



DIGITISATION: ECONOMIC AND SOCIAL IMPACTS IN RURAL

NATIONAL POLICY ANALYSIS

ITALY



DESIRA receives funding from the European Union's Horizon 2020 research and innovation programme

National Policy Analysis | Italy

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 Italy
Status	Draft / Final
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1. Executive Summary

The current context for digitalisation in Italy is characterised by a good level of connectivity and offer of digital public services in the majority of the territory, but by a low level of digital skills and a presence of ICT graduates and specialists well below the EU average. In the DESI index Italy ranks 25th out of 28 EU Member States in the 2020 edition of the Digital Economy and Society Index (DESI).

This situation may be also explained by the fact that Italian National Policies for digitalisation have been focused on a first time on connectivity and infrastructure development. Only in a second time (starting from 2019) the “Agenda Italia 2026” gave a specific focus on digital skills and development of public services.

The Italian National Digital Agenda has been defined for the first time in 2012 by several regulatory measures. In the same framework was created as specific tool to boost digitalisation in the country: the Agency for Digital Italy. The first version of the Agenda was developed on 2015 with the approval of two Strategic Plans on Digital Innovation: the Strategy for the digital growth 2014-2020 focusing on of modernisation and digital development of citizens and enterprises and the Italian Strategy for ultra-Broadband that focus on the infrastructure and in particular on filling the infrastructural gap of Italy with respect to the goals of the European Digital Agenda. In 2016 a new step was added related the procedures for the purchase of IT goods and services and connectivity from Public Administrations, in addition such law gives to the Italian Digital Agency the duty to develop an IT Plan for Public Administrations with a three years duration.

In this framework, in 2016 the National Plan “Enterprise 4.0” was launched as key instrument to support the digital transformation of Italian enterprises. Tax credits for investments in capital goods were among the most significant measures in the plan, and they have proved to be effective in stimulating investments. However, these measures were mainly used by medium and large enterprises and especially for investment in tangible, rather than intangible goods.

In order to complete the framework of the Italian National Policies on Digitalisation, it is important to consider also the large number of digital-related initiatives that the Italian Government put in place to deal with COVID-19 crisis. A specific package of measures was adopted in order to cope with the increase in the consumption of electronic communication services and of network traffic.

The main resources dedicated to digital transition in Italy are 6.71 billion euro for the development of ultrabroadband infrastructure and 6.74 billion euro for the digitalisation of public administrations. In addition to that, the 27% of the National Recovery and Resilience Plan (NRRP) have been devoted to support digital transition.

Even if there is not a specific pathway for rural and forest areas, there is an attention to small enterprises, small municipalities and areas with low access to services which are often located in rural and mountain areas. This is considered by the national strategy for Inner Areas, which is addressing regional policies in Italy in the last years. In addition to that, the CAP innovation measure, based on the development of Operational Groups often focused on innovations based on applications of



robotics to agriculture and precision agriculture technologies. Other political tools used in this sense are the intermediaries already present at local level since many years, such as the Local Action Groups (LAG) derived from the LEADER approach.

2. Introduction

Digitalisation in Italy is currently characterised by a good level of connectivity and offer of digital public services, beside the inner areas such as the mountain territory. However digital skills of citizens and ICT graduates and specialists are well below the EU average. This situation creates an unbalanced between the relatively high offer of services and the low take-up by citizens.

This context has been created also by the priorities identified since 2015 by National Policies for digitalisation which focused on a first phase on connectivity and infrastructure development and in a second one, starting from 2019, with the Agenda Italia 2026 which is addressing digital skills and development of public services. In general digitalisation policies in Italy have as priority the digitalisation of public administrations at all levels.

It is interesting to notice that a rights-based approach on Internet use has been adopted in Italy with the approval by the Parliament in 2015 of the National Declaration of people rights on Internet use.

The first basic conditions, the guarantee of internet access, has been addressed with the development of infrastructure to increase connectivity and ultra-broadband coverage at national level, moving from 21% of households in 2014 to 86% of households in 2019. However, the Next Generation Access (NGA) coverage still shows a clear difference between rural and total areas. While 90% of homes have HGA coverage in the whole country, only 42% of homes in rural areas and Inner areas are covered by NGA. Often the connection also in rural areas is better in habited centres than in sparse homes in larger rural or mountain areas and this create further divide also within rural areas for agricultural and forestry activities. However, the lack of data on the state of digitalisation in rural areas does not allow for an assessment of the specific level of digital-divide compared to urban areas in Italy (Brunori G. et al. 2021).

The second basic condition for digitalisation identified by the DESIRA RDF Briefing is the Human capital. This is a key target for Italian digitalisation policies and the intervention on human capital are addressing 4 different categories: (i) schools and Universities, (ii) active workers, (iii) IT specialists and graduate, (iv) citizens in general. Skills pathways to develop competences for accessing existing or planned digital infrastructure, understand and use resulting services are proposed for each category. Even if there is not a specific pathway for rural areas, there is an attention to small enterprises, small municipalities and areas with low access to services, which are often located in rural and forest areas. However, not specific attention is given to gender parity and co-design of new services and actions in

any category. The key idea is more to have a classical linear transfer of knowledge on digital tools to end users.

Finally, the third basic condition identified by DESIRA RDF Briefing, to give rural and forest areas the capacity to exploit economically their access to broadband and technologies, while the value created remains in local communities it is currently not directly addressed by national digitalisation policies. Regional administrations are responsible for the development of a network of intermediaries such as digital innovation hubs (DIH) and smart specialisation strategies (S3R) which provide guidelines on priorities for developing innovation at local level. The fab lab experiences are also developing since 2013 through local associations and private foundations activities. A specificity of Italy in this sense is the development of the first regional networks of fab lab as a result of Regional digital agenda of regional administrations such as Regione Emilia-Romagna, Regione Toscana, Regione Lazio, Regione Veneto, Municipality of Milano. The set up at local level of all such intermediate bodies just started, however in the next years, if well managed and connected to European larger networks, can help to develop local capacity to innovate and contribute to the co-design of new smart products and services.

Moving from digitalisation policies to other policies influencing the development of digitalisation in rural areas, agriculture and forestry, regional and cohesion policies play a key role in providing both guidelines and economic resources to make a digital transition to happen at local level. The national strategy for Inner Areas, which is addressing regional policies in Italy in the last years with a participatory process lead by local administration to identify local development agendas often include digitalisation interventions and has been identified as a case study for smart village strategy application. In addition to that, the CAP innovation measure, based on the development of Operational Groups often focused on innovations based on applications of robotics to agriculture and precision agriculture technologies. Other political tools used in this sense are the intermediaries already present at local level since many years, such as the Local Action Groups (LAG) derived from the LEADER approach.

Concerning economic resources, the current NRRP represented a key opportunity to boost digitalisation in Italy as 27% of the resources of the NRRP are related to digitalisation.

While there are several experiences and policy interventions addressing the agricultural sector, which have a direct impact on rural livelihood and some others more focused on monitoring of policy interventions (e.g. earth observation data to monitor CAP payments), there is not a specific attention on addressing sustainable development and societal challenges through digitalisation. The connection between rural and urban areas, the reduction of vulnerability of fragile environments, the improvement of local communities to anticipate environmental shocks and stresses are not directly addressed in Italian policies.

In the recommendation for the implementation of the future CAP national strategic plan, European Commission repeatedly remarked that the use of digital technologies and modern information and communication tools is still not widespread among agricultural and forestry companies in Italian rural areas. The development of digital technologies and tools tailored to the characteristics of various typologies of farms and farming systems is still at a research stage and did not reach the practical application. The existing experiences of digital technologies applied to agriculture are more related to experimentation in the use of standard tech solutions at local level. Smart Specialisation strategies at regional level could have a high potential in addressing this issue as they are strongly focusing on robotisation of agricultural sector.

Also, the Digital public services dimension of the DESI indicator shows that only 32% of Italian online users engage actively with e-government services (compared with the EU average of 67%). This figure even decreased between 2018 and 2019. Overall, the acceleration seen in 2019 in implementing key e-government projects may make up for the delays accumulated over previous years and bring Italy closer to the targets. In this regard, the Italian portal “advancement” set by the “Agency for Digital Italy” shows data on digital public services periodically updated (from weekly to half yearly updated). Here below the main findings regarding the main digital public services domains.

3. Context for (rural) digitalisation

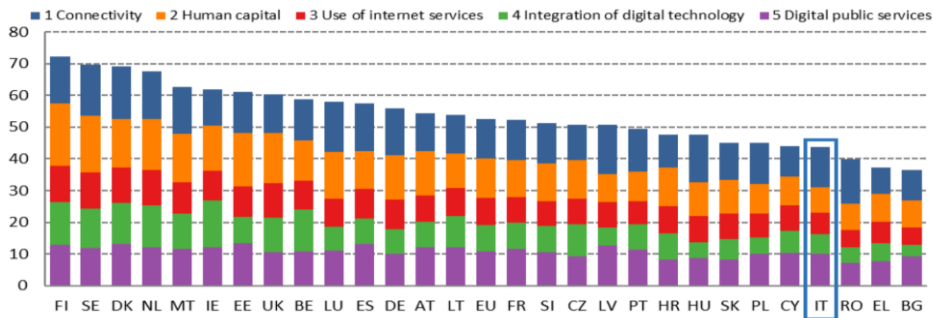
3.1. Current context for digitalisation

The current context for digitalisation in Italy is characterised by a good level of connectivity and offer of digital public services, but by a low level of digital skills and a presence of ICT graduates and specialists well below the EU average (Fig 1).

This context creates an unbalance between the relatively high offer of services and the low take-up by citizens. The same dynamics can be observed for enterprises: Italian enterprises lag behind in the use of technologies such as cloud and big data and in the uptake of e-commerce, with a direct effect on digitisation of business. The cost of Broadband in Italy is lower than the EU average.

In the 2020 DESI (Digital Economy and Society Index) Italy ranks 25th out of 28 EU Member States.

Figure 1: Digital Economy and Society Index (DESI) 2020 ranking



This not encouraging position is linked above all to the human component of the indicator used in the European Digitisation Report (DESI, 2020), as shown in Figure 2. On the other hand, data prior to the pandemic shows that Italy has a good ranking in terms of 5G preparedness, as all the pioneer bands were assigned and the first commercial services were launched. Due to this context, in 2019 the Italian Government focused on Digitalisation Policies and approved several actions and priorities that will be presented in the next section of this report.

Figure 2: DESI 2020: relative performance by dimension and evolution over time

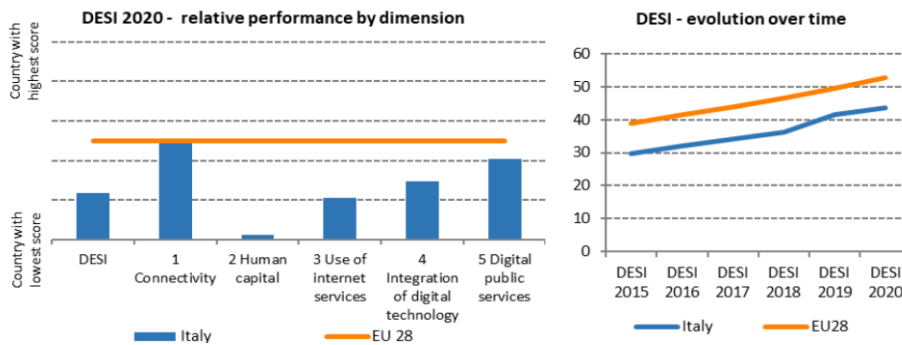


Fig. 2 shows that the DESI index of Italy has gradually improved in the last 5 years and confirms that connectivity and digital public services are the aspects with higher scores; while the low score of human capital has a direct effect on the use of internet services.

Regarding Connectivity, with an overall connectivity score of 50.0, Italy ranks 17th among EU countries (all the indicators of this DESI domain and their evolution are reported on the following table (Tab. 1) Moreover, it has to be noticed that from 2014 to 2019 the coverage of fast broadband (NGA) in Italy had a big boost (from 21 to 89% of households) while in the same period the European average went from 62 to 86% of families. For the penetration of broadband Italy is therefore in 18th place at European level. Italy is very advanced on 5G, ranking third at EU level, but it is less strong in the deployment of Very High Capacity Networks (VHCN) where it has a coverage of 30%, lower than the EU average of 44%.

Overall fixed take-up increased by one percentage point compared to 2018. Mobile broadband take-up (89 subscriptions per 100 people) remained stable in comparison to 2018. The at least 100 Mbps

fixed broadband take-up increased from 9% in 2018 to 13% in 2019. The Next Generation Access (NGA) coverage still shows a clear difference between rural and total areas. While 90% of homes have NGA coverage in the whole country, only 42% of homes in rural areas are covered by NGA.

Table 1: Dimension “Connectivity” of the Italian DESI indicator

	Italy			EU
	DESI 2018	DESI 2019	DESI 2020	DESI 2020
	value	value	value	value
1a1 Overall fixed broadband take-up	57%	60%	61%	78%
% households	2017	2018	2019	2019
1a2 At least 100 Mbps fixed broadband take-up	5%	9%	13%	26%
% households	2017	2018	2019	2019
1b1 Fast broadband (NGA) coverage	87%	88%	89%	86%
% households	2017	2018	2019	2019
1b2 Fixed Very High Capacity Network (VHCN) coverage	22%	24%	30%	44%
% households	2017	2018	2019	2019
1c1 4G coverage	91%	97%	97%	96%
% households (average of operators)	2017	2018	2019	2019
1c2 Mobile broadband take-up	86	89	89	100
Subscriptions per 100 people	2017	2018	2019	2019
1c3 5G readiness	NA	60%	60%	21%
Assigned spectrum as a % of total harmonised 5G spectrum		2019	2020	2020
1d1 Broadband price index	NA	NA	73	64
Score (0 to 100)			2019	2019

This could represent an important divide in terms of connectivity for rural areas but lack of data on the state of digitisation in rural areas that does not allow for an assessment specifies the level of digital-divide compared to urban areas in Italy (Brunori G. et al, 2021).

With regard to the Human Capital, the related DESI indicator (see Tab. 2) is the one that marks the worst performance being Italy ranked last (in 2019, Italy dropped two places). All the indicators included in this dimension are characterised for a general backwardness compared to other European countries. In fact, Italy ranks low as only 42% of people aged 16-74 years have at least basic digital skills, compared to the EU average of 58% in the same age range. ICT specialists in Italy are increasing, and reached 2.8% of total employment in 2020, which is still below the EU average of 3.9%. Only 1% of Italian graduates are ICT graduates, the lowest in EU and concerning gender, female ICT specialists are 1% of the total female employees. Gender analysis could be detailed with the “Women in Digital Scoreboard 2020” (WiD) monitoring women’s participation in the digital economy. The WiD scoreboard is a part of the Digital Economy and Society Index DESI and it assesses Member States’ performance in the areas of “internet use”, “internet user skills” as well as “specialist skills and employment” based on 12 indicators. Within this indicator, Italy ranks 25th with a score of 40.7 (EU average is 54.5). Use of internet and internet user are the worst domains (Italy ranks respectively 25th and 26th); for the “specialist skills and employment” domain, Italy ranks 18th.

Table 2: Dimension “Human Capital” of the Italian DESI indicator

	Italy			EU
	DESI 2018	DESI 2019	DESI 2020	DESI 2020
	value	value	value	value
2a1 At least basic digital skills	NA	NA	42%	58%
% individuals	2017	2017	2019	2019
2a2 Above basic digital skills	NA	NA	22%	33%
% individuals	2017	2017	2019	2019
2a3 At least basic software skills	NA	NA	45%	61%
% individuals	2017	2017	2019	2019
2b1 ICT specialists	2.6%	2.6%	2.8%	3.9%
% total employment	2016	2017	2018	2018
2b2 Female ICT specialists	0.9%	1.0%	1.0%	1.4%
% female employment	2016	2017	2018	2018
2b3 ICT graduates	NA	1.0%	1.0%	3.6%
% graduates	2015	2016	2017	2017

The third DESI dimension (use of the internet services) remained overall stable over the last year (Italy ranks 26°) showing that only 74% of Italians are regular internet users and 17% of people living in Italy have still never used the internet, which is double of the EU average. In effect, the Use of Internet services in Italy remains well below the EU average: its ranking remained the same as in the previous report, 26th out of 28 Member States. None of the online activities monitored scored above the EU average, except for video calls, used by 65% of internet users (above the EU average of 60%). This is the only activity that increased significantly since the previous year (from 47% in 2018). Other popular online activities in Italy are listening to music, watching videos or playing games, reading news and using social networks.

Table 3: Dimension “Use of the internet services” of the Italian DESI indicator

	Italy			EU
	DESI 2018	DESI 2019	DESI 2020	DESI 2020
	value	value	value	value
3a1 People who have never used the internet	22%	19%	17%	9%
% individuals	2017	2018	2019	2019
3a2 Internet users	69%	72%	74%	85%
% individuals	2017	2018	2019	2019
3b1 News	56%	56%	58%	72%
% internet users	2017	2017	2019	2019
3b2 Music, videos and games	79%	79%	79%	81%
% internet users	2016	2018	2018	2018
3b3 Video on demand	15%	23%	23%	31%
% internet users	2016	2018	2018	2018
3b4 Video calls	39%	47%	65%	60%
% internet users	2017	2018	2019	2019
3b5 Social networks	61%	63%	56%	65%
% internet users	2017	2018	2019	2019
3b6 Doing an online course	8%	8%	9%	11%
% internet users	2017	2017	2019	2019
3c1 Banking	43%	46%	48%	66%
% internet users	2017	2018	2019	2019
3c2 Shopping	44%	47%	49%	71%
% internet users	2017	2018	2019	2019
3c3 Selling online	11%	11%	11%	23%
% internet users	2017	2018	2019	2019

However, considering the index NRI, Italy performs particularly well in the indicator called “Rural gap in use of digital payments”. This indicator refers to the share of, respectively, the rural population and the total population that made or received digital payments in the last 12 months in a country. Making a digital payment include “using mobile money, a debit or credit card, or a mobile phone to make a payment from an account, or report using the Internet to pay bills or to buy something online.” Receiving a digital payment includes receiving money “directly from or into a financial institution account or through a mobile money account.” Scores are calculated as the ratio of the share related to the rural population over the share related to the total population.

With regards to the Integration of digital technology (Tab.4) Italy ranks 22nd. There has been almost no progress on the above indicators, except for the use of social media. The percentage of enterprises using social media increased to 22% (close to the EU average of 25%). The use of cloud services is integrated by 15% of Italian enterprises, remaining stable and just below the EU average (18%). Despite a decrease between 2017 and 2019, the use of electronic information sharing remains higher among Italian enterprises than the EU average (35% of Italian enterprises, against the EU average of 34%).

The gap between Italy and the EU is widening regarding e-commerce: in fact, only 10% of Italian SMEs sell online (EU average is 18%).

Table 4: Dimension “Integration of digital technology” of the Italian DESI indicator

	Italy			EU
	DESI 2018	DESI 2019	DESI 2020	DESI 2020
	value	value	value	value
4a1 Electronic information sharing	37%	37%	35%	34%
% enterprises	2017	2017	2019	2019
4a2 Social media	17%	17%	22%	25%
% enterprises	2017	2017	2019	2019
4a3 Big data	9%	7%	7%	12%
% enterprises	2016	2018	2018	2018
4a4 Cloud	NA	15%	15%	18%
% enterprises	2017	2018	2018	2018
4b1 SMEs selling online	8%	10%	10%	18%
% SMEs	2017	2018	2019	2019
4b2 e-Commerce turnover	6%	8%	8%	11%
% SME turnover	2017	2018	2019	2019
4b3 Selling online cross-border	6%	6%	6%	8%
% SMEs	2017	2017	2019	2019

Also, the Digital public services dimension (Tab. 5) is below the EU average (Italy ranks 19th) even though Italy performs well regarding the offer of digital services and open data. Italy outperforms the EU on online service completion, digital public services for businesses and open data. The low overall ranking of the country is due to the low level of online interaction between public authorities and the general public. Only 32% of Italian online users engage actively with e-government services (compared with the EU average of 67%). This figure even decreased between 2018 and 2019. Overall, the acceleration seen in 2019 in implementing key e-government projects may make up for the delays accumulated over previous years and bring Italy closer to the targets.

Table 5: Dimension “Digital public services” of the Italian DESI indicator

	Italy			EU
	DESI 2018	DESI 2019	DESI 2020	DESI 2020
	value	value	value	value
5a1 e-Government users	30%	37%	32%	67%
% internet users needing to submit forms	2017	2018	2019	2019
5a2 Pre-filled forms	33	48	48	59
Score (0 to 100)	2017	2018	2019	2019
5a3 Online service completion	89	91	92	90
Score (0 to 100)	2017	2018	2019	2019
5a4 Digital public services for businesses	81	82	94	88
Score (0 to 100) - including domestic and cross-border	2017	2018	2019	2019
5a5 Open data	NA	NA	77%	66%
% of maximum score			2019	2019

Concerning other aspects of the NRI (Networked Readiness) index, Italy is more or less in line with what would be expected given its income level. Italy ranks 32nd out of 134 economies included in the NRI 2020 and 23rd within Europe. Italy is strong on Future Technologies, SDG contribution and Inclusion, while is low in quality of life, Individuals and Access sub-pillars. In fact, Italy features in the top quartile in three of the four pillars, with its best performance in the dimension related to Impact (28th). More specifically, the positive impact of ICTs is driven by a strong SDG Contribution (21st), especially as it pertains to well-being and sustainability, and—to a lesser extent—by the country’s advanced, high-tech Economy (30th). Quality of Life (42nd) is more disappointing, however, primarily because of a lack of opportunities to make life choices. Italy’s second best-performing pillar is Technology (30th), which is primarily due to its adoption of Future Technologies (21st), including robotics. Although ICTs are pretty affordable, Access (45th) to digital technologies is the country’s lowest-ranked sub-pillar because of disappointing Internet access and capacity. Italy has one of the world’s best ICT regulatory environments, but Regulation (39th) is its lowest-ranked dimension in the Governance (33rd) pillar, partly because the general regulatory quality is weaker and regulation could be better adapted to new technologies. The only pillar where Italy is outside the top quartile is People (36th), with mediocre results in all three sub-pillars (Individuals, 44th; Businesses, 37th; Government, 36th).

4. Policy framework for (rural) digitalisation

4.1. European Digital Policies

Europe is looking to the future of digitisation, aware of its strengths and the challenges ahead.

Europe already has the world's most advanced systems of welfare State that can provide solutions to societal challenges around the world. Social protection systems will nevertheless need to be significantly modernised to remain affordable and to keep pace with new demographic and work-life realities.

This is doubly important as Europe gets to grips with a profound digitisation of society which is already blurring the lines between workers and self-employed, goods and services, or consumers and producers. Many of today's jobs did not exist a decade ago. Many more will emerge in the years ahead. It is likely that most children entering primary school today will end up working in new job types that do not yet exist. The challenges of increased use of technology and automation will affect all jobs and industries. Making the most of the new opportunities whilst mitigating any negative impact will require a massive investment in skills and a major rethink of education and lifelong learning systems. It will also call for the roll-out of new social rights to accompany the changing world of work.

In just a year, the COVID-19 pandemic has radically changed the role and perception of digitalisation in our societies and economies, and accelerated its pace. Digital technologies are now imperative for working, learning, entertaining, socialising, shopping, and accessing everything from health services to culture. It has also shown the decisive role that disruptive innovation can play. The pandemic has also exposed the vulnerabilities of our digital space, its dependencies on non-European technologies, and the impact of disinformation on our democratic societies.

In the light of these challenges, our stated ambition is more relevant than ever: to pursue digital policies that empower people and businesses to seize a human centred, sustainable and more prosperous digital future.

Europe will have to build on its strengths – an open and competitive single market, strong rules embedding European values, being an assertive player in fair and rule-based international trade, its solid industrial base, highly-skilled citizens and a robust civil society.

At the same time, it needs to carefully assess and address any strategic weaknesses, vulnerabilities and high-risk dependencies which put at risk the attainment of its ambitions and will need to accelerate associated investment.

That is the way for Europe to be digitally sovereign in an interconnected world by building and deploying technological capabilities in a way that empowers people and businesses to seize the potential of the digital transformation, and helps build a healthier and greener society.

In the State of the Union Address in September 2020, President von der Leyen announced that Europe should secure digital sovereignty with a common vision of the EU in 2030, based on clear goals and principles. The President put special emphasis on a European Cloud, leadership in ethical artificial intelligence, a secure digital identity for all, and vastly improved data, supercomputer and connectivity infrastructures. In response, the European Council invited the Commission to present a comprehensive Digital Compass by March 2021, setting out digital ambitions for 2030, establishing a monitoring system and outlining key milestones and the means of achieving these ambitions.

The Commission is determined to make this decade the European "digital decade". Europe must now strengthen its digital sovereignty and set standards, rather than following those of other countries, with a clear focus on data, technology and infrastructure. Since 2014, the Commission has undertaken a number of initiatives to facilitate the development of an agile data-based economy, such as:

- the Regulation on the free movement of non-personal data
- the Cyber Security Regulation
- the Open Data Directive
- the General Data Protection Regulation.

In 2018, the Commission presented for the first time an IA strategy and agreed on a coordinated plan with Member States. In April 2019, the High-Level Panel on Artificial Intelligence presented ethical guidelines for a reliable AI, based on the AI framework presented on 19 February 2020.

In her policy guidelines, Commission President Ursula von der Leyen stressed the need to lead the transition to a healthy planet and a new digital world. In this context he announced the start of the debate on an anthropocentric and ethical artificial intelligence and on the use of big data for the creation of wealth in favor of companies and enterprises during his first 100 days in office.

With regard to the Connecting Europe 2 instrument, we have the following objectives.

- It establishes the Connecting Europe Facility (CEF) which supports projects of common interest (that is, of EU interest as a whole) for infrastructure in the fields of:
 - transport;
 - telecommunications; and
 - energy.
- Its ultimate aim is to accelerate investment in the trans-European networks and to stimulate funding from the public and private sectors.
- It also sets out the amount of money to be made available from 2014 until 2020 and for which areas.

The European Commission sees the creation of efficient transport networks and energy infrastructure as a key tool to stimulate growth and strengthen confidence in the EU single market.

In particular, the CEF will support projects aiming at developing and building new infrastructure and services or improving existing infrastructure and services. One of its general objectives is to contribute to economic growth through the development of modern, high-efficiency trans-European networks, considering future traffic flows.

Another general objective of the CEF is to enable the EU to achieve its sustainable development objectives (a 20% reduction in greenhouse gas emissions compared to 1990 levels, a 20% improvement in energy efficiency and a 20% increase in renewable energy by 2020).

The total budget of the CEF for the period 2014-2020 is approximately EUR 33 billion. The amount is broken down as follows:

- some EUR 26 billion for transport;
- some EUR 1 billion for telecommunications; and
- some EUR 6 billion for the energy sector.

4.2. National Policies boosting digitalisation

4.2.1. National Digital Agenda or similar strategies

The national policies on digitalisation in Italy had two important phases of development: a first one more focused on connectivity and infrastructure development and a second one, more recent, started in 2019, with a strong focus on digital skills and development of public services.

The Italian National Digital Agenda has been defined for the first time in 2012 by several regulatory measures (D.L. n. 5/2012 converted from L. n. 35/2012, D.L. n. 83/2012 converted from L. n. 134/2012 e D.L. n. 179/2012 converted from L. n. 221/2012). In the same framework the Agency for Digital Italy was created as specific tool to boost digitalisation in the country. The first version of the Agenda was developed on the 3rd of March 2015 with the approval of two Strategic Plans on Digital Innovation:

- Strategy for the digital growth 2014-2020, that focus on the need of modernisation and digital development of citizens and enterprises.
- Italian Strategy for ultra-Broadband, that focus on the infrastructure and in particular on filling the infrastructural gap of Italy with respect to the goals of the European Digital Agenda.

In 2016, with the stability law n.208/2015, a new step was added related the procedures for the purchase of IT goods and services and connectivity from Public Administrations, in addition such law gives to the Italian Digital Agency the duty to develop an IT Plan for Public Administrations with a three years duration. Since 2017 Italy had three triennial IT Plans: 2017-2019/2019-2021/2020-2022 which identify the most relevant objectives for the development of the digital agenda. In 2017, with the law

232/2016 was set up the fund to insure economic resources for investments and infrastructural development of the Country for the period 2017-2032.

In 2019 a new Ministry of Technologies was created in Italy, re-named Ministry of Digital transition and Innovation by the current government. This was a key action to communicate the focus at political level on boosting digitalisation of the Italian Economy and Society. The new Ministry coordinates several initiatives, first at all the launch in December 2019 of the strategy “Italia 2026” which is a five-year plan that puts digitalisation and innovation at the centre of a “process for the structural and radical transformation of the country”. Most of the priorities emerged in the previous paragraph as context for digitalisation have been addressed by specific initiatives, with a focus on enhancing human capital.

The main resources dedicated to digital transition in Italy are 6.71 billion euro for the development of ultrabroadband infrastructure and 6.74 billion euro for the digitalisation of public administrations. In addition to that, the 27% of the Italian NRRF have been devoted to support digital transition.

The strategy Italia 2026 has the following objectives:

1. Spreading **digital identity**, ensuring that it is used by 70% of the population;
2. Bridging the **digital skills** gap, with at least 70% of the population being digitally capable;
3. Bring about 75% of Italian PAs to use **cloud services**;
4. Reach at least 80% of essential public services provided online;
5. Reach, in collaboration with the Mise, 100% of Italian families and businesses **with ultra-broadband networks**.

Digitisation of the private sector is related to the National Plan for Industrial development “Transition 4.0”, which have a stronger focus on innovation, green investment and participation of SMEs to industrial development of the country. Investments in innovative enterprises can be supported by National Innovation Fund, launched in March 2020 with an initial budget of 1 billion euro and operating on the basis of Venture Capital methodologies, using tax credits to stimulate investments. In the budget law 2020 the Ministry for Economic Development (MISE) allocated €7 billion to such plan, adopting a multi-annual planning approach to provide enterprises with a stable scenario. The changes recently introduced in the industrial policy of the country are expected to facilitate SMEs access to tax credits for research, development and innovation and to increase the number of beneficiary firms.

In this framework, in 2016 the National Plan “Enterprise 4.0” was launched as key instrument to support the digital transformation of Italian enterprises. Tax credits for investments in capital goods

were among the most significant measures in the plan, and they have proved to be effective in stimulating investments. However, these measures were mainly used by medium and large enterprises and especially for investment in tangible, rather than intangible goods.

In order to complete the framework of the Italian National Policies on Digitalisation, it is important to consider also the large number of digital-related initiatives that the Italian Government put in place to deal with COVID-19 crisis. A specific package of measures was adopted in order to cope with the increase in the consumption of electronic communication services and of network traffic. Particular attention was put on hospitals and schools. While hospitals have been provided of free Wi-Fi connection, schools were supported in the adoption of digital instruments and platforms, in the provision of devices to less well-off students and on the access of ultrafast connections and related services. Simplified procurement measures were introduced to facilitate the purchase of IT goods and services by public administrations.

In addition to that, in 2019, as part of the project WiFi Italia.it, managed by the Ministry of Economic Development, the Italian Government launched the “Piazza Italia WiFi” project. With a dedicated fund of € 45 million, this involved installing new public Wi-Fi hotspots, extending the previous intervention aimed primarily at small municipalities (with fewer than 2.000 inhabitants) and to the municipalities affected by the 2016 earthquake. At the beginning of October 2021, 3579 municipalities had joined the project and the authorities launched the procedure for installing the Wi-Fi hotspot in 2243 of them.

Concerning connectivity, in 2019 Italy completed Phase I of the ultra-broadband Italian plan for white areas. The next phase is ongoing, but it risks some delays due to the difficulty in accessing existing infrastructure and obtaining permits. According to the Italian authorities, in mid-April 2020, work had begun in over 2,600 municipalities and the infrastructure has been completed in 600 municipalities. Italy is considering further measures as part of a Phase II of the Italian Broadband plan. In addition to the National Agenda for Digital Italy, Italia 2026, there are other specific strategies developed in order to support digital transformation of the country. The National Strategy for Artificial Intelligence (AI) has been published in July 2020, developed by a group of experts identified by the Ministry of economic development. The same process, identification of expert and development of a national strategy has been followed for Blockchains, in this case one of the most important application identified is the one of traceability for the agri-food sector, which could have a direct impact on agricultural production.

4.2.2. Other policies and strategies influencing (rural) digitalisation

The national policies on digitalisation are not recognising a specific role to rural areas, however there is an attention to small enterprises, small municipalities and areas with low access to services which

are often located in rural areas. In addition to that, there are specific policy interventions which are addressing the agricultural sector with a direct impact on rural areas livelihood.

In addition to that, it is interesting to notice that in 2015 the Italian “Camera dei Deputati” approved the [Declaration for the rights of people in Internet](#). This is a non-binding document which identifies in 14 articles the basic right of people for digitalisation. Access to internet is at the art-2 and this recognition can be important for marginal and rural areas in order to support a request for access to ultra-broadband. It could be an interesting tool for local administration in asking the support to further develop digitalisation in rural areas.

Concerning resources, currently in Italy there is a high attention to the resources of the National Recovery and Resilience Plan (NRRP). As already said, the 27% of the resources of the Plan are devoted to investments supporting digital transition.

The Ministry of Agriculture, Food and Forestry dedicated specific resources to the re-design of the national database of agricultural plot (SIAN) making this integrated with the ones on Earth Observation in order to improve the monitoring of agricultural practices at national level. The collection of demand from individual farmers for economic support has been already digitalised and is done with electronic forms since several years. However, the database could be improved with the application of available technologies that allow to increase security and interoperability of data. This project can have an impact on the capacity of central administration to monitor rural areas remotely.

Another interesting project of the Ministry of Agriculture is related to the modernisation of machineries on the farms in order to enhance the Agriculture 4.0 approach and the application of precision farming and the enhancement of the logistics of the agri-food sector through the use of technologies to innovate the production process and the traceability such as blockchains, AI and RFID technologies. This investment is included in the NRRP with an amount of resources of 500 million € to be spent between 2021-2025. Buying new tractors to farmers, will make all the farmer beneficiary of this measure entering on the market of Agriculture of Data. The challenge for the government will be to regulate the use of such data from the companies selling the tractors.

Irrigation systems are also key for the development of the agricultural sector and rural areas. The NRRP devoted an amount of 880 million € to make the availability of water for irrigation more constant, increasing the resilience of the agro-ecosystem to climate change and waves of drought. By converting one third of current irrigation systems to other more efficient systems using innovative technologies, it is expected not only to improve water management and reduce losses, but also to tackle illegal water abstraction in rural areas.

Considering the specific issues related to the Italian DESIRA Living Lab, we should notice that the NRRP is also funding ordinary land management in order to reduce hydrogeological risks, which have a direct impact on rural areas.

Finally, it should be considered that the Italian regional policies 2014-2020 have been based on the National Strategy for the development of Inner areas which had a specific focus on improving the access to public services, with a smart villages approach. The development of digital public services is even more relevant in areas where public services are not always available at a reasonable distance.

In this framework the policies developing digital identity, digital payments and digital public services are of particular relevance in rural areas and for farmers which often have difficulties to move from their own farm in order to access basic services.

Table 6: National Policies

Ministry Authority /	Policy	Objective	Expected Impact
Camera dei Deputati	Declaration of rights in Internet	Identify the basic rights of people in Internet	Approved in 2015 is not a binding document but gives guidelines for public administration
Agency for digital Italy	Pago PA	Payment system for payments to public administrations	Facilitate the payments from citizens to the public administration
Agency for digital Italy	SPID	Digital identity to access public services online	Facilitate the access of citizens to digital public services
Agency for digital Italy	Digital General Register of resident population	Register all population residents in the country	DPR 17 luglio 2015, n. 126 Integration of data on the population from different local administration
Ministry of Agriculture, Food and Forestry	Digitisation of the identification of agricultural parcels of the national territory (SIPA)	Facilitate the process of farmers in providing information about their fields and plots in order to make demand for economic aid from the government	Approved in February 2021
Ministry of Agriculture, Food and Forestry	Digitalisation and re-design of National agriculture information system (SIAN)	Integrate information on Agricultural production from farms all over the country	To be funded with resources of the PNRR 2021
Ministry of Justice	Computerisation of the judicial administration	Telematic Civil Process Digital Criminal Register	A specific fund set up in 2017 foresees the availability of 1.246.603.932,00 euro in the period 2017-2032

		Digitalisation of documents and notifications	The fund has been renewed in national budget laws 2018, 2019, 2020 and 2021.
Ministry of foreign affair	Creation of the Italian Agency for cybersecurity (PNRR resources)	Increase the cybersecurity of the Public administration	DI 82/2021 of 4/08/2021 620 million euro from PNRR 527 million between 2021-2027 managed by the Ministry of Economics

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

Enhancing digital skills is a key objective of the Italian National Policies on digitalisation. A specific strategy has been developed and approved in August 2020 by the Ministry of Innovation and Technology: the **National Strategy for Digital Skills**. The main aim is to develop multisectoral, coherent and effective interventions on an area which is considered fundamental for the Country Economic Development. The strategy has 4 axes: (1) **Higher Education and Training** - for the development of e-skills for young people within the mandatory education cycles; the initiative is coordinated by the Ministry of Education (MI) and the Ministry of University and Research (MUR). (2) **Active workforce**: - to ensure adequate e-skills in both the private and public sectors, including e-leadership skills; the initiative is coordinated by the Ministry of Economic Development (MISE) and Minister for Public Administration (MIPA). (3) **ICT specialist Skills**: - to enhance the country's ability to develop skills for new markets and new jobs, with a specific focus on emerging technologies and key competencies for future jobs; the initiative is coordinated by the Ministry of University and Research (MUR) and the Ministry of Economic Development (MISE). (4) **Citizens**: - to develop the digital skills needed to exercise citizenship rights and promote active participation in the democratic life; the initiative is under the coordination of the Minister for Technological Innovation and Digitisation (MID).

The main goal is to eliminate the existing gap with other EU countries and reduce the gap among different areas within the country. An operational plan of the National Strategy for Digital Skills has been published in December 2020. Both the Strategy and the Operational Plan are periodically updated based on the changing context and effectiveness of the actions undertaken. In the NRRP approved in 2021, there are 190.000.000 euro to be used by 2025 in order to enhance digital skills, plus additional resources (489.900.000 euro) for training of public administration workers on digitalisation. The table that follows include some activities that have been set up by different ministries in order to enhance digital skills in different contexts.

Table 7: Programmes and initiatives addressing digital literacy and digital divide. (*) International, National, Regional or Local

Initiative	Objective	Key words	Period	Area of impact	Link	Public / Private	Scale of action *	Rural / General
National Plan for Digital Schools- Piano Nazionale Scuola Digitale — PNSD.	To answer to the call for a long-term vision for Education in the digital age directly linked to the challenges that all of society faces in applying and promoting life-long and life-wide learning, in both formal and non-formal contexts.	Education, school,		Italy	https://www.istruzione.it/scuola_digitale/index.shtml	Public	National	General
National Plan 'Enterprise 4.0'	Improving digitalisation in Italian enterprises	Tax credit for 'Training 4.0'.	2018 and extended it to 2020 and 2021	Italy	https://www.mise.gov.it/index.php/it/transizione40	Public	National	General
ITS 4.0' project	To strengthen post-secondary technical education and vocational training institutes.	Training, 3D printing, virtual reality and big data. Including ITSs among the institutes that can provide 'Training 4.0' under the tax credit scheme.	From 2019	Italy	https://www.its40.it/wp/	Public	National	General
Italia 2025 Digital Republic	To build an alliance between public and private organisations and citizens, and invite them to take concrete action to promote digital skills. It also includes a project to provide senior citizens, especially those living in small and isolated towns, with a tablet and assistance by volunteers	Basic digital skills, promotion of upskilling and reskilling of the workforce; developing ICT and emerging technologies skills.	2019-2024	Italy	https://innovazione.gov.it/progetti/repubblica-digitale/	Public	National	General
Digital Civil Services	To promote the role of young people as digital facilitators for digital inclusion of the whole population.	Digital skills, citizens, young people	From 2020	Italy	https://innovazione.gov.it/notizie/comunicati-stampa/nasce-il-servizio-civile-digitale-firmato-protocollo-intesa/	Public	National	General

4.2.4. Policies and strategies that incentivise digital innovations

Several regional and innovation policies are playing a key role to incentivise digital innovation in Italy.

In particular the Strategy of Inner Areas, developed in 2012 with the aim of addressing regional policies for the period 2014-2020 has been identified at EU level as an interesting case study of national policies applying a smart villages approach. The Strategy for Inner Areas is one of the most comprehensive and integrated strategies for tackling the problems of depopulation and low access to services in Europe. All four European Structural and Investment Funds are combined with national finance to support strategies for both local development and service innovation in 72 pilot areas. A targeted investment of around 1 billion EUR is planned, using a 'place-based approach' which brings together different sectors and levels of government. Associations of mayors are usually in the driving seat while LEADER Local Action Groups can play a variety of roles, ranging from supporting project design to implementing directly EAFRD measures in the area.

LEADER is an interesting bottom-up processes of connecting farmers, rural business, local organisation, public authorities and individuals from different sectors to form a local action group (LAGs). This method has been extended under the broader term Community-Led Local Development (CLLD) to other ESI Funds. As LAGs prepare their own local development strategies and manage their respective budgets, they can represent important tools to discuss possible scenario development for digitalisation

In the framework of the European Innovation Partnership on "Agricultural production and Sustainability", integrated within the CAP, the creation of Operational Groups is another interesting tools to develop multi-actor innovation networks. In Italy Operational Groups (OG) are funded by the Regional RDP programs (FEASR). As of now, 52 OG on Precision Farming and 14 on Robotics/automation have been funded with around 25 Mio euro (that is, on average, 400k euro for each OG) by 11 Regional Administration in Italy.

Another interesting phenomenon that has been observed in Italy is the one of the developments of regional fab lab networks in the framework of digital manufacture. Fab Labs represent a practice of innovation that affects the transformation of models of learning and continuous training, of generational interaction, professionalisation, and production. Each FabLab is open to the territory by offering free services with the main objective of spreading culture on a very young, unstructured and rapidly evolving domain of knowledge (the movement of makers and the through of "Do it Yourself). Schools, Universities, Design institutes, Art have the opportunity to have a space for innovation and



knowledge sharing. The creation of regional networks in Regione Emilia Romagna, Regione Veneto, Comune di Milano, Regione Toscana, Regione Lazio allow to have such innovation labs located also in rural areas and some of them are start focusing on agri-food innovation such as the Fab Lab of Bracciano, in Lazio Region which focus on agri-food and food innovation.

On top of all such initiatives, we can find the resources to enable the digital transition within the National Recovery and Resilience Plan (NRRP) which as already said dedicated the 27% of its resources to digital transformation. The NRRP defines action and interventions to overcome the economic and social impact of the pandemic, acting on the country's structural nodes and successfully facing environmental, technological and social challenges. The relaunch action is connected to the three strategic axes – digitisation and innovation, ecological transition and social inclusion – to restart growth and radically improve competitiveness of the economy, the quality of work and people's lives.

Table 8: 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
National Recovery and Resilience Plan (NRRP), known as Next Generation Italy	The RRP defines actions and interventions to overcome the economic and social impact of the pandemic, acting on the country's structural nodes and successfully facing environmental, technological and social challenges. The relaunch action is connected to three strategic axes – digitisation and innovation, ecological transition and social inclusion - to restart growth and radically improve the competitiveness of the economy, the quality of work and people's lives.	RRP's Mission 1 for 'Digitisation, Innovation and Competitiveness' aims to the completion of the broadband project, the construction of ultra-fast fibre optic networks, 5G and investments in satellite monitoring. In addition, action will be taken to encourage the internationalisation of the economy and to promote innovation.	Connectivity/broadband /digital transition of businesses	2021-2026	26.55 billion euro	Public (national level)	Yes	https://www.mef.gov.it/en/focus/The-National-Recovery-and-Resilience-Plan-NRRP/
National Strategy for Inner Areas (NSIA).	Italy's Inner Areas are rural areas characterised by their distance from the main service centres (education, health and mobility). The demographic and agricultural profile of Inner Areas is notably different from the average profile emerging at the national level. In	NSIA aims to contribute to the country's economic and social recovery, creating jobs, fostering social inclusion and reversing the demographic decline of Inner Areas, in terms of both population size and age profile.	Demography/digital divide/employment/inclusion/services/ICT/smart villages	2014-2023	767.58 Mio euro, of which 59.031 Mio euro for digital services	Public (regional level)	Yes	https://www.agenziacoesione.gov.it/strategia-nazionale-aree-interne/ AND https://enrd.ec.europa.eu/enrd-thematic-work/smart-and-competitive-rural-areas/smart-villages_en

	<p>the 2014-2020 programming period, Italy has put in place a new place-based integrated policy called the National Strategy for Inner Areas (NSIA). This policy applies to every region and macro-area in Italy for a total of around 2 million residents living in 1'000 municipalities. NSIA also contributes to the EU action for smart villages promoting and financing an initiative for a collective management of ICT services (such as telemedicine, broadband, etc.), that involves 360 municipalities and about 720k inhabitants. The implementation process builds on previous experiences of local development in Italy, and is being supported by all the main EU funds, as well as dedicated funding provided for under the Stability Law (national funds).</p>							
EIP-AGRI Operational Groups	<p>In the framework of the European Innovation Partnership on 'agricultural productivity and sustainability'. Operational Groups (OG) are funded in Italy by Regional RDP programmes (FEASR).</p>	<p>Develop cooperative and bottom-up initiatives for innovation in rural areas</p>	<p>Precision Farming and Automation/Robotics/ICT uptake</p>	<p>2015-2023</p>	<p>205.6 Mio euro, of which 25.1 Mio euro for OG on precision farming and robotics/automation</p>	<p>Public (regional level) and private</p>	<p>Yes</p>	<p>https://www.innovarurale.it/</p>

	As of now 52 OG on Precision Farming and 14 on Robotics/Automation have been funded with around 25 Mio euro (that is, on average 400k euro for each OG) by 11 Regional Administrations in Italy							
LEADER/CLLD	<p>LEADER is a “bottom up” approach, in which farmers, rural businesses, local organisations, public authorities and individuals from different sectors come together to form a local action groups (LAGs). LAGs prepare their own local development strategies and manage their own respective budgets.</p> <p>It is currently implemented in Italy by around 2’000 Local Action Groups (LAGs) under the EAFRD. In the 2014-2020 programming period the LEADER method has been extended under the broader term Community-Led Local Development (CLLD) to other ESI Funds, now covering the EMFF, ERDF and ESF.</p>	Strengthening bonds in local communities, encouraging innovations across sectors, and facilitating knowledge-sharing	Cooperation, innovation, local development, services, tourism, ICT	2014-2023	1’197.3 Mio euro	Public (regional level) and private	Yes	<p>https://www.reterurale.it/leader/20142020</p> <p>AND</p> <p>https://enrd.ec.europa.eu/leader-clld/lag-database_en</p>

<p>Regional Fab Lab networks</p>	<p>FabLabs are the place where bridges are built between the world of bits and that of atoms and for this reason they represent a practice of innovation that affects the transformation of models of learning and continuous training, of generational interaction, professionalisation and production.</p> <p>Each FabLab is open to the territory by offering free services with the main objective of spreading culture on a very young, unstructured and rapidly evolving domain of knowledge (the movement of makers and the thought of "Do It Yourself") and in particular to integrate the education of young people by giving them the opportunity to use new tools to face the future: schools, universities, design institutes, art, etc., have the opportunity to have a space for innovation, knowledge and knowledge sharing.</p>	<p>Continuous learning environment, cooperation among actors at local level in order to develop innovations, education of young people.</p>	<p>Capacity development, co-design of digital technologies</p>	<p>2013-2021</p>	<p>n.a.</p>	<p>Regional networks of Fab Lab in regione emilia-romagna, regione Toscana, regione veneto, regione Lazio, comune di Milano etc.</p>	<p>yes</p>	<p>https://www.mak-er.it/</p>
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4.3. Contributions from the Structural and Investment Funds and the Cohesion Policy

4.3.1. Broadband infrastructure

According to the DESI indicator, from 2014 to 2019 the coverage of fast broadband (NGA) in Italy had a big boost: from 21 to 89% of households. Italy is very advanced on 5G, ranking third at EU level, but it is less strong in the deployment of Very High Capacity Networks (VHCN) where it has a coverage of 30%, lower than the EU average of 44%. NGA coverage reached 89% of households in 2020. Mobile broadband take-up (89 subscriptions per 100 people) remained stable in comparison to 2018. The at least 100 Mbps fixed broadband take-up increased from 9% in 2018 to 13% in 2019. The Next Generation Access (NGA) coverage still shows a clear difference between rural and total areas. While 90% of homes have NGA coverage in the whole country, only 42% of homes in rural areas are covered by NGA. This could represent an important divide in terms of connectivity for rural areas, even if it has to be noticed widely lack of data on the state of digitisation in rural areas that does not allow for an assessment of the specific level of digital-divide compared to urban areas in Italy (Brunori G. et al, 2021). Figure 3 shows, in accordance with the Italian map of rural areas, the current internet coverage (both 4G coverage and fixed broadband coverage) mainly entails inhabited centres, while large rural areas are still without an adequate connection.

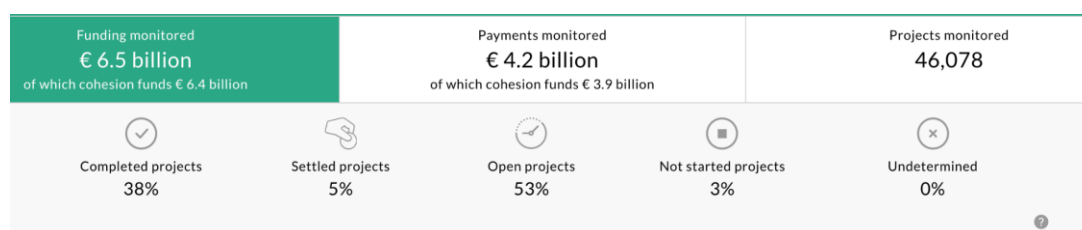
Figure 3: - Map of 4G a) and fixed broadband coverage b) coverage (Source: AGcom, www.maps.agcom.it) and of the Italian rural areas (Source: Rete Rurale Nazionale, www.reterurale.it).



In Italy the “[OpenCoesione](https://opencoesione.it)” portal is the open government initiative on cohesion policy. The portal provides access to searchable data on funds allocated and disbursed, locations, thematic areas, programming and implementing authorities, the timing required to complete operations and

disbursements for each operation. According to the portal, the projects under domain “Digital agenda” covered the construction of broadband and ultra-broadband infrastructure and connectivity, providing services to the public and enterprises, and offering aid to enterprises that istied to new technologies. It has to be considered that this domain also includes projects such as multimedia educational networks and labs in schools, e-government projects, e-health services (centralised medical appointment systems, services provided via national health service cards, online services for networks of general physicians) and e-inclusion services (active citizenry and e–participation, public internet access points). According to the platform, 6.5 billion euros have been monitored and 4.2 billion euros have been paid. In total, 46.078 projects have been monitored. Among those, 38% have been completed and 3% have still not started.

Figure 4: Italian “Digital agenda” projects: funding and payments monitored



4.3.2. Digital Public Services

Also, the Digital public services dimension of the DESI indicator shows that only 32% of Italian online users engage actively with e-government services (compared with the EU average of 67%). This figure even decreased between 2018 and 2019. Overall, the acceleration seen in 2019 in implementing key e-government projects may make up for the delays accumulated over previous years and bring Italy closer to the targets. In this regard, the Italian portal “advancement” set by the “Agency for Digital Italy” shows data on digital public services periodically updated (from weekly to half yearly updated). Here below the main findings regarding the main digital public services domains.

e-administration procedures and digital identities: According to the Agency for Digital Italy, to date, 8.037 public administrations allow access to online services also through SPID (Public System for the Management of the Digital Identity) and 24.766.281 digital identities have been registered. It is a single identity replacing the various existing codes, allowing access via web to the services of the Public Administration. **e-health:** According to the Agency for Digital Italy, the Electronic Health Record is the set of digital health and social-health data and documents generated by present and past clinical events concerning the patient. It has a time horizon that covers the entire life of the patient and is continuously fed by the subjects who treat him within the NHS and regional social and health services.

To date, all the Italian Regions have activated e-health procedures and the related platforms.

e-education: Italy's current reference framework for digital education is the National Digital School Plan (PNSD), adopted as part of the 2015 school reform. Prior to its adoption in 2016, the government's action was limited to fund specific activities with the support of the European Structural Funds, for a total expenditure of € 494 million. The stated goal of the PNSD is to transform Italian education through innovation and the use of information and communication technologies (ICT) for teaching, learning and school management. The plan aims to coordinate the action of a range of actors (schools, municipalities, private foundations, regional governments) and different sources of funding, including structural funds. According to the European Monitoring report of the education and training sector¹ for 2020 Italian schools are equipped with digital tools in line with other EU countries, but are lagging behind in terms of the level and speed of connection. Although practically all of them have an Internet connection (95.4%, MIUR), only 26.9% have a high-speed connection, well below the EU average (47%). 43% of schools report insufficient access to the Internet (OECD, TALIS 2019) (EU-22 23.8%). Students' confidence in their digital skills is comparable to the EU average, as is the percentage of students using computers at school weekly. By contrast, the percentage of teachers who feel well-prepared or highly prepared to use ICT for teaching is below the EU-22 average (35.6% versus 37.5%) (OECD, TALIS 2019). The COVID-19 crisis has prompted the government to increase investments in the digitisation of schools

Digital signature: on June 2021 the number of qualified digital signature certificates active (cumulative at the end of the period) in Italy is 26.265.987

On-line banking (transferences, account management, payments): according to the Annual Report on digital banking carried out by ABI Lab (the Consortium for Research and Innovation for the banks), the total volume of mobile banking transactions also increased by 56% from 2019 to 2020: among these, wire transfers and transfer accounts + 72%. Overall, in the sample under analysis, the PC is still the channel that records the most volumes (173 million transactions in 2020) although Mobile (with 171 million) is getting closer and closer to overtaking. Furthermore, the impact of the pandemic translated into an increase in average monthly accesses for the customer, respectively + 31% for mobile and + 14% for internet banking. For both the Mobile Banking apps and the Internet Banking portals, the study emphasises a strong focus on functionalities related to payments, in particular instant transfers, already offered by 52% of banks and personal finance management tools (57% already available from the app, 52% from Internet Banking).

¹ https://op.europa.eu/webpub/eac/education-and-training-monitor-2020/countries/italy_it.html#three

Bills (council taxes, water, electricity): PagoPA is the national digital platform (managed by the company PagoPA S.p.a) born in 2019 for allowing citizens to pay for all public services, relieving administrations from the costs and delays of traditional collection methods. It offers a standardised way through the participating Payment Service Providers (PSP). According to the Agency for Digital Italy to date, 18.147 Italian Public Administrations and public service operators have formally joined pagoPA public organisations (79,5%).

Table 9: Digital Public Services usage (perception)

		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		
	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

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

Innovation is considered as a key of economic development in European cohesion policies. In particular the innovation model based on the involvement of multi-level and multi-stakeholders is encouraged by the Smart Specialisation Strategy. The main aim of this strategy is the one of identifying investment priorities in research, development and innovation allowing to complete the productive capacity of a specific area in order to build comparative advantages and sustainable growth pathways in the middle and long term. Public and Private sectors interact in a mutual learning process in order to identify such investment priorities. In Italy there are 21 regional Smart Specialisation Strategies (S3) and a national one (National Intelligent Specialisation Strategy - SNSI)².

The National Intelligent Specialisation Strategy (SNSI) identifies the long-term investment priorities shared with the Regions and the main stakeholders, ensuring the complementarity between the actions planned at central level and those at the territorial level, so as to reduce the risks of duplication or of overlap and reinforce its impact. The goal is to create new value chains that, starting from research and development, reach the generation of innovative products and services and the development of key enabling technologies for the creation of subsequent generations of products to increase wealth, improve its distribution and bet on the possibility of new jobs that can last over time.

The SNSI thematic areas are:

- Smart and sustainable industry, energy and the environment
- Health, nutrition, quality of life
- Digital Agenda, Smart Communities, Intelligent Mobility Systems
- Tourism, cultural heritage and the creativity industry
- Aerospace and defence

The implementation of the Strategy takes place through direct initiatives of the National operational Plan (PON) for Research and Innovation (R&I) and the National operational Plan for Enterprises and Competitiveness (I&C) and through strategic plans where public resources of cohesion policy, ordinary national and regional resources, and private resources can converge.

² <https://www.agenziacoesione.gov.it/s3-smart-specialisation-strategy/strategia-nazionale-di-specializzazione-intelligente/>

The regional Smart Specialisation Strategies are divided into three kind of regions:

- Less developed (Basilicata, Calabria, Campania, Puglia, Sicilia)
- In transition (Abruzzo, Molise, Sardegna)
- More developed (Emilia Romagna, Friuli Venezia Giulia, Lazio, Liguria, Lombardia, Marche, Bolzano province, Trento province, Piemonte, Toscana, Umbria, Valle D'Aosta, Veneto)

With regard to the DESIRA Project topics, two Thematic Objectives (TO) are considered as relevant:

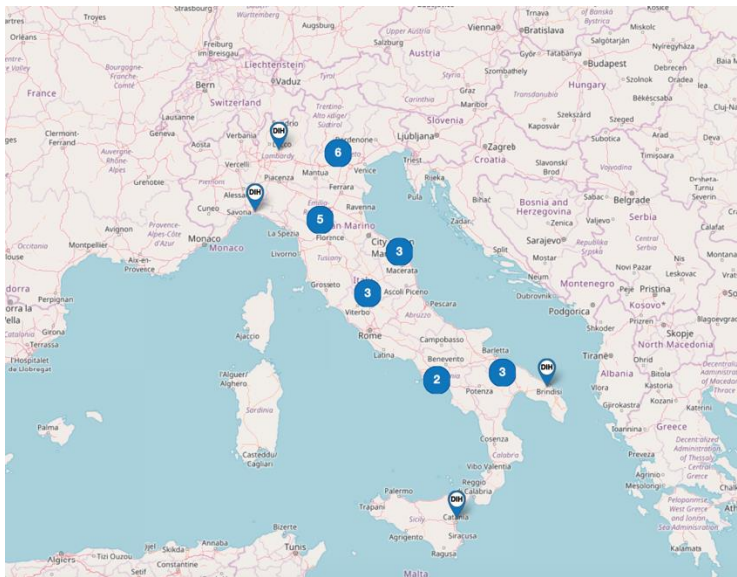
- "Improving access to information and communication technologies, as well as their use and quality"
- "Promote the TO of small and medium-sized enterprises, the agricultural sector and the fisheries and aquaculture sector".

4.3.4. Digital Innovation Centres (DIH)

At national level, the Ministry of Economic Development, the Ministry of University and Research and the Ministry of Technological Innovation and Digitisation have selected 45 national projects of DIHs. These projects will therefore participate in the restricted tender promoted by the European Commission for the establishment of the EDIH network (European Digital Innovation Hubs). To date, the Digital Innovation Hubs catalogue³ of the European Commission collects more than 450 hubs from all over Europe. By applying the "market sectors" filter it is possible to focus on agriculture/forestry-related DIHs in Italy. To date, in Italy there are 26 fully operating DIHs active in the agriculture and food sector (Figure 6).

Figure 6: Italian fully operating DIH from EDIH network

³ <https://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool>



Among the recognised Italian DIH, following the hubs and the related experiments and projects that have greater relevance to the agricultural and forestry sector are related to the RIF BioRobotics Institute DIH (Pontedera - Pisa) in charge of the GRAPE project (Ground Robotics for vineyard monitoring and Protection through biological control); SAGA project (Swarm robotics for agricultural applications) and GAROTICS project (Green asparagus harvesting robotic system).

The SMART AGRI HUB project selected two activities at national level:

- the data-driven Vineyard Precision Management - VINPREC - for promoting the uptake of precision strategies in viticulture by developing an application for growers which provides decision-making support for routine operations based on sensors attached to machinery.
- AquacultuER4.0 (Implementation of ICT in Aquaculture) for using ICT and IoT technologies to deliver precision fish farming which controls water quality and executes operational routines in order to bolster sustainable aquaculture.

Finally, it has to be noticed that a specificity of Italy is the development of the first regional networks of Fab Lab as a result of Regional digital agenda of regional administrations such as Regione Emilia-Romagna, Regione Toscana, Regione Lazio, Regione Veneto, Comune di Milano. The set up at local level of all such intermediate bodies just started, however in the next years, if well managed and connected to European larger networks, can help to develop local capacity to innovate and contribute to the co-design of new smart products and services.

4.4. CAP National Strategic Plans

CAP 2023-2027 will aim to foster digitalisation in agriculture and rural areas, stimulating knowledge sharing and innovation and encouraging their uptake. To achieve this horizontal goal of modernisation, CAP will promote uptake of information and communication technologies in the context of the Agricultural Knowledge and Innovation System (AKIS), cooperation for innovation within the scope of the EIP-agri, as well as will incentivise investments in digital technologies. Interestingly, there are only two result indicators proposed by the European Commission to measure CAP performance in terms of “digitalising agriculture and rural areas” at national level: the “percentage of farmers benefiting from support for precision agriculture technology through the CAP” and “(the amount of) rural population affected by the “smart villages” strategy. In order to foster a better use of CAP funds to address these digitalisation gap, the Italian Ministry of Agricultural, Food and Forestry Policy (MIPAAF), supported by other national agencies – the National Rural Network, the Council for Agricultural Research and Agricultural Economics Analysis (CREA) and the Institute of Services for the Agricultural and Food Market (ISMEA) – have realised a specific policy brief on “AKIS and digitalisation” as a preparatory document for the debate on the CAP National Strategic Plan (NSP).

This policy brief paved the road for a SWOT analysis elaborated by the MIPAAF and the other supporting agencies so as to better define needs and expectations for the NSP. As far as digitalisation was concerned, the following aspects emerged:

- A wide range and availability of digital technologies (e.g. precision agriculture) to support the diffusion of innovations and eco-compatible processes;
- A poor uptake of digital tools in agriculture due to low affordability, lack of attention of input providers to the real needs of farms, low level of digital education among farmers also related to ageing;
- An infrastructural gap in rural and marginal areas;
- A risk of a growing digital divide between territories and/or types of farms.

In line with these arguments, in the recommendation for the implementation of the future CAP national strategic plan, European Commission repeatedly remarked that the use of digital technologies and modern information and communication tools is still not widespread among agricultural and forestry companies in Italian rural areas. Afterwards, at the beginning of 2021, the Conference of Regions and Autonomous Provinces was involved in a validation process aimed to deliver a final version of the needs for the NSP. An open debate allowed the adaptation and fine-tuning of the initial proposal with the introduction of some changes in light of territorial specificities. As a final result a list of needs was produced. This list will represent the starting point for the definition of the intervention strategy of the NSP. Table 10 shows for each general objective of the CAP 2023-2027, a short description of the needs related to the digitalisation of agriculture in Italy. Furthermore, the table connects these needs with a list of potential strategies extracted from the recent document



"Towards a national strategy for a sustainable and inclusive agricultural, food, forestry system" published in spring 2021, which lays the foundations for a programming framework aimed to an integrated and complementary use of CAP 2023-27 and ESIF financial resources.

Table 10: NSP 2023-27: general objectives, needs and strategies for digitalising agriculture and rural areas in Italy

General Objective (GO)	Need	Strategies
<p>GO 1: Foster a smart, resilient and diversified agricultural sector ensuring food security</p>	<p>Increase the profitability of agricultural, agri-food and forestry companies, by supporting the restructuring, digitalisation, innovation and sustainable management of production inputs</p>	<p>Re-launch investments towards the digital and ecological transition, also in a post-COVID-19 recovery logic, fostering interventions aimed at introducing innovations in production, transformation and marketing processes, in particular to support investments aimed at the ecological transition, capable of fostering the transition from a linear economy to a circular economy, which enhances by-products and waste. In this regard, it is particularly important to encourage the dissemination of innovations through an effective system for transferring results from research to companies.</p> <p>Make the logistics system more efficient, to foster the reduction of production, transport and distribution costs of the supply chain through a plan of sustainable interventions aimed at infrastructures and logistics services for food and forest products, both in terms of internationalisation but also with a look at the logistics of proximity to large urbanised areas. In particular, it is necessary to invest, with the support of innovations in the digital field, in waste reduction, cold chain, extension of shelf-life, treatments and packaging, eCommerce and block chain, new</p>

		services to companies, also in a logic of circular economy and of shortening the supply chain.
	Strengthen the quality and accessibility of infrastructure networks, both material and digital, for agricultural, agri-food and forestry companies	
	Promote the aggregation of companies and favor the concentration for the supply of agricultural and forestry products, the marketing and promotion on domestic and foreign markets by facilitating associations, cooperation and the creation of networks, networks and clusters and organisational and digital innovation	
GO 2: Bolster environmental care and climate action and contribute to the environmental - and climate-related objectives of the Union	Promote the reduction of greenhouse gas emissions through the improvement of the management and extensification of farms and the reduction of production inputs, innovation and digitalisation, energy efficiency in agricultural, agri-food and forestry companies	Reduce soil erosion and degradation, through sustainable production methods with particular attention to the diffusion of conservative agronomic practices, to the diffusion of more extensive cultivation systems, to the efficiency of the system of reuse of agricultural organic matter (manure, digestate from anaerobic fermentation, by-products and waste) and extra-agricultural, to strengthen the overall system for monitoring the health of Italian soils, also leveraging the opportunities provided by the adoption of new digital technologies.
GO 3: Strengthen the socio-Economic fabric of rural areas and	Promote entrepreneurship in rural areas by fostering entrance and permanence of young people and new qualified entrepreneurs to run agricultural, forestry and non-agricultural businesses, ensuring	Overcome the infrastructural gap, with particular attention to the digital divide, and improving the availability/accessibility to services for the population and businesses, through the reorganisation and creation of

address societal concerns	<p>adequate training, facilitating access to credit and land capital and fostering the multifunctionality of companies and the processes of diversification of company activity, environmental sustainability, innovation and digitalisation of companies</p>	<p>services, also strengthening the environmental, socio-educational service capacity of companies agricultural and forestry.</p> <p>Increase the attractiveness of rural areas both for residential use and for other productive activities and investments through cultural enhancement, safety and renovation of housing structures, residential areas and rural villages; the recovery and reuse of rural structures and collective assets; energy efficiency and anti-seismic adaptation of rural housing; the provision of services, including proximity service and those related to digital economy.</p>
	<p>Implement and / or strengthen the telematic and digital infrastructure to promote the spread of broadband and ultra-broadband in rural areas, enhance the quality of ICT services and improve the skills of businesses and citizens to ensure optimal use of new technologies, contributing to the reduction of the Digital Divide</p>	
	<p>Raising the level of quality of life in rural areas through the improvement of social inclusion processes, the quality and accessibility of infrastructures and services, including digital ones, to the population and businesses, in order to put a stop to depopulation and support entrepreneurship, also strengthening the social relationship</p>	

4.4.1. CAP Integrated Administration and Control System (IACS)

European Union countries are responsible for the administration and control of payments to farmers in their country under a principle known as 'shared management'. The main building block of the management of payments system is the integrated administration and control system (IACS). It ensures that transactions financed under the area and animal-based aid schemes are carried out correctly as well as it prevents, discovers and follows up on irregularities and supports farmers in making correct applications ([European Commission, 2021](#)[sc1]).

Italy operates the IACS through accredited paying agencies both at national level and regional level. [AGEA](#) (Italian agency for payment in agriculture) is the Coordinating Body of 11 Italian Regional Paying Agencies, which have not set up their own Paying Agency and is also the CAP Paying Agency accredited in conformity to the EU Regulation No 907/2014.

The Italian IACS system applies to all income support schemes (whether obligatory or not) as well as certain rural development support measures which are granted based on the number of hectares or animals held by the farmer. EU countries also use the IACS to ensure that farmers respect some of the requirements and standards mandated by cross-compliance. In Italy the IACS consists of a number of digital and interconnected databases, such as:

- a system for the identification of all agricultural plots in EU countries, called **the land parcel identification system (LPIS)**;
- a system allowing farmers to graphically indicate the agricultural areas for which they apply for aid (**the geospatial aid application**);
- a **computerised database** for animals in EU countries where animal-based aid schemes apply;
- an **integrated control system**, which ensures systematic checks of aid applications based on computerised cross checks and physical on-farm controls (on-the spot checks).

AGEA, as a Coordinating Body, is also responsible for the coordination and management of the National Agricultural Information System ([SIAN](#)) which, among other things, manages the Farm Register, a database of national interest that is part of the IACS. However, as observed by the European Commission in their [recommendation for Italy's CAP Strategic Plan](#) (2020[sc2]), the Italian administrative system does not succeed in absorbing effectively EU funds, albeit with great differences among administrative Regions. Lengthy administrative and bureaucratic procedures and the lack of uniform and/or interoperable IT systems have brought delays in area-related rural development payments in more than one instance. Such delays have been recorded in some Regions more than in others, thus producing disparities among farmers who operate in the same market but different geographical areas. In the framework of a more general process of digitisation of the public administration, in the attempt to improve its efficiency and effectiveness, action has been taken to improve the quality of the LPIS and to adopt Check-by-Monitoring technologies, which can reduce the

administrative burden on the beneficiaries as remarked by the [European Court of Auditors](#) in 2020[sc3]. In this regard, governmental organisations have been participating in EU pilot projects dealing with the uptake of new technologies for the modernisation of the IACS. Italy was involved in a grant project in the framework of [ESS.VIP ADMIN](#) launched in 2013, 2014 and 2015 for Pilot projects on using IACS for agricultural statistics as well as other related actions. The results showed that administrative data collected by AGEA can be used for statistical purposes. The actions carried out have reached the important objective of developing, for the first time in Italy, a statistical register of the agricultural holdings using information coming from statistical and administrative sources.

Over the period 2017-2020, together with the national authorities of other five selected EU pilot countries (Czech Republic, Lithuania, Netherlands, Romania, Spain), AGEA took part to the [Sen4CAP](#) consortium, led by Belgium's Université Catholique de Louvain, demonstrating how the Copernicus Sentinels could be used in the Italian province of Foggia (Apulia Region) for the new CAP monitoring approach that came into play on 22 May 2018. This landmark change meant that data from the Copernicus Sentinels and other Earth observation missions – analysed with the latest machine-learning algorithms to provide national crop-type maps throughout the season – could replace the physical visits to farms and checks that were necessary for the EU to issue payments to farmers. More recently, AGEA takes part in the [NIVA Project](#) financed by the H2020 programme that brings together Paying Agencies from 9 Member States, research institutes, farmers and NGOs to tackle this challenge. The project promotes a collaborative approach towards development and validation of new technologies and introduces new digital tools and solutions to modernise the IACS systems AGEA is leading a pilot along with the Council for Agricultural Research and Economics - CREA, Abaco (a European company specialising in iACS) and E-geos (a joint venture between Telespazio S.p.A. and the Italian Space Agency) to achieve a CAP seamless claim ('Click-and-Pay'), by prototyping the Smart Contract concept (automated payment requirements) onto the existing IACS distributed ledgers (mainly the Farm Dossier and the Area Monitoring System). The innovative approach will be enhancing the handling process done through the Geospatial application, or pre-filled application, and Checks by Monitoring, making use of fully automated processing of data. It aims to reduce the sanctions, socio-economic costs and barriers for a wide range of stakeholders involved in the implementation of the CAP and enable the beneficiary to exploit all possible subsidy options (s)he is eligible to. This will realise a seamless experience for the farmer, reduce handling cost that often overcomes the average value of a CAP subsidy as well as the number of expensive on-the-spot checks or follow up actions. Nonetheless, the aforementioned examples show that much progress is still needed for the Italian administrative system to timely meet the needs of the CAP to deliver on the EU Green Deal, while simplifying the administrative burden of Member States and farmers.

4.5. Data management

This part of the report includes regulatory references related to data management. The areas analysed include open data, cybersecurity and interoperability. Because of its strategic importance and the

great deployment of financial resources, for each of these, a focus will be provided on the investments foreseen by the *National Recovery and Resilience Plan* (NRRP), a document – approved by the European Commission – that the Italian Government has prepared to illustrate which projects Italy intends to carry out thanks to the Community funds of the *Recovery Fund* under the *Next Generation Eu* (NGEU) program.

- Open Data

In Italy, the definition of open data has been formalised and included in the **Digital Administration Code (DAC)**. This is a single text that brings together and organises the rules concerning the computerisation of the Public Administration in its relationship with citizens and businesses. It was established by **Legislative Decree 82/2005** and subsequently amended and integrated by **Legislative Decree 179/2016** and **Legislative Decree 217/2017** to promote and make effective the rights of digital citizenship. According to the definition provided, open data are data available under the terms of a license that allows their use by anyone (including for commercial purposes) in disaggregated format, are accessible through information and communication technologies, are suitable for automatic use by computer programs, and are provided with the relevant metadata (a set of instructions and descriptions that help to read and interpret the data correctly). **The three-year plan for information technology in the public administration** (a document drawn up in compliance with the DAC, and approved by the President of the Council to guide the Public Administration along the path of digital transformation), integrates the notion of open data by stating that "data must be understood as a common good, shared free of charge between Public Administrations for institutional purposes and usable by civil society", developing the principle of *open by default* which was already regulated in Italian law. In fact, following the *European Directive PSI – Public Sector Information (Directive 2003/98/EC)*, which encourages the reuse of data of European Public Administrations (obliging them to make available the data in their possession in compliance with the legislation on the protection of personal data), in 2012 the rule of open data was introduced in the DAC by the **Decree-Law 179/2012**, converted into **Law 221/2012**. Following the entry into force of this provision, data and documents published online by Public Administrations – without an explicit user license defining the possibilities and limits of reuse – are considered as open data. The 2020-2022 version of the three-year plan devotes an entire chapter to data, following the **European Data Governance Strategy** and the framework outlined by the *European Directive on Open Data and Reuse of Public Sector Information (Directive (EU)2019/1024)*. A very important tool is the **Portal dati.gov.it**, which is the national catalogue of metadata related to open data released by Public Administrations and is the search tool and access point to data made available according to the paradigm of open data, following the provisions of the **Legislative Decree 36/2006** (transposition of **Directive 2003/98/EC** on the reuse of public sector information). This portal was born as a project promoted by the Italian Government in 2011, which since 2015 has been managed by the **Agency for Digital Italy (AgDI)**. AgDI is the technical agency of the Prime Minister's Office established by **Decree-Law 83/2012**, which is responsible for ensuring the implementation of the objectives of the **Italian Digital Agenda (IDA)**. The IDA is part of the **Digital Agenda for Europe** (one of the 7 pillars of the *Europe 2020 Strategy*, which indicates the

growth objectives of the EU until 2020, and whose purpose is to promote innovation, progress and economic growth, through the use of ICT, and having as the main objective the development of the digital single market). About the provisions of the **Three-Year Plan for Information Technology in the Public Administration 2019-2021**, an activity of technological evolution has been launched, which provides for the creation of the **Catalogue of Public Administration Databases** (a tool aimed at facilitating the dissemination and knowledge of data to encourage sharing between Public Administrations following the provisions of the DAC (a principle reiterated with **Decree Law 76/2020**). The Dati.gov.it portal, like the data portals of other European countries, contributes to feeding the **European Data Portal**. The theme of data is also taken up by the **Strategy for Technological Innovation and Digitisation of the Country 2025**, created by the Ministry for Innovation and Digital Transformation. An interesting document is the *Open Data Maturity Report* (by the European Data Portal), which aims to monitor annually the level of maturity of open data in all Member States, following different dimensions. The dimension related to "policy" analyzes the presence of public policies oriented to the dissemination of open data; the presence or absence of offices and governance structures for the promotion of stakeholder participation; the use of rules and regulations useful to make the processes of open data homogeneous and automated. Italy exceeds the European average in all dimensions. In terms of policy maturity, 92% of the European average of 85% is recorded (in many countries, open data policy is part of the national digital agenda. In Italy, the focus on open data is one of the actions in the government document **Strategy for Digital Growth 2014-2020**). With an overall score of 87% compared to the European (EU27) average of 78%, Italy ranks 9th in the European ranking.

NRRP: The issue of open data is addressed in the great process of digitalisation of the Public Administration (using the search tool and entering the keyword "open data" the user is directed to this tab). The goal is to redesign and digitise large central administrations.

Investment plan: 2021 [€60MM to start the work] → 2022 [+€73,1MM to bring the digitalisation to completion] - 2023 [+€96,5MM to bring the digitalisation to completion] → 2024 [+€102,5MM to bring the digitalisation to completion] → 2025 [+€144,5MM to bring the digitalisation to completion] → 2026 [+€134,6MM to digitalise all the processes of the large central administrations] → Total: €611,2MM

- Cybersecurity and data safety

Given the increased exposure to cyber threats, the need to develop protection mechanisms is growing. This need has also increased in light of measures to ensure secure cloud infrastructures and data centres with high-quality standards in the direction of increasing interoperability and information sharing. At the European level, the *NIS – Network and Information Security Directive (Directive (EU)2016/1148)* is concerned with promoting measures for a common high level of network and information system security in the Union to achieve a "high level of network and information system security in the national context, contributing to an increased common level of security in the European Union". The directive was transposed into Italian law by **Legislative Decree 65/2018**, which dictates

the measures to be adopted for the security of networks and information systems and identifies the competent entities. Subsequently, **Legislative Decree 105/2019** was adopted to ensure a high level of security of networks, information systems and services of public administrations, as well as national, public and private entities and operators, through the establishment of a national cyber security perimeter and the provision of measures aimed at ensuring the necessary security standards aimed at minimising risks.

NRRP: These investments are oriented to strengthen the defences of the Italian Public Administration to protect it from all cyber threats (frauds, blackmail, terrorist attacks, etc...). It will be possible to monitor and prevent risks thanks to an integrated system (NCP) that covers the whole country and is connected with international partners and companies that will provide the necessary technology. The integrated system will be developed through the implementation of a **National Cybersecurity Plan (NCP)**, in line with the security requirements established by **Directive (EU)2016/1148** on the security of networks and information systems (NIS Directive), and by strengthening the national cyber defence capabilities of technical inspection and risk monitoring.

The infrastructure for the NCP, through the creation of various structures and entities working together to improve the country's security, will be an operational structure connected at the European level with high-performance computing infrastructure, a new **National Cybersecurity Agency**, and a *Tech screening network*, led by the **National Cybersecurity Screening and Certification Laboratory**.

Investment plan: 2021 [€170MM to identify the operational model of the National Cybersecurity Security Plan (PSNC)] → 2022 [+€190,4MM to activate PSNC services throughout the national territory and upgrade the operational security structures] → 2023 [+€174MM to upgrade the operational security structures] → 2024 [+€88,6MM to have an operational safety monitoring network up and running] → Total: €623MM

- Interoperability

Today, most public bodies manage data and information in a poorly structured, open and interoperable way, which makes it difficult for administrations, citizens and businesses to share them. The Department for Digital Transformation of the Ministry of Technological Innovation and Digital Transition focuses its activities on the **National Data Strategy** and the **Interoperability Model** provided in the Digital Administration Code (DAC). Within the **National Digital Data Platform (NDDP)** (a virtual space designed to facilitate administrations in the adoption of the strategy and model), each body will be able to make its information available, according to shared rules and through digital interfaces (*API – Application Programming Interface*). The model makes possible the collaboration between Public Administrations and between them and third parties and is designed according to the principles outlined in the *European Interoperability Framework (EIF)*, published in 2010 as part of the *Interoperability solutions for the Public Administrations, businesses and citizens program*. The Agency for Digital Italy (AgDI) has defined the **Technical Interoperability Guideline** that all Public Administrations must adopt to guarantee the interoperability of their systems with those of other

entities. All administrations must follow the technological standards and use patterns and profiles of the new Interoperability Model, which will allow the definition and exposition of APIs compliant with European standards.

NRRP: The objective of this investment is to ensure full interoperability of key datasets and services between central and local Public Administrations, and the harmonisation of service procedures prioritised by the Single Digital Gateway Directive (**Regulation (EU)2018/1724**) with other EU countries. It will be necessary to change the mode of interconnection between the databases of administrations, thanks to a **centralised Catalog of APIs**; application programming interface. The measure provides for the development of a National Digital Data Platform (NDDP) that guarantees the interoperability of datasets through a catalogue of APIs shared between central and local administrations. In addition, it is also planned to develop a **One-stop Digital Shop** according to **Regulation (EU)2018/1724**, which will be managed to help central and Public Administrations restructure procedures and processes.

Investment plan: 2021 [€76MM to collect data required to establish the National Catalogue] → 2022 [+€122MM to establish a national data catalogue] → 2023 [+€197MM to make 21 procedures accessible online] → 2024 [+€147MM to begin API integration] → 2025 [+€104MM to continue with API integration] → Total:€623MM

5. Challenges and Opportunities

5.1. Barriers to digitalisation

Faced with the potential of digital technologies, at general level three main barriers to digitisation could be identified (Brunori G. et al, 2021):

- the factors that limit access;
- the correspondence of technologies to the real needs of users;
- the limited communication between technologies.

With regard to the first barrier, **factors that limit user access to digital technologies** may be physical (the connectivity), cognitive (the skills and training needed to access it) and economic.

In rural areas, agriculture and forestry, the three dimensions of access contribute to maintaining and, in some cases, to increase the digital divide. In the Italian context the main factor limiting user access are represented by low connectivity in rural areas and availability of offline use of digital devices for payments and other administrative tasks in mountain areas (physical factor limiting access); need of skills and training to access the technology and lack of new skills and abilities towards the use of digital technologies (cognitive factor limiting access); presence of entrance costs for integrating digital solutions and for subscription, membership, fees (economic factor limiting access)

As regards the **design** of technologies, it is necessary to distinguish between the technologies that adapt consistently with current practices on one hand and the technologies that require a change in those practices on the other hand. In the first case, in which, for example, innovation is incorporated in an 'improved' product or service compared to that normally in use (as in the case of machines with satellite guidance). In this case, the benefits are clear as well as the relationship between these benefits and their costs. The use of digitisation is sought when the added value is evident, even if the systems are often complicated and farmers do not take full advantage of its possibilities. In the second case, the adoption of digital technologies does not reduce to the purchase of some tools, but comes at the end of a real cultural revolution in the way of managing a company.

The main barriers related to the design of technology in rural areas, agriculture and forestry in Italy are related to interoperability among platforms and IT services (for e-invoicing) that affects time losses

and administrative burden for forest companies and public administrations; integration of digital devices with software packages for control and management; need of standardisation of information and procedures affecting the use of platforms and IT services.

The third limiting factor is the need to **coordinate technologies and skills** necessary for their use. Added to this is the fact that among the many innovation proposals, the most are not mature and unsupported by ancillary services and skills as essential. Many companies complain of dependence on the supplier. In some cases, the Italian supplier installs devices of foreign companies and therefore a kind of multiple dependence arises. Often, above all as far as the control of irrigation and fertigation is concerned, systems that are few in number are used more than prototypes, presented as tailor-made solutions and developed by small companies (sometimes startups).

Other cross-barriers are related to the legal domains: conflict over data ownership and profitability, lack of uniformity of regional regulation for authorisation of activities and high amount of data required. Finally, the identification of barriers must be approached with the criterion of development of innovation that is territorial and that involves the entire ecosystem linked to the enterprise: manufacturers, suppliers of products, service providers, infrastructures, consultants, the system educational training for human capital, governance. In this frame, economic and social barriers (like level and quality of public investments in broadband coverage in mountain areas and the increasing ageing of population) are relevant.

The magnitude of the impact and the duration of the COVID-19 outbreak are uncertain. In the short term, labour supply and transportation problems could disturb supply and marketing chains and affect meat production (including both slaughtering and processing). The measures taken to resist the pandemic also have, in the short term, influence on consumption patterns. The duration of the economic slowdown and its impact on income growth is likely to dampen overall demand in meat, which has a high-income responsiveness. Sustainability of food supply chains as well as food security and safety are nowadays more than ever in the heart of the debate.

(https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/trade/documents/map-2021-1_en.pdf).

Digitally enabled health solutions: The COVID-19 pandemic has shown the potential and paved the way for generalised use of innovative telemedicine, remote care and robotics solutions for protecting medical staff and helping patients being remotely cared for at their home. Digital technologies can empower citizens to monitor their health status, adapt their lifestyles, support independent living, prevent non-communicable diseases, and bring efficiency to health and care providers and health

systems. Coupled with adequate digital skills, citizens will be using tools that help them to continue active professional life as they age, and health professionals and carers will be able to reap the full benefits of digitally enabled health solutions to monitor and treat their patients.

Table 11: Barriers to digitalisation

Barriers to digitalisation		Influence of COVID-19
Technical	Physical factor limiting access: low connectivity in rural areas	New resources for digitalisation in the National Recovery Plan
	Physical factor limiting access: availability of offline use of digital devices for payments and other administrative tasks in mountain areas	
	Design barrier: interoperability among platforms and IT services (for e-invoicing) that affects time losses and administrative burden for forest companies and public administrations	
	Design barrier: integration of digital devices with software packages for control and management	
	Design barrier: standardisation of information required and procedures affecting the use of platforms and IT services	New resources for digitalisation in the National Recovery Plan (for the national agricultural information system – SIAN)
	Correspondence of technologies to the real needs of users	
Legal	Conflict over data ownership and profitability	

	Lack of uniformity of regional regulation for authorisation of activities and high amount of data required	
Training / Education	Cognitive factor limiting access: need of skills and training to access the technology and lack of new skills and abilities towards the use of digital technologies	
	Cognitive factor limiting access: lack of digital skills among civil servants, also due to the reduction of employees' turnover in the Italian public administrations).	Recently (also thanks to the COVID 19 outbreak) there have been considerable improvements in the diffusion and use of digital public services (e.g. IT portals). However, Public Administration offices still suffer from a lack of competitiveness due to ageing workforce, scarce managerial ability and low absorptive capacity for innovation.
Economic	Economic factor limiting access: presence of entrance costs for integrating digital solutions, subscription, membership, fees.	COVID 19 lockdown triggered online and digital payments and social distancing fostered the use of digital tools
	Level and quality of public investments in broadband coverage in mountain areas	
Others	(Increasing) ageing of population in mountain areas	

5.2. Actions to boost sustainable digitalisation

Table 12: Actions to boost sustainable digitalisation

Key rural development domains				
	Human capital	Innovation	Investments	Governance
Creating the basic conditions for digitalisation	<p>Improving skills and competences of local stakeholders</p> <p>Planning the local stakeholders' skills pathways to ensure competences and co-design of new services and actions.</p>	<p>Facilitating access to intermediaries, digitalisation brokers and 'spaces' to support digitalisation.</p> <p>Supporting the creation of Digital hubs, fab labs, co-working spaces, living labs</p>	<p>Boosting access to high-quality digital and internet infrastructure</p>	<p>Detecting market failures and supporting public intervention for giving access to digital and internet infrastructure</p>
Anchoring digitalisation to sustainable development	<p>Identifying needs and expectations of rural communities and businesses</p>	<p>Supporting the creation of new services to give competitiveness to rural economies</p>	<p>Tailored digital technologies and tools</p>	<p>Improve access to the market for rural products and services.</p>

Adapting digitalisation to different context	Tailored training	Engaging with rural stakeholders and conducting an analysis of social, historical, institutional, political and environmental elements	Boosting participatory and place-based approaches	
Favouring digital inclusion	Mapping vulnerable groups	Encouraging peer-to-peer networking	Support to vulnerable groups	Monitoring DESI indicators progress Active policies to avoid digital exclusion
Developing digital ecosystems	Organising training and knowledge transfer among “connectors” and local stakeholders	Identifying ‘connectors’, supporting digital coordination of local actors, selecting the best technologies, and promoting data sharing and interoperability	Supporting the creation of Digital hubs, fab labs, co-working spaces, living labs	
Developing adaptive governance models	Investing on local knowledge about stakeholders and their role in the local society	Tailored innovation and investments: design and implementation of sustainable digital development pathways that adapted to	Shifting from reactive to proactive governance models	

		the local reality.		
Designing policy tools for sustainable digitalisation	<p>Identifying barriers to access to the digitalisation</p> <p>Sharing best practices</p>	<p>Developing and implementing digitalisation and innovation actions plan</p>	<p>Monitoring progress</p>	<p>Regional Digitalisation Agencies or specific offices of Regional Development Agencies set up to support local communities</p>

6. Conclusions

The DESI 2020¹ report, which refers to June 2019, photographs a bivalent digital Italy, where the infrastructure is at the level of the European average, but the level of digital skills is among the lowest in Europe, with few limited exceptions. In particular, in the general ranking, Italy ranks 25th in Europe, losing two positions compared to the previous year, driven down by digital skills (28th and last place).

These gaps in digital skills are reflected in the modest use of online services, including digital public services. Only 74% of Italians often use the Internet. Although the country ranks relatively high in the supply of digital public services (e-government), their use remains low. Similarly, Italian companies are experiencing delays in the use of technologies such as the cloud and big data, as well as in the adoption of e-commerce. The analysis in relation to the geographical area of residence assumes particular importance. Analysing the data at the regional level, a significant correlation with the development levels of the territories seems to emerge.

Concerning connectivity, it has to be noticed that the Partnership Agreement between the European Commission and Italy for the implementation of the 2014-2020 programming of the Funds Europeans have been setting the goal of full coverage of the national territory (covering the 85% of the population with infrastructures capable of support services at 100Mbps and above guaranteeing at the remaining 15% connection speed equal to 30Mbps). The programming period is drawing to a close and the objectives are far from being achieved: in 2019 Italy completed Phase I of the ultra-broadband Italian plan for white areas. And the next phase is ongoing, but it risks some delays due to the difficulty in accessing existing infrastructure and obtaining permits. According to the Italian authorities, in mid-April 2020, work had begun in over 2,600 municipalities and the infrastructure has been completed in 600 municipalities. Italy is considering further measures as part of a Phase II of the Italian Broadband plan. Moreover, it has to be noticed that according Next Generation Access (NGA) coverage still shows a clear difference between rural and total areas. While 90% of homes have NGA coverage in the whole country, only 42% of homes in rural areas are covered by NGA. But digital transition means also digital skills and digital divide are, since 2019, at the center of the national digital agenda.

In Italy there is not a specific normative pathway for rural areas but it has to be noticed that there is an attention to small enterprises, small municipalities and areas with low access to services which are often located in rural and forest areas. Moreover, it has been produced the national strategy for Inner Areas, which is addressing regional policies in Italy in the last years. In addition to that, the CAP innovation measure, based on the development of Operational Groups often focused on innovations based on applications of robotics to agriculture and precision agriculture technologies. Other political



tools used in this sense are the intermediaries already present at local level since many years, such as the Local Action Groups (LAG) derived from the LEADER approach.

Next years will be strongly impacted by the National Recovery and Resilience Plan (NRRP) dedicating the 27% of its resources to digital transformation. The NRRP defines action and interventions to overcome the economic and social impact of the pandemic, acting on the country's structural nodes and successfully facing environmental, technological and social challenges. The relaunch action is connected to the three strategic axes – digitisation and innovation, ecological transition and social inclusion – to restart growth and radically improve competitiveness of the economy, the quality of work and people's lives. In the NRRP approved in 2021, there are 190,000,000 euro to be used by 2025 in order to enhance digital skills, plus additional resources (489,900,000 euro) for training of public administration workers on digitalisation.

7. Annex

7.1. Annex A

Table A.1: Policies influencing digitalisation in Italy

Areas being addressed / supported by the policies	Policy	Brief Description	Objectives	Area impact	Period of implementation	Budget (if any)	Public / Private	Address rural areas (Y/N) Specify how	Link
Rural access to technologies									
Broadband, connectivity	National Digital Agenda 2026	The strategy “Italia 2026” is a five-year plan that puts digitalisation and	100% of families connected to the ultra-	Connectivity and Access to Internet	2019-2026	6.71 billion euro for the development	Public	No	https://innovazione.gov.it/notizi

ity, affordability		innovation at the center of a “process for the structural and radical transformation of the country”.	broadband network, by 2026			of the ultrabroadband infrastructure			e/articoli/obiettivi-2026/
Creation of digital ecosystems in or with influence in rural areas	<p>Digital Innovation Hubs</p> <p>National Strategy for Inner Areas</p>	<p>At national level, the Ministry of Economic Development, the Ministry of University and Research and the Ministry of Technological Innovation and Digitisation have selected 45 national projects of DIHs. These projects will therefore participate in the restricted tender promoted by the European Commission for the establishment of the EDIH network (European Digital Innovation Hubs).</p> <p>The national strategy for Inner Areas is addressing regional policies in Italy in the last years with a</p>	<p>The Digital Innovation Hubs have the task of stimulating and promoting the demand for innovation in the production system, strengthening the level of knowledge and awareness of the opportunities offered by digitisation and are the "gateway" of companies to the world of Industry 4.0.</p> <p>The main aim is developing local development agenda, with a specific focus on access to public services which includes digital</p>	Creation of Innovation ecosystem	<p>2016-2024</p> <p>2014-2023</p>	<p>n.a.</p> <p>767.58 Mio euro, of which 59.031 Mio euro for digital services</p>	<p>Public</p> <p>Public</p>	<p>No, but there are DIH specific on Agricultural Sector</p> <p>Yes, most</p>	<p>https://preparatialfuture.confindustria.it/digital-innovation-hub/cosa-sono/</p> <p>https://www.agenziacoazione.gov.it/lacoazione/le-politiche-di-coesione-in-italia-2014-2020/strategie-delle-politiche-di-coesione/strategia-nazionale-</p>

		participatory process lead by local administration to identify local development agendas. It has been recognised as case study for the application of the smart villages approach	public services and connectivity in rural areas.					of the areas identified as inner areas are mountain or rural areas	per-le-aree-interne/
New digital business models in rural areas, agriculture, and forestry	Industry 4.0	Industry Policies to digitalise enterprises	The aim is to increase digitalisation of Italian Enterprises with a specific focus on SMEs	Digitalisation of SMEs	2020-2022	Tax credit mechanism	Public	No	https://www.mise.gov.it/index.php/it/transizione40
Funding of digitalisation	Digital Agenda Italy 2026	The strategy "Italia 2026" is a five-year plan that puts digitalisation and	Digital skills Cloud services	Digital Public services	2019-2026	6.74 billion euro for the digitalisation	Public	No	https://innovazione.gov.it/notizi

<p>ion (access to technologies, digital education, broadband access, etc.) in rural areas, agriculture, and forestry.</p>		<p>innovation at the centre of a “process for the structural and radical transformation of the country”.</p>	<p>Public services online, Digital Identity</p>			<p>of public administrations</p>			<p>e/articoli/obiettivi-2026/</p>
<p>National rural development networks’ initiatives</p>	<p>EIP-AGRI Operational groups LEADER LAGs</p>	<p>Operational groups are funded by Rural Development Programmes in Italy. As far x OG on Agriculture and precision farming have been funded in Italy and 14 OG on Robotics and Automation by 11 Regional administrations.</p>	<p>The main objective of Operational Groups is the creation of partnerships for innovation in agriculture at local level. The main objectives of LAGs groups is the</p>	<p>Networks for innovation in Agriculture Networks for local development</p>	<p>2015-2023 2007-2020</p>	<p>205.6 Mio euro, of which 25.1 Mio euro for OG on precision farming and robotics/automation</p>	<p>Public Public</p>	<p>Yes, OG focus on rural development and agricultural</p>	<p>www.innovaturale.it https://enrd.ec.europa.eu/leader-clld/leader-toolkit/implementing-lags-and-</p>

		<p>Leader method, based on Community Led-Local Development approach, is also creating Local Action Groups (LAGs) including local administrations, farmers organisation, rural business, citizens etc. with the aim of developing local development strategies.</p>	<p>creation of networks for the identification of a local development strategy by local actors.</p>					sector	local-strategies-1_it
								No, but most of LAGs are located in rural areas	
Digital Literacy and Digital Divide	National Plan for Digital Schools- Piano Nazionale Scuola Digitale – PNSD.	The National Plan for Digital schools is a comprehensive strategy for the innovation of the italian school and for a new role of the educational system in the digital era. Part of the Law 107/2015 called “la Buona Scuola”	To answer to the call for a long-term vision for Education in the digital age directly linked to the challenges that all of society faces in applying and promoting life-long and life-wide learning, in	Digital Skills	Since 2015	101 mio euro in 2021	Public	No	https://www.miur.gov.it/scuola-digitale
						15 mio euro in 2021		Public	No

	ITS 4.0' project	The ITS 4.0 project is connecting school and enterprises in public-private foundations managing post-secondary vocational training.	both formal and non-formal contexts.		2008 - present		Publics	No	https://www.serviziocivile.gov.it/menusx/bandi/progetti-sc/2021_avviso_scu_digitale.aspx
	Digital Service Civil	The Civil Service is an opportunity for young people to dedicate a period of their life as a service for the whole society. A specific programme on supporting the development of digital skills to citizens has been developed and called Digital Civil Service in the framework of the NextGenerationEU "Reskill and Upskill"	To strengthen post-secondary technical education and vocational training institutes. To promote the role of young people as digital facilitators for digital inclusion of the whole population		2021-2023	n.a.			

Open data, standardisation of data, data access, etc...	Open Government Partnership (OGP)	<p>Italy officially joined the Open Government Partnership (OGP) on September 5, 2011, committing itself to achieving the objectives of open government through specific initiatives contained in two-year National Action Plans (NAP), drawn up on the basis of the comparison with civil society which supervises the implementation of the initiatives.</p>	<p>The main objective is transparency, participation, fight against corruption and innovation of public administration through the use of open data from public administrations</p>	Making available data from public administrations	Since 2011 with a two year National Action Plans	n.a.	Public	No	https://open.gov.it/open-government-partnership/la-partecipazione-italiana-a-ogp/#
	National Strategy for Artificial Intelligence (AI) and Blockchain	<p>The National Strategy for Artificial Intelligence (AI) has been published in July 2020, developed by a group of experts identified by the</p>	<p>The main objective is to reap the benefits that AI can bring to the country, with an approach that integrates technology and sustainable development.</p>	Addressing actions on Artificial Intelligence	2020 - 2026			Public	

		Ministry of economic development.							
Cybersecurity	National Agency for Cybersecurity	The National Agency for Cybersecurity, created in August 2021 will have the responsibility to coordinate all activities of cybersecurity in Public Administrations	The main objective is to reduce the risks of external attacks to data from Public Administration.	Cybersecurity	2021-2027	529 Mio euro between 2021-2027	Public	No	https://www.altalex.com/documents/news/2021/06/23/nasce-agenzia-per-cybersicurezza-nazionale
Rural development networks' initiatives									

7.2. Bibliography and sitography

Gianluca Brunori, Leonardo Casini, Alessandra Di Lauro, Francesco Di Iacovo, Pietro Piccarolo, Alberto Pardossi, Giovanni Rallo, Anna Vagnozzi, Marco Vieri. (2021, April 12). Le prospettive della digitalizzazione per lo sviluppo sostenibile del territorio rurale. Zenodo. <http://doi.org/10.5281/zenodo.4680049>

Brussels, 18.12.2020 SWD (2020) 396 final COMMISSION STAFF WORKING DOCUMENT Commission recommendations for Italy's CAP strategic plan Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Recommendations to the Member States as regards their strategic plan for the Common Agricultural Policy

CENSIS (2020) Report on the digital transformation of Italy

European Commission (2020) Digital Economy and Society Index (DESI) 2020 Italy

European Court of Auditors, Special Report 04/2020. Using new imaging technologies to monitor the Common Agricultural Policy: steady progress overall, but slower for climate and environment monitoring, 2020

MIUR (2019), Focus: La dispersione scolastica nell'anno scolastico 2016/2017 e nel passaggio all'anno scolastico

2017/2018. <https://miur.gov.it/documents/20182/2155736/La+dispersione+scolastica+nell'a.s.2016-17+e+nel+passaggio+all'a.s.2017-18.pdf>

Ministry for technological innovation and digitisation (2019) Strategy for technological innovation e the digitisation of the Country: <https://docs.italia.it/italia/mid/piano-nazionale-innovazione-2025-docs/it/stabile/index.html>

OCSE (2019), *TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners*, TALIS, OECD Publishing, Paris, <https://doi.org/10.1787/1d0bc92a-en>

UNCEM (2020) THE MOUNTAIN ON THE NET - Italian Mountain Connectivity Agenda. Winning the digital divide together

UNCEM (2021) Towards the new Strategy for the Mountains and the internal areas



https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/financing-cap/financial-assurance/managing-payments_en

<https://www.agid.gov.it/it>

<https://avanzamentodigitale.italia.it/it>

<https://bandaultralarga.italia.it/>

<https://www.infratelitalia.it/>

<https://www.agid.gov.it/>

<https://italiadomani.gov.it/> on resources of the Italian NRRP

