Digital Decade Country Report 2024:

Italy

Italy

Contents

Executive summary

Italy has untapped potential to the European Union's (EU) Digital Decade objectives and targets, in view of a successful digitalisation that fosters competitiveness, resilience, sovereignty, European values and climate action.

In 2023, Italy made progress in the area of e-government, in particular in e-health and key digital public services for businesses and continued to advance on gigabit networks roll-out. However, despite some progress, particularly important **challenges persist** in digital skills, while Italian enterprises lag behind in the adoption of advanced technologies such as AI.

In recent years, also building on the Recovery and Resilience Plan, Italy **put in place significant efforts for the digital transformation of the country**, intensifying initiatives to digitalise the public administration, support the digitalisation of enterprises and improve digital skills across the country. Additionally, Italy can count on a robust foundation in areas as such as semiconductors, edge computing and quantum, which are key for the **country's position and technological leadership**.

According to the **Special Eurobarometer 'Digital Decade 2024'**[1], 71% of the Italians consider that the digitalisation of daily public and private services is making their life easier (73% in the EU), a figure that needs to be improved by bringing all citizens on board.

Participating in **joint efforts with other EU Member States** also remains crucial. Currently, Italy is involved in nine **European Digital Infrastructure Consortia** (EDICs) already set up or in the making[2], and in the Important Projects of Common European Interest (IPCEI) in the area of cloud infrastructure and services and microelectronics.

Italy allocates 25.6% of its total Recovery and Resilience Plan to digital (EUR 47 billion)[3], which **represents a significant opportunity but remains insufficient to fully reach the Digital Decade targets and requires strong focus on implementation and** alignment with the various existing strategic plans. Under Cohesion Policy, an additional EUR 5.5 billion (13% of the country's total Cohesion Policy funding) is allocated to the country's digital transformation[4].

[1] Special Eurobarometer 551 on 'the Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351
[2] Information updated on 31 May 2024.
[3] The share of financial allocations that contribute to digital objectives has been calculated using Annex VII to the Recovery and Resilience Facility Regulation.
[4] This amount includes all investment specifically aimed at or substantially contributing to digital transformation in the 2021-2027 Cohesion Policy programming period. The source funds are the European Regional Development Fund, the Cohesion Fund, the European Social Fund Plus, and the Just Transition Fund.

Digital Decade KPI [1]	Italy			EU		Digital Decade target by 2030	
	DESI 2023	DESI 2024	Annual progress	DESI 2024 (year 2023)	Annual progress	**IT**	**EU**
Fixed Very High-Capacity Network (VHCN)	53.7%	59.6%	11.0%	78.8%	7.4%	100%	100%
Fibre to the Premises (FTTP) coverage[2]	53.7%	59.6%	11.0%	64.0%	13.5%	100%	-
Overall 5G coverage	99.7%	99.5%	-0.2%[3]	89.3%	9.8%	100%	100%
Semiconductors		NA					
Edge Nodes		77		1 186		946	10 000
SMEs with at least a basic level of digital intensity	60.3%	60.7%	0.3%	57.7%	2.6%	90%	90%
Cloud	51.9%	55.1%	3.0%	38.9%	7.0%	74%	75%
Artificial Intelligence	6.2%	5.0%	-	8.0%	2.6%	60%	75%
Data analytics	NA	26.6%	NA	33.2%	NA	60%	75%
AI or Cloud or Data analytics	NA	63.1%	NA	54.6%	NA		75%
Unicorns		7		263		16	500
At least basic digital skills	45.6%	45.8%	0.2%	55.6%	1.5%	74.6%	80%
ICT specialists	3.9%	4.1%	5.1%	4.8%	4.3%	7.3%	~10%
e ID scheme notification		Yes					
Digital public services for citizens	67.9	68.3	0.5%	79.4	3.1%	100	100
Digital public services for businesses	74.7	76.3	2.1%	85.4	2.0%	100	100
Access to e-Health records	71.3	82.7	15.9%	79.1	10.6%	100	100

[1] See the methodological note for the description of the indicators and other descriptive metrics

[2] The indicator on VHCN coverage and the indicator on FTTP coverage coincide.

[3] The variation does not reflect a change in coverage, but it is the consequence of small refinements in criteria adopted to estimate the coverage.

[4] The variation between the two years is not considered statistically significant but in line with the stagnation of this indicator.

National digital decade strategic roadmap

With respect to **Italy's** contribution to the Digital Decade reflected in its roadmap, it is demonstrating **a very high ambition** and, based on this document, intends to devote **significant effort** to achieve the Digital Decade objectives and targets. However, **the formal adoption and publication of the roadmap at the national level,** which is crucial for the country to fully commit towards these ambitions, **is still pending**.

The roadmap provides a **complete overview**, covering **all targets to 2030**. While targets are generally ambitious and in line with the EU targets, those on basic digital skills and ICT specialists and on the uptake of Artificial Intelligence (AI) and data analytics remain below the EU levels, reflecting only the measures currently in place. The roadmap outlines a total of over **60 policy measures with a budget of over EUR 32 billion (about 1.6% of GDP)**. Accent is on improving digital skills, ICT specialists and digital public services. However, some areas, including unicorns and uptake of AI, lack targeted measures. A more comprehensive approach could be taken regarding the country's position in key technology areas, such as semiconductors and quantum.

Recommendations for the roadmap

Italy should, when submitting adjustments to its national roadmap in accordance with Article 8(3) of the Digital Decade Policy Programme (DDPP) Decision:

- **TARGETS:** (i) Provide a trajectory for the target on unicorns; (ii) Consider aligning the level of ambition of targets for basic digital skills, ICT specialists and technologies take up (AI, cloud, data analytics) to the EU's target.
- **MEASURES:** (i) Strengthen and/or better tailor the measures contributing to targets that are the most difficult to achieve, especially for **skills, ICT specialists, take up of AI and big data analytics**; (ii) Specify the measures that support the **target on unicorns**; (iii) Consider providing a more comprehensive analysis and overview of the measures and strategies for **semiconductors and quantum**; (iv) Review the **budget** description of all measures, ensuring completeness and accuracy; (v) Provide more information on the i**mplementation of digital rights and principles** (and Digital Decade general objectives), including what national measures contribute to it.
- **CONSULTATION:** Report on the consultation of stakeholders in the roadmap. .

Digital rights and principles

The Special Eurobarometer 'Digital Decade 2024' reveals that, in Italy, 49% of the population believes the EU protects their digital rights well, and while it marks a 6-point decline from the previous year, still remains above the EU average of 45%. Confidence in digital privacy stands at 57%, also above the EU average. Concerns include the safety of digital environments for children, with 45% expressing worry, and 40% are concerned about control over personal data. Despite these concerns, 83% of Italians recognize the importance of digital technologies for accessing public services, and 81% for connecting with friends and family, highlighting a strong appreciation for digital advancements. The monitoring of the Declaration on Digital Rights and Principles shows that increasing the profile of the Declaration at national level and fostering better stakeholder engagement could help improve outcomes in the years to come[5].

A competitive, sovereign, and resilient EU based on technological leadership

The country is making progress in deploying connectivity networks, while advanced technologies such as edge, quantum and semiconductors are increasingly gaining attention. Sustaining this momentum should remain a priority in order to strengthen the country's capabilities and positioning. While Italy is advanced in general 5G coverage, continued and rapid progress to deploy fixed Very High-Capacity Networks (VHCN), and specifically fibre-to-the-premises networks (FTTP), is needed, next to increased efforts to link the connectivity infrastructure with cloud and edge computing capabilities. In addition, more efforts should be devoted to improving the Quality of Service of 5G networks and provide on a large scale the superior performance that is needed for advanced use cases, especially for business-to-business (B2B) communications.

The presence of key projects and centres of excellence in quantum capabilities could boost Italy's ambitions in the field, but the level of investment needs careful assessment. The semiconductor sector is gaining attention with growing investments, requiring a coherent vision and sustained efforts.

The uptake of technologies is relatively high among Italian enterprises, including SMEs. However, major gaps remain in the use of AI and in the area of innovative and high-growth enterprises

[5] See SWD 'Digital Decade in 2024: Implementation and perspective' with annexes, SWD(2024)260: https://digital-strategy.ec.europa.eu/en/news-redirect/833325, Annex 4.

(unicorns). Scaling up enterprises in Italy remains difficult, hindered by a generally weak ecosystem and limited venture capital investments.

Recommendations – Italy should:

- **CONNECTIVITY INFRASTRUCTURE**: (i) Continue to deploy FTTP ensuring a high growth rate and strengthen efforts to develop connectivity infrastructures coherently and jointly with cloud and edge computing capabilities exploiting the potential of the country's 5G network; (ii) Ensure sufficient access of new players to spectrum for innovative business-to-business (B2B) and business-to-consumer (B2C) applications and encourage operators to speed up the deployment of 5G stand-alone core networks.
- **SEMICONDUCTORS AND QUANTUM**: Continue the efforts in the semiconductors sector and increase investments in quantum technologies also within the frame of EU initiatives and in view of contributing to the European Chips Act.
- **CYBERSECURITY:** Continue the implementation of the 5G Cybersecurity Toolbox to ensure secure and resilient 5G networks.
- **AI/CLOUD/DATA ANALYTICS:**
    - (i) Strengthen measures targeted to the adoption of technologies by enterprises, with particular attention to AI and looking at the barriers and drivers specific to the national context.
    - (ii) Ensuring the broad uptake of the next generation of cloud infrastructure and services under development in the IPCEI-CIS by companies of all sizes, including by developing a country-specific dissemination strategy (complementing what has already been committed under IPCEI-CIS); contributing to the additional dissemination activities led by the Cloud IPCEI Exploitation Office.
- **UNICORNS:** Strengthen actions to sustain the ecosystem of start-ups and innovative enterprises, including boosting the availability of effective financial tools, initiatives to support the scale up of enterprises, in particular in strategic sectors, building synergies between research and industrial systems.

Protecting and empowering EU people and society

The country's major gaps remain in digital skills, impacting efforts to close the digital divides and hindering competitiveness. Despite the roadmap's focus and Italy's numerous recent initiatives, only 45.8% of people in Italy have at least basic digital skills and **the share of ICT specialists in employment remains limited, while demand by enterprises for these skills is surging.**

Italy performs well on the deployment of the Electronic Health Records and its action to strengthen access to key digital public services continued in 2023, but further efforts are needed. Italy has two certified eIDAS digital identity schemes and is contributing to the work for the deployment of the EU Digital Identity Wallet. The Electronic Health Record (EHR) has been introduced in all regions. However, the availability of digital public services for citizens was still below the EU average in 2023. The ongoing major e-government projects and investments are not yet showing their full impact.

Recommendations – Italy should:

- **BASIC DIGITAL SKILLS:** Increase efforts to boost digital skills across all target groups with tailored interventions, including by: (i) strengthening services to accompany citizens in the use of digital tools; (ii) expanding digital educational programmes in schools and increasing interest in STEM (Science Technology Engineering and Mathematics) and ICT disciplines; (iii) and incentivising reskilling and upskilling paths for workers.
- **ICT SPECIALISTS:** (i) Increase ICT programmes in higher education, including the strengthening of ITS Academies, in connection with the job market needs and in collaboration with industry; (ii) take specific measures to increase participation of women in ICT education and in the ICT careers; (iii) consider measures to attract and retain ICT specialists.
- **KEY DIGITAL PUBLIC SERVICES:** Continue efforts to digitalise public services, focusing on user-friendliness and interoperability to further increase simplification and re-use of information available to public administrations.
- **E-HEALTH:** (i) Increase the supply of health data by onboarding more categories of healthcare providers; (ii) build on existing legal provisions and implement access opportunities for legal guardians, authorised persons and disadvantaged groups; (iii) make all types of medical images available to citizens in a timely manner and in all regions through the online access service, including through mobile applications.

Leveraging digital transformation for a smart greening

The Recovery and Resilience Plan is boosting initiatives twinning the green and digital transition. The adoption of the 'Transition 5.0' plan, part of the REPowerEU chapter, promotes the transition of enterprises through investment to reduce their energy consumption. The plan also includes measures on advanced climate change monitoring and support for smart transport systems in three pilot cities. These efforts complement existing initiatives in urban energy management, strategic asset utilisation, and innovative public procurement.

Recommendations - Italy should:

- Continue and intensify the efforts to join up the twin green and digital transition, also leveraging advanced technologies and scaling up successful initiatives.
- Develop a coherent approach to twinning the digital and green transitions. First, promote improvements in energy and material efficiency of digital infrastructures, in particular data centres. Second, support the development and deployment of digital solutions that reduce the carbon footprint in other sectors, such as energy, transport, buildings, and agriculture, including the uptake of such solutions by SMEs.
- Monitor and quantify the emission reductions of the deployed digital solutions in line with the relevant EU guidance and with the support of the methodology developed by the European Green Digital Coalition, in view of future policy development, as well as of attracting relevant financing.

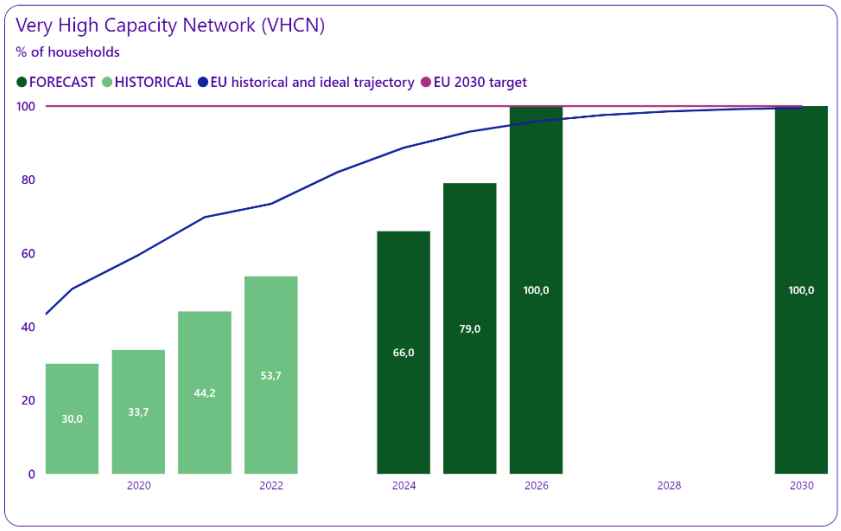
A competitive, sovereign and resilient EU based on technological leadership

The current global situation is characterised by economic and geopolitical instability. In this time of systemic uncertainty, investment in the digital transformation is set to play a leading role in the growth of the economy.

Italy can count on the expansion of its digital infrastructure, boosted by the resources available under the Recovery and Resilience Plan (RRP), alongside a good level of basic digitalisation among its SMEs. The country is also emerging as a key player in the development of quantum technologies, while investments in the strategic sector of semiconductors are becoming more and more prominent. However, there are shortcomings, particularly in the adoption of artificial intelligence (AI) by Italian enterprises and efforts are still needed to achieve nationwide connectivity and strengthen investments in strategic sectors.

Building technological leadership: digital infrastructure and technologies

Connectivity infrastructure (Gigabit)[6]



2023 state of play and recent progress

	Country level	EU level
FORECAST		82,0
DESI 2024	59,6	78,8
AVERAGE ANNUAL GROWTH %	11,0	7,4

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Italy has scope to improve its performance to contribute to EU's digital decade VHCN target, despite the positive dynamic. Coverage remains below the EU average and the urban-rural divide persists. In 2023, VHCN/FTTP[7] coverage stood at 59.6%, a 11% increase compared to 2022 but still below the EU averages (78.8% for VHCN and 64% for FTTP). In rural areas, VHCN/FTTP coverage drops to 37.7% (EU average is 55.6% for VHCN and 52.7% for FTTP).

Despite the growth rate having slowed down, there is a positive dynamic for VHCN/FTTP deployment, which continued to increase in 2023. Deployment reached an inflection point earlier

[6] All historical values presented in the figures are sourced from the corresponding data sources and not the national roadmaps.

[7] VHCN is defined as the combination of FTTP and DOCSIS 3.1. In the absence of DOCSIS 3.1 in Italy, the indicator on VHCN coverage and the indicator on FTTP coverage coincide.

than expected[8], possibly due to the increased focus on less densely populated areas where implementation is more expensive and complex. In parallel, deployment in black areas has been stagnating, due to constraints such as the lack of specialised workforce. According to AGCOM, most of the coverage gaps currently remain in black areas (19.8%), followed by grey (14.8%) and white areas (5.8%).

The share of fast fixed broadband take-up is also increasing, although it remains limited. In 2023, the share of fixed broadband subscriptions ensuring connectivity speeds equal or above 1 Gbps stood at 19.3% (up from 14.7% in 2022 and slightly above the EU average of 18.5%).

Italy aims to reach 100% VHCN coverage by 2026, which is earlier than the EU target of 2030. It remains an ambitious objective in view of the current downturn in the growth and the fact that the last deployments might prove more difficult to achieve.

Achieving the target will require swift and robust implementation of the planned investment, so far affected by delays, and sustained action by market operators. As stated in the roadmap, the target is supported by two main lines of intervention, which complement the expected investment by market operators. First is the **Ultra-Broadband Plan in white areas**, adopted in 2015, which has so far connected about 6.6 million residential units (out of a target of 8.4 million)[9]. The plan, originally due to be completed in 2022, was affected by persisting delays, attributed in part to works starting late. Second is '**Italia 1 Giga**', supported by the Recovery and Resilience Plan (RRP), whose objective is deploying at least 1 Gbps connectivity via fibre-to-the-home/building (FTTH/B) or Fixed Wireless Access (FWA) in grey areas. Following the revision of the RRP adopted in December 2023, the target was reduced from 8 500 000 to 3 400 000 house numbers[10] following a more precise mapping of the residential units to be connected.

The new Broadband Strategy 2023-2026 **is expected to contribute to better monitoring and planning high-capacity networks deployment**[11]. In identifying the weaknesses in the implementation of previous and ongoing plans (delays in the issuance of the permits, lack of qualified workers and of sufficient planning instruments, low demand), the strategy confirms existing initiatives[12] and launches an additional set of interventions for monitoring and developing fixed network infrastructure, next-generation 5G networks, and the deployment of innovative services. A central element of the strategy is the strengthening of the 'instruments' (**mapping and databases**) to monitor the existing infrastructure and, thus, optimize public investments in the deployment of high-capacity networks.

[8] According to data provided by AGCOM on the evolution of the FTTH network coverage curve, the point of inflection, or the moment when growth begins to slow down significantly, occurs earlier compared to what was observed previously with FTTC technology. While for FTTC, the inflection point had been identified around 65% of households covered, for FTTH it has been found that this occurs near 50% of households, if not lower.

[9] In particular, to date, the ultra broadband services were saleable for 4.7 million FTTH real estate units, compared to a total of 6.3 million units expected at the end of the plan, and for 1.9 million FWA real estate units, compared to a total 2.1 million units expected at the end of the plan. The activation overall reached 307 556 real estate units. The reasons for the low number of activations must be attributed essentially to limited interest by retail operators in the withe areas and, in part, to customer refusals expressed after the order to start the service, and to a high percentage of addresses without house numbers.

[10] In the revision, the objective of reaching at least 450 000 scattered households was maintained.

[11] In terms of fixed coverage, the overall objective of the new strategy is to provide fixed network coverage with speeds (transmission capacity in the peak hour and for each active customer) equal to or greater than 1 Gigabit/s for all civic numbers/building units and FWA (Fixed Wireless Access) coverage in the most remote areas with a minimum speed of 100 Megabit/s for each active customer in the peak hour.

[12] Ultra-Broadband Plan in white areas, Connectivity measures funded under the Recovery and Resilience Plan, connectivity vouchers for enterprises (that will also use the resources not allocated under the vouchers for households due to the lack of demand).

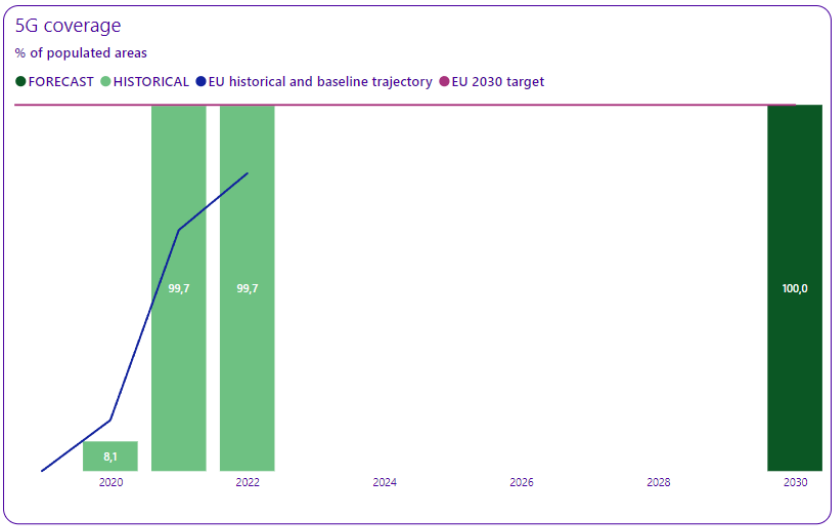
Italy

Building on the experience developed under the 'Italia 1 Giga' Plan, the implementation of which was facilitated by on-site checks (walk-ins) to check the factual existence and connectivity of the designated house numbers outlined in the plan, Italy is planning a series of actions to create a common database containing all the information related to ultra-wideband infrastructure, including real-time monitoring. Moreover, according to the changes to the Italian Electronic Communication Code, mapping exercises should be carried out on yearly basis and include not only the network but also their capacity and level of usage. Moreover, investment commitments made by the operator in the context of the mapping exercise should become binding, with possible positive impacts on black areas where modest increases in coverage have been observed. These changes also include **interventions to simplify** procedures for network deployment, particularly for fixed fibre optic networks across the national territory. The existing framework is complex, creating hurdles with national and local administrative rules. To streamline processes, administrative simplification measures were adopted to clarify timelines and conditions for procedure interruption and define a national-level policy framework that standardises authorisation methods and procedures.

The electronic communication markets are characterised by strong retail competition, based mainly on prices with low margins for operators which impairs their investment capacity. The market is responding with consolidation, sharing agreements, and new structural changes of the incumbent network ownership. The regulator adopted a new market review of access markets setting more pro-competitive rules aimed at encouraging, in a neutral manner, investments in very high capacity networks by all operators, ensuring greater flexibility of remedies where certain conditions are met.

Overall, although Italy is advancing and measures are in place, there is still a need to further incentivise rapid deployment of gigabit connectivity, as also highlighted in last year recommendation.

Connectivity infrastructure (5G)



2023 state of play and recent progress

	Country level	EU level
FORECAST		
DESI 2024	99,5	89,3
AVERAGE ANNUAL GROWTH %	-0,2	9,8

Average, annual growth is computed between the two most recent available data points. No ideal trajectory, and therefore no EU level forecast, is provided for 5G (see 2023 Communication on EU-level trajectories)

Note: The source of national forecast values is the 2023 country roadmap

Italy brings a very strong contribution to the EU's digital decade target of 5G coverage in populated areas. Italy had achieved nationwide 5G coverage in 2022 and recorded a value of 99.5% in 2023[13] [14].

[13] The variation compared to 2022 does not reflect a change in coverage but it is the consequence of small refinements in criteria adopted to estimate the coverage.

[14] In Italy, the rights of use of frequencies in the so-called 5G 'pioneer bands' were awarded in 2018 with a multi-band auction (i.e., 694-790 MHz, 3600-3800 MHz and 26.5-27.5 GHz bands), according to the regulation set by AGCOM

In addition, 88.3% of Italian households are covered by the 3.4-3.8 GHz band (EU average is 50.6%), which enables advanced applications requiring large spectrum bandwidth. 5G uptake is slightly below the EU average, and overall limited: 5G SIM cards are about 20.4% of the population (EU average is 24.6%). No new assignment procedures of EU-harmonised spectrum were carried out in 2023, but AGCOM took several measures aimed at rationalising the spectrum usage[15]. The electromagnetic field (EMF) limits were increased from 6 V/m to 15 V/m. Although this new measure[16] still sets the values below the respective limit recommended at EU level (Council Recommendation 1999/519/EC), it is expected to have a significant positive impact on 5G network deployment and operation.

The main measure currently supporting further progress in 5G coverage is 'Italia 5G'. Part of the RRP, it aims at the deployment of 5G networks along extra-urban roads, corridors and market failure populated areas and it is expected to be completed by 2026. Part of its targets were significantly revised during implementation because of lack of interest by the market in covering scarcely populated market failure areas[17].

The Broadband Strategy 2023-2026 includes relevant measures for the development and adoption of next-generation 5G networks, and the deployment of innovative services based on 5G (5G verticals). Measures proposed include the deployment of (publicly-owned) 5G infrastructure along the railway network and in the tunnels Milano-Cortina, providing uninterrupted 5G connectivity, improved logistics, safety and quality of service offered to passengers; and the deployment of next generation mobile networks, of 5G verticals and services based on Edge Cloud Computing, through pilots in areas such as healthcare, agriculture, logistics. Those measures are very important for future market developments, but their implementation has not started yet, in the absence of defined sources of funding.

An impulse for the development of 5G innovative use cases comes from the 'Houses of Emerging Technologies' (CTEs). Since 2018, the initiative has established 13 CTEs to drive the adoption of 5G and enabling technologies, completing 29 experiments and 65 use cases. With EUR 144 million allocated, these projects will conclude by 2025, focusing on areas like augmented reality and industrial automation. The CTEs, evenly distributed geographically, also serve as hubs for innovation, offering support to startups and facilitating access to funding. First tangible results are expected for next year.

In conclusion, steps have been taken towards measures promoting 5G applications, but their full implementation remains important to respond to the recommendation issued in last year's report calling for consolidating 'the significant achievements made in mobile connectivity, particularly for advanced applications'.

Semiconductors

Italy's semiconductors sector stands out as one of the most important in Europe. This is mainly due to the role played by a leading company in the market, but also to the presence of smaller and highly specialised enterprises in semiconductors which enrich the industrial landscape, such as in

(Decision no. 231/18/CONS). First commercial 5G services were launched in the summer 2019 in some major Italian cities (including Rome and Milan).

[15] AGCOM adopted measures regarding the supplementary coverage obligations for Iliad Italia, S.p.a. and other measures to foster the defragmentation process in the 3.4-3.6 GHz band to promote the efficiency of 5G networks.

[16] Law No 214 of 30 December 2023.

[17] In the framework of the revision of the RRP adopted in December 2023, one of the targets was reduced from 'At least additional 15 000 sq. km of market failure areas provided with 5G coverage of at least 1 Gbps' to 'At least additional 1 400 sq. km of market failure populated areas enabled with 5G coverage, out of which, at least 500 sq. km provided with 5G coverage'.

manufacturing equipment. However, these Italian enterprises, often family-owned SMEs, face the pressure of increasingly intense global competition. Moreover, Italy lacks production facilities to manufacture cutting-edge chips, which will play an increasingly key role in global value chains. As the rest of the EU, Italy also lags behind in the design of integrated circuits, which represents one of the areas with the highest added value in the semiconductor sector[18].

Italy can count on various research and technology transfer centres, encompassing universities, specialised research institutes, and national and international networks. There are several institutes (with a key role played by the National Research Council - CNR) and universities engaged in R&D in the area of semiconductors, and equipped with laboratories and research infrastructure. In parallel, a number of initiatives bring together research institutions/universities and industrial partners, facilitating technology transfer[19]. Among others, the Foundation Chips.IT is one of the initiatives launched in 2023 as the Italian hub for the design of integrated circuits. It will coordinate research and design activities involving both public and private actors, and provide state-of-the-art equipment and software. The foundation will also serve as a Competence Centre, helping to train professionals in this sector.

In 2023, the Italian government heightened the focus on this sector, promoting investment in semiconductors including the allocation of resources for the Microprocessor Fund and tax credits to enterprises. In October 2023, Italy started implement the Microprocessor Fund[20] that, with an allocation of EUR 3.3 billion, promotes research and development in microprocessor technology and investment in new industrial applications. This includes the conversion of existing industrial sites and the establishment of new facilities, also through the attraction of foreign investment. Using the Microprocessor Fund, the government allocated about EUR 600 million in tax credits addressed to enterprises engaged in R&D in the area of semiconductors, and to support participation in EU projects under the Chips Joint Undertaking[21].

Government support is coupled with growing private investment. In 2023, it was announced that the Singapore-based semiconductor firm Silicon Box will invest EUR 3.2 billion in a new plant in northern Italy, with the support of the Italian government. The company is specialised in the integration, advanced packaging and testing of so-called chiplets, with applications in field of artificial intelligence (AI), high performance computing (HPC) and electric vehicles[22]. Moreover, additional investment in Sicily is expected to build the biggest EU hub for silicon carbide, including the pilot line promoted under the Chips Act and approved under the Chips Joint Undertaking in April 2024[23].

[18] Maria Rita Pierleoni, L'industria globale dei semiconduttori e il ruolo dell'Italia, published by Ministero dell'Economia e delle Finanze and Ministero del Tesoro (Nota tematica N° 3 - Dicembre 2023).

[19] Ibidem.

[20] Established in 2022, Italy issued the decree specifying the resources allocated, the scope and implementation procedures of the Fund at the end of 2023 (Decree of the President of the Council of the Ministers of 27 October 2023 published on the Official Journal of 12-04-2023, no. 283).

[21] Legislative decree of 10 August 2023, n. 104, Urgent provisions aimed at safeguarding users, in the fields of economic and financial activities, as well as strategic investments.

[22] Website of the Ministry of Enterprises and Made in Italy (https://www.mimit.gov.it/it/notizie-stampa/urso-annuncia-un-maxi-investimento-da-3-2-miliardi-di-silicon-box-in-italia).

[23] Website of the Ministry of Enterprises and Made in Italy (https://www.mimit.gov.it/it/notizie-stampa/chips-urso-ok-ue-a-linea-pilota-a-catania-italia-conferma-leadership-sui-semiconduttori).

Investment planned under the National Recovery and Resilience Plan (RRP) complement the initiatives in this area, supporting the participation in the IPCEI 'Microelectronics II'[24], the construction of a plant in the semiconductor value chain in Sicily[25], large R&D projects in enterprises[26].

Overall, a number of relevant measures is raising, although not all reflected in the roadmap. The State of the Digital Decade report 2023 encouraged Italy to continue its activities on semiconductors in order to help the EU become a strong market player in this area. The establishment of a new Committee within the Ministry of Enterprises and Made in Italy could also ease the monitoring and coordination of the actions taken, give coherence and improve synergies between different initiatives.

Edge nodes

The analysis by the Edge Observatory first data report[27] estimates that the number of edge nodes deployed in Italy is 77. This value represents 6.5% of all edge nodes estimated in the EU in 2023, and stands well below other EU countries like France or Germany. Italy provides a preliminary national trajectory for edge nodes in its roadmap, with the objective of deploying of 946 edge nodes in 2030. The ambitious trajectory aligns with the country's scale and large market size and could be influenced by targeted investments in specific sectors that leverage edge computing technologies[28]. A mapping of the existing data centres is ongoing, and its results will help to better estimate the state of play and trajectory. New legislative initiatives on the use of edge infrastructures and services for public administrations are also ongoing.

The Broadband Strategy 2023-2026 includes measures to support the creation of an Edge-Cloud Computing network, but plans for operational deployments are unclear. A measure that also forms part of the national roadmap supports the adaptation of access and distribution points of Telco networks to edge technology. The public support interventions aim to increase network resilience through asset modernisation. A more operational description of the measure and the allocation of the planned budget (EUR 50 million) remain pending. The measures to stimulate 5G verticals will also contribute to the target in this area. Finally, Telecoms operators are investing in the sector (see section 2.1.b above).

At the EU level, Italy participates in the IPCEI Next Generation Cloud Infrastructure and Services. It supports the development of software technologies useful in the exploitation of edge nodes, notably industrial 5G. It should also enable the EU to develop cutting-edge technologies for innovative edge nodes, with low latency and energy footprint.

Quantum technologies

Italy set an ambitious target on quantum computing: building 5 quantum computers by 2030. The target is supported by centres of excellence in this area and several projects contributing to the development of HPC and quantum capabilities. Italy is home to prestigious research centres, like the CINECA (Consorzio Interuniversitario per il Calcolo Automatico dell'Italia del Nord Orientale), and the National Quantum Science and Technology Institute (NQSTI).

[24] For an investment estimated to about EUR 450 million.
[25] The investment is a EUR 292.5 million direct grant to support STMicroelectronics' EUR 730 million investment for the construction of a Silicon Carbide ('SiC') wafer plant.
[26] With the measure Innovation Agreements, which supports investments in key enabling technologies, including semiconductors.
[27] The Edge Observatory 1st data report (https://ec.europa.eu/newsroom/dae/redirection/document/104539).
[28] Edge Observatory for the Digital Decade, 2023.

Many initiatives to boost research and deployment of solutions are ongoing. In particular, CINECA and other universities, research centres, private and public operators are involved in a number of projects, including the 'ICSC National Research Centre for High Performance Computing, Big Data and Quantum Computing'. This initiative was launched with the support of the RRP and is facilitating the creation of networks of universities, research centres and enterprises for R&D&I in several thematic areas. These include: 'supercomputing cloud infrastructure', to consolidate a federation of supercomputing centres and data-intensive facilities (Spoke 0)[29]; 'quantum computing', aimed at the creation of applications using quantum calculators as accelerators, the development of hardware and software tools and the planning of large and scalable quantum computers (Spoke 10). The objective of Spoke 10 is to build 3 quantum computers by 2025[30]. Overall, notable results have already been achieved (for an example, see the box below on the ongoing activities at the University of Naples 'Federico II').

Another project is 'WCRI-QCSC', which aims to acquire a general purpose quantum trapped ion computer by 2028, with potential applications, for instance, in cybersecurity, privacy, health[31].

Overall investments in quantum are increasing. A new draft law is expected to support regulatory instruments on new technologies, including on quantum technologies, with a total budget around EUR 150 million. Furthermore, the projects mentioned above (Spoke 0 and Spoke 10), and included in the Italian roadmap, amount to about EUR 50 million for a period of three years[32] and coupled with other relevant projects that can directly or indirectly affect the development of quantum technologies[33]. Overall, their size, despite increasing, is still limited compared to what other EU countries are committing. Regarding the private market, it was estimated that in Italy in 2023, investments from Venture Capitals in quantum technologies amounted to just EUR 6.6 million, and investments from enterprises in quantum computing remained below EUR 6 million[34].

Best practice: Quantum computing development at the University 'Federico II' of Naples

Under a measure supported by the RRP, the University of Naples Federico II participates in the National Centre on HPC, Big Data and Quantum Computing and specifically within Spoke No. 10 (dedicated to Quantum).

In this context, a 24-qubit superconductive quantum computer has just been installed and, by the end of 2024, the plan is to install a scalable 40-qubit computer. The computer will be open and cloud-accessible to students, researchers, and enterprises, and provide them with access to quantum technologies and computational capacity for various applications (chemistry, biology, drug-design, high energy and condensed matter physics, data-science, industrial optimization, etc.). It will also be interfaced with a high-performance computer (a brand new HPC system to be installed by CINECA at the campus San Giovanni, Naples) to develop classical/quantum hybrid computing architectures.

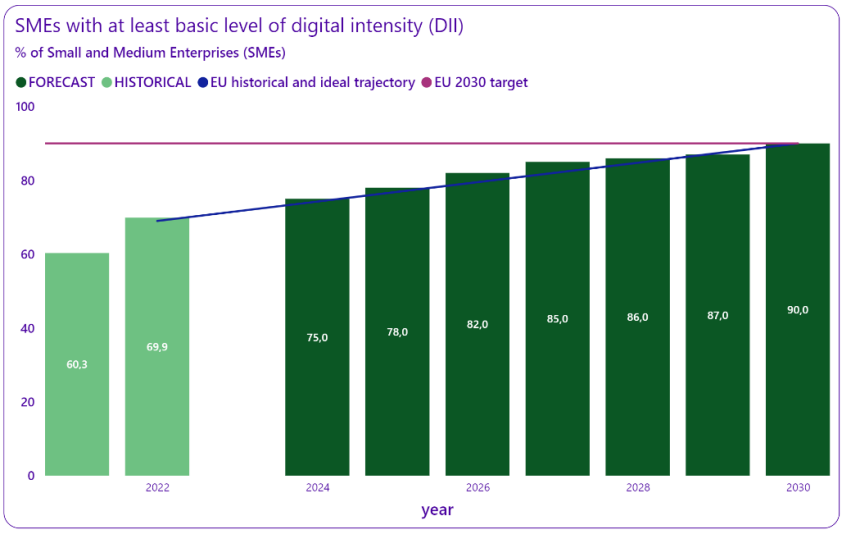
By 2024, the University also plans to complete a nano-fabrication centre for the manufacturing of superconductive quantum processors, funded with national resources (approximately EUR 10

[29] https://www.hpc.cineca.it/projects/pnrr-cn/. The budget is about EUR 19 million.
[30] SPOKE 10 – QUANTUM COMPUTING - Supercomputing ICSC (supercomputing-icsc.it). The budget is about EUR 30 million.
[31] Website of the University of Padua (https://qtech.unipd.it/trapped-ion-quantum-computer-padua).
[32] Considering the amounts budgeted for Spoke 0 and Spoke 10 (see footnotes above). The budget of WCRI-QCSC is not known.
[33] For example, the total budget dedicated to the ICSC National Research Centre for High Performance Computing, Big Data and Quantum Computing is EUR 320 million.
[34] Politecnico di Milano, Osservatorio Quantum Computing & Communication (https://www.osservatori.net/it/ricerche/comunicati-stampa/quantum-computing-italia-investimenti).

million). This centre will allow the in-house manufacturing of superconductive chips and enabling components, including qubits, measurement devices and control electronics for quantum computers. It will contribute to the development and production of critical technologies throughout the Union, also safeguarding European technological sovereignty and strengthening the value chain in the sector of digital and deep tech innovations. The centre will be open for broad spectrum scientific and industrial applications requiring nano-electronic components, and will host collaborative projects with industries.

Supporting EU-wide digital ecosystems and scaling up innovative enterprises

SMEs with at least basic digital intensity



2023 state of play and recent progress

	Country level	EU level
FORECAST		71,6
DESI 2024	60,7	57,7
AVERAGE ANNUAL GROWTH %	0,3	2,6

In the case of DII, the average, annual growth is computed between 2023 and 2021 due to data comparability reasons.

Note 1: DII 2022 is version IV that is not comparable with DII 2021, that was version III. The EU-level ideal trajectory refers to DII version IV, as published in the 2023 Communication on EU-level trajectories

Note 2: The source of national forecast values is the 2023 country roadmap

Italy brings a positive contribution to the EU target (90% of SMEs with at least basic digital intensity), but it demonstrates a very limited dynamic. Italy performs above the EU average with 60.7% of SMEs with at least a basic level of digital intensity (EU: 57.7%). However, progress has stopped: the 2023 value represents an annual growth of just 0.3% over two years (i.e., from 2021, which is the last comparable year that used a similar methodology for measuring the digital intensity of enterprises).

In its roadmap, Italy presented a level of ambition in line with the EU 2030 target of 90% of digitalised SMEs. While Italy starts from a value just above the EU average, maintaining the growth rate currently observed will not enable the country to reach its target by 2030. The roadmap presents several existing and well-established measures as contributing to this target, from Transition 4.0 to regional measures funded under the EU's cohesion policy, to vouchers for the uptake of broadband by SMEs, to other measures more focused on advanced technologies.

Data related to the implementation of Transition 4.0 shows higher than expected uptake of tax credits, particularly for investments in tangible assets (rather than investments in intangibles and R&D&I). According to data for the tax year 2020-2021[35], Transition 4.0 reached almost 120 700

[35] Data is based on tax declarations. In 2023, the last available data was related to tax year 2020-2021.

beneficiaries, already exceeding the intermediate target of 69 900 set in the RRP for 2024[36]. However, the situation varies significantly depending on the type of investment considered. The uptake of tax credits was higher than expected for investment in tangible Industry 4.0 assets (i.e., investment in machinery and equipment, which represents by far the highest component of the measure), standard immaterial assets (not specifically related to digital), and – importantly – in training in the area of Industry 4.0[37]. Instead, tax credits for intangible Industry 4.0 assets (e.g., advanced software, AI, and machine learning applications) and for research, development, and innovation activities were less used by Italian enterprises[38]. The system of public incentives for enterprises is currently under revision.

Building capacity and supporting a widespread network of facilitation and technology transfer centres across the country remain key to maximising impacts. In 2023, Italy continued its policies in the area of digitalisation of businesses, supporting advanced technologies, capacity, and knowledge building, in line with last year's recommendation. In broad terms, stakeholders noted the general and stable increase in the digital maturity of enterprises, for example through the use of digital maturity self-assessment[39]. In Italy, there is a good network of facilitation centres (e.g., 37 European Digital Innovation Hubs[40], 8 Competence Centres, almost 90 'Punti Impresa Digitale'), supporting digitalisation at different levels of maturity and with different specialisations.

On the one hand, this network plays an important role in reach also those small-, micro- and/or family-owned enterprises that usually face difficulties in exploring and embracing innovation. On the other hand, creating synergies and leveraging this network to build capacity is a condition to maximise the impact of investment in digital assets promoted by other national measures (e.g., the acquisition of tangible assets under Transition 4.0, or the broadband vouchers for SMEs).

[36] The 2024 intermediate target is referred to data of the tax year 2021 and 2022.

[37] Especially in the area of training, the uptake of tax credits was higher than expected: the number of enterprises that used tax credits for Industry 4.0 training in 2020 and 2020 was 15 023, against a target of 2 000 enterprises set in the Recovery and Resilience Facility for 2025.

[38] All data reported in this paragraph is based on: Corte dei Conti, Rapporto sul coordinamento della finanza pubblica 2023 (Download (corteconti.it)), pages 356 to 359.

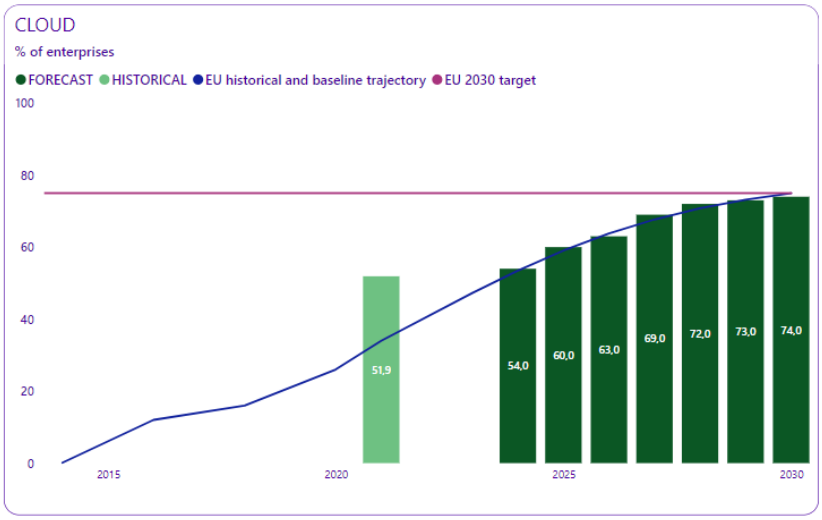
[39] Tools provided by Union Camere include Self I4.0 (digital maturity self-assessment), Zoom 4.0 (assessment involving a digital promoter), Check-Up Sicurezza IT (related to vulnerabilities to cyber threats).

[40] 13 funded under the Digital Europe Programme. The remaining have received the Seal of Excellence and are funded with other resources.

Italy

Take up of cloud/AI/data analytics

- **Cloud**



2023 state of play and recent progress

	Country level	EU level
FORECAST		47,3
DESI 2024	55,1	38,9
AVERAGE ANNUAL GROWTH %	3,0	7,0

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

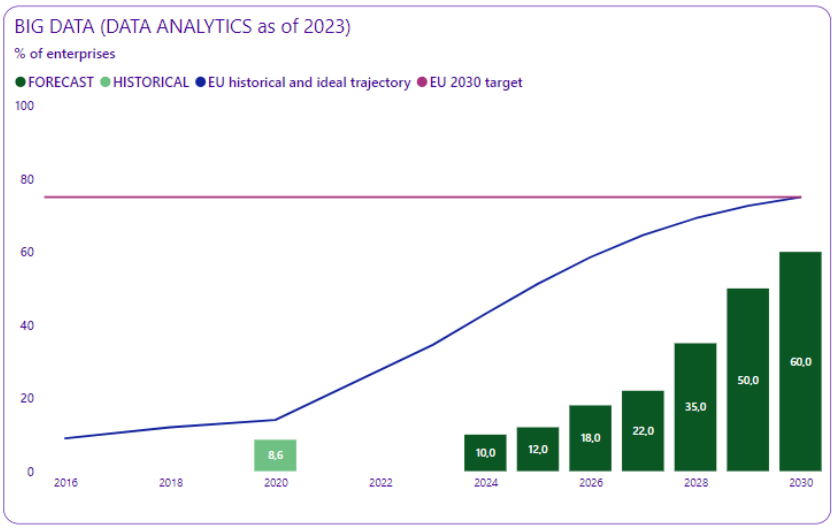
On the uptake of cloud services, Italy brings a very strong contribution to the EU's digital decade target of 75% of EU enterprises using cloud services by 2030, while demonstrating a limited dynamic. Italy performs above the EU average, with 55.1% of Italian enterprises use cloud services, standing well above the EU average of 38.9%. The growth rate is, however, lower than the one observed at the EU level.

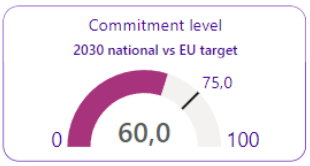
Italy set a target of 74% uptake by 2030, slightly below but substantially in line with the EU target. Despite the good starting point, at the current pace, reaching the target set in the roadmap may well be challenging.

To encourage the adoption of cloud by enterprises, the roadmap relies on measures generally aimed at supporting the uptake of advanced technologies, such as the projects started under the Houses of Emerging Technologies (see also point 2.1.b), grants launched in 2023 (for EUR 11 million) to promote R&D projects based on emerging technologies such as Blockchain, Artificial Intelligence, and Internet of Things (IoT), or Transition 4.0[41]. At the EU level, Italy participates in the recently approved (December 2023) IPCEI Next Generation Cloud Infrastructure and Services.

[41] See section 2.3 as regards measures on cloud infrastructure and migration of public administrations to the cloud.

- **Data Analytics (Big Data)[42]**





2023 state of play and recent progress

	Country level	EU level
FORECAST		34,6
DESI 2024	26,6	33,2
AVERAGE ANNUAL GROWTH %		

Annual growth cannot be computed in this case because Big Data was replaced by Data Analytics in 2023. The two indicators are not comparable.

Note: The source of national forecast values is the 2023 country roadmap

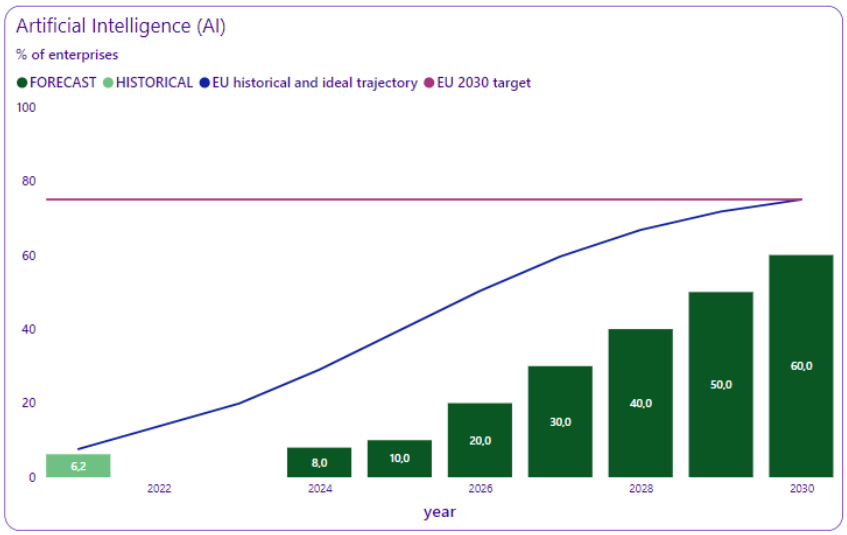
On the use of data analytics by enterprises, Italy has untapped potential to contribute to the EU's digital decade target. Italy (with 26.6%) is below the EU average (33.2%). Progress cannot be assessed since the indicator's definition has evolved.

Italy presented in its roadmap a target for 2030 (60%) which is below the EU target (75% of enterprises adopting Big Data/data analytics), but still ambitious. Currently, given the starting point, the achievement of the target by 2030 appears challenging.

The Italian roadmap does not present specific measures to encourage the adoption of data analytics, counting on measures generally aimed at supporting the uptake of advanced technologies.

[42] As of 2023, Big Data was changed by ESTAT, in agreement with all the EU National Statistical Institutes, into Data Analytics and covers a broader range of technologies including Big Data. For this reason, no comparison is possible with previous years.

- **Artificial Intelligence**



2023 state of play and recent progress

	Country level	EU level
FORECAST		19,9
DESI 2024	5,0	8,0
AVERAGE ANNUAL GROWTH %	-10,2	2,6

Average, annual growth is computed between the two most recent available data points.

Note 1: at the end of 2023 ESTAT revised backward the values of AI. The revised value for 2021 at the EU level is 7.6 % (from 7.9 %).

Note 2: The source of national forecast values is the 2023 country roadmap

Italy has untapped potential to contribute to the EU's digital decade target on Artificial Intelligence and demonstrates a very limited dynamic. Only 5% of Italian enterprises adopt AI solutions in 2023, standing below the EU average that is also at a very low value, 8.0%. Compared to 2021, the percentage of enterprises adopting AI technologies decreased from 6.2% to 5%. This deviation is however not to be considered statistically significant but rather in line with the overall EU stagnation for this Key Performance Indicator (KPI).

The target set by Italy in its roadmap (60%) is below the EU ambition, but it seems difficult to reach when considering the starting point and recent dynamic observed. Additionally, it lacks backing from specific measures in the roadmap, apart from the general measures to support digitalisation of businesses and uptake of advanced technologies mentioned above.

The AI market is growing, but SMEs still lag behind and are not engaged in exploring the potential and possible impacts of Generative AI. According to an analysis by the Observatory for Artificial intelligence[43], in 2023, the AI market in Italy reached EUR 760 million. Spending by enterprises on AI projects saw a year-on-year increase of 52%, data which does not yet reflect the potential impact of generative AI. Such growth is essentially driven by large enterprises. Moreover, around half of large enterprises (49%) have started to consider the potential and possible impacts of Generative AI, with 17% already engaged in projects, while only 7% of SMEs are considering potential applications and only 2% starting specific initiatives.

Italy made progress in training researchers in AI, but still struggles to attract and retain talent. The report of the Observatory for Artificial intelligence also shows that, in 2022-2023, Italy made progress in the capacity to train researchers, thanks to the establishment of new doctoral scholarships and increased funding (+25%) for AI research positions. Nevertheless, attracting and retaining talents

[43] Contributo dell'Osservatorio Artificial Intelligence all'Indagine Conoscitiva sull'intelligenza artificiale: opportunità e rischi per il sistema produttivo italiano, 31/01/2024 (3._Osservatorio_Artificial_Intelligence.pdf (camera.it)).

remains challenging, with 69% of the major Italian organisations considering foreign companies more attractive[44].

The government is working on the new AI strategy, replacing the one adopted for the period 2022-2024. Expected initiatives include establishing a public-private venture capital fund to support Italian startups and creating a Foundation dedicated to AI, supporting research and development, innovative projects, and fund high-tech startups and companies to bring research results to the market[45]. The establishment of dedicated funding (missing in the previous AI strategy) will be an important element in determining the potential impact.

- **Take-up by enterprises of AI or Data analytics or Cloud**

Taking the three technologies together (adoption of either AI, Cloud, or Data analytics), Italy stands at 63.1%, significantly above the EU average of 54.6%. Italy's above-average performance is driven by the uptake of cloud and, partly, of data analytics.

Unicorns/scale-ups/start-ups

Italy has seven unicorns, including two key players in the online payment segment.

There is a weak ecosystem supporting innovative start-ups and enabling them to secure funding from public entities, companies, business angels, or venture capital investments. In Italy, in 2022, venture capital investments (seed, start-up and other early stage investment) represented only 2% of GDP, well below EU countries of comparable size (such as France, Germany and Spain, where the share ranged from 6% in France, to 5% in Germany, and to 4% in Spain)[46]. Another obstacle is related to the economic structure of the country and the large prevalence of micro and small enterprises, that can play only a limited role in supporting innovative startups. More broadly, Italy also records a performance below other comparable economies when it comes to the size of the ICT sector (3.4% of the gross value added in 2019 vs. an EU average of 4.9%[47]) and the R&D intensity in the ICT sector (16.3%[48]), which translates to a low number of patents in ICT, in particular when compared to its advanced scientific knowledge.

The target set in the Italian roadmap is ambitious: reaching 16 unicorns in 2030. Initiatives that should support the achievement of this target include funds managed by Cassa Depositi e Prestiti (CDP)[49], such as the 'National Innovation Fund' that, set up in 2020, is supporting a considerable number of startups in accessing resources and fundamental skills for their growth and potentially turning them into new unicorns. CDP also manages a specific Fund dedicated to the digital transition, supported by the RRP. With EUR 300 million of initial capital, the fund supports start-ups and SMEs with high innovation potential and projects concerning, for instance, Artificial Intelligence, cloud, health, Industry 4.0, cybersecurity, fintech or blockchain. The funds are complemented by the National Network of Accelerators, including sector-specific accelerators, that aim to pool private national and international partners and provide mentorship programmes for start-ups.

[44] Ibidem.
[45] https://www.arenadigitale.it/2024/03/12/lintervento-del-sottosegretario-butti-allevento-lintelligenza-artificiale-per-litalia/.
[46] OECD, Going Digital Toolkit, 2024.
[47] Percentage of the ICT sector in Gross value added (isoc_bde15ag).
[48] Share of the ICT sector in business enterprise expenditure on research and development (isoc_bde15ar2).
[49] CDP Venture Capital SGR. There are nine different funds dedicated to start-ups and SMEs operating in strategic sectors for growth and competitiveness in the country, in particular the large Venture fund is dedicated to with minimum tickets of EUR 10 million in series B or C rounds worth more than EUR 20 million, again in co-investment with other entities.

There is as well an ongoing comprehensive review of the business incentive system. The review aims to ensure that public intervention supports the productive sector more effectively through incentive policies, ensuring better planning, organisation and implementation. In 2024, the Italian government also plans to revise the 2021 Start-up Act, which introduced measures in the fields of administrative simplification, labour market, tax incentives, and bankruptcy law. In 2024, with the first annual law on small and medium-sized enterprises, a review of the measures of the Startup Act will be carried out.

While there are many measures designed to support the start-ups, there are currently no specific measure on the development of champions, and supporting the scale up of new businesses.

Strengthening Cybersecurity & Resilience

Given the growing reliance on digital technologies, companies face an increasing risk of cybersecurity incidents and a greater need for preparedness. In 2022, 3.1% of enterprises in Italy reported ICT service outage due to cyberattacks (e.g., ransomware attacks, denial of service attacks), standing slightly below the EU average (3.5%). Most Italian enterprises (92.9%) reported using ICT security measures (EU average 92.4%), but only 16.4% reported being insured against ICT security incidents (EU average of 25%).

Looking into more detailed national data, in 2023, the subjects affected by Distributed Denial-of-Service (DDoS) attacks were mainly Central Public Administrations and enterprises in the transport and of financial services sectors. Even in the case of ransomware, in the vast majority of cases (84%) the victims are from the private sector. As regards the size of the impacted firms, approximately 23% of ransomware events affected large businesses, while in over 75% of the cases small (46.3%) and medium-sized enterprises (30.6%) were involved. Classifying, where possible, the victims according to sectors of economic activity, it emerges that the manufacturing sector was the most affected, in continuity with 2022, followed by retail and the healthcare and technology sectors[50].

Italy has a Cybersecurity Strategy **for 2022-2026 covering a wide range of domains.** Consisting of 82 measures to be implemented by 2026, it aims to strengthen the resilience in the digital transition of both public administrations and enterprises, achieve strategic autonomy, counter cyber threats and manage cyber crises. The strategy is supported by two funds: the Fund for the implementation of the National Cybersecurity Strategy, intended to finance investments for technological autonomy in the digital sector and for increasing the cybersecurity levels of national information systems (with an endowment of 420 million for 2023-2026); and the Fund for the management of cybersecurity, intended to finance operational management activities (with an endowment of 200 million for 2023-2026)[51].

Several measures were implemented during 2023 to strengthen cybersecurity of public administrations. Among the most notable initiatives was the strengthening of technical tools for cyber risk management and operational capabilities for the monitoring and analysis of malicious software, as well as of detection activities for the dissemination of safety events and early warnings. During 2023, the National Cybersecurity Agency (ACN) managed 422 cyber events against national public institutions. Considering the frequency and impact of the different types of events, in 2023 DDoS was

[50] Annual Report to Parliament for the year 2023, available on the ACN website (https://www.acn.gov.it/portale/documents/20119/446882/ACN_Relazione_2023.pdf).
[51] Information provided by Italian authorities.

the most frequent kind of attack against public institutions, followed by the exploitation of vulnerabilities and phishing[52].

Moreover, it was established a mechanism for the exchange of information on cyber-threats, through the so-called Indicators of Compromise (IoCs), to strengthen the responsiveness and defence capacity of public administrations. During 2023, CERT-AgID identified and countered a total of 1 713 malicious campaigns, sharing a total of 20 603 indicators of compromise (IoCs) with the public administrations participating in this network[53].

In addition, initiatives targeted training in cybersecurity and the strengthening of cybersecurity capabilities among public administrations and SMEs. At the beginning of 2023, the National Agency for Cybersecurity (ACN) launched a series of initiatives aimed at promoting cybersecurity training at the national level, defining a national reference framework. The strategy covers a wide range of measures tailored to specific needs and covering different levels and types of training, from schools and universities to industry-based training programs.

Several European Digital Innovation Hubs (EDIHs) established in Italy specifically address the development of cybersecurity capabilities, in specific sectors (e.g., DANTE for the healthcare sector, DIHCUBE for the construction sector) or across the board (I-NEST, MicroCyber, InnoVA).

Finally, it is worth mentioning the ongoing measures **to build resilient, secure and reliable cloud infrastructure**, starting with the creation of the National Strategic Hub, the qualification of public cloud providers and the migration of public administrations' data and services the most appropriate cloud solution.

[52] The source is the Annual Report to Parliament for the year 2023, available on the ACN website (https://www.acn.gov.it/portale/documents/20119/446882/ACN_Relazione_2023.pdf).

[53] Data available on the website of CERT-AgID (*https://cert-agid.gov.it/news/report-riepilogativo-sullandamento-delle-campagne-malevole-che-hanno-interessato-litalia-nel-2023/*).

Protecting and empowering EU people and society

Empowering people and bringing the digital transformation closer to their needs

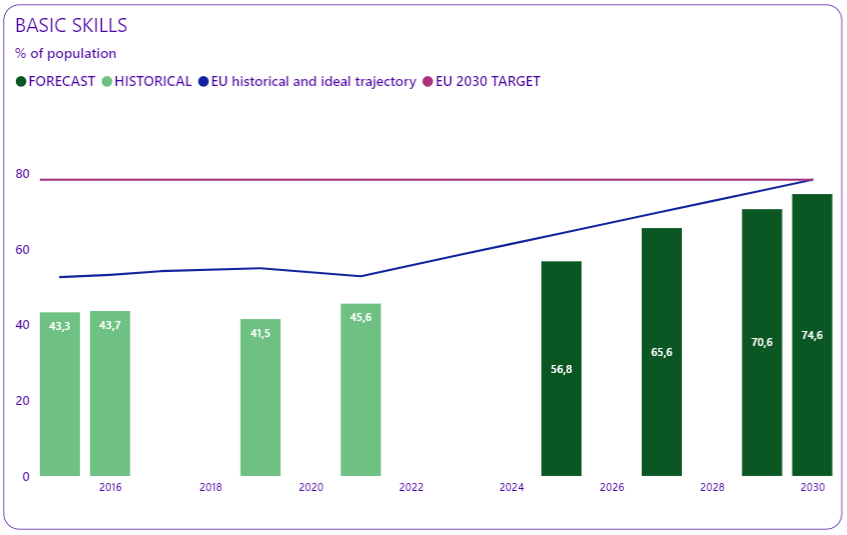
The roadmap and policy developments in the recent years show that Italy is focusing on bridging the digital divide, boosting digital skills, digitalising public services and improving access, and protecting users online.

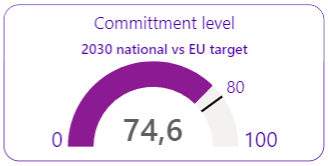
According to the Digital Decade Eurobarometer, 71% of Italians consider that the digitalisation of daily public and private services is making their life easier, standing broadly in line with the EU average (73%). The survey shows a general positive opinion on how digital rights and principles are applied in Italy. For example, there is a general positive opinion as regards: getting basic and advanced digital education, training and skills (for 60% of Italians this right/principle is well applied, in line with the EU average); getting easy online access to all key public services in the EU (61% in Italy vs. 58% in the EU); or control on own' data (54% in Italy; 47% in the EU).

However, Italy suffers from divides at different levels (geographical, socio-economic, educational) that are also reflected online. It is one of the EU Member States with the lowest levels of basic digital skills. In addition, efforts are still needed to make digital public services fully accessible to both citizens and businesses, advancing in all areas and all public administrations.

Equipping people with digital skills

Basic Digital Skills





2023 state of play and recent progress

	Country level	EU level
FORECAST		59,8
DESI 2024	45,8	55,6
AVERAGE ANNUAL GROWTH %	0,2	1,5

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap

Italy has scope to improve its performance to contribute to the EU's digital decade target on basic digital skills, while demonstrating limited dynamic. In 2023, only 45.8% of the people in Italy had at

least basic digital skills, against an EU average of 55.6%. In the last 2 years, there has been no overall significant improvement (the value increased by only 0.2% annually compared to 2021)[54].

The indicator is particularly low for people who have low or no formal education, with only 22.6% of them having at least basic digital skills (versus 33.6% in the EU), and for people between 55 and 74 years old, for which the value is 30% (vs 37% in the EU). Population living in rural areas also records lower levels of digital skills, with 40.6% recording at least a basic level (vs 47.5% in the EU).

The gap between Italy and the rest of the EU is significant especially when considering the youngest generations and people living in urban areas, which are groups generally expected to have higher levels of digital skills. In Italy, only 59% of people aged 16-24 and 54% of those aged 25-54 have at least basic digital skills. The EU averages are 10 percentage points above with, 70% and 64% respectively. Similarly, only 51% of the population living in urban areas has at least basic digital skills, vs 63% in the EU, with a 12 percentage points gap. Italy only narrows the gap with the EU for people with medium and high education levels.

In its national roadmaps, Italy set a target of 74.6% by 2023, standing below the 80% EU target. The target remains very ambitious, considering the low starting point, the limited growth rate observed so far, and despite possible positive effects due to the population dynamics and the generational shift.

Italy has strengthened the focus on digital skills in the last 5 years and the roadmap supports measures addressing the general population, schools, and workers. A heightened focus started in 2019, when Italy introduced its first digital skills strategy, and launched the flagship initiative Digital Republic and the related fund. With the RRP, measures in the different areas of action have been strengthened. In particular, the RRP supports key investment measures in basic digital skills for the general population. Two of the main measures aimed at providing citizens with at least basic digital skills and helping them use digital services are: the digital civic service (EUR 60 million) that, in 2023, involved around 1 900 young volunteers who, in turn, reached about 80 000 citizens; and the network of digital facilitation services (EUR 135 million), with the opening of 504 facilitation services (Punti Digitale Facile) across the country in 2023, which supported about 6 000 people in using digital services[55].

Other measures presented in the roadmap, and also partly supported by the RRP, focus on schools, including strengthening teachers' skills; and on upskilling and reskilling of workers, with initiatives such as the New Skills Fund, that contributes to the cost of training borne by the employer, or the Digital Skills Syllabus, that targets public sector employees and is showing encouraging results.

In particular, the syllabus reached over 205 000 public sector employees on basic digital skills, providing personalised training. Data collected during its implementation shows that there are strong gaps in terms of skills, but also that there is high interest, including in small public administrations, and that those who start the training path are likely to continue and reach advanced levels. In general terms and following the RRP, the digital competences of public sector employees have acquired an increasing attention, translated in specific targets (e.g., training on digital skills of employees is part of the criteria

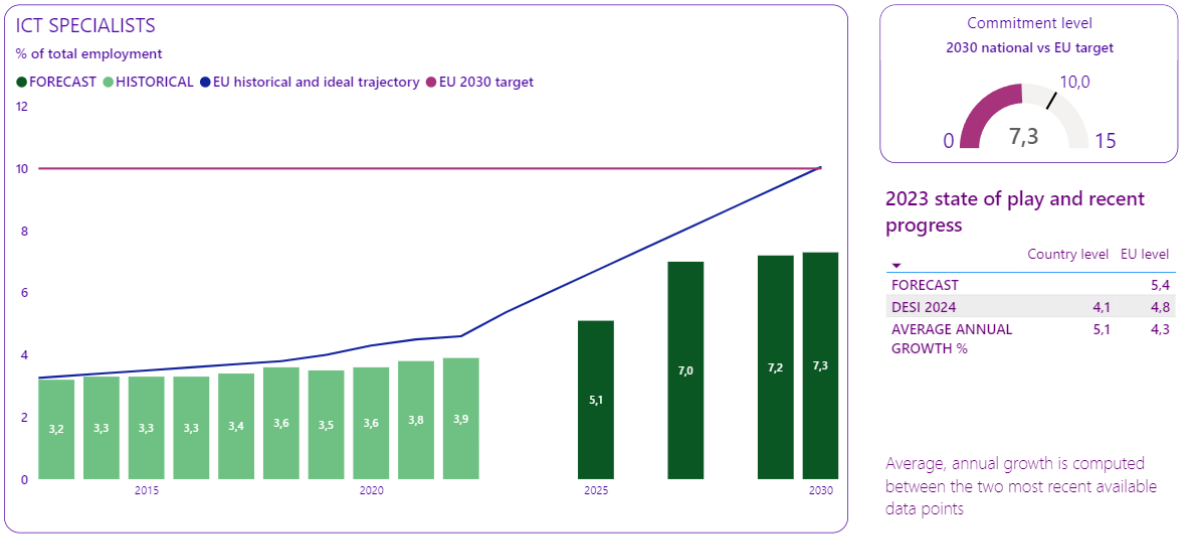
[54] Looking more in detail at the skill domains covered by the indicator, the low progress and performance has to be mainly attributed to people with poor skills in the area of 'Digital Content Creation' and 'Security'. In other areas, instead, there were improvements compared to 2021; in particular, the percentage of people with advanced digital skills in the 'Communication and Collaboration' domain increased by 4 percentage points and by nearly 3 percentage points in the 'Problem Solving' domain.

[55] Data updated in September 2023. The objectives are: on digital civil service, to train 1 million citizens by 2025; on the network of digital facilitation services, reaching more than 2 million of citizens by 2026.

to measure the performance of managers; employees should receive at least 24 hours of training per year; 75% of employees should be trained on digital skills by 2025).

Overall, strengthening basic digital skills and overcoming the significant shortcomings remain a priority. Basic digital skills receive most of the support in the roadmap, with 16 measures and EUR 7.8 billion of planned investment until 2026. Measures also target re-skilling and upskilling of the workforce, aligning with last year's recommendation. However, data clearly shows that Italy faces a wide gap and progress is very slow, a combination that requires significant and targeted efforts, covering all sections of the population including young people.

ICT specialists



Note: The source of national forecast values is the 2023 country roadmap

Italy has scope to improve its performance to contribute to the EU's digital decade target on ICT specialists, despite it shows a positive dynamic. In 2023, ICT specialists in Italy were 4.1% of the people employed, standing behind the European average of 4.8%. Moreover, women represent only 15.7% of ICT specialists, against an EU average of 19.4%.

The target set in the roadmap is difficult to reach if the current trends continue. The trajectory set by Italy aims at reaching 7.3% by 2023, below the EU target of 10% and requiring to significantly accelerate the current trend. Due to its large population, the efforts of Italy will have decisive consequences on the achievement of the ICT specialist 2030 target at EU level.

The demand for ICT professionals has significantly increased in the last 5 years and largely exceed the offer of ICT specialists on the job market. According to national research, the number of job postings to hire ICT professionals has increased from about 20 000 in early 2019 to about 60 000 in April 2023. Most of the demand comes from large enterprises and focuses on professions like software developers and experts in network and systems engineering. This demand, however, largely exceed the offer (by 5 times, according to estimates of the research)[56]. This gap is confirmed by the data on the share of Italian enterprises that tried to recruit ICT specialists and found difficulties, which is also on an increasing path: from 54% in 2019 to 60% in 2022 (latest data available)[57].

[56] AICA, Anitec-Assinform, Assintel, ICT: Talenti Cercasi, December 2023.
[57] Eurostat, Enterprises that recruited or tried to recruit ICT specialists by size class of enterprise (isoc_ske_itrcrs).

Italy has a low share of ICT graduates, while the academic offer seems to increase too slowly. Few people in Italy undertake ICT studies, with about 1.5% of all graduates being classified as ICT graduates in 2022 (EU average is 4.5%)[58]. The ability of the educational offer (including Universities, ITS academies, and high schools) to meet the growing needs is a key factor. For example, according to the research, in Italy Universities still show limited growth in ICT courses (these courses represent 7% of the educational offer) and strong gender imbalances; while the existing specialised Tertiary Education Institutes (Istituti Tecnologici Nazionali or ITS) can give a strong contribution, to date, there are only 19 programs in ICT with about 30 students each per year . Increasing the number of ICT specialists in the Italian labour market will require acting on both these factors, i.e., participation in ICT studies and educational offer. In parallel, issues related to the low attractiveness of Italian enterprises for digital talents also deserve proper attention, as a dynamic that might further exacerbate the lack of ICT specialists in the Italian market.

Efforts to boost results in this area are supported by measures to encourage access to and participation in ICT programmes, and initiatives for technological transfer and capacity building in SMEs. Most of the measures included in the RRP, however, will give results only in 2024-2025. Actions to increase the number of ICT specialists cover, for example, scholarship programmes for doctoral students[59], and financial support to universities to increase enrolments in ICT-related courses through guidance activities in secondary schools, teacher training, mentoring and guidance in the first years of their studies, or financial contributions to students[60]. Part of the efforts are also targeted at strengthening digital programmes dedicated to university students, professionals, and businesses, by facilitating the activation of inter-university digital educational programmes and exchanges[61].

Finally, the national roadmap presents measures to strengthen the availability of advanced skills in SMEs, for example, through vouchers giving SMEs the possibility to hire innovation managers. In the industry landscape, an important role is also played by the Competence Centers, delivering demonstrations and training courses especially in relation to industry 4.0 technologies.

The participation of women in the ICT sector is streamlined in the general measures promoted by the Italian roadmap.

Overall, there is still a need to increase the capacity to train ICT specialists, attract and retain talents, and ensuring Italy's strong contribution to the EU target.

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

e-ID

Italy has two certified eIDAS digital identity schemes, SPID and CIE, which are widely adopted in the country. The number of SPID and CIE issued continued to increase. In 2023, the total number of active SPIDs exceeded 37 million (from 34 million in 2022), and the total number CIE stood at 39 million. In

[58] Distribution of graduates at education level and programme orientation (Eurostat), considering the ISCED code 'Information and Communication Technologies'. According to national data (Laureati - Informazione sui file relativi ai laureati - Open Data dell'istruzione superiore (mur.gov.it)), if also graduates in computer science engineering are considered, this share would increase to 4.3%, however this data cannot be used for comparison with the EU average.

[59] Measure under the RRP (Mission 4, Component 1, investment 3.4), with the overall objective of providing 500 scholarships.

[60] ICT Graduates Plan, funded with national resources for a budget of about EUR 1 million per year.

[61] Digital Education Hubs.

other words, most adults have at least one of the two e-ID schemes. The national authorities also highlighted the continuous rise in the access to digital public services through SPID and CIE[62].

A positive picture is also provided by Eurostat data showing that, in Italy, in 2023 about 40% of individuals reported having used their e-IDs to access online public services in their country, and 47% had used their e-IDs to access online services for private purposes. Both these figures are above the EU average (36% and 41%, respectively)[63]. If coupled with the low level of digital skills in the country, these figures represent a remarkable achievement.

Also, with the support of the Recovery and Resilience Facility, Italy has taken many initiatives to increase the number of services integrated in SPID and CIE and incentivise their use among citizens. In particular, as part of the measure 'Citizen experience', the Plan allocates EUR 285 million to foster the adoption of e-IDs, setting two targets: 42.3 million citizens having an e-ID by 2026; and 16 500 public administrations adopting an e-ID scheme[64]. Moreover, in March 2023, AGID issued a regulation identifying technology intermediaries with the task of simplifying the onboarding of public and private service providers in the SPID system.

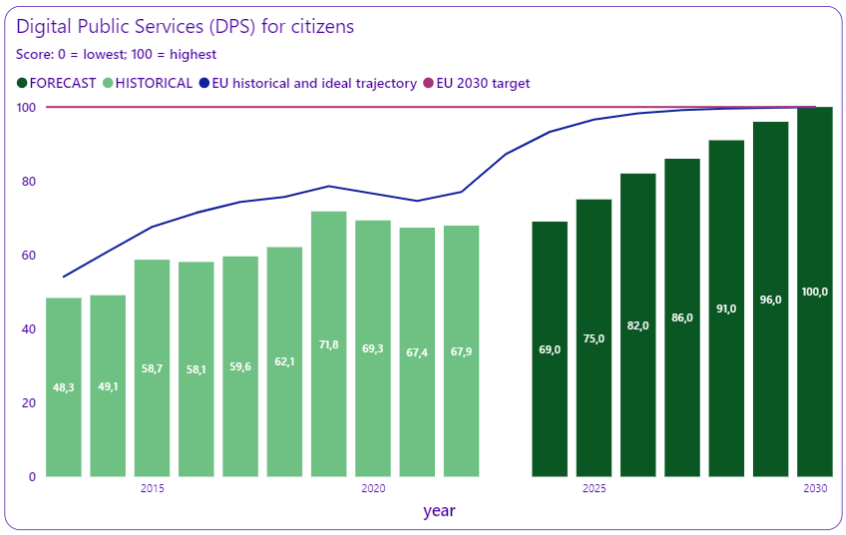
Italy is contributing to the development of the regulatory and technological framework of the European Digital Identity Wallet (EUDI Wallet) participating in the international consortia for the development use cases. In particular, the country is actively engaged in: NOBID, a consortium involving a set of Nordic and Baltic countries, Germany and Italy, for a large-scale pilot for the payment use case in the EU Digital Wallet; and Potential, bringing together 19 Member States (plus Ukraine) for the development of six use cases (e-Government services, e-Prescriptions, bank account opening, SIM card registration, driving licences, and eSignatures).

Italy has initiated the development of a national wallet, 'IT Wallet', in line with the framework being defined at the EU level. The IT Wallet is aimed at rationalizing the digital identity ecosystem in Italy and facilitating access to public services. In line with the EU Digital Identity Wallet, the IT Wallet will provide a single place where to securely store most important documents and will allow people to authenticate and access the digital space while maintaining full control of their data. With this project, Italy intends to develop the wallet ahead of the roll-out of the EU Digital Identity Wallet, expected by 2026.

[62] Based on information provided by Italian authorities, in 2023, there were more than 1 billion accesses with SPID to public and private services, while the number of accesses with CIEs reached 34.999.181 (up 67% from 2022).
[63] Eurostat, Use of electronic identification (e-ID), isoc_eid_ieid.
[64] Mission 1, Component 1, Investment 1.4.4: Adoption scale up of the National Digital Identity platforms (SPID, CIE) and the national registry (ANPR).

Italy

Digitalisation of public services for citizens and businesses



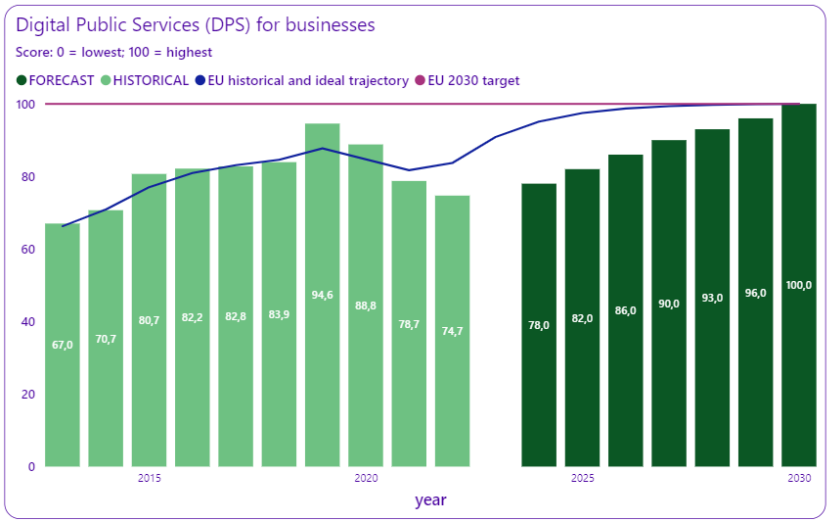
2023 state of play and recent progress

	Country level	EU level
FORECAST		87,2
DESI 2024	68,3	79,4
AVERAGE ANNUAL GROWTH %	0,5	3,1

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap



2023 state of play and recent progress

	Country level	EU level
FORECAST		90,9
DESI 2024	76,3	85,4
AVERAGE ANNUAL GROWTH %	2,1	2,0

Average, annual growth is computed between the two most recent available data points

Note 1: Data break-in-series in 2020

Note 2: The source of national forecast values is the 2023 country roadmap

Italy has scope to improve its performance to contribute to the EU's digital decade target on making accessible online key digital public services to citizens and businesses. On the availability of digital public services for citizens, in 2023 Italy scored 68.3, against an EU average of 79.4, with a limited dynamic in term of progress. On the availability of digital public services for businesses, the score was 76.3 in 2023, also below the EU average of 85.4 but showing an increase of about 2% compared to last year. The gaps in terms of cross-border availability of services, for both citizens and businesses, negatively affect the overall score of the country[65].

[65] In 2023, in cross-border availability of digital public services for citizens, Italy scores 47, against an EU average of about 68; the score for businesses is 58, against an EU average of 73.

In its roadmap, Italy aims to reach the EU level target of 100% of key digital public services available to citizens and businesses by 2030. The current data and limited growth make the achievement of this target within the defined time period challenging.

The digitalisation of public services, however, has been an important area of focus for Italy's digital policies in recent years and it benefits from significant investment supported by the Recovery and Resilience Facility. Measures supported with the RRP build on major e-government projects that are at the cornerstone of the Italian strategy to digitise public services, encourage their take up and increase the efficiency of public administration, notably: the integration of services in enabling platforms like appIO (as one-stop-shop for access to public services), PagoPA (for digital payments towards the public administration) and SEND (for notifications of acts with legal value), which provide user-friendly interfaces for interaction between citizens/businesses and the public administration; the development of interoperability and exchange of data between public administrations, with further progress in the implementation of the national digital registry (ANPR) and the national data platform (PDND); the resilience of infrastructure of public administrations, with the advancements in the migration to the most appropriate cloud solutions (in line with the Italian Cloud Strategy 2021). These measures are also part of the national roadmap along with other initiatives, such as those for the implementation of the Single Digital Gateway and POLIS (which supports the use of digital public services by citizens, with dedicated support services and infrastructure located in post offices).

In 2024, Italy published a new Digital Plan for the public administration, which re-affirms the objective of building a more efficient and accessible system for citizens. It aligns the interventions with the measures supported under the RRP and places particular focus on the monitoring of digitalisation across the public administrations[66].

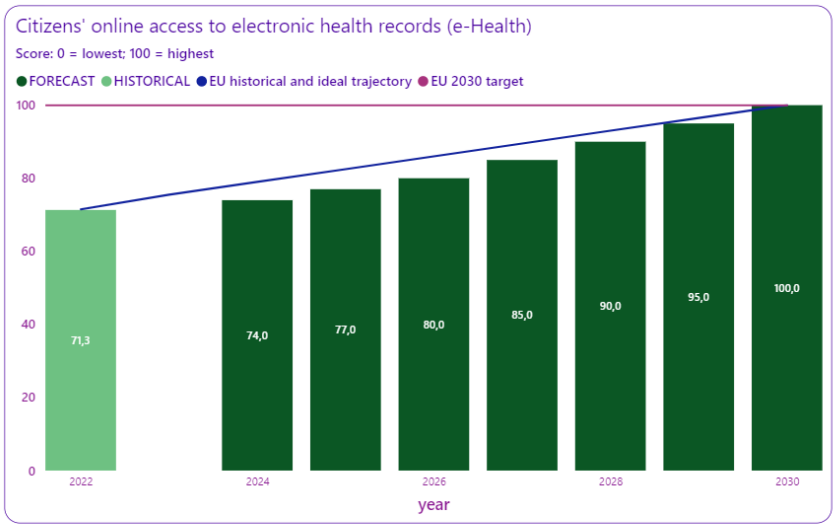
Some issues related to complexity and lack of user-friendliness of digital public services remain and are raised by stakeholders, such as the non-intuitive design of websites, the lack of consistency between the online and physical channels, insufficient user support, or need to provide documents more than once[67]. These issues were still raised despite the efforts made by the government through projects such as the Designers Italia (which produces guidelines, models, and resources for designing and implementing public services)the accessibility guidelines, and a number of measures covering monitoring, guidance and training. In 2023, AgID conducted in-depth monitoring of 100 websites and mobile applications of public entities, next to the quarterly automated monitoring of approximately 25,000 public entity websites which provides feedback on the level of accessibility and mistakes detected. In addition, the agency organized specific training sessions to promote the culture of accessibility and usability.

[66] Piano Triennale per l'Informatica nella Pubblica Amministrazione 2024-2026 (https://www.agid.gov.it/sites/default/files/repository_files/piano_triennale_per_linformatica_nella_pa_2024-2026.pdf).

[67] These issues are also reflected in the results of the e-government benchmark on the indicators related to the use of pre-filled forms, user support and transparency (Study 'eGovernment benchmark 2024': https://digital-strategy.ec.europa.eu/en/news-redirect/833346).

Italy

e-Health



2023 state of play and recent progress

	Country level	EU level
FORECAST		75,5
DESI 2024	82,7	79,1
AVERAGE ANNUAL GROWTH %	15,9	10,6

Average, annual growth is computed between the two most recent available data points

Note: The source of national forecast values is the 2023 country roadmap

Italy brings a very strong contribution to the Digital Decade target of making Electronic Health Records (EHR) accessible to all citizens, showing a positive dynamic. The country has an overall eHealth maturity score of 83 out of 100 in 2023 (EU average is 79/100). Italy significantly improved its performance, moving from a maturity score of 71/100 in 2022.

The EHR has been introduced in all regions and between 80% and 100% of the national population is technically able to access online eHealth records through both native mobile application(s) and online portal(s), logging in using an eID compliant with eIDAS Regulation. The Web Content Accessibility Guidelines are generally followed. Over 40% of the regions have implemented a functionality to put legal provisions for access opportunities into practice.

Most of health data types are made available in a timely manner, although there is room for improvement[68]. The main gap, however, is related to the limited uptake by healthcare providers supplying health data. Only 3 out of 11 applicable categories of healthcare providers supply relevant data[69].

For 2030, Italy aims to score 100 in e-health, in line with the EU target. The target seems achievable if efforts are sustained.

As part of the RRP, Italy has started a specific measure on the EHR. The aim is to improve services provided by regional EHRs, ensuring that Italian citizens have access to their medical file regardless of where they seek assistance within the country.

Emphasis is currently on improving interoperability, promoting consistency in content, services, and user experience, as well as standardisation and portability between regions. In 2023, two 'crash programmes' were launched in a sample of regions: one focused on implementation, particularly in terms of inputting data into the EHR by healthcare professionals, and another on interoperability between regions. The programme gave good results. For instance, in Campania, as result of the crash programme, implementation rates of the EHR surged from 2% before the program to 70% afterwards.

[68] Data about medical images are unavailable in most regions, and data about allergies, current problems, medical devices/implants, procedures/operations and current/past medicines are available in most regions but not in a timely manner.

[69] Study 'Digital Decade eHealth Indicator Study': https://digital-strategy.ec.europa.eu/en/news-redirect/833348.

Regarding interoperability, following the programme, it was decided to launch a mapping of the applications used by different regions and the establishment of a national accreditation system to ensure that the applications used were interoperable.

Building a safe and human centric digital environment and preserving our democracy

The Eurobarometer reveals that Italians are concerned about risks encountered online, but there is also limited awareness regarding the continuity of offline rights online. According to the results of the Eurobarometer[70], Italians are especially concerned by the impacts of fake news and disinformation (flagged as important by 43% of the respondents), misuse of personal data (40%) and insufficient protection of minors (33%) on their daily lives[71]. Another important element, that public authorities should focus on, is the development of AI and other digital technologies in compliance with our rights and values. This aspect is mentioned as important by 82% of the respondents in Italy (against 78% in the EU).

However, almost half of the people interviewed in Italy (49%) declared to be not aware that their offline rights apply also online (versus an EU average of 39%).

The Italian roadmap emphasises aspects such as bridging the digital divide, encouraging digital inclusion and participation as principles that guide digital transformation efforts. Various working groups, coordinated by the government and involving stakeholders are tackling issues such as bridging the digital divide, encouraging digital inclusion and facilitating access to digital public services, and boosting specialised ICT skills. Notable initiatives include programmes for digital literacy education aired on the national public broadcasting network, the Digital Skills Award, or the work of the National Coalition for Digital Skills and Jobs ('Digital Republic'), which has trained millions of people. Furthermore, ongoing trials with electronic voting aim to empower Italians living abroad by enabling them to vote remotely, showcasing a commitment to embracing digital innovations to boost democratic processes.

Efforts have been addressed to safeguard users from various forms of illicit content, protect minors and users in the evolving digital landscape. Over the years, in the context of the EU legislative framework, Italy has developed instruments spanning legislation banning secondary ticketing[72] and advertising associated with gambling[73], age verification systems to protect minor from access to pornographic content[74] and guidelines for protection of minors in the cyber space[75], copyright law to combat online piracy of live events, particularly sport events[76], and to increase the protection of works

[70] Special Eurobarometer on the Digital Decade 2024.

[71] Answer to the question: 'The European Union has regulated the behaviour of online platforms, such as social media and online marketplaces, in the EU. In the context of the enforcement of this legislation, which one of the following issues do you feel has the biggest personal impact on you? Firstly? And then?'. The answer options mentioned in the text are those that were mentioned by most of the respondents (out of a total of 9 answer options).

[72] Law no 232 of 11 December 2016 – Budget Law 2017.

[73] Law Decree n. 87 of 12 July 2018 ('Dignity Decree').

[74] Law Decree n. 159 of 15 November 2023.

[75] Decision No. 9/23/CONS, implementing the art. 7-bis of the legislative decree of 30 April 2020, n. 28, regarding 'Systems for the protection of minors from cyberspace risks'. The guidelines, implementing legislation on the protection of minors from cyberspace risks, mandate parental control systems for Internet service providers, irrespective of the delivery technology, to filter inappropriate content for minors and to block content reserved for an audience over the age of 18.

[76] Law n. 93 of 14 July 2023, and Decision N. 189/23/CONS.

with high digital content[77].Additional initiatives are ongoing in the area of protection of minors and influencers: a consultation on technical and procedural actions that website operators and providers of video-sharing platforms shall adopt in order to verify users' age and ensure an appropriate level of protection; a public consultation and the establishment of a technical committee to draft a code of conduct on influencers.

[77] Article 27, paragraph 2, of Law No. 206 of December 27, 2023, 'Organic provisions for the enhancement, promotion and protection of the made in Italy' provided for the establishment of an inventory of the works of digital creators in the general public register of protected works, referred to in Article 103 of Law No. 633 of April 22, 1941.

Leveraging digital transformation for a smart greening

Italian enterprises are generally attentive to matters related to the impact of the digital devices, while Italian citizens consider the digital transition as important in supporting the green transition. In 2022, 59.9% of enterprises in Italy declared to consider the environmental impact of ICT services, or ICT equipment, before selecting them and applied some measures, affecting the paper or energy consumption of the ICT equipment. This figure is well above the EU average of 48.7%.

However, the propensity of people to recycle old digital devices is slightly lower in Italy than in the rest of the EU. About 10.7% of the population recycling mobile phones, 5.9% laptops and tablets and 9.7% desktop computers (10.4%, 9.7% and 12.8% respectively at EU level). However, Italian citizens support the relevance of digital as means to fight climate change and support the green transition. According to the Eurobarometer survey 'Digital Decade 2024', 81% of respondents in Italy consider that digital technologies are important to help fighting climate change compared to the EU average of 74%). 80% of Italian respondents also think that ensuring that digital technologies serve the green transition should be an important action for public authorities (in line with the EU average of 81%).

In 2024, Italy approved the 'Transition 5.0' Plan, to encourage enterprises to invest in green and digital technologies. Supported under the REPowerEU chapter of the RRP, the plan supports investments in digitization and the green transition of businesses through a tax credit scheme. With a total budget of about EUR 6.3 billion for 2024-2025, the tax credit will be granted to enterprises of any size for investments in tangible and intangible assets, provided that a reduction in energy consumption of the production unit of at least 3% is achieved (or 5% if calculated on the process affected by the investment). In addition, within the framework of innovation projects resulting in the reduction in energy consumption mentioned above, the tax credits will also apply to investments in new instrumental assets necessary for self-production of energy from renewable sources, and expenses for training of employees aimed at acquiring or consolidating skills in technologies for the digital and energy transition of production processes.

This plan will scale up and consolidate actions in this direction that had been already launched. For example, the implementation of 'Sustainable Investments 4.0' is supporting innovative and sustainable investments by businesses, leveraging digital technologies as outlined in the Transition 4.0 Plan. This initiative primarily benefits micro, small, and medium-sized enterprises across seven regions[78].

Ongoing projects in Italy also aim to use advanced technologies to mitigate the environmental impact of human activities or combat climate change by leveraging data. For instance, an initiative of the RRP is to implement an advanced and integrated monitoring and forecast system, identifying and predicting risks as a result of climate change and inadequate spatial planning through the use of advanced technologies (e.g., spatial data using satellite observation systems, drones, remote sensors). Another example under the RRP is a measure to develop large-scale mobility services based on the Mobility as a Service (MaaS) paradigm. These services optimise public and private transportation relationships, boosting more efficient, sustainable, inclusive, and digital mobility options. It has been launched in three pilot cities.

[78] Basilicata, Calabria, Campania, Molise, Puglia, Sicilia, and Sardegna.

Overall, the interconnection between digital and green transitions is streamlined in various policies, which tackle multiple aspects. Another area of action is to promote green solutions through innovative public procurement strategies. The ENEA (National Agency for new technologies, energy and sustainable economic development) has been promoting innovation in the management process of energy-intensive and strategically important infrastructure at local level, in a 'smart city' perspective. Leveraging innovative technological and digital solutions, it has initiated the development of a management model and related tools for Public Lighting infrastructure. It developed the PELL Platform (Public Energy Living Lab) as a tool for collecting, organizing, managing, processing, and evaluating data for the monitoring of the infrastructure and its efficient and effective management. Recently, in collaboration with AgID, ENEA has defined the specification of the PELL IP data model to ensure the interoperability of data and systems, extending the application to other energy-intensive public infrastructures such as schools and hospitals.

Annex I – National roadmap analysis

Italy's national Digital Decade strategic roadmap

On 31 January, Italy submitted its national strategic roadmap, in line with Article 7 of the Digital Decade Policy Programme Decision. The roadmap in itself has not been consulted on, but measures are the result of consultation processes in place for different areas of action. Government approval is pending, as is its publication.

The Italian roadmap is very comprehensive and presents 14 targets and 12 trajectories until 2030. To be noted that, in Italy, the indicators on VHCN and FTTP coincide. A trajectory is missing for unicorns, although the target value for 2030 is provided. Most of national targets match the 2030 EU targets, including the commitment to achieve 100% VHCN coverage by 2026, building on the measures of the Recovery and Resilience Plan. Basic digital skills, ICT specialists, the adoption of technologies by enterprises (cloud, AI, data analytics), taken separately, are set below the EU target values (with the target on cloud uptake set at 74%, thus broadly in line with the EU target). The trajectories have been computed on the basis of the correct KPI definitions but might require adjustments as regards the years taken as starting value/baseline.

The table below reflects a best-effort attempt to categorise the measures and budget as presented in the Italian roadmap in line with the Digital Decade targets. While some targets lack specific measures, it is reasonable to assume that they will benefit from different measures of the roadmap, as elaborated further below.

Digital Decade target	Budget in the roadmap (EUR million)	Number of measures in the roadmap
Connectivity gigabit	5 400	3
Connectivity 5G	2 000	1
Semiconductors	3 292.0	2
Edge nodes	50.0	1
Quantum computing	49.9	4
SME take up	1 532.5	4
Cloud/AI/Big data uptake	136.0	3
Cloud only uptake	900.0	1
AI only uptake	-	-
Big data uptake	-	-
Unicorns	-	-
Basic digital skills	9 222.9	15
ICT specialists	1 173.2	12
e-ID	259.7	1
Key public services	7 147.3	13
e-Health	1 300.0	1
Objectives	-	-
Total	**32 507**	**61**

The roadmap describes policies, measures and actions supporting each of the targets. In the table above, the targets on AI and big data do not have measures nor budget. However, those targets are

considered to be broadly supported by the measures contributing to the targets related to SMEs digitalisation and uptake of cloud/AI/Big data taken together.

The roadmap also provides an **overview of regional measures** that are relevant to each target, although quantifications are not available in all cases.

While not reported in the table above, **objectives and digital rights and principles are also addressed** with an overview of some of the existing measures outlining the efforts made towards inclusion, accessibility and participation, technological leadership (with a narrow focus on cybersecurity), and the green and digital transitions.

Measures related to **basic digital skills** and **ICT specialists** are the **most prominent**, **in line with the positioning of the country and the ambition of the national trajectory**. The document outlines a variety of proposed measures, aimed at boosting digital skills across the population, encouraging inclusivity, and supporting re-skilling and upskilling. Efforts are also directed towards improving **connectivity**, building on the measures planned as part of the Recovery and Resilience Plan, and advancing the **digitalisation of businesses**, including support for emerging technologies like AI and blockchain. There is a strong focus on improving **digital public services**, next to initiatives for the development and deployment of e-ID and electronic health records, with specific targets for practitioner adoption. The targets on **semiconductors, edge-nodes and quantum** are supported by a **limited number of targeted measures**, which represent part of the initiatives and capabilities on which the country can build.

Overall, the roadmap presents a coherent effort to increase the digitalisation of the country, also addressing its weaknesses (e.g., in the area of digital skills) and answering to challenges identified in the previous State of the Digital Decade report 2023. However, some aspects **might require more targeted efforts**. While there are general measures addressing the uptake of technologies by businesses, measures aimed at facilitating the **adoption of specific technologies, starting from AI**, should be considered. The **ambitious target on unicorns**, in addition, does **not appear to be supported by specific measures**, including action to address framework conditions and encourage private investment. A more **comprehensive approach** could be taken to strengthen the country's position in **key areas such as semiconductors, edge computing, and quantum technologies**. In addition, given the magnitude of the challenge and the existing gaps, the **scale of efforts directed towards skills development and ICT specialists** should be carefully considered.

The roadmap strongly builds on the Recovery and Resilience Plan, which determines the timespan of the measures presented, in most of the cases until 2026.

Annex II – Factsheet on multi-country projects (MCPs) and funding

MCP and EDICs

Italy is member of the following EDICs already set up: the Alliance for Language Technologies (ALT-EDIC), European Blockchain Partnership and European Blockchain Services Infrastructure (EUROPEUM-EDIC) and is finalising negotiations to become member of the CitiVERSE EDIC. Italy is participating in the working groups of the following possible future EDICs: Cybersecurity Skills Academy, Cancer Image Europe (EUCAIM EDIC), AGRIfood EDIC, Mobility and Logistics Data EDIC, Genome EDIC. It participates as an observer in the working group for the possible future Digital Commons EDIC.

Moreover, Italy participates in the IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI-CIS), the IPCEI in Microelectronics (IPCEI-ME) and the IPCEI on Microelectronics and Communication Technologies (IPCEI-ME/CT).

All in all, Italy is active in 3 IPCEIs and in 9 EDICs that are **set up or in the making.**

Moreover, as highlighted in the roadmap, Italy is active in a number of multi-country projects and initiatives, such as the **EuroHPC JU, EuroQCI, Chips Joint Undertaking**, the network of **Testing and Experimentation Facilities**, of **European Digital Innovation Hubs**.

EU funding for digital policies in Italy

The Italian Recovery and Resilience Plan (RRP) devotes EUR 47 billion (26% of the total) to the digital transformation. According to a JRC study, EUR 41.8 billion directly contribute achieving Digital Decade targets[79].

The largest digital measure of the RRP is dedicated to the digitalisation of enterprises (Transition 4.0), which provides tax credits for the acquisition of industry 4.0 tangible and intangible assets. Measures also aim to strengthen technology transfer centres, in complementary with the network of European Digital Innovation Hubs.

Significant reforms and investments contribute to the transformation of the public administration. This includes measures for the uptake of cloud across all administrations, interoperability of national systems and registers, the improvement of digital public services through the uptake of enabling platforms. The RRP also aims to strengthen the healthcare system through digital technologies, including a measure focused on the deployment and uptake of the Electronic Health Record.

The RRP addresses digital-skills development with measures aimed at improving the basic digital skills of the general population, increasing the offer of training on advanced digital skills, and upskilling and reskilling the workforce.

[79] Based on an estimation of the possible contribution to the Digital Decade (Joint Research Centre report 'Mapping EU level funding instruments to Digital Decade targets - 2024 update' (Signorelli et al., 2024)).

Finally, the Plan allocates EUR 5.3 billion to the deployment of VHCN and 5G (primarily with the two key measures 'Italia 1 Giga' and 'Italia 5G') and supports the development and deployment of advanced technologies, such as microelectronics.
As of March 2024, Italy has submitted five payment requests and has received disbursement for EUR 102.5 billion (including pre-financing and the positive assessment of four payment requests).

According to the JRC study mentioned above, Italy also received EUR 3.5 billion of Digital Decade-relevant budget from cohesion policy funds with an accent given to digitalisation of public services and of enterprises.