



DIGITISATION: ECONOMIC AND SOCIAL IMPACTS IN RURAL AREAS

NATIONAL POLICY ANALYSIS

GERMANY

TO BE SUBMITTED BY 11TH OCTOBER 2021



DESIRA receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 818194.

National Policy Analysis | Germany

Project name	DESIRA Digitisation: Economic and Social Impacts in Rural Areas
Project ID	818194
H2020 Type of funding scheme	Research and Innovation Action (RIA)
H2020 Call ID & Topic	H2020-RUR-2018-2 / RUR-02-2018 Socio-economic impacts of digitisation of agriculture and rural areas
Website	www.desira2020.eu
Document Type	Working document
File Name	WD 4.2– National Policy Report Germany
Status	Final
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Executive Summary

Concerning the overall state of digitalisation in Germany, the situation is more than complex, if not contradictory. Looking at the usual indicators such as DESI, Germany, generally speaking, ranks average to good – with some aspects massively peeling off positively as well as negatively. While, for example, future technologies are of high relevance in Germany, the sector of e-Government and public services is poorly developed. Further challenges are the digital infrastructure, especially in terms of very high-capacity internet connections and gapless connectivity in rural areas. Also, Germany lags behind with the digitalisation of the education sector, especially schools. In total, the status quo of digitalisation does not reflect the economic potentials of the European Union's strongest national economy.

Those deficiencies, however, have not remained unnoticed. The past years are characterised by massive investments in digitalisation, both conceptually and financially. Firstly, against the background of the strong autonomy of the federal states the *DigitalPakt Schule* is an historically exceptional cooperation of Federation and states to improve the situation in schools. Secondly, the Federal Programme for the Gigabit Society has moved its focus from vectoring to fibre technology and the comprehensive provision of cellular networks. And the Online Access Act obliges all federal, state and municipal authorities to provide administrative services digitally for citizens and businesses by the end of 2022.

Next to those activities on the general federal level, a number of policies are explicitly focussing on rural areas. Here, the equality of living conditions in urban and rural parts of Germany is becoming a main principle. Concrete programmes are set up by the ministries of agriculture, interior affairs or economy. They are promoting topics such as smart cities and smart rural areas, the development of innovative services supporting local economic, social and cultural life, the production of food and the conservation of resources. Moreover, federal initiatives are complemented by policies on the level of federal states. This is also where EU funds for regional development increasingly are orienting towards topics of digitalisation.

Those examples illustrate that rural digitalisation is shaped by at least two types of policies: on the one hand, policies promoting digitalisation on a rather general level, also affecting agriculture, forestry and rural areas, and on the other hand rural and agricultural policies that foster digitalisation. This report aims to analyse both, identifying how the rural sector is being addressed by general digitalisation policies and how sectoral policies are boosting digital changes.

On the level of results, we recommend, among other things, to maintain funding and the development as well as the adaption of digital policies at a high level, but to make funding and other forms of support available more easily and to transform the current focus on pilot and lighthouse projects to strategies of broader support.

1. Introduction

Concerning the overall state of digitalisation in Germany, the situation is more than complex, if not contradictory. Looking at the usual indicators such as DESI, Germany, generally speaking, ranks average to good – with some aspects massively peeling off positively as well as negatively. While, for example, future technologies are of high relevance in Germany, the sector of e-Government services is poorly developed. In total, the status quo of digitalisation does not reflect the economic potentials of the European Union’s strongest national economy. This phenomenon is not surprising, since Germany’s economic wealth goes along with a historically quite solid infrastructure and well-established industrial branches. That is why the uptake of fundamental changes such as digitalisation might take place faster in countries, which are at a specific point of development when fundamental processes of transformation set in. Here, the Baltic states can be referred to as one example where a massive structural restart favoured the uptake of digitalisation.

Compared to this, Germany started relatively late with explicit policies, strategies and concerted activities in the field of digitalisation. An illustrative example can be seen in the question of digital infrastructures. The grid-bound data infrastructure in Germany is mainly based upon a comparatively dense and reliable telecommunication infrastructure and cable television networks. As a result, infrastructural development for long time strongly emphasised vectoring with resulted in initially sufficient bandwidths. But while requirements in bandwidth are constantly growing, vectoring gets stretched to its limits – especially in rural areas with great distances and ageing landline networks. Also, the situation concerning the cellular data infrastructure is suboptimal, again, especially for rural areas. The reason for this is, that licenses are being sold by auction to private telecommunications providers to generate state revenue. The providers are in turn responsible for setting up the infrastructure and very much focus on economically promising areas with a dense population, thus putting less emphasis on the connectivity in the countryside. Only recently has the German Federal Government adjusted its infrastructure policy to the current and future requirements of the “Gigabit Society”, what must be seen as one mayor prerequisite and pillar of digital development in general and in rural areas in particular. Further challenges next to the question of digital infrastructure are the digitalisation of public and administrative services and digitalisation of the education sector, especially schools.

Those examples illustrate that rural digitalisation is shaped by at least two types of policies: policies promoting digitalisation and the digital transition in general, also affecting agriculture, forestry and rural areas on the one hand, and rural and agricultural policies that foster digitalisation, on the other hand. This report aims to analyse both, identifying how the rural sector is being addressed by general digitalisation policies and how sectoral policies are boosting digital changes. And this differentiation becomes even more complex with the German political and administrative structure: Digital policies also touch upon the question of who is responsible for what and, thus, the two levels of the German Federation (Bund) and its single states (*Bundesländer*).

National policies boosting digitalisation and the digital transition have a rather short history in Germany. The commission of inquiry on Internet and digital society (*Enquete-Kommission Internet und digitale Gesellschaft*) was founded in 2010 and existed until 2013. It was followed by a national digital agenda in the former legislative period (“*Digitale Agenda 2014-2017*”). For the currently expiring

legislative period (2017-2021) the German Government developed the national digital strategy “Shaping Digitalisation” (*Umsetzungsstrategie “Digitalisierung gestalten”*). The digital strategy aims at utilising digitalisation to increase the quality of life, to realise economic as well as ecological potentials and to support social cohesion. It is complemented by horizontal issues such as a federal strategy for open data and cyber security, which have been adopted and updated, respectively, in the year 2021.

Concerning rural development policies, in general, one has to refer to the commission for equal living conditions, which presented 12 measures as a guideline for the activities of different ministries and their areas of responsibility. Some of those measures directly mention rural areas and some also include aspects of digitalisation, such as the nationwide expansion of grid-bound and cellular data networks. As concerns rural and agricultural policies that directly foster digitalisation, the most relevant initiatives and programmes are provided by the Federal Ministry for Food, Agriculture and Consumer Protection’s (*BMEL*) but also the Federal Ministry of the Interior (*BMI*). Here, especially pilot projects with an emphasis on the development of innovative digital services along with local or regional digital strategies and necessary competences such as Land.Digital, Smarte.Land.Regionen or Heimat 2.0 stick out.

At the European level, digitalisation is a priority and numerous policies and initiatives have been launched to boost digital transformation. For example, the EAFRD funds in Germany is managed by 13 federal state programmes. In sum, for the German case, it is fairly complicated to differentiate European, federal, state level and regional policies, especially in terms of funding sources. Due to this complexity, this report does not assert a claim of being exhaustive but must be characterised as explorative and selective.

2. Context for (rural) digitalisation

2.1. Current context for digitalisation

Digital Economy and Society Index (DESI)

Concerning the **Digital Economy and Society Index (DESI)** in 2020, Germany ranks 12th out of 28 EU Member States (see fig. 1)¹. Compared with the two previous years, Germany has continuously moved up one place in the ranking. The score is slightly above the EU average, and it is also noticeable, that the gap between the German score and the EU average score has widened. In summary, Germany performs well in most DESI dimensions. In the area of *digital public services*, however, Germany ranks 21st and is thus below the EU average (see fig. 2). Furthermore, the range *Integration of digital technology* is slightly below the average. In terms of evolution over time, it can be noted that the German index grows in a similar curve with that of the EU28. In each year, the German Index is slightly above this curve.

¹ https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=66916

	Germany		EU
	Rank	score	score
DESI 2020	12	56.1	52.6
DESI 2019	13	51.2	49.4
DESI 2018	14	47.9	46.5

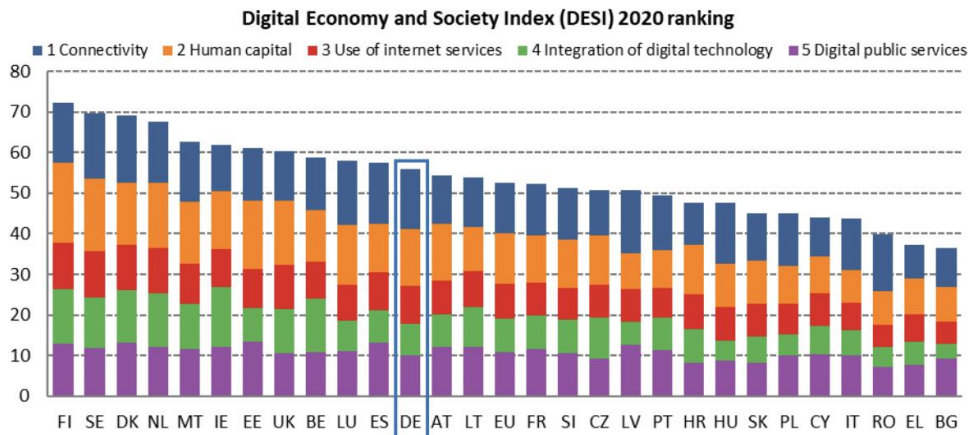


Fig. 1: DESI ranking (Digital Economy and Society Index 2020 Germany report, p. 3.)

To be able to better assess the current digitalisation process in Germany, the following section takes a closer look at the DESI dimensions connectivity, human capital, use of internet services, integration of digital technology, and digital public services.

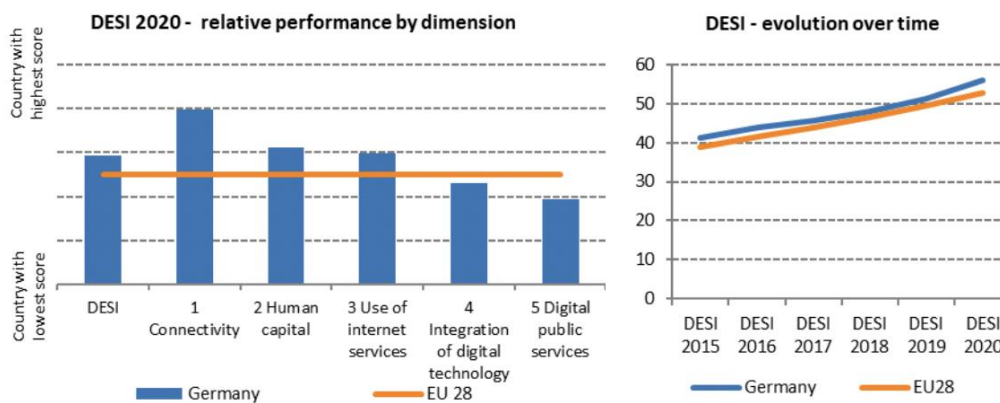


Fig. 2: German relative performance and evolution (Digital Economy and Society Index 2020 Germany report, p. 4.)

The **connectivity dimension** of the Digital Economy and Society Index looks at both the demand and the supply side of fixed and mobile broadband.² In summary, broadband is available to all households

² Concerning terminology, under *fixed broadband* are evaluated “the take-up of overall and ultrafast broadband (at least 100 Mbps), the availability of fast broadband (next generation access (NGA) providing at least 30 Mbps) and of fixed very high capacity networks (VHCNs), and also considers the prices of retail offers.” *Mobile broadband* “includes 4G coverage, the take-

in the EU, when considering all major technologies³. Overall, with a view to the connectivity indicator, Germany improved from 14th place in 2019 to eighth in 2020.

1 Connectivity	Germany		EU
	rank	score	score
DESI 2020	8	59.4	50.1
DESI 2019	14	47.7	44.7
DESI 2018	16	40.6	39.9

Figure 1 Digital Economy and Society Index 2020, Connectivity

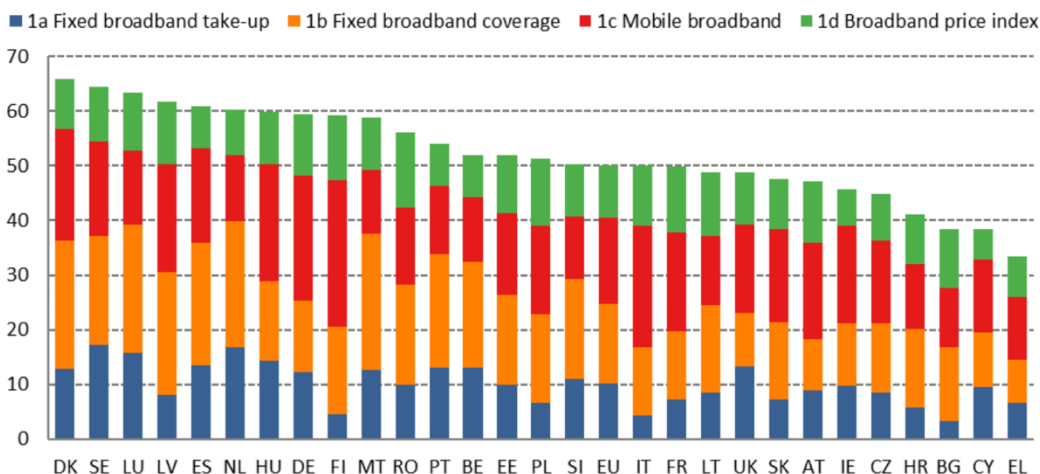


Fig. 3: Connectivity (DESI 2020 Connectivity report, p. 5)

The most widely used technology is DSL based on vectoring. Regarding fixed broadband coverage, Germany ranks 14th with 98% of households covered (total). In rural areas, it is slightly less (about 95%) and the gap between total and rural is larger than for the 13 countries, which rank higher (cf. DESI 2020 Connectivity report, p. 7). By focusing on fast broadband, Germany has 92% coverage in total. Addressing the rural area, however, the report notes: “Although rural coverage has significantly improved since 2019, from 66% to 75%, and is above the EU average, Germany still has a clear digital divide between urban and rural areas.”⁴

In fourth place, Germany registered some of the highest fixed broadband take-up rates. Together with six other countries, in Germany, the urban and rural penetration rates are identical or almost identical, whereas elsewhere in the EU there is a significant gap between fixed broadband penetration rates in urban and rural areas (cf. DESI 2020 Connectivity report, p. 13-14).

As the report states, mobile broadband is still mainly complementary to fixed broadband. “Until the end of March 2020, 17 Member States assigned spectrum in the 5G pioneer bands. Germany, Finland, Hungary and Italy assigned at least 60% of the 5G spectrum already.” (DESI 2020 Connectivity, p. 20) Germany is rated best for its 5G readiness.

up of mobile broadband (3G and 4G) and the indicator on 5G readiness. Digital connectivity is considered a social right in the EU.” (DESI 2020 Connectivity report, p. 4)

³ https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=67079

⁴ https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=66916, p. 5.

In terms of *fixed very high capacity network coverage* (VHCN), Germany ranks 21st with 33% coverage, which is below the EU average (44%) (cf. DESI 2020 Germany report, p. 5) – with a clearly pointed situation in rural parts of the country.

2 Human capital	Germany		EU
	rank	Score	score
DESI 2020	10	56.4	49.3
DESI 2019	10	54.4	47.9
DESI 2018	10	54.2	47.6

Fig. 4: Human capital (Digital Economy and Society Index 2020 Germany report, p. 7.)

The **human capital dimension** of the DESI has two sub-dimensions: *internet user skills* and *advanced skills and development*.⁵ While Finland is leading in both sub-dimensions of human capital, according to the latest data, Germany's performance is in the first third on an almost equal level with Austria and Ireland. Germany ranks 10th out of 28 EU countries and is thus above the EU average.

With 72%, Germany is among the top countries in terms of basic software skills among the population. By comparison, the Netherlands leads with 80% and Bulgaria brings up the rear with 31%. “The advanced skills and development sub-dimension looks at the workforce and its potential to work in and develop the digital economy. This takes into account the percentage of people in the workforce with ICT specialist skills and includes a separate indicator on female ICT specialists. At the same time, it looks at the share of ICT graduates. In 2018, some 9.1 million people worked as ICT specialists across the EU. The highest number was reported in the UK and Germany (both 1.6 million), followed by France (1.1 million).” (DESI 2020 Human capital report, p. 6) In Germany, almost 70% of enterprises that recruited or tried to recruit ICT specialists report problems in filling these positions.

The **Use of internet services** in Germany is slightly higher than the EU average.⁶ Concerning the **Integration of digital technology** in business activities, Germany ranks 18th in the EU.⁷ According to the DESI report, less than a third of enterprises (29%) share information electronically. This deficiency is already being addressed with several grants: “The Federal Ministry for Economic Affairs and Energy has launched several measures with the aim of advancing digitalisation: a digital innovation competition for business start-ups, the Digital Hub Initiative, GINSEP, Mittelstand 4.0 Centres of Excellence, ‘go digital’, the Town-Country-Digital Initiative, IT Security in the Business Sector and Industrie 4.0.” (DESI 2020 Germany report, p. 10) Finally, Germany ranks 21st in the EU on **Digital public services**. According to the DESI 2020 report, this is the greatest digital challenge. “The level of online interaction between public authorities and the general public is very low. Only 49% of German online users engage actively with e-government services, compared with an EU average of 67%, with Germany ranked 26th for this indicator.” (DESI 2020 Germany report, p. 12)

⁵ https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=67077

⁶ https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=67075

⁷ https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=67076

Network Readiness Index (NRI)

Looking at the **Network Readiness Index (NRI)**, Germany is one of the top 10 performers in NRI 2020⁸, ranking 9th, the same position as in NRI 2019.⁹ According to the report, “Germany finds itself in the top 10 in two of the four pillars: Technology and Impact (ranking 7th in both). Its best performance at the sub-pillar level relates to Future Technologies (3rd), which can be attributed to the country being at the forefront of adopting and investing in emerging technologies, such as robotics. Also in the Technology pillar, Germany is a top 10 country when it comes to Content (10th), but its main challenge is to improve Access (27th) to ICTs.

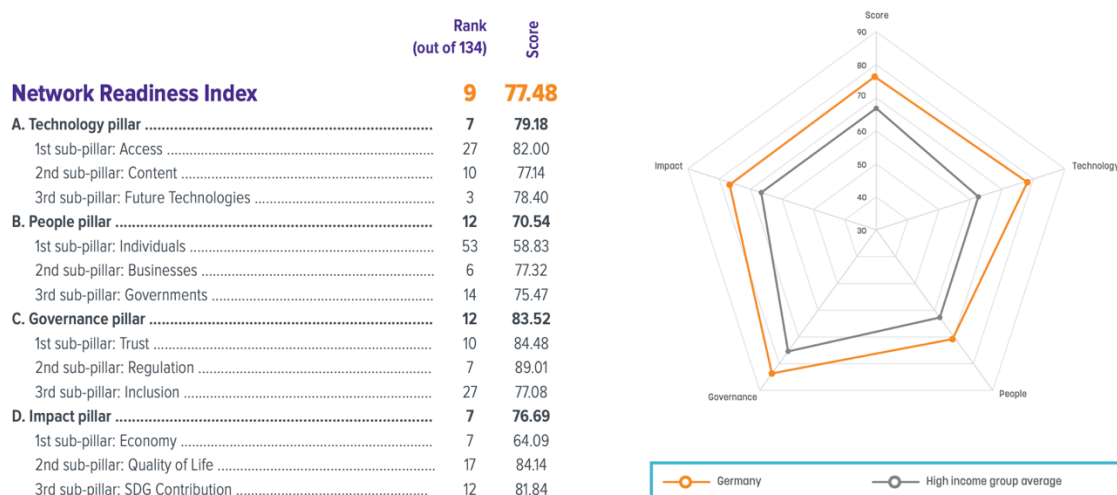


Fig. 5: German NRI (The Network Readiness Index 2020 report p. 110)

As for the Impact pillar, its main advantage lies in its advanced, high-tech Economy (7th), while addressing inequalities in income and gender would improve the other sub-pillars (Quality of Life, 17th; SDG Contribution, 12th). The overall performance of Germany in the People (12th) pillar masks diverse showings in the three sub-pillars: high usage and skills of ICTs among Businesses (6th) and, to a lesser extent, in the Government (14th) is offset by sub-par levels among Individuals (53rd). Although the contrasts are not as stark, the Governance (12th) pillar includes two sub-pillars— Trust (10th) and Regulation (7th)—where Germany ranks in the top 10 and that stand against a weaker level of Inclusion (27th).” (NRI 2020 report, p. 39)

Women in Digital Scoreboard 2020

Germany ranks 12th with a score of 54.2 in the **Women in Digital Scoreboard 2020** ranking and is thus very slightly below the EU average (score 54.5).¹⁰ The highest ranking in the subcategories is achieved in "Internet user skills" (6th place). Interestingly, 68% of women in the 16-24 years age group have

⁸ https://networkreadinessindex.org/wp-content/uploads/2020/11/NRI-2020-V8_28-11-2020.pdf

⁹ <https://networkreadinessindex.org/2019/wp-content/uploads/2020/03/The-Network-Readiness-Index-2019-New-version-March-2020-2.pdf>

¹⁰ https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=71574

"above basic digital skills", while the score for men in this age group is lower (60%). In the 25-54y and 55-74y age groups, the situation is reversed.

	Germany		EU	
	Women value	Men rank	Women value	Men value
1 Use of internet				
1.1 Internet users	90%	8	93%	84%
% individuals, 2019				86%
1.2 People who have never used the internet	6%	7	4%	10%
% individuals, 2019				9%
1.3 Online banking	64%	16	67%	65%
% internet users, 2019				67%
1.4 Doing an online course	7%	18	10%	11%
% internet users, 2019				11%
1.5 Online consultations or voting	17%	4	19%	12%
% internet users, 2019				12%
1.6 e-Government users	44%	26	54%	66%
% internet users submitting forms, 2019				68%
1 Use of internet	60	14		60
Score (0-100)				
2 Internet user skills				
2.1 At least basic digital skills	67%	6	73%	56%
% individuals, 2019				60%
2.2 Above basic digital skills	35%	9	42%	31%
% individuals, 2019				36%
2.3 At least basic software skills	69%	5	74%	59%
% individuals, 2019				63%
2 Internet user skills	65	6		55
Score (0-100)				
3 Specialist skills and employment				
3.1 STEM graduates	11.8	19	27.8	14.3
Per 1000 individuals aged 20-29, 2018				26.3
3.2 ICT specialists	1.4%	16	6.2%	1.6%
% total employment, 2019				6.2%
3.3 Unadjusted gender pay gap	25%	23		18%
% difference in pay, 2018				
3 Specialist skills and employment	38	22		48
Score (0-100)				
Women in Digital Index	54.2	12		54.5
Score (0-100)				

Fig. 6: German ranking in the Women in Digital Scoreboard 2020 (Women in Digital Scoreboard 2020)

Concerning gender differences in urban and rural settings, the availability of data is limited. On a general level, differences concerning e.g. the use of digital media are not only influenced by gender, or connectivity, but also by age, income situation and regional situatedness (in Germany, the regional situatedness relates to urban and rural areas but also to the western and eastern parts of the country). Also, digital skills heavily depend on the level of education¹¹. For example, the internet usage is 98% men/97% women for high education but 79% men/61% women with low education. Similarly, mobile internet usage is 91% men/90% women for high education and 69% men/52% women for a lower levels of formal education. This indicates that the main influence factor is education and not the difference between rural and urban areas. However, the *interrelation* of such factors is rarely reported on. For example, the report of the federal German government on "Digitisation gender-just design" (*Digitalisierung geschlechtergerecht gestalten*)¹² asks "What course do we need in order to set developments in the digital economy in such a way that women and men have equal chances for

¹¹ https://initiated21.de/app/uploads/2021/02/d21-digital-index-2020_2021.pdf

¹² <https://www.dritter-gleichstellungsbericht.de/de/topic/62.expertisen.html>

realisation?” However, it does not report explicitly on gender differences between rural and urban areas.

3. Policy framework for (rural) digitalisation

This section aims to identify how general policies boosting digitalisation influence rural areas and also how rural and agricultural policies foster digital transition.

3.1. European Digital Policies

On a rather general level, the Federal Government of Germany directly refers to European Digital policies in its current national digital strategy (see chapter 3.2.1).

The Digital Agenda 2014-2017 comprised 7 fields of action (digital infrastructures; digital economy and digital work; innovative state; shaping digital living environments in society; education, research, science, culture and media; security, protection and trust for society and the economy; European and international dimension of the Digital Agenda). Most notable investments of the Federal government were: support for young, innovative companies and start-ups and improvement of financing conditions for start-ups (about 4 billion euros), investment in broadband expansion (4 billion euros), investment in the microelectronics industry with about 1 billion euros. The Connecting Europe Facility (2014-2020), Germany got about 2.4 billion Euro, 2.2 of it were granted for transport. Apart from this, the Federal Government of Germany welcomed the Digital Single Market. The contract law, which has changed, was widely discussed.¹³

The point of reference for current policies is the document “**Shaping Europe’s Digital Future**” published in February 2020¹⁴, which can be regarded a summary of the core issues and objectives of European digital policy until 2025. The German Federal Government explicitly affirms this European strategy and sees itself mostly in line with its orientation.¹⁵

When looking at the detailed level of the manifold recent EU strategies and policies, the situation is much less transparent. Probably, due to the fact that the federal elections were held only recently in September of 2021, the EU policies and strategies have not been set in stone, yet. That is why the following descriptions only refer to some of the EU’s current policies and must be characterised as rather vague.

Lately, in July 2021, the Bundestag adopted the Federal Government’s bill to adapt copyright law to the requirements of the directive on copyright and related rights in the **Digital Single Market**¹⁶. The reform is the biggest in European copyright law in the past 20 years. It was prompted by the rapid

¹³ https://www.bmwi.de/Redaktion/DE/Downloads/Monatsbericht/Monatsbericht-Themen/2018-02-europaeisches-vertragsrecht.pdf?__blob=publicationFile&v=8

¹⁴ https://ec.europa.eu/info/sites/default/files/communication-shaping-europes-digital-future-feb2020_de_0.pdf

¹⁵ <https://www.digital-made-in.de/resource/blob/1793046/1794318/339a38c264fd50ff9efca6ad8da64bae/2021-digitalisierung-gestalten-aktualisierung-juni-2021-pdf-data.pdf?download=1>

¹⁶ <https://www.bundesregierung.de/breg-de/suche/urheberrechtsreform-1845042>

developments in digitisation and networking, which have led to a constant change in the way copyrighted content is created, generated, distributed, exploited and used by the public. This especially applies to streaming portals as well as to the use of social media. A central aspect of the copyright reform is the copyright responsibility of upload platforms such as YouTube or Facebook: Users distribute content from their own devices via these platforms on the internet. In future, the platforms themselves will be directly responsible for this distribution and connected issues of copyright and rights of exploitation. In addition, Germany is adjusting its Act Against Restraints of Competition to the context of increasingly digital markets.

The **Digital Europe Programme** is currently referred to e.g. by the German Federal Ministry of Education and Research as one funding opportunity in the field of digital and industrial technologies.¹⁷

Similarly, the German Ministry of Transport and Digital Infrastructure publishes information on the programme **Connecting Europe Facility 2**.¹⁸ Interested parties and initiatives are encouraged to prepare for future calls and planned infrastructure projects can be communicated to the ministry in advance. Furthermore, applications for funding have to be audited and approved by the ministry.

Next to a Europe Fit for the Digital Age, the **European Green Deal** is one of the six priorities of the current European Commission. It focuses on the reduction of greenhouse gases and zero emission in the EU by the year 2050. Germany's self-conception in this respect is expressed in an active contribution to shaping the EU climate policy.¹⁹ In terms of overlaps between digitalisation and a sustainable development, high potentials are seen in smart city and smart rural areas. Digitalisation is seen as a key to the optimisation of the use of resources, especially as it comes to the transformation of the sectors of mobility and energy.

3.2. National Policies boosting digitalisation

This section gathers the different existing policies at national level promoted by different ministries and institutions.

3.2.1. National Digital Agenda

For the currently expiring legislative period (2017-2021) the German Government developed the national digital strategy "Shaping Digitalisation" (*Umsetzungsstrategie "Digitalisierung gestalten"*).²⁰ It was passed in November 2018. The digital strategy aims at utilising digitalisation to increase the quality of life, to realise economic as well as ecological potentials and to support social cohesion. Historically, this document has two predecessors: The commission of inquiry on Internet and digital

¹⁷ <https://www.nks-dit.de/weitere-foerdermoeglichkeiten/digitaleurope>

¹⁸ <https://www.bmvi.de/SharedDocs/DE/Artikel/DG/connecting-europe-facility-2-digital.html>

¹⁹ <https://www.bmu.de/themen/klimaschutz-anpassung/klimaschutz/eu-klimapolitik>

²⁰ <https://www.digital-made-in.de/resource/blob/1793046/1794318/339a38c264fd50ff9efca6ad8da64bae/2021-digitalisierung-gestalten-aktualisierung-juni-2021-pdf-data.pdf?download=1>

society (*Enquete-Kommission Internet und digitale Gesellschaft*) existed from 2010 until 2013. It was followed by a digital agenda in the former legislative period ("*Digitale Agenda 2014-2017*").

However, in 2019 there was uncertainty about the budget for investment in digitisation in Germany.²¹ In 2020, following an inquiry of the opposition in the Bundestag, the budget was put at 3.8 billion euros.²² The current budget is difficult to determine; after the Bundestag elections in 2021, the topic of digitisation is a main point of discussion in the current coalition negotiations. It is being discussed whether a digital ministry should be installed, which should give this issue more transparency in the future.²³ In other words, there is neither a dedicated budget allocated on the federal level, nor is it possible to make a reasonable statement based on the budgets of the single departments involved.

The current digital strategy comprises a set of measures in five fields of action along with a strategy of implementation. It is not intended as a concluded but rather as an open and dynamic agenda, which brings together the central topics of different ministries. Thus, it functions as an umbrella construct for various German Federal Ministries and contains more than 100 different activities. The five fields of action include (we added the budget for most important activities in case we found details, note that we only mention activities with a budget higher than 100 million Euro here^{24 25}):

- digital competences ("*Digitale Kompetenz*")
 - 6.5 billion Euro for the school system until 2024
- infrastructure and equipment ("*Infrastruktur und Ausstattung*")
 - 5 Billion Euro for 5G networks until 2024
 - Up to 6.3 Billion for digital infrastructure in health system until 2024
 - Since 2015 8 Billion Euro investments in broadband infrastructure for rural areas
- innovation and digital transformation ("*Innovation und digitale Transformation*")
 - 5 Billion for Artificial Intelligence until 2025
 - 6 Billion Euro for start-ups until 2030
 - 250 Million Euro for data innovations and artificial intelligence in vehicles, infrastructure, systems
- society in digital transition ("*Gesellschaft im digitalen Wandel*")
- modern state ("*Moderner Staat*")

²¹ <https://www.handelsblatt.com/politik/deutschland/bundesregierung-digital-staatsministerin-baer-kann-das-digitalbudget-nicht-beziffern/25233116.html?ticket=ST-1237145-wLch1PIrKAmKcTpEUhRp-cas01.example.org>

²² <https://www.handelsblatt.com/politik/deutschland/haushalt-bundesregierung-gibt-3-8-milliarden-euro-fuer-digitalisierung-aus/25576112.html>

²³ <https://www.behörden-spiegel.de/2021/11/25/die-spannung-bleibt-digitalisierung-im-neuen-koalitionsvertrag/>

²⁴ <https://www.bundesregierung.de/breg-de/service/publikationen/digitalisierung-gestalten-1605002>

²⁵ https://www.bmwi.de/Redaktion/DE/Publikationen/Europa/nationales-reformprogramm-2021.pdf?__blob=publicationFile&v=26

- 3.3 Billion Euro to push digitalisation in the administration forward until 2024

Digital Competences as field of action aims to equip the German population with skills and competences to productively use the potentials of digitalisation in a self-determined way. It is subdivided into the three core themes schooling, training/vocational/further education and the digital literacy at the level of society in general.

The field of **infrastructure and equipment** focuses on the nationwide provision of an efficient and reliable digital infrastructure. Paramount are the two aspects of fibre-optic and cellular networks with 5G as key technology. Additional themes are telematics for the health sector, security of critical infrastructures (e.g. health care, energy, water, finances) and infrastructures of public administration.

Innovation and digital transformation focuses on sustainable wealth and social cohesion through technological innovation following legal and ethical values. This field of action comprises a broad set of core themes including innovations in science and technology, applied innovation, support of innovative start-ups, the digital transformation of economy (e.g. in SMEs), transformations in higher education and research, social innovations and transformation of employment, digital innovations for environment, climate and resources, as well as digital innovations in defence, foreign and security policy.

Society in digital transition aims to incorporate the digital transformation within the centre of society. Various focus areas comprise aspects such as ethics, urban and rural contexts, culture and media, mobility, work life and participation, Europe and global relations.

Finally, the **modern state** as a field of action refers to the digitalisation of administrative services. This includes not only a stronger alignment of the state as provider of services but also digital administrations from the federal down to the municipal level as well as the taxation of digital business models.

All those fields of action along with their sub-divisions into different core themes are connected to a total of currently 147 policies, programs and projects.²⁶ Thereby, security and gender equality have been defined as crosscutting issues which are supposed to be considered collectively.

On a secondary level, the digital strategy also addresses rural areas. Rural areas are mentioned in four out of five fields of action. Most notably, rural areas are in the focus when it comes to the development of digital infrastructures, both grid-bound as well as cellular. This is one of the points where the shortcomings in Germany are most obvious. Also, the category society in digital transition contains urban and rural areas as one core topic. Here, many measures are directly dedicated to the structural digital development of rural areas. Furthermore, some measures in the field of digital competences refer to rural populations as explicit target groups of adult education. Also, the core topic of mobility within this field of action addresses the improvement of mobility services in undersupplied areas. Finally, the digital strategy refers to smart farming as one possible way to protect the environment and conserve resources within the field of innovation and digital transformation.

²⁶ cf. <https://www.digital-made-in.de/dmide>

3.2.2. Other policies and strategies influencing (rural) digitalisation

This section lists and describes a range of policies and strategies that indirectly or directly influence rural digitalisation in Germany (see table 1). Examples for a rather indirect impact include the twelve measures defined by the commission of equal conditions of living (*Kommission "Gleichwertige Lebensverhältnisse"*) and the program "Smart Cities made in Germany" which refers to urban but also rural communities, just as "Stadt.Land.Digital". Examples with a direct influence on rural life contain different programs and activities aiming at rural development, which vary in terms of the emphasis put on digitalisation.

Table 1: National Policies

Ministry / Authority	Policy	Objective	Expected Impact
Federal Government (<i>Bundesregierung</i>)	Measures of the Commission for Equal Living Conditions (<i>Kommission gleichwertige Lebensverhältnisse</i>)	Just distribution of resources and opportunities	Reduction of geographical inequalities in terms of economy, infrastructures, services and social life
Federal Ministry of the Interior (<i>BMI</i>)	Smart Cities made in Germany	Supporting municipalities' digital urban and regional development	Urban and rural municipalities develop and implement human centred digital strategies for liveable communities
Federal Ministry for Economic Affairs and Energy (<i>BMWi</i>)	City.Country.Digital (<i>Stadt.Land.Digital</i>)	Economic impulses and better quality of life through digital transformation	Reliable digital strategies and networks of exchange of smart cities and smart regions
Federal Ministry for Food, Agriculture and Consumer Protection (<i>BMEL</i>)	Federal Program for Rural Development (<i>BULE</i>)	Strengthening rural areas and contributing to equal living conditions	Improvement of the future viability of rural regions through pilot projects and knowledge transfer
Federal Ministry of the Interior (<i>BMI</i>)	Homeland 2.0 (<i>Heimat 2.0</i>)	Digitalisation of public services in structurally weak rural areas	Improvement of digital public services through pilot projects and knowledge transfer
Federal Ministry for Food, Agriculture and Consumer Protection (<i>BMEL</i>)	Country.Digital (<i>Land.Digital</i>)	Funding of innovative local projects in rural areas	Permanent use and interconnection of information and communication technologies to solve rural problems
Federal Ministry for Food, Agriculture and Consumer Protection (<i>BMEL</i>)	Smart.Country.Regions (<i>Smarte.Land.Regionen</i>)	Development of innovative services in rural districts	Improvement of living conditions in rural districts based on digital strategies and pilot software development

The **commission for equal living conditions** was established by the German Federal Government in July 2018.²⁷ In May 2019 it presented a set of analyses and suggestions which were the foundation for 12 measures. Those measures create a guideline for the activities of different ministries and their areas of responsibility. While established on the federal level, the impact of those measures aims at regional and local levels.

While structural aspects are in the focus, the urban-rural differentiation is only secondary. However, a part of the measures directly mentions rural areas and some also include aspects of digitalisation. Paramount, measure 3 supports the nationwide expansion of grid-bound and cellular data networks, especially in rural areas where the development by commercial providers is not profitable. Here, overlaps with the national digital strategy are obvious. Other measures such as mobility and traffic infrastructure (measure 4), strengthening villages and rural areas (measure 5), urban planning and subsidised housing (measure 6), involvement and volunteering (measure 8), and the togetherness of citizens in municipalities (measure 11) do not directly mention means of digitalisation but on the level of implementation technologies such as digital platforms, smart services, smart city solutions are applied.

“Smart Cities made in Germany” is a program by the Federal Ministry of the Interior (BMI), which aims at supporting municipalities’ digital urban and regional development. It supports urban as well as rural municipalities, regions and associations of municipalities to develop and implement human centred digital strategies for liveable communities. Between 2019 and 2021, three rounds of pilot projects were tendered with public funds of 1.25 billion Euros.

The Federal Ministry for Economic Affairs and Energy (BMWi) is responsible for the initiative **“City.Country.Digital”** (Stadt.Land.Digital).²⁸ It aims to set economic impulses and improve the quality of life through digital transformation focusing on reliable digital strategies and networks of exchange of smart cities and smart regions. The initiative supports on-line and off-line networking, hosts workshops, and offers information on best practices.

A core instrument which is intended to directly strengthen rural areas and contribute to equal living conditions is the Federal Ministry for Food, Agriculture and Consumer Protection’s (BMEL) **“Federal Program for Rural Development”** (BULE). BULE aims at the improvement of the future viability of rural regions through four modules models and pilots, model regions, contests and knowledge transfer.²⁹ Digitalisation is the core topic in the following three initiatives: **“Country.Digital”** (*Land.Digital*) offers funding to innovative local projects in rural areas. Between 2017 and 2022, 61 projects piloting the permanent use and interconnection of information and communication technologies to solve rural problems are supported. The initiative **“Smart.Country.Regions”** (*Smarte.Land.Regionen*) addresses the development of innovative services in rural districts to improve the living conditions based on digital strategies and pilot software development. Also funded by BULE but organised by the Federal

²⁷ https://www.bmi.bund.de/SharedDocs/downloads/DE/publikationen/themen/heimat-integration/kom-gl-massnahmen.pdf?__blob=publicationFile&v=2

²⁸ <https://www.de.digital/DIGITAL/Navigation/DE/Initiativen/initiativen.html>

²⁹ https://www.ble.de/DE/Projektfoerderung/Foerderungen-Auftraege/Kompetenzzentrum-Laendliche-Entwicklung/kompetenzzentrum-laendliche-entwicklung_node.html

Ministry of the Interior (*BMI*) is the initiative **“Homeland 2.0”** (*Heimat 2.0*). Homeland 2.0 supports structurally weak rural areas concerning the digitalisation of public services.³⁰ Between 2020 and 2024, 16 pilot projects are given the opportunity to develop or implement innovative software services and transfer the knowledge generated during the funding period.

3.2.3. Policies and strategies to boost digital literacy and tackle the digital divide

The measures and initiatives to promote digital literacy and bridge digital gaps in Germany focus on different areas: from school education to training and continuing education as well as a comprehensive perspective on digital skills like age-appropriate media use, gender digital divide, protection from digital violence, support for seniors in digital applications. Some programmes will be summarised in the following paragraphs. The table 2 provides an overview of initiatives.

A comprehensive federal programme is **“DigitalPact School”** (*DigitalPakt Schule*). Initiated by the Federal Ministry of Education and Research (BMBF), it supports the German federal states in investing in digital education infrastructure and better equipment for schools. For a comprehensive view of digitisation in the school sector, technology and infrastructure funding by the federal republic goes hand in hand with pedagogical concepts and the qualification of teachers – what in turn has to be financed by the federal states.

The initiative **“Gutes Aufwachsen mit Medien”** (*Growing up well with media*) supports parents and educational professionals in their educational responsibilities in the digital age. It offers children and young people age-appropriate access to the media world. The programme is a nationwide association of stakeholders, including foundations and associations. It is funded by the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ).

To counteract the gender digital divide, the initiative **“YouCodeGirls”** is addressed at girls and young women. By creating an online platform, it enables them to learn about coding without stereotypes. This should set the course for a later career choice. The Didactic Innovations GmbH is responsible for the project in cooperation with the Research Institute Education Digital (FoBiD) and the German Research Center for Artificial Intelligence (DFKI). The German Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ) supports YouCodeGirls as a lighthouse project of smart social policy.

A similar approach, only with an international view and a more comprehensive design, is offered by the G20 **“#eSkills4Girls”** initiative. The aim is to improve digital skills and Internet access for girls and women in particular in low-income and developing countries. This platform was initiated by the G20 members together with UNESCO, UN Women, ITU, OECD, the German Federal Ministry for Economic Cooperation and Development (BMZ) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

With its project **“Ernährungskompetenzen ausbauen – digital und unterwegs”** (*“Expanding nutrition skills – digitally and on the go”*), the German Federal Ministry of Food and Agriculture (BMEL) aims to

³⁰ <https://www.bbsr.bund.de/BBSR/DE/forschung/programme/region-gestalten/initiativen/2020/heimat-2-0/01-start.html>

support the development of digital skills concerning knowledge transfer. Nutrition is the reference framework for the project.

The programme “**Digitaler Engel**” (english: “Digital angel”) supports older people in using digital services. It is a project of “Deutschland sicher im Netz e.V.” (*Germany on the web safely association*), funded by the German Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ).

Finally, since 2016, the umbrella initiative “**Berufsbildung 4.0**” (*Job Training 4.0*) has bundled the diverse activities of the Federal Ministry of Education and Research (BMBF) to align the structure and content of dual vocational training with the requirements of an increasingly digitalised and networked economy. One project, for example, is the “**Sonderprogramm ÜBS-Digitalisierung**”. It offers supplementary training with digital content when companies are unable to provide it themselves.

Table 2: Programmes and initiatives addressing digital literacy and digital divide.

Initiative	Objective	Key words	Period	Area of impact	Link	Public / Private	Scale of action *	Rural / General
DigitalPakt Schule	Broadband Internet and digital learning infrastructures for all schools in Germany	BMBF, schools, digital education infrastructures	2019-2024	Germany	https://www.digitalpaktsc hule.de	public	national	general
Gutes Aufwachsen mit Medien	Media competence for children, adolescents, parents and educators	BMFSFJ, media education for children	2015-2022	Germany	https://www.gutes-aufwachsen-mit-medien.de	public	national	general
Initiative YouCodeGirls	Enthrall girls and young women for coding to reduce gender bias in job decisions and enforce women's digital participation	BMFSFJ, coding, gender digital divide	since 2020	Germany	https://youcodegirls.de	public/private	national	general
#eSkills4Girls	Improving digital competences of and internet access for girls and women in developing countries	BMZ, digital competences, gender digital divide	since 2016	Europe-wide	https://www.eskills4girls.org	public	international	general
Ernährungskompetenzen ausbauen – digital und unterwegs	Digital and target group specific information for nutrition competence	BMEL, nutritional competence, digital knowledge transfer	since 2018	Germany	https://www.digital-made-in.de/dmide/vorhaben/ernaehrungskompetenz-ausbauen-1793982	public	national	general

3.2.4. Policies and strategies that incentivise digital innovations

Concerning policies influencing digitalisation in rural areas (table 3), in the fall of 2019, the German Federal Ministry for Food, Agriculture and Consumer Protection (BMEL) introduced its Future Programme “**Digital policy Agriculture**” (Zukunftsprogramm "Digitalpolitik Landwirtschaft").³¹ With this programme, the ministry aims to foster innovations in the field of agriculture. It takes up and continues e.g. platform-oriented projects such as an agricultural data platform to support processes in farming, a digital platform for the reduction of food waste or a platform for gathering and analysing the health and behaviour of livestock.

With more than 50 million euros the biggest share of the Future Programme is dedicated to the initiative “**Digital Fields for Experimentation in Agriculture**” (Digitale Experimentierfelder in der Landwirtschaft). The experimental fields investigate how digital technologies can be applied to protect the environment, increase animal welfare and biodiversity.

“**Innovations in Agricultural Engineering to Increase Resource Efficiency**” (Innovationen in der Agrartechnik zur Steigerung der Ressourceneffizienz) offers funding to several collaborative projects within the framework of the guideline for the promotion of innovations in agricultural technology to increase resource efficiency (e.g. big data in agriculture).

Finally the “**Satellite-based Monitoring of Farm Land**” (Satellitengestütztes Monitoring aller landwirtschaftlichen Flächen) applies satellite image-based monitoring of agricultural areas in order to modernise and simplify EU agricultural support for both farmers and state administrations.

³¹ <https://www.bundesregierung.de/breg-de/themen/digitalisierung/digitalpolitik-landwirtschaft-1686296>

Table 3: Policies influencing digitalisation in rural areas

Initiative	Brief Description	Objectives	Area of impact	Period of implementation	Budget (if any)	Public / Private	Are rural areas specifically mentioned or addressed? Y/N	Link
Zukunftsprogramm "Digitalpolitik Landwirtschaft"	The program combines several areas of Smart Farming: Capacity building, infrastructure, experimental fields, provision of relevant data.	Analyze developments and challenges from all areas of digitisation in agriculture, develop proposals for solutions	Germany, agriculture	2019-2022	60 million euros	public	Y	https://www.bundesregierung.de/breg-de/themen/digitalisierung/digitalpolitik-landwirtschaft-1686296
Digitale Experimentierfelder in der Landwirtschaft	The experimental fields will be used to investigate how digital technologies can be optimally used to protect the environment, increase animal welfare and biodiversity.	Testing the practicality of digital applications	Germany, agriculture	2019-2022	50 million euros (share of "Digitalpolitik Landwirtschaft")	public	Y	https://www.bundesregierung.de/breg-de/themen/digitalisierung/digitale-experimentierfelder-1682544
Innovationen in der Agrartechnik zur Steigerung der Ressourceneffizienz	Funding of several collaborative projects within the framework of the guideline for the promotion of innovations in agricultural technology to increase resource efficiency (Big Data in agriculture).	Use resources more efficiently, optimise production processes	Germany, agriculture	since 2015	28.49 million euros	public	Y	https://www.digital-made-in.de/dmide/vorhaben/agrartechnik-1794080
Satellitengestütztes Monitoring aller landwirtschaftlichen Flächen	Satellite image-based monitoring of agricultural areas in order to take greater account of new technologies in EU agricultural subsidies.	Modernisation and simplification of EU agricultural support for both farmers and state administrations.	Germany, agriculture	since 2018	unknown	public	Y	https://www.digital-made-in.de/dmide/vorhaben/monitoring-landwirtschaftliche-flaechen-1794232

3.3. Contributions from the Structural and Investment Funds and the Cohesion Policy

In Germany, the Federal Ministry for Economic Affairs and Energy is responsible for coordinating the EU cohesion and structural policies as well as the European Regional Development Fund (ERDF).³² Germany received a total of almost 29 billion euros from the European Structural and Investment Funds in the last funding period (2014-2020). In principle, all 16 German federal states benefit from funding from the EU Structural Funds, but they make a major contribution to regional employment, especially for the German federal states in the east of Germany.

In June 2017, the Federal Government and the 16 federal states (*Bundesländer*) set out their priorities for European cohesion policy after 2020 in a paper on the future cohesion policy³³. The central demand is that EU cohesion policy should continue to take into account all regions within the European Union after 2020, differentiated according to their structural development and in line with their regional needs. At the same time, it suggests to make the funding more efficient in the future, i.e. the administration of the funds needs to be simplified and synergies with other funding instruments should be strengthened.

3.3.1. Broadband infrastructure

The development of digital telecommunications and data infrastructure in general as well as the expansion of gigabit capable networks in particular is primarily in the hands of private sector companies. Where private sector expansion is not profitable, the Federal Government as well as financial resources provided by the federal states and EU programmes (ERDF, EAFRD) support the expansion of gigabit networks on the local or regional level³⁴. Expansion is only supported in areas where private sector expansion is not economically viable and a market failure has been identified.

The overall goal of the German government is the “gigabit society” in 2025, i.e. a nationwide fibre optic gigabit capable network infrastructure. To achieve this, the German Federation provides 12 billion euros.³⁵ In order to take economically weak regions into account, the GRW programme³⁶ was created, which among other aspects promotes the digital infrastructure in such areas. For municipalities with low economic strength, increased federal funding rates (up to 70% instead of 50%) are available.

³² <https://www.bmwi.de/Redaktion/DE/Artikel/Europa/eu-kohaesions-und-strukturpolitik.html>

³³ https://www.bmwi.de/Redaktion/DE/Downloads/S-T/stellungnahme-bund-lander-kohaesionspolitik.pdf?__blob=publicationFile&v=4

³⁴ <https://www.breitbandausschreibungen.de/foerderprogs>

³⁵ https://www.bmvi.de/SharedDocs/DE/Anlage/DG/steckbrief-breitbandausbau-deutschland.pdf?__blob=publicationFile

³⁶ https://www.bmwi.de/Redaktion/DE/Downloads/G/gesamtdeutsches-foerdersystem.pdf?__blob=publicationFile&v=16

3.3.2. Digital Public Services

In terms of **digital public services**, Germany ranks 21st in the EU³⁷. Despite an improvement in the Digital Public Services for Business indicator (from 80 to 92), Germany continues to lag behind in this respect. For open data, Germany is above the EU average (13th place). In the assessment for online processing of services, Germany matches the EU average with 90 points. However, online interactions between public authorities and citizens continue to take place only to a very limited extent. Only 49% of German Internet users actively access e-government services (EU average 67%). This puts Germany in 26th place for this indicator. For the indicator pre-filled forms, there was no change for Germany with a value of 41. This put Germany well below the EU average (59).

The Online Access Act (OZG) passed in August 2017 obliges all federal and state authorities to provide administrative services digitally for citizens and businesses by the end of 2022. This act comprises 575 services to be provided jointly by the Federal Government, the federal states and the municipalities.

Furthermore, research indicates³⁸ that the Covid-19 pandemic has not caused a broader use of eGovernment services in Germany. In rural areas, it is stated, people regard going to the administration as more comfortable than going online. So, in rural areas fewer citizens tend use digital administrative services (50%) whereas 58% among city dwellers use them. The reasons for this lie in a reciprocity of supply or availability and demand or awareness and openness. That means that in addition to the expansion of digital services, the awareness of the citizens must also be considered.

Also, in 2020 only 34% of the companies in Germany used **digital signatures** (18%) or plan to use them (16%)³⁹. The larger the companies the more likely they use digital signatures. Another findings⁴⁰ show that in 2020, only 36% of Germans used a digital signature (50% in EU) but 69% of the German users say that it would be good if more companies would provide digital signatures. Generally speaking, the Covid19 pandemic pushed digital signatures massively in Germany and a tendency for more use of digital signatures can be expected in Germany. Evidence for differences concerning the use in rural areas were not found.

In terms of **e-health**, Germany clearly lies behind other EU member states. But in 2020, the number of video consultations exploded, increasing by 350 percent. Among others, the rapid spread of the Corona warning app last year showed that young people in particular are ready to use apps for health care. The biggest obstacle for citizens to use e-health in Germany is the fear of misuse of data. According to a study⁴¹, just over a quarter of respondents believe that doctors or clinics can assure that patient data is safe. Just as many feel uncomfortable if the doctor gets direct access to pulse or

³⁷ <https://digital-strategy.ec.europa.eu/en/library/digital-economy-and-society-index-desi-2020>

³⁸ https://initiated21.de/app/uploads/2020/10/egovernment_monitor_2020_onlineausgabe.pdf

³⁹ https://www.bitkom.org/sites/default/files/2020-10/201012_studienbericht_doi-2020_v11_final-1.pdf

⁴⁰ <https://www.it-business.de/digitale-signatur-deutschland-ist-mal-wieder-letzter-a-999717/>

⁴¹ <https://www.sueddeutsche.de/wirtschaft/gesundheits-e-health-digitalisierung-1.5269868>

blood pressure values, for example via a smartwatch, or information about one's lifestyle. This is the case even if the doctor could then make a better diagnosis.

To counteract such tendencies, there is also an action plan Digital Health 2025⁴², which contains five main points for digital medical provision in Germany. Due to a shortage of doctors in Germany, especially in rural regions, eHealth is seen as a major opportunity to counteract this lack⁴³.

The level of **e-Education** also is quite low in Germany. One reason for this can be seen in the decentralised federal structure of Germany, in which the federal states have absolute sovereignty concerning education. However, in 2019, the Bundestag and Bundesrat created the legal prerequisites for the so-called DigitalPakt Schule (*DigitalPact School*), which allows the federal government to financially support the digitisation of schools with 5 billion euros. However, only a fractional part of these funds had been called up by the summer of 2020. When schools of general education were closed in mid-March 2020 due to the pandemic, only few were prepared for digital schooling. Thus, the Corona crisis has revealed numerous deficits in the digitisation of education. In order to cope with the school closures as a result of the Corona pandemic, funding was extended for a limited period to include the procurement of devices for needy pupils and teachers.

Digital identifiers are managed by an electronic identity card, which has two basic functions: A legally binding signature can be made remotely and citizens can prove their identity beyond doubt online or at special machines in public authorities. With these functions, users can, for example, take out an insurance, open bank accounts, activate SIM cards or complete administrative procedures digitally.

Furthermore, a new law that has come into force enables secure proof of identity using a smartphone⁴⁴ without the need for an additional ID card. More than 150 services can be used with the app. In 2019, only 25 million citizens activated the online functionality of their ID card and only 2.2 million citizens actually used it⁴⁵. However, it is not unlikely that the Online Acces Act will push the eID forward.

Online-banking was used by about 96% of the population younger than 50 years in Germany in 2020⁴⁶. 87% of the people from 50-65 years use online banking. Hence, a wide diffusion can be stated with no evidence for difference between cities and rural areas.

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https://www.bundesgesundheitsministerium.de/fileadmin/Dateien/5_Publikationen/Gesundheit/Broschueren/BMG_Digitale_Gesundheit_2025_Broschuere_barr.pdf

⁴³ <https://www.vitanet.de/Artikel/laendliche-Gesundheitsversorgung-mit-Telemedizin>

⁴⁴ <https://www.bundesregierung.de/breg-de/suche/digitale-identitaet-1852094> and <https://www.ausweisapp.bund.de/ausweisapp2/>

⁴⁵ <https://www.handelsblatt.com/politik/deutschland/e-government-nur-wenige-deutsche-nutzen-die-online-funktion-ihres-personalausweises/24435958.html?ticket=ST-8270846-DJxVGaRffwKMTfNnJkbM-ap6>

⁴⁶ <https://de.statista.com/statistik/daten/studie/740162/umfrage/nutzung-von-online-banking-nach-alter-in-deutschland/>

Table 4: Digital Public Services usage

		Extremely common	Very common	Fairly common	Not common for most of the population	It is not a possibility nowadays
e-Administration procedures	In general in the country			(X)	X	
	In rural areas				X	
e-Health	In general in the country				X	
	In rural areas				X	
e-Education	In general in the country				X	
	In rural areas				X	
Digital identity	In general in the country				X	
	In rural areas				X	
Digital signature	In general in the country			X		
	In rural areas			X		
On-line banking (account management, payments)	In general in the country	X				
	In rural areas	X				
Bills (council taxes, water, electricity)	In general in the country				X	
	In rural areas				X	

To pay **bills**, there is the **ePayBL** (*elektronische Zahlungsverkehrsplattform von Bund und Ländern*) which is part of the EU Regulation 2018/1724. Many authorities offer this administrative service via service portals on the Internet. Citizens and companies can pay fees using the electronic payment platform. However, the acceptance of this system is quite low, hence the ITZ Bund⁴⁷ plans to improve the services. The goal is that by the end of 2025, only two basic services (or two cross-sectional services) will be running at central IT service providers for the same functionalities in Germany⁴⁸. This

⁴⁷ <https://www.itzbund.de/DE/itloesungen/standardloesungen/epayment/epayment.html>

⁴⁸ https://www.onlinezugangsgesetz.de/SharedDocs/downloads/Webs/OZG/DE/integrationsleitfaden-bund.pdf?__blob=publicationFile&v=10

means, for example, that there will only be one IT procedure for electronic file management (e-file) or personnel management. Thus, the technology is available but not fully developed. Hence, the acceptance by the citizens is quite low. But this may change in the future as the systems become more and more user friendly and trustworthy.

3.3.3. Research and Innovation Strategies for Smart Specialisation (RIS3)

In Germany, the RIS3 strategies were developed by the federal states⁴⁹. This makes an exhaustive description difficult. Generally speaking, RIS3 induced a strong impulse for the modernisation of innovation policies in the federal states and strengthened their strategic anchoring. The RIS3 strategies largely formed the central strategic frame of reference for innovation policy in the federal states. The focus of the funding measures is mostly on technology- or thematically open funding.

Good practices were:

- Structures that enable a continuous dialogue between the stakeholders,
- Initiatives with other regions to effectively coordinate innovation processes between regions,
- Formation of cluster organisations in which structures and actors from different areas (business, science & society) in the region, which have already grown over several years, were brought together.

For the RIS3 2021-2027 funding period, in July 2020, five federal states already had published their future RIS3 strategies.

3.3.4. Digital Innovation Centres (DIH)

At the moment, there are 64 DIHs listed in Germany⁵⁰. Furthermore, 33 initiatives have applied as candidates for an EDIH position.

Furthermore, in Germany, the de:hub initiative is led by the Federal Ministry for Economic Affairs and Energy⁵¹. The main goal is to connect SMEs and corporations with new partners for innovation from science and the start-up scene. In innovation programmes, accelerators and incubators new solutions are developed for industry relevant fields - from artificial intelligence to mobility and smart infrastructure. Overall, there are twelve DIHs throughout Germany focussing on different domains (e.g. logistics, traffic, artificial intelligence). None of them is focussing on rural areas, however, the hub in Dresden deals with components necessary for Smart Systems in the fields of connectivity or IoT platforms

⁴⁹ https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/smart_spec_germany_de.pdf

⁵⁰ <https://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool>

⁵¹ <https://www.de-hub.de/>

3.4. CAP National Strategic Plans

Up to now (2014 to 2020), support for the development of rural areas in EAFRD has been implemented through regional development plans in Germany at the level of the federal states. In the new funding period (2023-2027), a development plan (GAP-SP, GAP-Strategy Plan) will be drawn at federal level, which on the one hand contains binding components for implementation throughout Germany, and on the other hand provides the framework for further planning by the federal states.⁵²

The CAP in Germany is accomplished by the Federal Ministry of Food and Agriculture (BMEL⁵³) which provides an overview of preliminary documents on which the development of the German CAP strategic plan by the end of 2021 is based. The strategic plan consists of three main goals:

- I. promote a smart, crisis-proof and diversified agricultural sector and ensure food security;
- II. strengthen environmental care and climate protection and contribute to the environmental and climate-related objectives of the European Union;
- III. strengthen the socio-economic fabric of rural areas.

These main goals are addressed by nine specific goals plus the cross-cutting goal “Promotion and transfer of knowledge, innovation and digitalisation”. The total GAP budget for Germany (2023-2027) is 30.3 billion Euro and the budget will be split into the two main pillars EAGF (“European Agricultural Guidance and Guarantee Fund”, 22 billion €) and ERDF (“European Regional Development Fund”, 8.3 billion €). The strategy stresses the environmental aspect of the budget. So, for the main goal II. above, Germany spends 1.3 billion Euro until 2023 for agriculture and forestry. Parts of the budget (about 600 million Euro per year) will be taken from the EAGF and will very likely have an impact on rural areas but not necessarily on digitalisation.

According to digitalisation, important interventions that contribute to strengthening rural development are, among others, the promotion of material infrastructure in rural areas, e.g. broadband supply, cellular networks, equipment with digital technology in educational institutions. A bottom-up approach is envisaged to promote rural development and digitalisation is explicitly mentioned as a means to improve agriculture in rural areas. Securing or improving services of general interest in rural areas through adequate local infrastructures and supply facilities for the population with the help of digitalisation have the highest priority level⁵⁴.

Another goal is to compensate deficits in the IT equipment of schools and adult education facilities in rural areas. To this end, the expansion of public and private facilities for the promotion of communication infrastructure is to be promoted. Another cross-cutting task for achieving the goals of

⁵² https://www.bmel.de/SharedDocs/Downloads/DE/_Landwirtschaft/EU-Agrarpolitik-Foerderung/gap-strategieplan-umweltbericht.pdf?__blob=publicationFile&v=3

⁵³ <https://www.bmel.de/DE/themen/landwirtschaft/eu-agrarpolitik-und-foerderung/gap/gap-strategieplan-kasten-umweltpruefung-links.html;jsessionid=9DB9F78EFECAB5C1BAEDF8BA70C71469.live841>

⁵⁴ https://www.bmel.de/SharedDocs/Downloads/DE/_Landwirtschaft/EU-Agrarpolitik-Foerderung/gap-strategieplan-bedarfsanalyse.pdf;jsessionid=75760FD204731553280DFBC0C438865F.live921?__blob=publicationFile&v=5

the CAP strategic plan is the promotion of knowledge through networking and digitalisation in agriculture. Important starting points are (among others):

- Strengthening coordination structures for agricultural research and dissemination of results at European, state and federal state level in the AKIS system, greater involvement of practice and extension in research and knowledge transfer;
- Knowledge transfer on the possibilities and requirements of digitisation and strengthening of digital formats;
- Expansion of regional, interdisciplinary cooperation as well as networking and information exchange;
- Strengthening the innovative power of agricultural and forestry enterprises and actors in rural areas.

In particular, the transfer of knowledge and information measures, advisory services, professional exchange and the establishment of advisory services. These can be supported, for example, through the promotion of networks and cooperation as well as through demonstration projects. The promotion of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) is an important instrument for supporting innovative approaches and their dissemination in practice.

A concrete programme mentioned is the Fruit and Vegetables Sector Programme, where structural and technical investments in machinery, equipment and technical installations (including IT systems) are promoted. Investments in water conservation and protection are also eligible for support. Interventions to adapt to drought and heavy rainfall events and thus to climate change, including water storage, intelligent (e.g. digital or automated) irrigation control solutions and water-saving irrigation systems.

A final point we found is that food waste will be tackled by digitalisation. Through the interaction of four fields of action - politics, business, society and through research and digitalisation - the food supply chain is to be designed in such a way that waste or losses do not occur in the first place.

3.4.1. CAP Integrated Administration and Control System (IACS)

For the control mechanism, the CAP Integrated Administration and Control System Act was adopted in June 2021 and will enter into force in August 2021. Essentially, these are regulations on the administration and control procedure for the implementation of direct payments. Farmers will thus receive far more targeted support offers than before, with which concrete public services for the environment, biodiversity and climate will be rewarded.

3.5. Data management

In July 2021, the Federal Ministry of the Interior, Construction and Home Affairs adopted a new **Open Data Strategy**⁵⁵. The Open Data Strategy comprises 68 implementation measures by various ministries and subordinate authorities for the next five years. Analogous to the Federal Government's data strategy, the Federal Government's Open Data Strategy supports the following three main fields of action:

- Improving data provision for an efficient and sustainable design of data infrastructures;
- Increasing innovative and responsible data use;
- Increasing data competence and establishing a new data culture in order to increase the quality and usability of the data provided.

The measures relate to the areas of health, public procurement, integrity & corruption prevention, mobility and the economy, as well as improved IT support for the federal administration for the data provision process. To increase data literacy, the Competence Centre Open Data (CCOD) at the Federal Office of Administration will design various training courses in cooperation with the Federal Academy of Public Administration (BAkÖV) and create a "catalogue of topics" on open data in the federal administration.

To make it easier to find the open data provided by federal, state and local administrations, the national metadata portal GovData was created as a central entry point for searching open administrative data⁵⁶. Metadata contain a great deal of information about the content of the data described. This includes, for example, a description of what the data is about, who created it or to which time period or location the data refers. A metadata standard ensures interoperability with the EU's overarching open data portal, the European Data Portal.

With its geo-information strategy, the Federal Ministry of Transport and Digital Infrastructure (BMVI) supports the implementation of the declared open data goals and provides platforms with the mCLOUD, the Mobility Data Marketplace (MDM) and CODE-DE that enable open access to data from the division, the data and services from the Copernicus Earth Observation Programme and to other data from the BMVI's thematic areas. From 2022, the mCLOUD and MDM platforms will be merged to form the new mobility data platform Mobilithek. Via the mCLOUD, open data from the BMVI business area will be automatically forwarded to the national open data portal GovData (see above).

Only a few smaller or rural municipalities or districts actively operate open data portals. This means that rural areas are threatened to be excluded from important developments in another fundamental field of action of municipal digital policy. The project [OpenDataLand](#) of the Federal Ministry of Agriculture and Food (BMEL) undertakes an analysis of the potentials and challenges of Open Data specifically in rural regions and develops recommendations for good practice approaches for the provision, pricing and licensing of Open Data in rural areas in Germany. In order for rural areas in

⁵⁵ <https://www.bmi.bund.de/SharedDocs/pressemitteilungen/DE/2021/07/open-data-strategie-der-bundesregierung.html>

⁵⁶ <https://www.bmi.bund.de/DE/themen/moderne-verwaltung/open-government/open-data/open-data-node.html>

general, and administrations, political representatives and citizens in particular, to benefit more from Open Data in the future, it is necessary to gain a detailed understanding of the motives, challenges and framework conditions for the establishment and expansion of Open Data portals in rural areas.

The Covid19 pandemic has given a further boost to technological development. The shift of many processes, whether in a private, professional or official context, into cyberspace or a digitised world offers many opportunities. However, accompanying risks must not be forgotten. In September 2021, the Federal Ministry of the Interior, for Building and the Home Affairs (BMI) adopted the "Cybersecurity Strategy for Germany 2021"⁵⁷. It provides the framework for **cyber security** for the next five years. The cyber security strategy focuses on the four fields of action: 1) society, 2) economy, 3) state and 4) EU/international. 44 strategic goals are described in the fields of action. The following to goals are new and will be priorities:

- The Federal Office for Information Security (BSI) is to be expanded into a central agency in the federal-state relationship and thus - in addition to the Federal Criminal Police Office in the police system and the Federal Office for the Protection of the Constitution in the Office for the Protection of the Constitution - to be further developed into the third pillar of a federally integrated cyber security architecture.
- The strategy strengthens digital sovereignty and thus the secure digitisation of our country. To this end, the German digital economy will be advanced through the targeted promotion of key technologies and networking with relevant researchers. For key and future technologies, the security-by-design approach will be taken into account from the very beginning.

Germany's engagement in the EU and NATO is also indispensable in cyber security issues⁵⁸. Cooperation with international partners and the integration of national measures into European and international processes are essential for ensuring a high level of cyber security in Germany. As a holistic concept, the cybersecurity strategy is organised by six federal ministries and the representatives of the Länder, in addition to the Federal Chancellery and the Federal Foreign Office.

Thanks to the newly created **interoperability** of the "federal user account" (*Nutzerkonto Bund*), all user accounts will be technically adapted by the end of 2021 so that citizens can use digital administrative services of all administrative portals nationwide with the one account of their choice⁵⁹. With the "federal user account", the desired administrative services can be applied for easily and securely. After setting up the "Federal user account", the required personal data is conveniently transferred to a user account. This saves time and also facilitates the processing of an application. Registration and login are carried out in accordance with the requirements of the European Regulation on Electronic Identification and Trust Services (eIDAS-VO)⁶⁰. User accounts ensure the secure authentication of persons who use digital administrative services for themselves or on behalf of an

⁵⁷ <https://www.bmi.bund.de/SharedDocs/pressemitteilungen/DE/2021/09/cybersicherheitsstrategie-2021.html>

⁵⁸ <https://www.bundesregierung.de/breg-de/suche/neue-cybersicherheitsstrategie-1958144>

⁵⁹ <https://id.bund.de/de/eservice/konto>

⁶⁰ <https://www.bmi.bund.de/DE/themen/moderne-verwaltung/verwaltungsmodernisierung/portalverbund/portalverbund-node.html>

organisation. The higher the security level of an administrative service, the higher the requirements for the respective means of identification to be used. Possible means of identification include the user name/password combination and the online ID function of the identity card, the electronic residence permit and the eID card for EU citizens. In rural areas, this is of importance because you don't need to drive a few kilometres to meet the local administration service.

4. Challenges and opportunities

4.1. Barriers to digitalisation

This section presents a set of barriers to the digital transition in rural areas, agriculture, and forestry in Germany and reflects on the influence of COVID-19 (table 5).

In terms of **technology**, a major barrier to the digitalisation especially in rural areas of Germany is the lack of digital infrastructures in terms of high-speed grid-bound as well as cellular networks. This goes back to the fact that infrastructure development in Germany for a long time was concentrated on vectoring technology using the existing but especially in rural areas less reliant telecommunication infrastructures. Concerning cellular networks weak bandwidth and blind spots are, among others, related to the situation that licenses have been sold for high prices to telecommunications providers leaving them less means for the development of infrastructure development. COVID-19 has not directly influenced these barriers but clearly indicated the necessity of nationwide connectivity. Further barriers to the digital transformation refer to the German **economic** structure with a very powerful secondary sector of industrial production focussing very much on optimisation of existing concepts but less on innovation in the sense of new (digital) business models. This also refers to the reluctance of SMEs, which have a very important status in Germany, to adopt digital means of production. A third field, which holds important barriers to digitalisation, is the field of **education and training**. As we have mentioned multiple times in this report, the digitalisation of schools has been widely ignored by the German federal states in the past decades in terms of infrastructure (Internet access for schools), equipment and pedagogical concepts. On the one hand, COVID-19 has made this deficiency more visible than ever before, on the other hand, the result is an acceleration of related programmes and initiatives. But, also the public sector in Germany is characterised by low standards as well as competences concerning digital processes and skills. The result is a massively unequal distribution of **knowledge** and competences between public and private institutions. This becomes even more relevant in smaller rural administrations with less personnel and a lower degree of specialisation and differentiation of administrative labour. Especially the little and vague knowledge concerning the complex **legal** situation of data usage and protection in the public sector propels the contradictions of data potentials for public services, generation of profit in the private sector and data protection as well as sovereignty. Here, also **trust** is a central category. Citizens as well as businesses must be able to trust in information safety and that their data is protected against misuse⁶¹. Users and

⁶¹ https://www.bmwi.de/Redaktion/DE/Publikationen/Digitale-Welt/digitale-strategie-2025.pdf?__blob=publicationFile&v=8

consumers must be able to make sovereign decisions concerning the use of their data. **Data security and data sovereignty** are important pillars of democracy and at the same time a prerequisite for the acceptance and success of a data-driven economy. Without trustworthy and secure ICT infrastructures, the risk of losing competitiveness and future viability in Germany is high.

Table 5: Barriers to digitalisation

Barriers to digitalisation		Influence of COVID-19
Technical	Low connectivity in rural areas	More obvious due to Covid-19
	Focus on vectoring technology	No influence
Economic	Focus on optimisation instead of new (digital) business models	No influence
	Reluctance of SMEs to adopt digital means	No influence
	High costs of cellular licenses hinders infrastructure development	No influence
Training / Education	Lack of digital skills e.g. in the public sector	More obvious due to Covid-19
	Low standard of digitalisation in education (connectivity, equipment, concepts)	Much more obvious due to Covid-19
Knowledge	Lack of knowledge concerning data policies in the public sector	No influence
Legal	Conflict over data ownership and profitability	No influence
Trust	Lack of knowledge concerning data policies in the public sector	More obvious due to Covid-19
Structures	Small rural administrations with little budgets are overchallenged with the digital transformation	More obvious due to Covid-19

4.2. Actions to boost sustainable digitalisation

Table 6 lists ideas for actions that should guide the new generation of rural policies, which boost sustainable digitalisation of agriculture, forestry and rural areas in your country.

Table 6: Actions to boost sustainable digitalisation

	Key rural development domains			
	Human capital	Innovation	Investments	Governance
Creating the basic conditions for digitalisation	Ensuring basic skills, knowledge and acceptance	Supporting a climate for innovations	Expanding funding from pilot projects to diffusion	Making digital development a top priority
Anchoring digitalisation to sustainable development	Promoting relevance of digitalisation and social sustainability	Promoting relevance of digitalisation and technological sustainability	Promoting relevance of sustainability as baseline criteria for investment decisions	Promoting Digitalisation as tool instead of a redeemer
Adapting digitalisation to different contexts	Exploiting digital potentials of different target groups	Understanding the relevance of digital innovations in e.g. social or cultural sense	Digitalisation requires investments in various fields and contexts	Promoting multi contextual strategies and policies of digitalisation
Favouring digital inclusion	Considering marginalised groups	-	Promoting digital accessibility	
Developing digital ecosystems	Supporting individual autonomy in digital ecosystems	Recognising digital ecosystems as driver of innovations	Supporting provision of and participation in digital ecosystems	Ensuring productive regulation of digital ecosystems
Developing adaptive governance models	Promoting principles of agility	-	Considering openness and interoperability in investment decisions	Promoting agile policy models
Designing policy tools for sustainable digitalisation	Developing an understanding of both, digitalisation and sustainability	-	Engaging reflections the on sustainability of investments in digitalisation	Monitoring aspects of sustainability in digitalisation

5. Conclusions

The situation of rural digitalisation in Germany, just as the state of digitalisation in general, can be regarded contradictory. As we have shown in chapter 2, compared to other countries in Europe Germany ranks good or at least average in most digitalisation indicators. The mayor challenges can be seen in fields of digital education and infrastructure as well as public and administrative services. Shortcomings in the digitalisation of schools (connectivity and equipment as well as pedagogical concepts) are striking and have become relentlessly disclosed by COVID-19. Grid-bound, very high capacity internet connections and the coverage with cellular data networks are not yet fit for future due to an emphasis on vectoring and high costs for licenses of mobile networks, respectively. Here, a digital gap between urban and rural areas is obvious. And offers as well as the uptake of smart solutions in public services and eGovernment (two categories between which the separation in Germany is stronger than in other countries) are way below the European average. Again, this situation is much more severe in rural areas, since local administrations have way less capacities and expertise as compared to bigger urban units. While Germany is well situated referring to the development of digital technologies, research activities in future fields of innovation such as AI and the general level of education, the factors described above lead the conclusion that the country right now falls short of its potentials as Europe's most powerful national economy.

Those deficiencies, however, have not remained unnoticed. The past years are characterised by massive investments into digitalisation, both conceptually and financially. Firstly, against the background of the strong autonomy of the federal states the *DigitalPakt Schule* is an historically exceptional cooperation of Federation and states to improve the situation in schools. Secondly, the Federal Programme for the Gigabit Society has moved its focus from vectoring to fibre technology and the comprehensive provision of cellular networks. And the Online Access Act obliges all federal, state and municipal authorities to provide administrative services digitally for citizens and businesses by the end of 2022.

Next to those activities on the general federal level, a number of policies are explicitly focussing on rural areas. Here, the equality of living conditions in urban and rural parts of Germany is becoming a main principle. Concrete programmes are set up by the ministries of agriculture, interior affairs or economy. They are promoting topics such as smart cities and smart rural areas, the development of innovative services supporting local economic, social and cultural life, the production of food and the conservation of resources. Moreover, federal initiatives are complemented by policies on the level of federal states. This is also where EU funds for regional development increasingly are orienting towards topics of digitalisation.

On the level of results, positive as well as negative aspects must be mentioned. It can be recognised that the topic of digitalisation is increasingly understood as a stringent necessity. While this notion has developed in larger cities along with a growing number of smart city projects, rural areas have been

somewhat lagging behind. Here, a massive number of funding initiatives and lighthouse projects has positively contributed to the relevance of digitalisation.

But this has also led to the situation that currently one main challenge is to gain an overview of the vast funding options coming from the German Federation, the states and the EU. This especially applies to rural areas, where e.g. administrative units are small and less specialised. And not only funding structures but also the capacity to take action and get confronted with the challenges of digitalisation is rather limited on this level, which hinders development.

Hence, our main recommendations are as follows:

- to maintain funding and the development as well as the adaption of digital policies at a high level
- to improve the overview of the various sources of funding and means of support
- to make funding and other forms of support for conceptual development easily available
- to ensure the continuation of the results of pilot projects
- to transform the current focus on pilot and lighthouse projects to strategies of broader support

6. Annex

Table A.1: Policies influencing digitalisation in your country

Areas being addressed / supported by the policies	Policy	Brief Description	Objectives	Area of impact	Period of implementation	Budget (if any)	Public / Private	Address rural areas (Y/N)	Link
Rural access to technologies	Land.Digital	Funding of 61 innovative local pilot projects in rural areas within the Federal Programme for Rural Development (BULE). Funding of max. 200,000 euros is available for enterprises, associations, universities, municipalities and rural districts.	Permanent use and interconnection of information and communication technologies to solve rural problems	Rural areas	2017-2022	unclear	Public	Yes – all pilot projects are located in rural areas	https://www.bmel.de/DE/the-men/laendliche-regionen/digitales/land-digital/mud-land-digital.html;jsessionid=03CA5E69CB032577E2A8560FDB78E271.live842
Broadband, connectivity, affordability	Graue-Flecken-Förderprogramm	Within the Federal Funding Programme for Broad Band Internet the "Graue-Flecken-Programme" (<i>Grey-Spots-Programme</i>) adjusts its strategy for grid-bound infrastructure funding. Funding focusses on gigabit level, so that regions with less than 100 Mbit/s infrastructures can apply for funding.	Creation of a nationwide gigabit society through federal funding of infrastructure is not economically viable for the private sector, further emphasis is on hospitals, schools and commercial areas	Rural and Urban regions	2021-2025	12 billion euros	Public	No – not directly, but mayor regions can be specified as rural	https://www.bmvi.de/DE/The-men/Digitales/Breitbandausbau/Breitbandfoerderung/breitbandfoerderung.html
Creation of digital innovation ecosystems in or with influence in rural areas	Smarte.Land.Regionen	Pilot Project within the Federal Programme for Rural Development (BULE) funding the development of innovative services in seven rural districts in Germany. Based on a digital ecosystem approach a platform will be provided hosting software services which are developed in the participating pilot regions.	Improvement of living conditions in rural districts, based on digital strategies and pilot software development, development of competences and transfer of knowledge	Rural districts	2019-2024	25 million euros	Public	Yes - all projects are specified as rural districts	https://www.bmel.de/DE/the-men/laendliche-regionen/digitales/smarte-landregionen/mud-smarte-landregionen.html
New digital business models in rural areas, agriculture, and forestry	Land(auf)Schwung	Funded by the Federal Ministry of Food and Agriculture (BMEL), 13 selected rural areas received grants to autonomously define more than 500 projects which develop local Eco-nomic Value Added and improve public services.	Piloting of innovative forms of funding (regional budgets), development of structurally weak rural areas to support innovative business approaches and public services.	Structurally weak rural areas	2014-2020	34,2 million euros	Public	Yes - structurally weak rural areas	https://www.bmel.de/DE/the-men/laendliche-regionen/wirtschaft/landaufschwung.html
Funding of digitalisation (access to technologies, digital education, broadband access, etc.) in rural areas, agriculture, and forestry.	Heimat 2.0	Heimat 2.0 is a pilot initiative organised by the Federal Ministry of the Interior and financed by the Federal Programme of Rural Development (BULE). It aims to support 16 structurally weak rural areas with the development of innovative digital tools for public services.	Development of innovative software tools supporting and improving public services, supporting digital competences and transfer of knowledge and technology.	Structurally weak rural areas	2020-2024	unclear	Public	Yes - structurally weak rural areas	https://www.bbsr.bund.de/BBSR/DE/forschung/programm/region-gestalten/initiativen/2020/heimat-2-0/01-start.html
National rural development networks' initiatives	Deutsche Vernetzungsstelle Ländliche Räume	The German Networking Site Rural Areas is the German network responsible for connecting the 13 federal state EAFRD programmes.	Moderating and guiding topics for EAFRD funding, connecting rural actors, supporting LEADER regions, presenting information and best practices	Actors in the context of rural development	unclear	unclear	Public	Yes – purpose of the network	https://www.netzwerk-laendlicher-raum.de/impressum/

Digital Literacy and Digital Divide	Ernährungs-kompetenzen ausbauen – digital und unterwegs	Digital and target group specific information for nutrition competence	Improving nutritional as well as digital competence and digital knowledge transfer.	Nationwide	2018-	unclear	Public	No	https://www.digital-made-in.de/dmide/vorhaben/ernaehrungskompetenz-ausbauen-1793982
Open data, standardisation of data, data access, etc...	Open-Data-Strategie der Bundesregierung	The Federal Ministry of the Interior, Construction and Home Affairs adopted a new Open Data Strategy, which comprises 68 implementation measures by various ministries and subordinate authorities for the next five years.	The Federal Government's Open Data Strategy supports Improving data provision for an efficient and sustainable design of data infrastructures; Increasing innovative and responsible data use; Increasing data competence and establishing a new data culture in order to increase the quality and usability of the data provided.	Nationwide	2021-2026	-	Public	No	https://www.bmi.bund.de/SharedDocs/pressemitteilungen/DE/2021/07/open-data-strategie-der-bundesregierung.html
Cybersecurity	Cybersicherheitsstrategie für Deutschland 2021	The Federal Ministry of the Interior, for Building and the Home Affairs (BMI) adopted the "Cybersecurity Strategy for Germany 2021", providing the framework for cyber security for the next five years. The cyber security strategy focuses on society, economy, state, and EU/international aspects.	44 strategic goals with two newly added aspects: expansion of the Federal Office for Information Security (BSI) into a central agency and strengthening the digital sovereignty as well as the secure digitisation of Germany.	Nationwide	2021-2026	-	Public	No	https://www.bmi.bund.de/SharedDocs/pressemitteilungen/DE/2021/09/cybersicherheitsstrategie-2021.html

