale from 1 (highest performance) to 6. According to a Bitkom survey, digital transformation is widely perceived as a significant challenge: 53% of firms report difficulties in managing the digital transformation. While 32% of companies consider themselves pioneers, a majority of 64% classify their position as lagging behind.

Survey evidence points to limited time, limited human and financial resources and regulatory complexity as the main factors limiting the pace of digitalisation in businesses, and SMEs in particular. According to the Bitkom survey, data protection requirements represent the most significant obstacle (for 88% of firms). This is followed by the shortage of skilled workers (74%), limited time in day-to-day operations (60%), and insufficient financial means (55%). Findings from the DIHK survey highlight similar constraints, with lack of time (58%), complexity (56%), and financial limitations (40%) being the most relevant factors. The Commission of Experts for Research and Innovation (EFI)

2026 report emphasises that these challenges are particularly pronounced among SMEs. Many SMEs are still at an early stage of digital development, often due to a lack of in-house IT expertise. At the same time, the transition to digital systems typically requires substantial upfront investment, which can be difficult to achieve given constrained financial and human resources.

Digitalisation efforts are primarily oriented toward productivity gains, while applications related to innovation and business model transformation appear less frequently. The EFI 2026 report indicates that SMEs that invest in digital technologies (i.e. in software and databases) show an average productivity advantage of 11% compared to firms without such investments. At the same time, the DIHK survey results suggest that firms predominantly pursue incremental operational objectives: cost reduction (65%), quality improvement (64%), and increased flexibility at work (63%). By contrast, only 26% of companies report focusing on developing innovative products, services, or business models**.** This pattern is also reflected in the Digitalisation Index 2024. While relatively high levels of digitalisation are observed in processes (136.5 – with all values indexed to a 2020 baseline of 100) and technical infrastructure (130.8), lower levels are reported for products (116.4) and business models (108.8). In addition, research and innovation activity declined compared to 2021 (from 105.4 to 101.4).

The need to accelerate digital transformation is further amplified by broader structural changes in the economy. A large share of companies (82%) associates the current challenges of the German economy, at least in part, with a relatively slow pace of digitalisation. According to the European Commission report on Mapping the Impact of Industrial Decline on European Regions, Germany is among the EU Member States with the highest share of regions affected by industrial decline (68%). In this context, digitalisation and innovation can be understood as relevant factors supporting structural adjustment processes**.**

Against this background, Germany has been running the *Mittelstand-Digital funding priority* for several years, with a focus on informing and training SMEs in digital transformation, AI and cybersecurity. The external evaluation report, focusing on three - partially former - funding priority components, i.e. the network of *Mittelstand-Digital* Innovation Hubs, the Cybersecurity for SMEs initiative and the investment grant scheme 'Digital now'[3], concludes that *Mittelstand-Digital* effectively addresses the digitalisation barriers for SMEs. However, it also identifies areas for potential improvement in future programme design, including a clearer definition of target groups and a clear delineation with existing programmes. It further notes that, where funding is limited, non-financial support should be prioritised to avoid significant oversubscription. An interim report on the Network of *Mittelstand-Digital* Innovation Hubs recommends placing a stronger focus on small and micro enterprises while maintaining support for both emerging topics (e.g. AI, cybersecurity) and basic digitalisation needs.

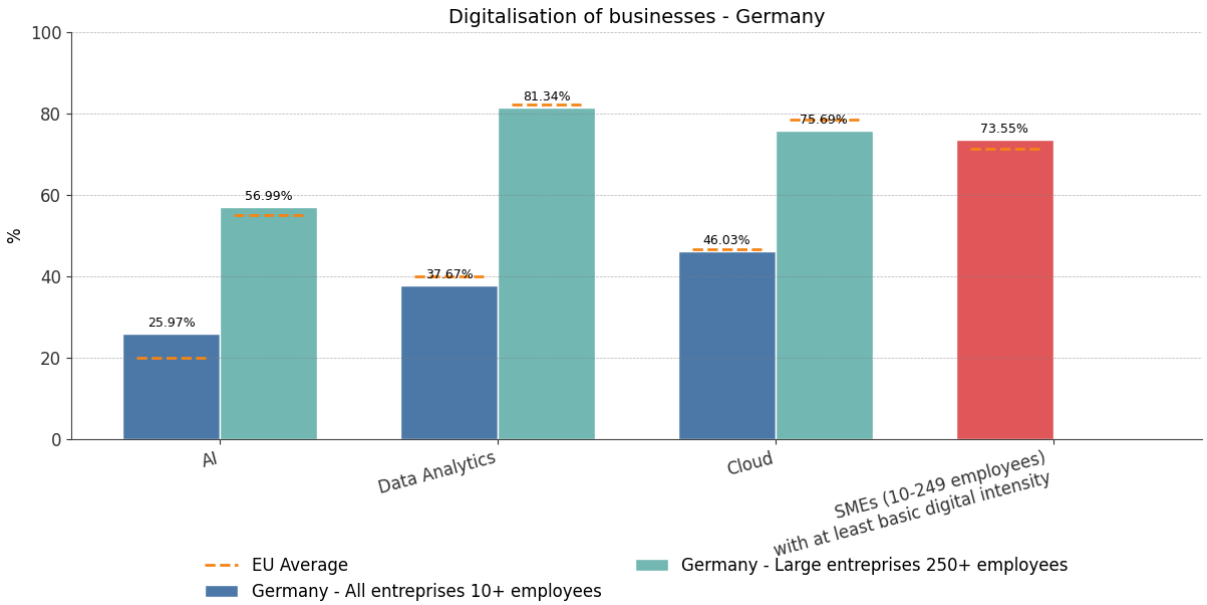
In addition, Germany has further developed a funding programme in collaboration with the national promotional bank. In 2025, it relaunched the programme as *ERP-Förderkredit Digitalisierung*, providing companies low-interest loans for their digitalisation projects. A new feature of the programme is the introduction of three project levels - ranging from basic over level-up to high-end digitalisation - with loans and possibly grant subsidies depending on the level. Another new element of the programme is a digitalisation check, which helps companies to assess their current level of digitalisation and better tailor the financed project to their needs. In 2025, the commitment value

[3] '*Digital now'* ended in December 2023.

amounted to around EUR 2.7 billion, covering over 2500 individual and consolidated loans (with consolidated loans financing multiple companies).

Take up of advanced technologies

Performance assessment



The uptake of digital technologies by enterprises is gradually increasing and, when considering the adoption of Artificial Intelligence (AI), cloud computing, or data analytics technologies together, German enterprises performed in line with their EU peers in 2025 (63.22% in DE vs 63.20% in EU). Germany's annual growth rate of 4.4% was lower than the EU's growth rate of 7.5%. Examining these technologies individually reveals:

- 37.67% of German enterprises adopted **data analytics**, below the EU average of 39.85% (Germany's annual growth rate of 0.8% lagged significantly behind the EU's growth rate of 9.5%)
- 46.03% of German enterprises adopted **cloud technologies**, around the EU average of 46.69% (with similar annual growth rates in Germany (9.3%) and the EU (9.5%))
- 25.97% of German enterprises adopted **artificial intelligence**, above the EU average of 19.95% (Germany's annual growth rate of 31.5% was lower than the EU's growth rate of 48.0%)

Concerning the indicator on the combined adoption of either AI, cloud computing or data analytics, the country is on track according to its trajectory presented in the Digital Decade national roadmap.

Moreover, gaps persist between SMEs (10-249 employees) and large enterprises (250 employees or more). However, their dynamics broadly mirror the overall patterns observed for each technology when comparing Germany's performance with that of the EU.

Policy context and assessment of recommendations

Similar to the uptake of basic digital technologies, companies widely recognise the importance of advanced technologies, yet they have not fully harnessed their potential. According to a Bitkom survey, 90% view AI and 97% big data as critical for competitiveness. However, adoption remains uneven, with 64% of firms still considering themselves to be lagging behind in AI. AI implementation is primarily focused on process optimisation (61%), with less emphasis on integration into products

and services (34%). AI is most commonly used in customer service (86%) and marketing (47%), but only marginally in R&D (15%).

Barriers to broader use persist. An OECD report on AI in Germany highlights skill shortages, limited understanding of use cases, and fragmented data in industry and public administration among the key constraints. According to a DIHK survey, looking more specifically at the use of data, these barriers include legal uncertainty (60%), technical challenges (51%), and limited data processing expertise (36%). Overcoming these barriers could further leverage the solid research basis and computing capacity (especially in the research sector).

There are indications of an 'innovation fatigue' following a prolonged period of economic stability, potentially also slowing the pace of AI adoption especially in the manufacturing sector. The OECD report indicates that, in some sectors, the potential of AI is not yet fully recognised, partly due to a perceived lack of urgency for change as well as a relatively low risk tolerance. Moreover, AI usage varies by type. According to an ifo Institute study, German firms using AI rely more on voice recognition than EU peers but lag behind in areas such as robotic process automation. In line with this, the OECD report finds that the manufacturing sector is advancing relatively slowly in AI adoption. Given the sector's central role in the German economy, this suggests significant untapped potential.

Germany is expanding its AI-related infrastructure through a set of targeted policy initiatives and investments. As part of its *Hightech Agenda*, launched in autumn 2025, the government aims to make AI a major driver of economic growth by 2030. It focuses on supporting AI innovation and adoption in key industries, expanding access to AI-relevant infrastructure, such as data and computing power, and investing in advanced research and AI foundation models. Moreover, Germany hosts 2 of the 19 European AI Factories, which are designed to connect supercomputing centres, universities and industry, driving advancements in AI application in different industrial sectors. These are the HammerHAI factory in Stuttgart, which focuses on AI applications in manufacturing, engineering, and research, and the JUPITER AI Factory in Jülich. The latter is linked to Europe's first exascale supercomputer, JUPITER (see quantum section). Moreover, in a 2025 call for proposals, 13 European Digital Innovation Hubs (EDIHs) in Germany received funding to continue their activities, in particular testing before investing, training and skills development, support to find investments, networking and access to innovation ecosystems. These EDIHs will also collaborate with the *Mittelstand-Digital* funding priority as well as with EU AI innovation infrastructures, such as AI Factories, to bridge the gap between AI research and application and help fine-tune AI solutions for SMEs.

In parallel, Germany's Data Centre Strategy, published in March 2026, aims to double national capacity by 2030. The country currently has approximately 3 000 MW of IT connection capacity (more than twice as much as in 2010), making it the largest data centre location in Europe by absolute size. Relative to GDP, however, it ranks mid-range within Europe. Capacity is strongly concentrated in the Frankfurt/Rhine-Main region, part of the FLAP-D market (Frankfurt, London, Amsterdam, Paris and Dublin). Around 15% of the country's total capacity is used for high-performance computing and AI applications and it can be expected that initiatives such as AI Factories will further expand AI-related computing capacity. The data centre strategy identifies three priority areas, factoring in Germany's strengths and weaknesses: energy and sustainability, site availability and land use, as well as technology and sovereignty. These areas are supported by 28 measures to be implemented within the next 12 months. Measures include simplifying identification of suitable locations and stronger integration of European technologies in data centre infrastructure.

Unicorns, scale-ups and start-ups

Performance assessment

At the beginning of 2026, Germany had 74 unicorns, which is 8 more than in 2025 (66 in 2025, figure revised)[4]. The country did not provide a national trajectory point for 2025 in the Digital Decade national roadmap.

Policy context and assessment of recommendations

Germany is taking some action to reduce administrative burden and improve access to funding. A start-up strategy is expected in 2026, with a focus on reducing administrative burden and improving funding conditions. In addition, the establishment of the new Ministry for Digital Transformation and Government Modernisation and several workstreams, including the modernisation agenda of the federal government, are being pursued to further streamline bureaucracy. Key flagship projects include a process for faster business formation (*'Schneller Gründen'*), which is currently being implemented as part of the digital public services provided at federal level. Its aim is to make business creation easier, faster and more digital, as establishing a limited liability company (GmbH) currently takes around four to eight weeks.

In the area of funding, the *High-Tech Gründerfonds* is one of the key measures. It is part of the German Future Fund (*Zukunftsfonds*), which provides financing for start-ups, especially for their growth phase. The *High-Tech Gründerfonds* is a private-public partnership that provides seed financing for high-potential tech start-ups. So far, more than 800 companies, including deep and digital tech companies, have received funding (around EUR 2 billion fund volume with more than EUR 8 billion follow-on financing from third parties into the portfolio). Moreover, scale-up direct has recently been introduced to co-fund innovative start-ups and young companies in deep tech until 2030 with around EUR 1 billion. On the fund-of-funds side, EIF German Equity is investing in venture capital funds with a volume of EUR 1.6 billion, while KfW Capital has launched private investor fundraising for the Growth Fund II (*'Wachstumsfond II'*) with a target size of EUR 1 billion.

2025 recommendation on unicorns: Implement measures to improve access to funding and reduce administrative burden.
Germany made some efforts to address the recommendation through new policy actions in 2025. Measures to improve access to funding, such as the *High-Tech Gründerfonds* and scale-up direct, and to reduce administrative burden, such as a process for faster business formation (*'Schneller Gründen'*), are currently being prepared and/or ongoing.

[4] Based on data from Dealroom (extracted on 21.01.2026). A unicorn is a company that has been valued at over USD 1 billion in an initial public offering or trade sale or a company that has been valued at over USD 1 billion in its last private venture funding round.

Strengthening Cybersecurity & Resilience

German enterprises score higher than their EU peers concerning the implementation of cybersecurity measures. In 2024, 71.35% of enterprises applied at least five cybersecurity measures (out of 11 measures as measured by Eurostat), higher than the EU average of 56.85%. Germany performed particularly well in the use of encryption techniques (57.94%, EU: 39.72%), authentication via biometric methods (24.73% in Germany, 18.27% in the EU) and maintaining log files for analysis after security incidents (59.53%, EU: 45.16%).

However, cybersecurity remains a growing concern for companies, with an upward trend in the frequency and damage caused by attacks. According to a Bitkom survey, 73% of businesses reported having been affected - either actually or presumably - by digital sabotage over the past twelve months, and this trend is expected to continue in the future. In particular, ransomware (34%), Distributed Denial of Service (DDoS, 25%) and malware (24%) have become more widespread**.** In parallel, new attack types, such as deepfakes and robocalls, have also occurred, but still on a very limited scale (4% for deepfakes and 3% for robocalls). The economic impact is substantial, with cyberattacks accounting for an increasing share of overall damage caused by data theft, sabotage, and industrial espionage (EUR 202 billion, or 70%, in 2025 compared to EUR 179 billion, or 67%, in 2024). A report on the State of IT Security in 2025 from the Federal Office for Information Security (BSI) indicates that there is a continued shift away from large, complex attacks toward smaller, easier-to-execute attacks: around 80% of reported attacks target SMEs, which often lack the resources and expertise to protect themselves.

At the same time, only half of companies consider themselves very well prepared, while 59% perceive cyber threats as a risk to their business continuity. Against this background, the increase of cybersecurity budget share in the IT budget is comparatively modest (from 17% to 18% - however, it was at only 9% in 2022), although coming closer to the suggestion of the Federal Office for Information Security (BSI) to invest around 20% in cybersecurity. According to a ZEW survey, the prevalence of cyber insurance varies across sectors, but is close to 50% in several key industries (e.g. ICT, automotive and mechanical engineering). The rise in cyberattacks is also reflected in the labour market: according to a IW Köln study, the number of online job postings requiring cybersecurity skills increased significantly, from 117 000 in 2019 to 203 000 in 2024.

Against a background of increasing cyber threats and gaps in companies' preparedness, public support measures for businesses continue, but have not been expanded. As part of the *Mittelstand-Digital* funding priority, the Cybersecurity for SMEs initiative provides support to raise awareness and minimise damage caused by cybersecurity incidents. It also assists companies in the implementation of key regulatory frameworks, such as the Network and Information Systems (NIS) 2 Directive and the Cyber Resilience Act (CRA). The initiative includes a Transfer Centre for Cybersecurity in SMEs, which serves as a central point of contact for companies seeking to improve their IT security. The transfer centre offers training and advisory services for prevention and detection of security gaps, and emergency support via an online tool. The transfer centre reached approximately 13 000 people via its information and training events as well as workshops (plus around 26 000 people via events organised by other institutions) and around 3 000 people have used its online tools since the project start in July 2023. Additionally, focus projects provide digital tools, trainings, and self-evaluation tools for specific technical questions or for employee qualification (e.g. on NIS2, CRA, production facilities). The *Mittelstand-Digital* Innovation Hubs are expected to introduce cybersecurity instructors in 2027, who will be trained by the transfer centres.

Germany

In 2024, a German Federal Court of Audit (*Bundesrechnungshof*) report highlighted insufficient coordination and funding of cybersecurity measures within the federal government, as well as a lack of effective IT security control. The report also calls for further organisational strengthening of the BSI. Moreover, the often outdated and fragmented IT systems in public administration, especially on municipal level (see also digital public services section), may be an additional burden in this regard. It should also be noted that directly advising more than 11 000 municipalities is not within the BSI's remit; however, it can provide support through guidance documents and training. In the 2026 budget, in connection with the BSI's additional responsibilities under NIS 2 and the Cyber Resilience Act, the BSI's budget will be increased by EUR 97 million. Moreover, the federal-level resources will be expanded by around 1 700 new positions, primarily in the police, cybersecurity, and disaster management sectors. It remains to be seen whether these additional resources will be sufficient to meet the increased responsibilities and overall demand for cybersecurity support.

2025 recommendation on cybersecurity: Increase efforts in cybersecurity, particularly by increasing awareness amongst private and public entities.
In 2025, Germany continued the implementation of existing measures but did not take any new measures. Despite increasing cyber threats and gaps in companies' preparedness, measures to support private entities, such as the Cybersecurity for SMEs initiative with its transfer centre, were largely continued, but not yet significantly expanded. For public entities, it remains to be seen if the additional resources will be sufficient to meet the increased tasks and demand.

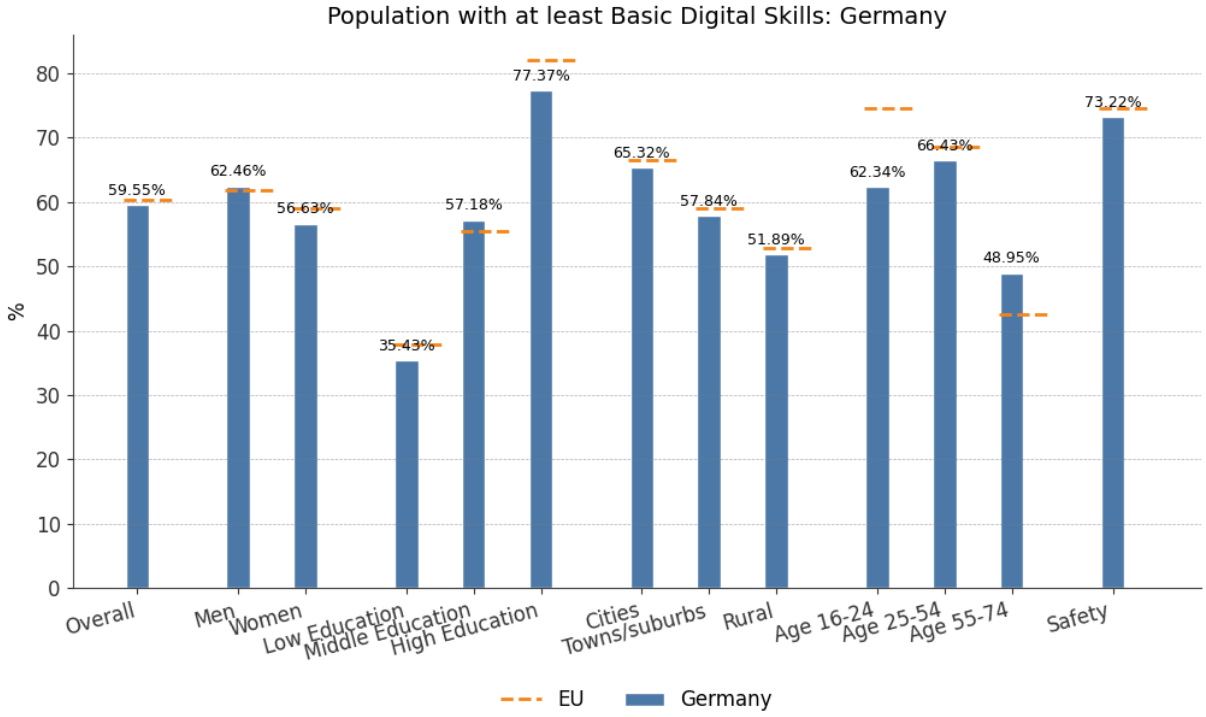
Protecting and empowering EU people and society

Empowering people and bringing the digital transformation closer to their needs

Equipping people with digital skills

Basic digital skills

Performance assessment

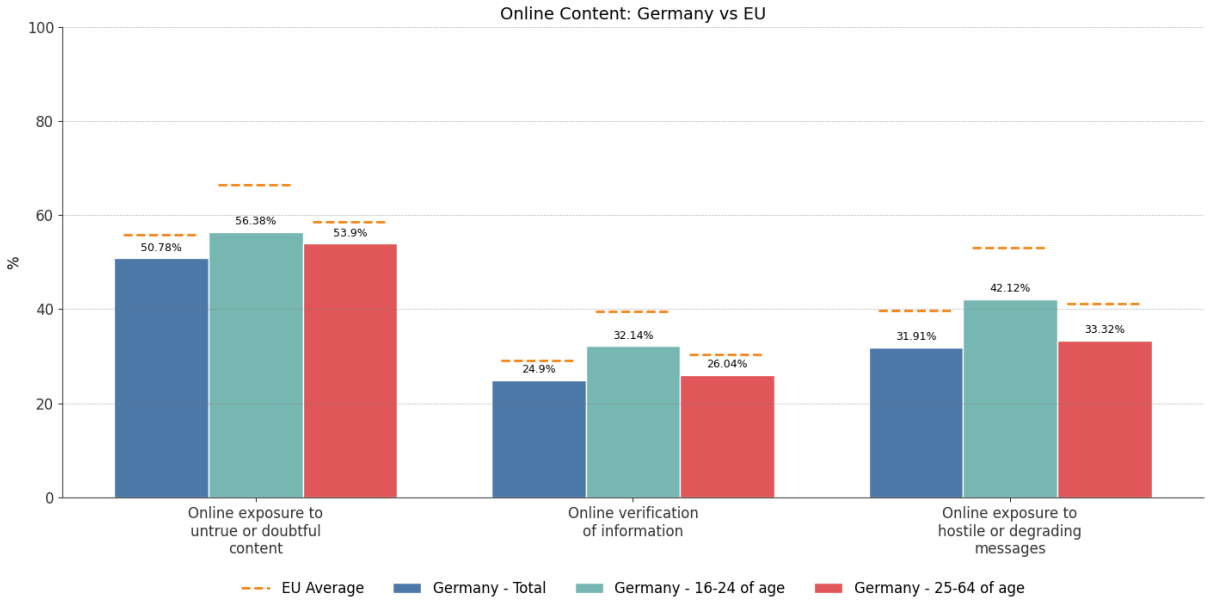


Basic digital skills are very close to the EU level, with comparatively more pronounced disparities in gender and, to a lesser extent, in education levels, similar urban-rural disparities and relatively smaller gaps across age groups.

- **At least basic digital skills: In 2025, 59.55% of individuals aged 16-74 had at least basic digital skills, slightly below the EU average of 60.40%.** Germany's growth rate (6.8%) surpasses the EU's (4.3%). The country is on track according to its trajectory presented in the Digital Decade national roadmap.
- **Gender gap:** Germany exhibited a gender gap of 5.83 percentage points in favour of men in 2025, with 62.46% of men and 56.63% of women possessing at least basic digital skills in 2025. This gap is larger than the EU average of 2.75 percentage points.
- **Education level:** 35.43% of individuals with no or low formal education had basic digital skills in 2025, representing a 24.12 percentage point gap relative to the national average. This gap is slightly larger than the EU average of 22.84 percentage points.
- **Living areas:** 65.32% of individuals in German cities had at least basic digital skills (EU average of 66.50%). This figure is lower in rural areas, with 51.89% of individuals possessing basic digital skills in 2025 (EU average of 52.83%). The gap between urban and rural areas in

Germany is 13.43 percentage points, slightly smaller than the EU average of 13.67 percentage points.

- **Age groups:** 66.43% of individuals aged 25 to 54 (EU average of 68.57%) and 48.95% of individuals aged 55 to 74 (EU average of 42.6%) in Germany had basic digital skills.
- **Digital safety skills:** Regarding digital safety skills, 73.22% of individuals in Germany have at least basic safety skills, slightly below the EU average of 74.63%.
- **Use of generative AI:** 32.25% of people in Germany used this technology in 2025, marginally below the EU average of 32.66%. For professional purposes, 15.79% of Germans used generative AI, slightly above the EU average of 15.36%.



- **Exposure to misinformation:** Germany is at 50.78% of individuals exposed to untrue or doubtful content online, below the EU average of 55.90% and with an identical growth rate (6.5 pp annually compared to 2023). The gap between the younger age group (16-24) and older adults (25-64) in Germany is 2.48 pp, significantly smaller than the EU average gap of 7.77 pp.
- **Fact-checking:** Germany is at 24.90% of individuals verifying the truthfulness of online content, below the EU average of 29.16% but experiencing a higher growth rate (12% vs. EU 9.6% annually compared to 2023). However, the gap between the younger age group (16-24) and older adults (25-64) in Germany is 6.10 pp, smaller than the EU average gap of 9.09 pp.
- **Hostile content online:** 31.91% of individuals were exposed to hostile or degrading messages online in 2025, lower than the EU average of 39.72%, but with a higher growth rate (12.0% vs. EU 8.9% annually compared to 2023). For the 16-24 age group, 42.12% of individuals in Germany reported exposure in 2025, compared to 52.99% in the EU. For the 25-64 age group, the figure was 33.32% in Germany, lower than the EU's 41.14% and also with a smaller gap between the younger age group (16-24) and older adults (25-64) - 8.80 pp in Germany vs. 11.85 pp at EU level.

Policy context and assessment of the recommendations

The key recent measure in this area is the Digital Pact 2.0, a successor of the Digital Pact School, which continues to support the digital transformation of the education system. Under the Digital Pact School, more than 30 000 schools received funding to improve their IT infrastructure, including laptops, tablets, smartboards or displays, as well as Wi-Fi and server connections, according to the

Digital Pact School Progress Report 2023-2024. In total, EUR 7 billion was provided jointly by the federal and *Länder* levels. Around 48% of the funded entities were primary schools, 39% were other general education schools, and 13% were vocational education and training (VET) schools, despite VET pupils accounting for around 20% of all pupils.

Launched in 2026 and running until 2030, the Digital Pact 2.0 has a total budget of EUR 5 billion. While it continues to support investments in ICT infrastructure, it places a stronger emphasis on structural support for school and teaching development, as well as on digital teaching and learning. This expanded scope reflects the findings of extensive evaluation work on the initial Digital Pact School. Also linked to the latest discussions about social media use of minors, it remains to be seen to what extent digital media use and skills will be addressed, e.g. by future curriculum adjustments and/or the expert commission on child and youth protection in the digital world .

2025 recommendation on basic digital skills: Improve the effectiveness of existing measures and evaluate whether increased efforts and/or additional measures are necessary, in particular in the area of formal education.
Germany addressed the recommendation fully by putting significant policy actions into place in 2025. With the launch of the Digital Pact 2.0, the central measure in the area of formal education will be continued. It will have a similar duration and level of funding as its predecessor, while introducing a more refined scope of supported measures.

ICT specialists

Performance assessment

Germany is at 5.5% of ICT specialists in total employment after a progression of 7.8% in 2025, standing above the EU average of 5.0% (with annual growth rate of 2.0%). In 2024, the figure for Germany was 5.1%, which was also higher than the EU average of 4.9%. The share of female employed ICT specialists was as well above the EU average in 2025 (20.0% vs EU's 19.5%). Moreover, in 2024, Germany appears as one of the Member States with a relatively high share of ICT graduates, at 6.0% of all graduates. The country is on track according to its trajectory presented in the Digital Decade national roadmap.

However, demand for ICT specialists remains unmet. The share of enterprises that recruited or tried to recruit personnel with ICT specialist skills slightly increased from 11.0% in 2022 to 12.0 % in 2024 and remained above EU levels (9.5% in 2022 and 9.6% in 2024) according to Eurostat. Moreover, 8.7% of enterprises reported hard-to-fill vacancies for ICT specialist roles, compared to 5.5% in the EU.

Policy context and assessment of the recommendations

Shortages in ICT specialists remain an issue for the German economy. The Skilled Labour Monitoring identifies ICT-related professions, including IT systems analysis, IT advisory services, software development and programming as areas with potential workforce shortages. According to a Bitkom survey, the German economy lacked more than 100 000 ICT specialists in 2025. Although this figure is significantly lower than in 2023 (149 000 ICT specialists) – possibly also linked to the overall economic situation – it remains a major issue, with around 85% of companies reporting a lack of ICT specialists in the labour market. Companies indicated that it takes almost eight months to fill an ICT vacancy and one in four companies report receiving few to no applications. Furthermore, sectoral strategies emphasise the growing need for highly skilled specialists in key areas such as AI, quantum technologies or semiconductors (see also the *Hightech Agenda*).

Against this background, Germany is further developing existing initiatives, in particular its National Skills Strategy and the Skilled Labour Strategy. The overall approach is to adapt to recent

developments and to engage with stakeholders at the regional level to take their needs into account. For the National Skills Strategy, a follow-up paper was published in late 2025. Strengthening digital education further and harnessing the opportunities of digitalisation and artificial intelligence will be part of the updated strategy, including through new working groups and funding schemes. To further develop the Skilled Labour Strategy, a discussion paper was published in 2026, serving as a key input for the updated strategy expected in 2027. The paper introduces AI and digital technology adoption as new priority areas, addressing how the increasing use of AI is reshaping job structures and skill requirements, creating both opportunities for upskilling and reskilling, as well as risks of deskilling due to reduced human autonomy and expertise. The paper will be discussed across different regions with representatives from companies and labour market actors. Moreover, existing initiatives aimed at young people – particularly girls – are being continued to promote diversity. These include measures such as the Girls Day or the *klischeefrei* initiative, which address different aspects of gender equality.

As part of the Skilled Labour Strategy, in 2025 Germany announced the establishment of a Work and Stay Agency. The Work and Stay Agency aims to facilitate the immigration of skilled foreign workers to Germany by simplifying and streamlining administrative processes and improving transparency. This will include putting in place a central IT platform based on the once-only principle. As a next step, all relevant IT services are to be commissioned by the end of 2026.

It remains to be seen if the implementation speed and scope of these ongoing and planned measures will be sufficient to address the ICT labour shortages. The National Regulatory Control Council (*Normenkontrollrat*) noted in a statement on the Work and Stay Agency that, in addition to digitalising procedures, it is crucial to optimise processes and bundle and centralise competences across authorities, including when it comes to recognising foreign professional qualifications.

2025 recommendation on ICT specialists: Launch targeted measures to increase the attractiveness of STEM disciplines at school to boost the number of young people, including girls and women, interested in taking up ICT-related studies or careers.
Germany made some efforts to address the recommendation through new policy actions in 2025. With the continued development of the National Skills Strategy and the Skilled Labour Strategy, Germany aims to further align its support measures with labour market needs, with a focus on developing and attracting ICT specialists. Moreover, measures to attract young people – particularly girls – have been continued.

Key digital public services and solutions – trusted, user-friendly, and accessible to all

Performance assessment

In 2025, Germany scored 78.11 out of 100 on digital public services for citizens, below the EU average of 84.64 and representing a 1.0% decrease compared to 2024. The decline was in particular due to false positives being corrected this year and the reclassification of services from regional to central provision. While life events such as Transport (89.19), Studying (87.92), and Family (87.64) perform best, lower-scoring areas include areas such as Health (67.36), Starting a small claims procedure (68.75), and Moving (71.50). The country is on track according to its trajectory presented in the Digital Decade national roadmap. **On digital public services for businesses, Germany scored 77.76 out of 100, below the EU average of 88.59** and representing a 0.3% increase compared to 2024. The country is lagging behind compared to its trajectory presented in the Digital Decade national roadmap.

Germany also scored below the EU average for cross-border services for citizens (score of 72.60 compared to the EU's 75.28) **and considerably below the EU average for businesses** (56.25 compared

to the EU's 78.37), while it scored slightly above the EU average for national users (score of 99.26 compared to the EU's 98.81).

Germany has a score of 87.72 out of 100 for access to electronic health records, after a progression of 0.9% in 2025, standing above the EU average of 86.51 (with annual growth rate of 4.6%). In 2024, the score for Germany was 86.96, which was also higher than the EU average of 82.70. The country is lagging behind compared to its trajectory presented in the Digital Decade national roadmap.

Policy context and assessment of the recommendations

Comparatively low availability and use of digital public services have been among the key challenges in Germany in the area of digitalisation over recent years, with limited possibilities at the federal level to steer and support local rollout. With the new Ministry for Digital Transformation and Government Modernisation placing digital public services and the digital transformation of public administration among its key priorities, some momentum has been created to improve Germany's performance in this area and work is ongoing in this direction. However, achieving substantial improvements will depend on the ability to address persistent structural challenges.

One key influencing factor is how services have been provided over recent years under the Online Access Act. Based on the 'one for all' ('*Einer für Alle'- EfA*) principle, the federal level and/or a *Land* is tasked with developing a specific public service. Once developed, the service is made available for reuse by other *Länder* and/or and municipalities *('Nachnutzung'*). However, a lack of overarching interoperability standards and specifications for the EfA solutions, the high number of re-users - i.e. 16 *Länder* and more than 11 000 municipalities - combined with significant differences in IT procedures and infrastructure across entities pose major challenges. In particular, establishing the necessary interfaces (APIs) to connect to these services has become a major obstacle in the rollout of digital public services.

A broad rollout of services, such as the address registration service - potentially accessible to 55 million users based on around 2 000 connected municipalities - is a good starting point, but remains the exception rather than the rule. Regional differences exist: according to the Digital Administration Dashboard, the *Länder* Bavaria and North Rhine-Westphalia appear to be relatively advanced. However, this overview may be incomplete, as there is no reporting obligation for municipalities on the availability of digital public services at their level. This limits monitoring and guiding capacity at the federal level.

Decentralised rollout is hindered by technical, organisational and political challenges, aggravated by fragmented responsibilities. At municipal level, challenges include insufficient financial and human resources, as well as a lack of structured information to connect (often outdated) IT systems to new online services. These challenges are aggravated by a limited awareness of the importance of digitalisation amid competing priorities (also considering that uptake of public services often remains limited)**.** Moreover, in general, direct support from the federal level to municipalities is limited due to constitutional principles and usually channelled through the *Länder*. Against this background, municipalities have been requesting a more standardised and centralised approach to digital public services for several years.

Linked to this, the new Ministry for Digital Transformation and Government Modernisation has created some momentum to change dynamics, including moving more from the 'one for all' (EfA) principle towards more standardised solutions. Moreover, it aims to accelerate the provision of digital public services through promising new measures, such as the Deutschland-Stack, and structural adjustments, including a financial prerogative for IT solutions for major expenditures in federal administration. Whether this prerogative will lead to a more streamlined and coordinated provision of

IT solutions will also depend on the willingness of other ministries to cooperate. The Deutschland-Stack is an IT infrastructure aimed at facilitating the reuse of basic components and digital public services by public authorities at federal, *Länder* and municipal level. It will define technical standards, with a focus on sovereignty, interoperability and open-source solutions. Moreover, it will also provide digital public services, integrating previously developed services as well as new functionalities, such as an AI-supported planning and permitting platform. The upcoming EUDI Wallet will also be integrated in the Deutschland-Stack. Under the umbrella of the IT planning council, work on a federal IT Architecture has started in 2024.

In addition, pilot projects have been launched under the leadership of the new ministry to deliver quick wins and demonstrate the potential of cross-level collaboration. While these initiatives are promising, it will take time before tangible and measurable results emerge on a broader scale. For example, in response to the challenges at municipal level, the *Länder* Bavaria and Hesse, together with new ministry, have decided to test a different implementation mode by rolling out five commonly used digital services across their territories by the end of 2026. The rollout will be carried out centrally by a general contractor responsible for the entire process. It will be designed in a way that allows other *Länder* to join at later stages.

Moreover, the use of e-Government services continues to increase but remains below the EU average. The share of internet users interacting with public authorities increased from 64% in 2024 to 70% in 2025 (EU: 76% in 2025 and 75% in 2024), but Germany ranked sixth lowest in the EU in 2025 (compared to fourth lowest in 2023). Among the most common reasons for this are the limited and heterogenous availability of digital public services (varying across municipalities) and the fact that users often prefer in-person interactions with local authorities. According to an Initiative D21 survey, 33% of public service users handled their interactions with authorities in Germany entirely offline. The survey also indicates that this is often due to deliberate rejection of online services, as well as limited discoverability and a lack of awareness of these services.

Moreover, the user-friendliness of services remains a concern. Although Germany has improved, it still scores significantly below EU level: 55 out of 100 compared to an EU average of 70 for service process transparency and design, and 85 compared to 90 for user support. Services are often not fully digital, as many procedures still combine online and analogue steps. For example, according to the Digital Administration Dashboard, only about half of the roughly 800 federal online services have reached maturity level 3, meaning they allow a fully digital procedure.

Linked to the limited integration between front-end and back-end systems, limited data reuse remains an issue. This is reflected in the low availability of pre-filled forms, which measures the share of administrative steps that present pre-filled data in online forms to users. While Germany's score increased considerably from 38 in 2024 to 52 in 2025, it remains second lowest in the EU and significantly below the EU average (71 in 2024 and 76 in 2025). This is expected to improve further once the national once-only technical system (NOOTS) becomes fully operational, enabling both national and cross-border data exchange between authorities, including through the EU once-only technical system. The NOOTS is expected to begin connecting registers and online services in 2026. This step is also crucial in view of the EUDI Wallet, as interconnected registers are a prerequisite for its functionality, providing the data that the wallet will rely on.

2025 recommendation on Digital Public Services: Accelerate the digitalisation of key public services by making additional public services available online, improving interoperability, as well as front-end and back-end digitalisation.

Germany made some efforts to address the recommendation through new policy actions in 2025.

The new Ministry for Digital Transformation and Government Modernisation has created some momentum to change dynamics, including moving more from the 'one for all' (EfA) principle towards more standardised solutions. In addition to the continued implementation of very relevant projects such as the Online Access Act for development of digital public services and the national once-only technical system to connect registers and facilitate data reuse, important new measures such as the Deutschland-Stack, and structural adjustments including a financial prerogative for IT solutions are currently being implemented.

As for e-Government users and for similar reasons, Germany scores low in the use of eID: with 15%, it records the fourth-lowest share of users in the EU (EU average of 52%) as measured by Eurostat**.** Nevertheless, the number of authentications is increasing. According to data provided by the Federal Printing Office (*Bundesdruckerei*) and the company providing the ID Card app, 24 million eID authentications took place in 2025, compared to 20 million in 2024. Although this indicates solid growth, the overall volume is comparatively low given that 70 million people have an ID card. According to an Initiative D21 survey, 42% of ID card holders have an 'eID ready' ID card (i.e. users have set their own PIN code). The most frequently cited reasons for not using the eID include a lack of knowledge about specific use cases (31%) and a lack of perceived benefit or advantage (14%), as well as perceived complexity (14%). A further 11% have attempted to use the online ID but failed. Meanwhile, 9% cite the loss of the PIN as a barrier (and thus the inability to use the eID).

Perceived complexity and usability challenges appear to contribute to the non-use of eID and have likely been exacerbated by the increased burden associated with the PIN use since the end of 2023. Since then, users have been required to visit a public administration office in person to reset their PIN or activate the eID function, including for first-time use. Previously, users could request this online and receive the necessary credentials by post; however, this option was discontinued due to cost considerations, as it required a costly delivery process. It should also be noted that, of the approximately two million letters sent between 2022 and the end of 2023 for this purpose, only about 60% were actually used to activate an eID. The government is currently working on reintroducing a PIN reset and activation service, enabling users to request reset letters online. These services are expected to be available later this year.

With the *BundID*, Germany has set up a central account that users can use to prove their identity online to public authorities. The account is connected to the portal *verwaltung.bund.de*, which provides online access to some digital public services at federal, *Länder* and municipal level. Authentication works with the eID or other authentication means (e.g. username and password, ELSTER tax certificate), depending on the type of service and the level of security requested. *BundID* provides for some level of standardisation and simplification. Preparations are currently ongoing to make *Länder* participation mandatory later in 2026.

The implementation of the EUDI Wallet has the potential to alleviate some of the challenges associated with eID usage, in particular linked to interoperability and monitoring. However, to fully leverage its potential, the key challenges identified in the digital public services section of this report need to be considered. In particular, the timely and comprehensive connection of registers (see NOOTS) is a prerequisite for the effective functioning of the EUDI Wallet. In this context, differences in IT procedures and infrastructure across government levels pose an additional challenge, as there are a larger number of different interfaces that need to be connected. Germany is currently working on a sandbox for the EUDI Wallet to allow businesses and public authorities to test central functionalities and application cases to prepare for the implementation of the EUDI Wallet early on.

2025 recommendation on eID: Launch targeted measures to ensure eID uptake and use.
Germany made some efforts to address the recommendation through new policy actions in 2025. Germany is working on the rollout of the *BundID* as a central account for authentication and on reducing some administrative burden on the eID use (related to PIN reset). Moreover, it is preparing for the EUDI Wallet implementation, including with a sandbox approach. The work on the national once-only technical system (prerequisite for EUDI Wallet use) is being continued.

In the area of e-health, one of the most recent key developments is the requirement for all medical practices, hospitals and pharmacies to use the electronic patient record (ePA) as of October 2025. The electronic patient record was launched earlier in 2025 and health insurance providers made it available to all insured persons who did not opt out. Its aim is to consolidate all relevant information, including medical findings, prescriptions and vaccinations, in one place. Initial experiences with the electronic patient record indicate challenges in its use. These relate in particular to access, i.e. the need for authentication with eID or a health insurance card, and overview and organisation of the information stored. Furthermore, medical providers do not yet appear to upload information to the record in a systematic manner. These factors may help explain the still limited use of the ePA: According to a Federation of German Consumer Organisations (vzbv) survey, 94% of insured persons are aware of the ePA, yet around 71% do not use it actively, primarily because they have not engaged with it, while a smaller share perceive no personal benefit.

Leveraging digital transformation for a smart greening

Germany's ICT sector shows relatively high air emissions, but also strong performance in recycling electronic equipment. In 2022, the sector emitted 30.9 kg of CO_2 equivalent per capita, which is above the EU average of 22.8 kg. Most of these emissions come from ICT services activities (87.10%). Despite this, the ICT sector represented only 0.42% of air emissions in the total economy, slightly higher than the EU average (0.35%). At the same time, Germany performs well in managing its electronic waste: 85.13% of ICT-related waste collected (corresponding to two categories of waste electrical and electronic equipment) is recycled or prepared for reuse, which is above the EU average of 80.23%.

Germany is integrating sustainability and greening the digital transformation into several initiatives. The evaluation report of the *Mittelstand-Digital* programme shows that sustainability considerations (e.g. regarding resource consumption) are included, though with varying levels of depth across projects. The 2025 Data Centre Strategy also addresses the rising energy consumption of data centres, which are expected to account for around 4% of gross electricity consumption in 2025. While efficiency has improved, evidenced by a reduction in power usage effectiveness (PUE) from an average of 1.8 in 2010 to 1.43, these gains are being outpaced by a rapid growth in demand. The strategy further notes that the scaling of technological innovations in data centres, such as direct hot-water cooling or modular data centre architectures, remains slow and gradual. To strengthen the link between digitalisation and sustainability, Germany continues to facilitate exchanges within an interministerial working group on digitalisation and sustainability. This forum aims to ensure better collaboration and information sharing.

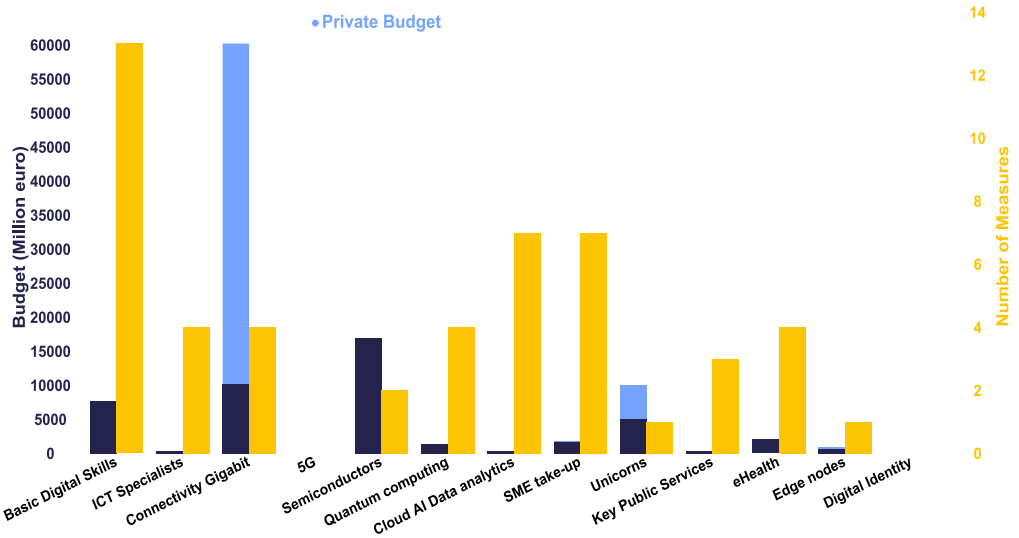
Annex I: National roadmap analysis

Germany's national Digital Decade strategic roadmap

Germany submitted a revised national Digital Decade roadmap on 21 December 2024.

Germany adjusted a limited number of measures, especially in the area of gigabit connectivity and AI. It made changes to the measures' budgets and added one new measure to establish hubs for quantum computing. For other areas, Germany argued that in due time the existing measures would prove sufficient to achieve the national targets. New targets for ICT specialists (below the EU-level target) and for digital public services for citizens and businesses (in line with the EU-level target) were introduced. The revised roadmap includes stakeholder consultation.

Measures and budget in the national roadmap[5]



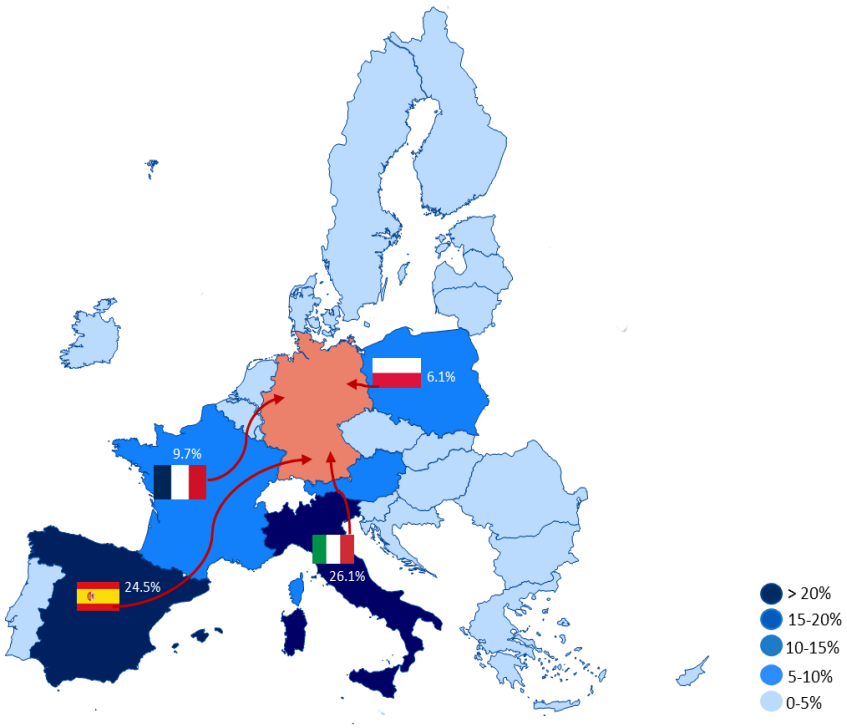
[5] When referring to national roadmaps, data used in this report are those declared by the Member States in their national roadmaps, on the basis of the Commission's guidance (C(2023) 4025 final). Data might reflect possible variations in reporting practices and methodological choices across Member States. No systematic assessment of the extent to which Member States followed the guidance was carried out.

Annex II: Funding, economic impacts & Multi-Country Projects

Country results from the study 'Assessing the Economic Impact of Digital Investments under the Recovery and Resilience Facility'

A modelling study conducted by the European Commission services, with the FIDELIO model, assesses the economic impact of the digital component of the RRF. As of November 2025, the digital part of the Recovery and Resilience Plan of Germany is evaluated to EUR 12.91 billion with EUR 1.52 billion for digital infrastructures, EUR 1.62 billion for digital skills, EUR 1.64 billion for the digitalisation of businesses, EUR 6.64 billion for the digitalisation of public services, and EUR 1.48 billion for other digital priorities.

The total economic impact of RRF digital measures is estimated to EUR 30.78 billion for the national economy. Of this, EUR 15.94 billion stems from the direct effects of Germany's own RRP and EUR 14.84 billion corresponds to spillover effects from the implementation of other EU Member States' plans. Germany benefited the most from spillover effects from RRPs of Italy (EUR 3.88 billion), Spain (EUR 3.63 billion), France (EUR 1.44 billion). The most impacted sectors are Manufacturing (EUR 11.82 billion), ICT Services (EUR 4.58 billion), and Professional Services (EUR 3.16 billion).



RRF spillover effects to Germany

Germany

Funding from the Recovery and Resilience Facility (RRF) & Cohesion Policy

Germany allocates 46% of its total recovery and resilience plan to digital (EUR 12.8 billion)[6]. In addition, under cohesion policy, EUR 2.4 billion, representing 12% of the country's total cohesion policy funding, is dedicated to advancing Germany's digital transformation[7].

Multi-Country Projects

Germany is a member of the Local Digital Twins towards the CitiVERSE EDIC, and a member of the Digital Commons EDIC. It is also working towards setting up an EDIC in the area of agri-food. Germany is directly participating in the IPCEI on Microelectronics and Communication Technologies (IPCEI-ME/CT) and in the IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI-CIS). Germany is also a participating state of the EuroHPC Joint Undertaking (JU) and of the Chips JU.

[6] The share of financial allocations that contribute to digital objectives has been calculated using Annex VII to the Recovery and Resilience Facility Regulation. Last data update: 23 April 2026.

[7] This amount includes all investment specifically aimed at or substantially contributing to digital transformation in the 2021-2027 Cohesion policy programming period. The source funds are the European Regional Development Fund (including Interreg), the Cohesion Fund, the European Social Fund Plus, and the Just Transition Fund.