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PART 4/6

# COMMISSION STAFF WORKING DOCUMENT

## Digital Decade country reports


# State of the Digital Decade 2024

## Latvia

# 1 Executive Summary

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

**In 2023, Latvia made notable progress** in the digitalisation of SMEs, the overall uptake of cloud and in the digitalisation of public services for businesses. However, particularly important **challenges persist** in improving citizens digital skills and strengthening the overall connectivity infrastructure, both gigabit and 5G.

**Digitalisation is a priority for the Latvian authorities.** It is included in several national strategies such as the **Digital Transformation Guidelines 2021-2027**, **Electronic Communications Sector Development Plan for 2021-2027**, **National Industrial Policy Guidelines (2021-2027)** and **National Development Plan 2021-2027**. Latvia ranks below the EU average for digital infrastructures, **despite** showing a strong annual growth. Latvia is progressing in the digitalisation of public services for **citizens** and **enterprises**, while at the same time falling **below** the EU average in basic digital skills, digitalisation of SMEs.

According to the **Special Eurobarometer 'Digital Decade 2024'[1],** 78% of Latvians consider that the digitalisation of daily public and private services is making their life easier, which is above the EU average of 73%.

Latvia is a member of the existing **Alliance for Language Technologies EDIC** (ALT EDIC) and Local Digital Twins towards **CitiVERSE EDIC** and is engaging in discussion on the setting up of Cancer Image Europe (EUCAIM) EDIC with an informal working group. The country also participates with indirect participants in the IPCEI Next Generation Cloud Infrastructure and Services[2].

The Latvian RRP dedicates 23% of the plan to foster the digital transition (EUR 416 million)[3] with a focus on improving basic digital skills, increasing the uptake of digital solutions, and the number of ICT specialists. Under Cohesion Policy, an additional EUR 0.5 billion (11% 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 last 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] | Latvia | | | EU | | Digital Decade target by 2030 | |
|---|---|---|---|---|---|---|---|
| | DESI 2023 | DESI 2024 (year 2023) | Annual progress | DESI 2024 (year 2023) | Annual progress | LV | EU |
| **Fixed Very High Capacity Network (VHCN) coverage** | 62.7% | 71.5% | 13.9% | 78.8% | 7.4% | 53% | 100% |
| **Fibre to the Premises (FTTP) coverage** | 60.9% | 61.9% | 1.6% | 64.0% | 13.5% | x | - |
| **Overall 5G coverage** | 42.0% | 53.1% | 26.5% | 89.3% | 9.8% | 70% | 100% |
| **Semiconductors** | | NA | | | | | |
| **Edge Nodes** | | 3 | | 1 186 | | x | 10 000 |
| **SMEs with at least a basic level of digital intensity** | 38.1% | 48.2% | 12.5% | 57.7% | 2.6% | 90% | 90% |
| **Cloud** | 22.2% | 29.0% | 14.3% | 38.9% | 7.0% | 75% | 75% |
| **Artificial Intelligence** | 3.7% | 4.5% | 10.3% | 8.0% | 2.6% | 75% | 75% |
| **Data analytics** | NA | 36.9% | NA | 33.2% | NA | 75% | 75% |
| **AI or Cloud or Data analytics** | NA | 48.2% | NA | 54.6% | NA | | 75% |
| **Unicorns** | | 0 | | 263 | | 2 | 500 |
| **At least basic digital skills** | 50.8% | 45.3% | -5.5% | 55.6% | 1.5% | 70% | 80% |
| **ICT specialists** | 4.4% | 4.4% | 0.0% | 4.8% | 4.3% | 10% | ~10% |
| **eID scheme notification** | | Yes | | | | | |
| **Digital public services for citizens** | 87.2 | 88.2 | 1.2% | 79.4 | 3.1% | 100 | 100 |
| **Digital public services for businesses** | 85.8 | 87.2 | 1.6% | 85.4 | 2.0% | 100 | 100 |
| **Access to e-Health records** | 78.8 | 84.8 | 7.6% | 79.1 | 10.6% | 100 | 100 |

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

## National Digital Decade strategic roadmap

With respect to **Latvia's** contribution to the Digital Decade reflected in its roadmap, it is demonstrating **a high ambition** and, based on this document, intends to allocate **significant effort** to achieve the Digital Decade objectives and targets.

**The roadmap is overall ambitious and coherent including on objectives but with some weaknesses in the digitalisation of enterprises**. The roadmap covers all objectives of the Digital Decade such as a human centred digital space, resilience and security, sovereignty, green, and protection of the society with a high level of ambition, especially on the human centricity, and sovereignty.

The roadmap includes all 2030 KPIs provides limited information on progress for **semiconductors, edge nodes and FTTP**. All, but three national targets (basic digital skills, gigabit and 5G connectivity) are aligned with EU 2030 targets. The roadmap does not provide a national target nor trajectory on FTTP nor edge nodes. In total, the roadmap presents 47 measures.

A public consultation on the roadmap resulted in extensive feedback including from the social partners and non-governmental organisations (NGOs). Latvia has taken this feedback, and the Commission's recommendations from the 2023 report on the Digital Decade into account in the version submitted.

The roadmap's total budget **is estimated at EUR 1 539 million** (about 4.5% of its GDP) with priorities set on developing unicorns, SME take-up and take-up of cloud/AI/big data. Some aspects require further effort, especially in raising the level of digital skills.

**Recommendations for the roadmap**

Latvia should, when submitting adjustments to its national roadmap in accordance with Article 8(3) of the DDPP Decision:

- **TARGETS:** (i) Propose a target and trajectory for FTTP and edge nodes. (ii) Align the level of ambition of targets for at least basic digital skills, VHCN, and 5G with the EU targets.
- **MEASURES:** (i) Strengthen measures and increase funding for at least basic digital skills, VHCN, and 5G to be able to align its national targets with the Digital Decade target. (ii) Increase funding for digitalisation of businesses and digital skills to be able to reach targets for digital intensity of SMEs, uptake of cloud, AI, data analytics, and for ICT specialists. (iii) Provide **more information on the implementation of digital rights and principles** (and Digital Decade general objectives), including what national measures contribute to it.

## Digital rights and principles

The Special Eurobarometer 'Digital Decade 2024' reveals key insights into Latvian perceptions of digital rights. Only 42% of Latvians believe the EU protects their digital rights well, a significant 16-point decrease from last year, and 3 points lower than the EU average. Confidence in digital privacy is at 48%, also 3 points lower than the EU average. Concerns include the safety of digital environments for children (56% concerned) and control over personal data (38% concerned), with a notable decline in confidence. Positive trends include the importance of digital technologies for connecting with friends and family (90%), significantly above the EU average of 83%. 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

**When it comes to reaching a technological leadership for a competitive, sovereign, and resilient EU Latvia is falling behind on connectivity infrastructure, while showing impressive growth and ambition in terms of digital uptake by SMEs.** In terms of FTTP coverage, Latvia is below the EU average with an annual growth rate significantly below the EU average. As regards VHCN and 5G coverage, Latvia also falls below the EU average, though in this case the growth rate is more consistent (above the EU average). Latvia has an uphill challenge to establish a good digital infrastructure. In this respect it is focusing on targeted public support measures to deploy of middle and last mile network segments. Latvia is showing progress in semiconductors and quantum computing, while demonstrating extremely limited initiatives in edge nodes. Furthermore, the indicators on the digitalisation of businesses (basic intensity of SMEs and take-up of data analytics, AI, or cloud) all point to a performance below the EU average, however, show a remarkable growth. Latvia is focusing on cybersecurity, demonstrated by the launch of their Cybersecurity Strategy 2023-2026, measures targeting cybersecurity infrastructure and multi-country collaboration, which is especially important due to their geopolitical position.

[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.

**Recommendations – Latvia should:**

- **CONNECTIVITY INFRASTRUCTURE:** (i) Continue the ongoing efforts to support VHCN, FTTP and significantly increase efforts for 5G rollout, including by fostering private investment and by stimulating take-up. (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.
- **CYBERSECURITY:** (i) Implement cyber security classes in the formal education in relevant study programs; (ii) Continue the implementation of the 5G Cybersecurity Toolbox to ensure secure and resilient 5G networks.
- **EDGE NODES:** Consider measures specific to edge nodes deployment, supplementary to the IPCEI-CIS participation.
- **DIGITALISATION OF ENTEPRISES:** Establish and sustain ambitious initiatives to further increase the digitalisation of SMEs.
- **CLOUD/AI/DATA ANALYTICS:** (i) Continue, expand, and accelerate public and private investments in the uptake of Cloud/AI/Data analytics. (ii) Support 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 liaising with the direct participants to develop a country-specific dissemination strategy reaching beyond the participating organisations.

## Protecting and empowering EU people and society

**Latvia is working towards delivering an inclusive digital transition. This will, however, require sustained and ambitious efforts to increase the level of digital skills of the population.** The level of basic digital skills of the population is below the EU average; with a significant decrease compared to last years' report, due to post-COVID-19 effects (i.e., lower usage of ICT tools). Over the last years, Latvia has made the development of digital skills a national priority. The country and has as a result integrated digital skills training at various stages, from early formal and non-formal education, employed people, adult learning, individual learning account approach, and e-learning. It is crucial that Latvia continues, sustains, and increases efforts to improve at least basic digital skills, as this impacts all the digital targets. Latvia is implementing measures specifically targeting girls and women, to boost their basic digital skills and increase the number of female ICT specialists, to maintain their performance above the EU average. The ambition of the EU's Digital Decade will require sustained efforts considering the relatively slow evolution of increase of digital skills. The digitalisation of public services, and development of e-health and e-ID is progressing well, above the EU average.

**Recommendations – Latvia should:**

- **BASIC DIGITAL SKILLS:** (i) Accelerate measures to further boost digital skills of the population and increase investments. (ii) Focus on implementing measures and digital literacy education for everyone.
- **ICT SPECIALIST:** Continue existing and implement additional measures targeting various groups to ensure an increase of ICT specialists, and improve gender balance.
- **e-HEALTH:** (i) Ensure that all data types are made available in a timely manner. (ii) Offer a mobile application for citizens to access their electronic health records. (iii) Connect more private rehabilitation centres to the online access service. (iv) Ensure that the online access service complies to web accessibility guidelines.

- **KEY PUBLIC SERVICES:** Ensure coordinated implementation of public services and work towards integration of public records with the view of implementing 'once-only' principle in public administration.

## Leveraging digital transformation for a smart greening

**Latvia has started to implement green policies in its digital transformation.** The 2021-2027 Environmental Policy as well as Green ICT Procurement policy are examples of the interplay **between the** green and digital. However, most of the measures outlined in the Latvian roadmap are **cross-cutting** initiatives that by reduce environmental effects as a by-product, rather than actively targeting them.

**Recommendations – Latvia should:**

- 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.

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

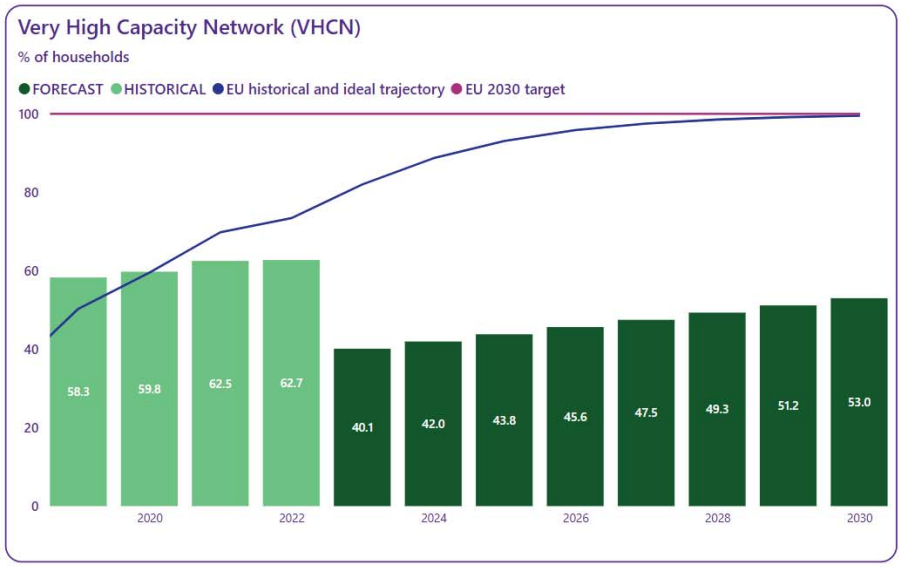
**Latvia aims to regain competitiveness through investing in key technologies.** Latvia is falling behind in digital infrastructure. The country shows weak performance in the broad uptake by enterprises because the metrics observed in the digitalisation of SMEs with at least basic level of digital intensity and take-up of Artificial Intelligence (AI) and cloud are sub-par. Latvia needs to continue supporting the deployment of future-proof middle and last mile network segments, while at the same time encouraging the digitalisation of its whole business sector, including SMEs and their up-take of AI and cloud to increase its competitiveness.

According to the 2023 Digital Decade Eurobarometer, 81% of Latvians believe that building efficient and secure digital infrastructure including connectivity and data processing facilities should be a priority for public authorities. Additionally, 82% of Latvians believe that increasing research and innovation to develop more robust and secure strong digital technologies should be a priority for public authorities.

## 2.1 Building technological leadership: digital infrastructure and technologies

**Latvia is committed to ensuring that everyone has access to affordable and high-speed digital connectivity.** While incentivising investment in the context of uneven population distribution will prove to be a challenge, Latvia is showing initiative to bridge the digital divide and provide equal access for all.

### 2.1.a Connectivity infrastructure (gigabit)



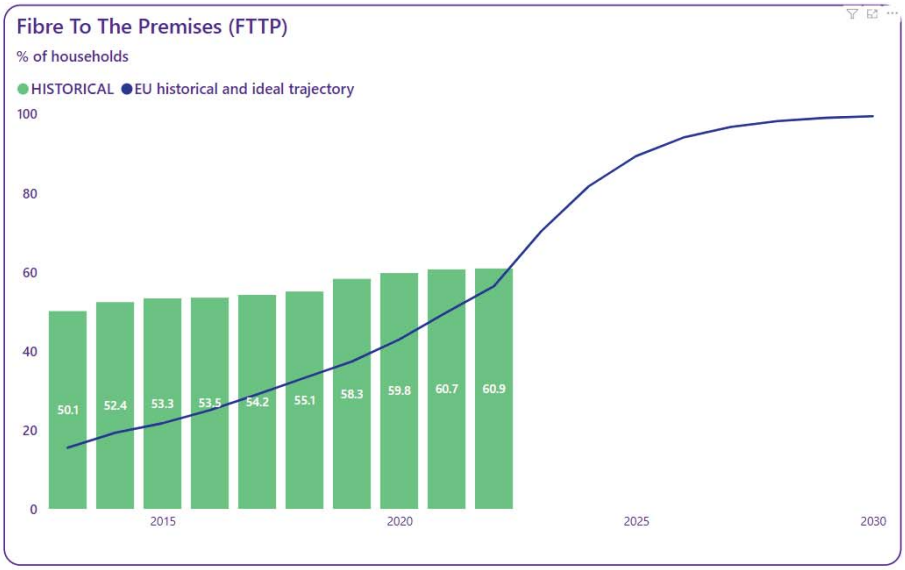


2023 state of play and recent progress

| | Country level | EU level |
|---|---|---|
| FORECAST | 40.1 | 82.0 |
| DESI 2024 | 71.5 | 78.8 |
| AVERAGE ANNUAL GROWTH % | 13.9 | 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





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | | 70.3 |
| DESI 2024 | 61.9 | 64.0 |
| AVERAGE ANNUAL GROWTH % | 1.6 | 13.5 |

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

**Latvia has untapped potential to contribute to the EU's Digital Decade target for Very High-Capacity Networks (VHCN) while showing a very strong dynamic. On Fibre-to-the-premises (FTTP), Latvia also has untapped potential to contribute to the EU's Digital Decade target while showing a very limited dynamic.** With 71.5% of households currently covered with VHCN, Latvia falls below the EU average of 78.8%, while at the same time showing a significant annual growth of 13.9% in comparison to the EU average of 7.4%. Moreover, based on current rate of annual growth of VHCN, and that its current performance is above its 2030 targets, a higher level of ambition for this national target could be envisaged. At the same time, the FTTP household coverage of 61.9% also falls below the EU average 64% and demonstrates a significantly lower annual growth at 1.6% versus the EU average of 13.5%. Latvia forecasts that there will be an increase in the value of fixed connections of VHCN by 15 812 households per year and forecasts a value of 455 678 households with 100 Mbit/s connections by 2030. Moreover, based on the current rate of progress regarding FTTP, it appears that, in absence of an intensification of efforts over the coming years, Latvia's contribution to this EU target will remain limited. Latvia has not provided a trajectory or a target for FTTP. Merely 4.55% of its fixed broadband subscriptions have a connection speed of at least 1Gbps/s, significantly below the EU average (18.52%).

**Last year's Digital Decade report stated that Latvia had 92% VHCN and 91% FTTP household coverage.** However, in 2023 there was a revision of the data collection method, as the national regulatory authority (NRA) started collecting data coverage (previously only connections by speed were provided). As a result of this, the data published in the 2023 Digital Decade report have been revised. The findings which were confirmed by the NRA showed that Latvia had 62.7% VHCN and 60.9% FTTP household coverage in 2022.

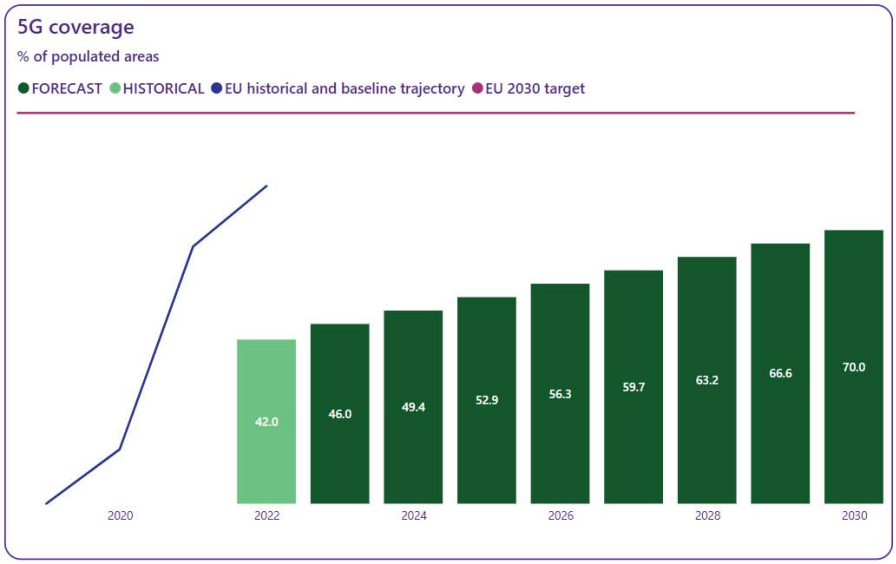
**In its roadmap, Latvia presents five measures related to improving gigabit connectivity.** Latvia has introduced measures to encourage the deployment of 'the last mile' and 'middle mile' for VHCN by supplying aid and launching a call for tender to connect 6 200 additional households, businesses, schools, medical institutions, and other public buildings with a VHCN. The measure will be funded by EUR 16.5 million from the Recovery and Resilience Fund. Latvia is also planning to reallocate a total of EUR 27 million (EUR 22 million from the European Regional Development Fund (ERDRF)) for the last mile measures. Additionally, Latvia has introduced measures focusing on broadband. For example, the establishment of the Broadband Competence Centre and the carrying out of an assessment on the broadband investment gap.

**Latvia identifies two main challenges in reaching the gigabit Digital Decade target: its uneven population distribution and the limited public funding to fill the investment gap.** In its roadmap, Latvia sets out the issue of the uneven population density with 1 315 000 urban inhabitants (68%) and 605 000 rural inhabitants (22%). Rural areas tend to be sparsely populated, with inhabitants living on a low income. This, combined with the fact that operators charge higher prices outside urban areas, might deepen the digital divide in access to high-speed connectivity. According to the 2023 Digital Decade Eurobarometer, 85% of Latvians believe that the availability and affordability of a high-speed internet connection was an important factor in significantly easing their daily use of digital technologies.

**Furthermore, there is a lack of private sector interest in further expanding the middle and last mile networks because of a lack in investment return.** For this reason, further network expansion becomes more and more reliant on public funding (estimated reliance is 70% public funding). The Study on EU funds 2021 estimated that the investment gap of last mile network deployment as being between EUR 50 and 975 million, depending on various scenarios considered. The planned funding of EUR 50.9 million from EU funding (RRF and ERDF) and EUR 1.54 million from private investments, to be allocated to both middle and last mile networks and 5G construction, will not fill the funding gap. Against the background of a persistent digital divide between urban and rural areas, it is crucial to reach full coverage with gigabit connectivity to ensure no one is left behind.

**The market dynamics can be considered healthy.** With four main operators in Latvia and despite one operator having more market shares than the others, the national regulatory authority ('*Sabiedrisko pakalpojumu regulēšanas komisija')* considers the market to be competitive and affordable for consumers.

### 2.1.b Connectivity infrastructure (5G)





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 46.0 | |
| DESI 2024 | 53.1 | 89.3 |
| AVERAGE ANNUAL GROWTH % | 26.5 | 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

**Latvia has scope to improve its contribution to the EU's Digital Decade target while showing a positive dynamic.** In 2023, only 53.1% of Latvia's populated areas had 5G coverage, placing Latvia third lowest performing country and therefore significantly lower than the EU average rate of 89.3%. However, Latvia's current growth rate is 26.5%, exceeding the EU average of 9.8%. Standing at 70%, Latvia's target for 5G is below the EU target of 100%, and based on the current rate of progress, a higher level of ambition for this national target could be envisaged. 5G in the 3.4-3.8GHz band, an essential band for enabling advanced applications requiring large spectrum bandwidth, covers 39% of Latvian households in 2023, which stands significantly below EU average (50.6%).

**Latvian operators are prioritising 5G roll-out and are taking significant steps to increase their 5G coverage, as shown by their increase in base stations providing 5G.** It is reported that the three operators active in the 5G market, have 5G network facilities (approximately 360 base stations each). In addition, one operator's 5G base stations operate on the 700 MHz band, which is suitable for less populated areas. This allows for a wider area to be covered, which in turn reduces the digital divide between the urban and rural population. Additionally, the same operator uses the 3.5 GHz band to accommodate urban environments with speeds of up to 1 Gbps. Another important market development in Latvia in 2023 is the two providers of port technical services (Latvijas Mobilais Telefons and LVR Flote) that have started working towards establishing 5G connectivity in the Baltic Sea. Furthermore, some operators have also announced the first phase of their 2G and 3G switching off process, with the intention of replacing the legacy networks with 5G.

**The national authorities support 5G infrastructure through the Via Baltica and Rail Baltica projects.** They aim to create an electronic communication system that will support the continuous provision of 5G mobile network coverage on the motorway and have been awarded planned funding amounting to EUR 10.7 million from the ERDF and an additional EUR 1.8 million from private sector funds. However, to complete this project, an investment gap of EUR 13.2 million for the construction of 5G support infrastructure along the Via Baltica corridor and EUR 3.7 million for the Rail Baltica corridor remains.

**Latvia has identified the same main challenges for 5G as for gigabit coverage expansion, which are its uneven population distribution and the limited available public funding to fill the investment gap.**

### 2.1.c Semiconductors

**Latvia is showing ambition to increase and develop its production capacity for semiconductors.** The country has a growing electronic and optical equipment manufacturing sector. Latvia estimates that production volumes have doubled since 2016 and jobs on average have increased by 50%. This infrastructure is intended to develop semiconductors. The Latvian semiconductor ecosystem consists of more than 100 diverse types of businesses, organisations, institutions, research and application centres.

**Latvia's approach is three-fold as highlighted in their Memorandum of Understanding (MoU) signed in 2022.** It sets out the public and private cooperation to develop a semiconductor ecosystem, education and research opportunities, and production of chips. The duration of the MoU is 10 years and there is the possibility to extend it for another 10 years. Furthermore, in line with the European Chips Act, there are two measures planned. First, to support candidates with national investment participate in the Chips Joint Undertaking project calls. Second, to amend the Cabinet Regulation No 857 of 11 December 2012 on the Statute of the Investment and Development Agency of Latvia. The amendment aims to: (i) identify and collect information on the main market participants in the semiconductor supply chains; and (ii) ensure participation and coordination in the European Semiconductor Council and the national Single Point of Contact for the semiconductor system.

The joint report on Latvia's Opportunities in Semiconductor Technology Development" is scheduled for review in summer 2024, aiming to robustly compile information on Latvia's opportunities and potential within the international semiconductor value chain, providing an assessment of the benefits for Latvia's involvement in semiconductor activities, including those at the EU level as stipulated in the EU Chips Act.

**A central measure established in 2022 and operated in 2023 is the 'Loans with a capital rebate for investment projects to promote competitiveness (Investment Fund)'.** It aims to assist enterprises with new equipment and technological processes. The measure's total national budget is EUR 252 million. It aims to approve at least 20 large investment projects every year to encourage an annual export increase of EUR 80 million and create at least 800 new well-paid jobs.

**Latvia identifies the lack of available funding as the main obstacle to reaching the EU target value.** The roadmap estimates that the funding needed to execute the current ambition for semiconductors until 2030 would be between EUR 1 and 2 billion of the public and private sector funding.

#### 2.1.d Edge nodes

**Latest studies estimate 3 edge nodes in Latvia which is less than half a percentage of the total edge nodes estimated at the EU level.** The roadmap does not set a target or a national trajectory for edge nodes to contribute to the EU target of 10 000 climate neutral and secure edge nodes.

**At the EU level, Latvia participates with indirect participants only in the IPCEI Next Generation Cloud Infrastructure and Services**. It supports the development of software technologies useful for the exploitation of edge nodes, including industrial 5G. It should also allow the EU to develop technologies for innovative edge nodes, with a low latency and energy footprint.

#### 2.1.e Quantum technologies

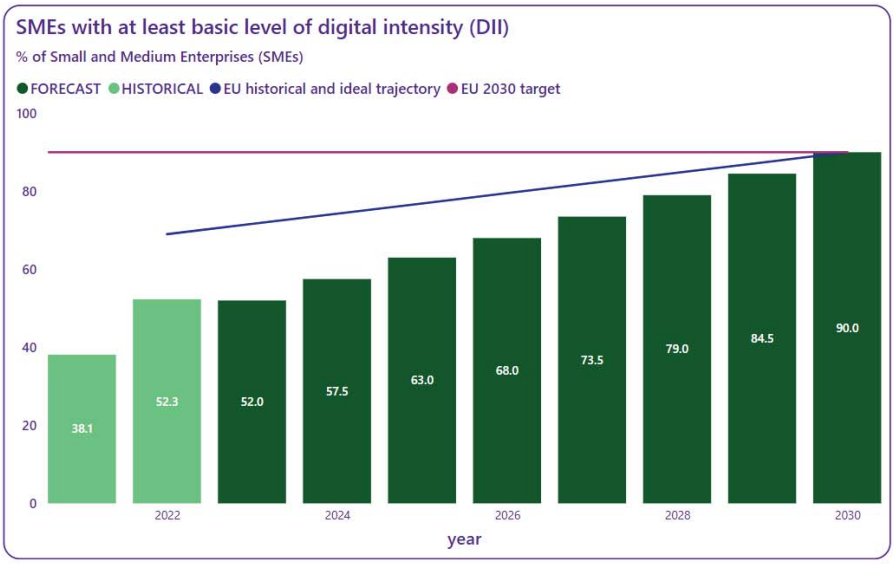
**Latvia shows initiative in pursuing quantum technologies by focusing on educational measures.** In 2023, Latvia launched a Resilience and Recovery Fund funded project (EUR 6.2 million), the Quantum Technology Initiative, in collaboration with the University of Latvia and the Riga Technical University. The project aims to monitor and coordinate activities, educate and promote the acquisition of high-level academic skills in quantum technologies and promote synergies between higher education, science and innovation. Another project launched in 2023 introduced three centres of excellence to develop advanced skills in quantum computing, high-performance computing and language technologies. It is expected that during 2023-2026, the project will have: (i) trained 180 specialists in quantum technology; (ii) created 12 new study modules to develop advanced digital skills in quantum technology; and (iii) published 4 scientific publications in quantum technology.

The Latvian Deploying Advanced National QCI Systems and Networks project, as a part of the EuroQCI initiative, aims to establish an infrastructure for secure communication between public authorities to implement the closed part of the emergency national electronic communications. It is receiving EU funding of around EUR 4 million. The project is expected to provide the public sector with the latest technologies and knowhow and therefore directly contribute to the Digital Europe Programme's (DEP) priority of modernising European public administration.

### 2.2 Supporting EU-wide digital ecosystems and scaling up of innovative enterprises

**Latvia is falling behind on the digitalisation and scaling up of innovative businesses.** Despite this, Latvia is showing strong annual growth, standing above the EU average in all areas. In the EU Digital Decade Eurobarometer, 75% of respondents believe that it is important for public authorities to ensure that European businesses can grow and are able to compete globally. Furthermore, according to its projections, Latvia is expected to reach the Digital Decade target of SMEs with at least a basic level of digital intensity, and uptake of cloud / data analytics / big data by 2030. However, to do so funding needs to be increased.

## 2.2.a SMEs with at least a basic level of digital intensity





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 52.0 | 71.6 |
| DESI 2024 | 48.2 | 57.7 |
| AVERAGE ANNUAL GROWTH % | 12.5 | 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

**Latvia has scope to improve its performance to contribute to the EU's digital decade target while showing a very strong dynamic.** With 48.2%, Latvia falls significantly below the EU average of 57.5% for the that indicator that measures SMEs with at least a basic level of digital intensity. However, Latvia's annual growth of 12.4% over 2 years compared with 2021, which is the most recent comparable year that used a similar methodology for measuring the digital intensity of businesses, is significantly higher than the EU average of 2.6%. The country estimates that it will reach the EU target of 90% by 2030, a high value compared to Latvia's starting point. Moreover, based on the current rate of progress, and assuming that the ongoing efforts will be sustained, Latvia's contribution to this target will continue to be very significant.

**Latvia relies on Recovery and Resilience Fund measures to increase businesses with at least a basic level of digital intensity.** The roadmap includes four Recovery and Resilience Fund measures that not only contribute to increasing the number of SMEs with at least a basic level of digital intensity, but also enterprises' uptake of cloud / data analytics / AI. The measures focus on supporting the establishment of Digital Innovation Hubs and regional points, the digitalisation of processes in commercial activities, the introduction of new products and services in commercial activities, as well as the award of funding to facilitate the digital transformation of businesses. By June 2026, it is expected that the measures will have benefited 3500 grant support beneficiaries (through the European Digital Innovation Hubs (EDIH)), 200 beneficiaries for digitalisation in commercial activities, 43 research projects and 133 merchants to receive loans.

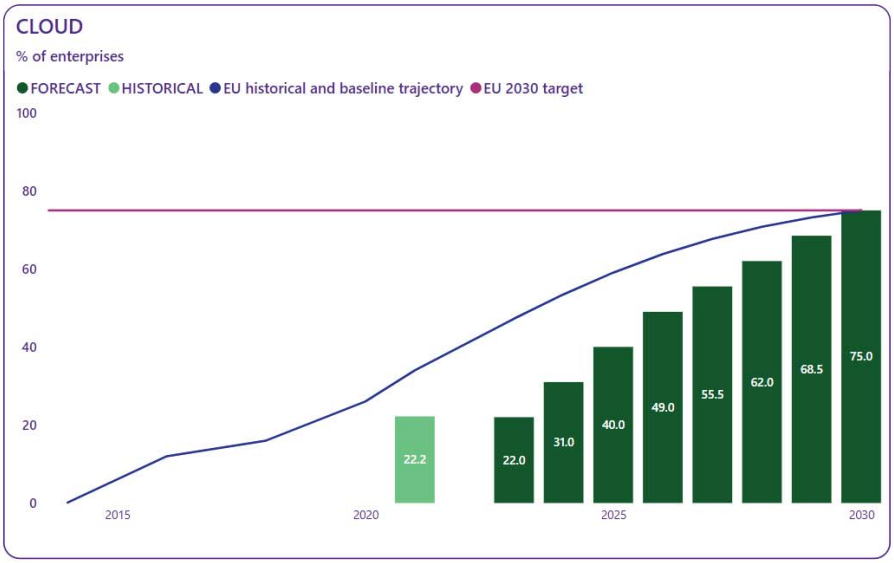
**Under these measures, in 2023, the Ministry of Economics received more than 3 000 applications for support with digital maturity tests, digital development road maps, test-before-invest, grants for digitalisation of inner commercial processes, and solutions as well as loans for investment in business digital transformation tools and automation**. Support for developments of new products, digital technologies are still in project application selection process. In addition, by June 2024, 3 500 beneficiaries will have received EDIH support, 80 beneficiaries will have been provided digitalisation support in commercial activities, 14 projects will have been awarded support to implement research and increase digitalisation, and loans will have been given to 51 merchants.

Additionally, the final RRF measure presented in the roadmap aims to strengthen development of enterprise digital skills, by increasing the number of ICT specialists by 10 000 [6].

**The total budget for the target is EUR 12 million from national funding, EUR 238.2 million from EU funding and a further EUR 134 million from private sector investments.** Latvia also plans to invest EUR 20 million (up to EUR 5 million per project) Initial Public Offering Fund for Baltic small and medium-sized companies. Latvia is also receiving funding from the ERDF that will lead to 1750 SMEs receiving funding and increasing their level of digitalisation by the end of 2029. Latvia estimates in its national Digital Decade Roadmap that an increase of funding, which equals to an additional EUR 524 million, would be needed to reach the Digital Decade target in 2030.

### 2.2.b Take up of cloud / data analytics / AI

- **Cloud**





2023 state of play and recent progress

| | Country level | EU level |
|---|---|---|
| FORECAST | 22.0 | 47.3 |
| DESI 2024 | 29.0 | 38.9 |
| AVERAGE ANNUAL GROWTH % | 14.3 | 7.0 |

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

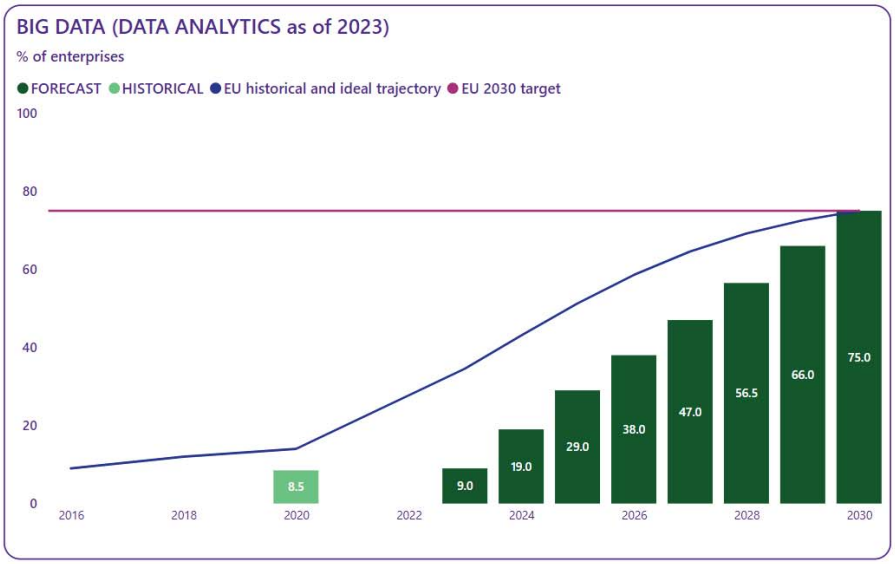
Note: The source of national forecast values is the 2023 country roadmap

**Latvia has scope to improve its performance to contribute to the EU's digital decade target on cloud adoption while showing a very strong dynamic.** The take-up of cloud solutions by Latvian businesses was at 29% in 2023, standing significantly below the EU average of 38.9%. Moreover, based on Latvia's current progress (14.3% compared with the EU average of 7.0%), and assuming that the ongoing efforts will be sustained, Latvia's contribution to the EU target will be significant. Latvia estimates that it will reach the EU target by 2030, predicting an average growth rate of 9% until 2026 and thereafter a growth rate of 6.5% until 2030. Latvia estimates that a quadruple increase of funding, which equates to a further EUR 592 million would be needed to reach the Digital Decade target in 2030.

Latvia is an indirect participant in the IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI-CIS), organisations from LV contribute significantly to the development and deployment of cutting-edge cloud and edge capacities.

[6] see more under ICT specialists.

- **Data analytics (Big Data)**[7]





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 9.0 | 34.6 |
| DESI 2024 | 36.9 | 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

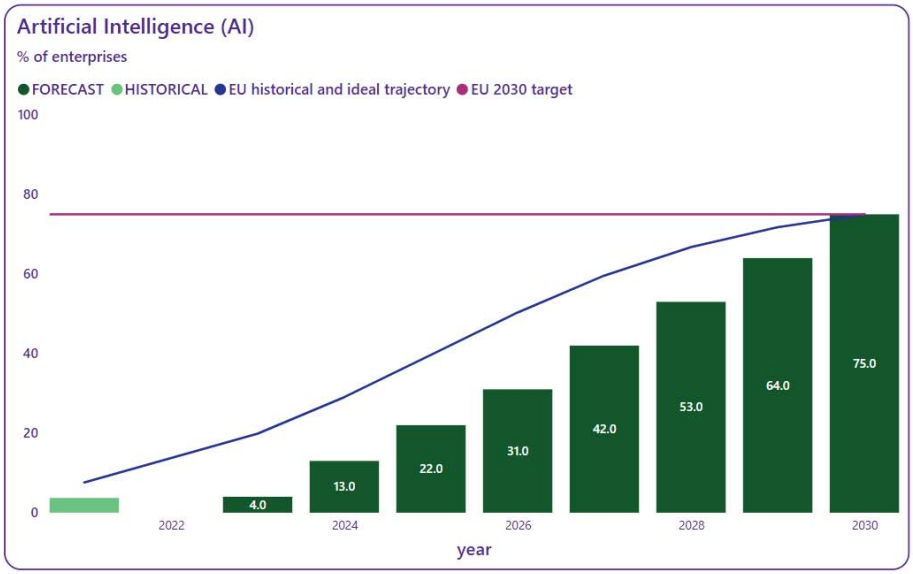
**On the use of data analytics by companies, Latvia contributes positively to the EU's Digital Decade target**. With 36.9%, Latvia is above the EU average of 33.2%. Latvia estimates that the uptake of data analytics will increase by 9-10% each year until reaching the EU target of 75% in 2030.

**National action plans include the development of big data.** Under the 2021-2027 National Industrial Policy Guidelines, SMEs should increase their level of digital development, including promoting the use of big data services. Additionally, the 2021-2027 Digital Transformation Guidelines promote Latvia as an EU-wide IT training centre that will focus on big data in digital medicine and develop high-level digital skills in big data content in vocational education and higher education.

Latvia estimates that a sevenfold increase in funding, which equates to a further EUR 1 036 million, is needed to reach the Digital Decade target in 2030.

[7] As of 2023, Eurostat changed the big Data into a data analytics indicator, therefore disabling comparison with previous years.

- **Artificial Intelligence**





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 4.0 | 19.9 |
| DESI 2024 | 4.5 | 8.0 |
| AVERAGE ANNUAL GROWTH % | 10.3 | 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

**Latvia has untapped potential to contribute to EU's Digital Decade target on Artificial Intelligence (AI) adoption while showing a positive dynamic.** With 4.5%, Latvia falls below the EU average of 8% while showing an impressive annual growth of 10.3% (the EU average is 2.6%). Latvia estimates that the AI uptake will grow by 9 or 11% annually until 2030. Moreover, based on the current rate of progress, and assuming the ongoing efforts will be sustained, Latvia's contribution to this EU target could be very significant.

**Despite Latvia's lower uptake of AI, its businesses are competitive in offering AI solutions.** The language technology companies Tilde.ai and Tilde MT have been used by several EU presidencies and are expected to be used by the Maltese, Finnish and other governments. Models for satellite data analysis are now also being used. For example, Smartomica (biotechnology): AI in the treatment of oncology; Wearedots: integrated GPT-4 (AI) language model with Intervy training assistant; Waterson Technologies: AI to monitor water quality; Fyma and SIA "LMT": AI-based traffic analysis; CopyMonkey.ai: AI content generation in e-commerce, winner of the Emerge conference challenge; eStepControl: identification of suspicious activities of users of the information system; and SMARTRetail.

**Latvia is showing AI development in the private sector.** In December 2022, the Latvian IT Cluster, Latvian Information and Communication Technology Association (LIKTA) signed an EU Grant Agreement with the European Commission for the project EIDH: support for digitalisation and development of artificial intelligence in Latvia / Development of AI – ICT for Manufacturing EIDH in Latvia. It is estimated that a sevenfold increase in funding, which amounts to a further EUR 1 036 million, is needed to reach the Digital Decade target in 2030.

- **Take-up by enterprises of cloud or data analytics or AI**

**Latvia has scope to contribute further to the EU's Digital Decade cloud or data analytics or target since its contribution of 48.2% falls below the EU average of 54.6%**. Latvia has no target on the combined indicator of take-up by enterprises of cloud or data analytics or AI. While Latvian enterprises' take-up of cloud and AI fall below the EU average, their uptake of data are above EU average. Latvia has four measures within

**Recovery and Resilience and European Regional Development Fund** and ERDF programmes that strives towards increasing the take up of cloud/ai/big data[8].

**2.2.c Unicorns, scale-ups and start-ups**

**Latvia is in its starting phase of expanding the start-up ecosystem and is taking ambitious measures to do so.** The size of the Latvian ICT sector (6.12 GVA% in 2021) is slightly above the EU average (5.49%). The venture capital investments for seed and start-up amounted to 5% of the GDP in 2022, putting Latvia above other large EU economies such as Italy and Spain[9]. In 2023 Latvia had no unicorns. In its roadmap Latvia estimates that it has 512 start-ups, of which 46% are no than three years old and more than half are active in the ICT services sector. Additionally, 373 start-ups were registered as members of the Latvian Startup Association in the data base Startin.lv.

**Latvia is supporting the start-up ecosystem by granting financial stipends.** In 2022 the Ministry of Environment, and various start-up organisations signed a Memorandum of Cooperation on the Strategy for the Development of the Latvian Start-up Ecosystem. The strategy will run until 2025, with EUR 300 million in investments, and it will increase the number of start-up employees by 1500. It is an ambitious strategy that seeks to: improve access to funding: update the regulatory framework: provide tax reliefs: coordinate educational events and seminars (including international events), support diaspora to return to Latvia: develop data-collection and analysis of the start-ups; and create n central home (Start-up House) for the benefit of start-ups.

**Business incubators are guiding the Latvian start-up ecosystem**. Since 2016, business incubators have provided support to start-ups and have since established 11 regional business incubators and 9 support units that provides support pre-incubation and incubation. By 31 May 2023, the business incubator programme has supported 972 merchants and created 2 016 new jobs. It is planned that the measure will in total support 1 500 businesses (of which 300 will be authors of new ideas). During the programming period 2021-2027, it is planned to support 422 businesses and create 1 000 new jobs.

**Latvia estimates that it will have 2 unicorns by 2029, which is in line with the EU's projection of doubling the numbers of unicorns, and seems likely given the proposed measures.**

## 2.3 Strengthening cybersecurity & resilience

**As companies rely increasingly on digital technologies,** their risk of exposure to cybersecurity incidents is increasing, just like their need for preparedness in this area. Latvian companies, seem to be less prepared for cybersecurity attacks than their peers, as in 2022, only 9.1% of Latvian companies reported being insured against ICT security incidents and 82.7% reported using ICT security measures. In additionally, according to the Eurobarometer 83% of Latvians believe that improved cybersecurity, better protection of online data and safety of digital technologies is important to significantly improve their daily use of digital technologies.

**Following the launch of its 2023-2026 Cybersecurity Strategy, Latvia has made efforts to strengthen its enforcement capabilities**. The 2023-2026 Cybersecurity Strategy focuses on boosting cybersecurity management, strengthening resilience, improving public understanding, education, and research, international cooperation and preventing and combating cybercrime.

**Latvia has introduced measures to strengthen cybersecurity infrastructures.** National CERT.LV provides free firewall services to all individuals. The country decided to implement the Government of Latvia Internet Exchange – united data exchange infrastructure (GLV-IX), that provides an extra solution for crisis situations. The Ministry of Transport is working on introducing the Unified Cyber Security Infrastructure, funded by EUR

[8] S a SME with at least basic digital intensity

[9] OECD Going Digit

4.35 EUR million (EUR 3.697 million from the ERDF). The measure aims to secure investments in the cybersecurity of government institutions, increase the cybersecurity level and preparedness, and develop the skill level of IT staff.

**Collaboration on cybersecurity is important for Latvia.** In early 2023, Latvia established the National Cybersecurity Coordination Centre (NCC-LV) to strengthen cybersecurity and improve basic cybersecurity skills. One of the first initiatives from the NCC-LV was to establish the National Cybersecurity Community that consists of more than 30 member organisations from the public and private sectors, academia and NGOs. In addition, the NCC-LV has worked with the Nordic-Baltic-Benelux National Cybersecurity Centres on matchmaking events, a technology conference, and a student hackathon to take place in 2024.

**NCC-LV community members including NGOs have provided feedback on the Latvian roadmap** calling for creation of Latvian cybersecurity education development roadmap and improvement of the content of studies in cybersecurity. The Community experts are calling for integration of cybersecurity topics in all educational levels, strengthen its cross-disciplinary teaching, as well as inclusion of cybersecurity in the relevant study programmes to address the gap in cyber-security education because students' need training/education outside of formal education.

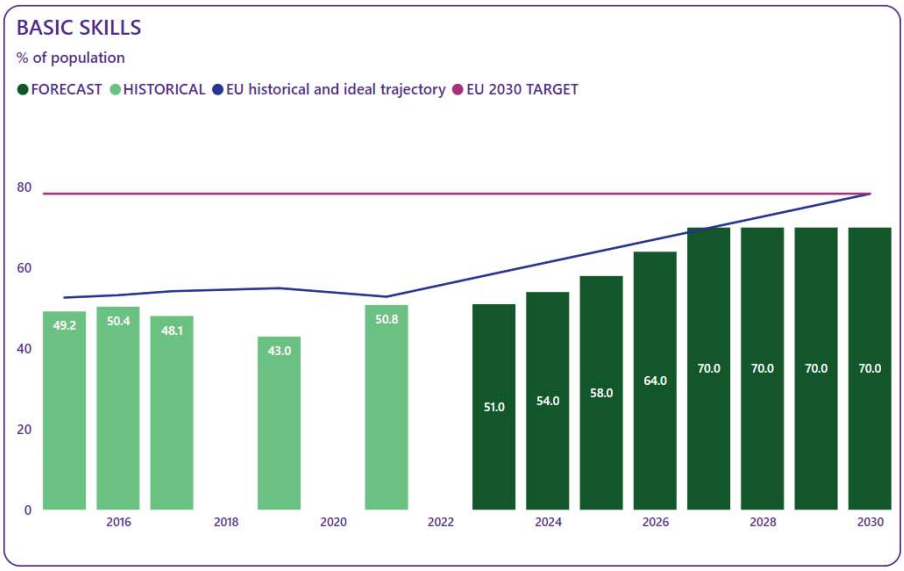
# 3 Protecting and empowering EU people and society

## 3.1 Empowering people and bringing the digital transformation closer to their needs

**Latvia designs its digital transition with a strong emphasis on inclusiveness.** Latvia's challenge in having a lack of basic digital skills in the population affects all areas of digitalisation. The lower than average starting point in basic digital skills impacts many other targets. For example, it hinders the development of SMEs and their take-up of cloud / AI / data analytics, cybersecurity, and digital public services (including e-health and e-ID). Therefore, improving digital skills is of the utmost importance. Several specific programmes have been developed, such as focusing on educating digital leaders (e.g., teachers and community leaders), creating digital educational material, information programmes as well as projects targeting increasing female digital skills and the number of female ICT specialists. Latvia is very strong in the digitalisation of public services for people and businesses. According to the Digital Decade Eurobarometer, 78% of Latvians consider that the digitalisation of daily public and private services is making their life easier, which is above the EU average (73%). In addition, 68% believe that digital technologies will be important in their daily democratic life, which stands below the EU average (74%).

### 3.1.1 Equipping people with digital skills

#### 3.1.1.a Basic digital skills





2023 state of play and recent progress

| | Country level | EU level |
|---|---|---|
| FORECAST | 51.0 | 59.8 |
| DESI 2024 | 45.3 | 55.6 |
| AVERAGE ANNUAL GROWTH % | -5.5 | 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

**Latvia has scope to improve its performance to contribute to the EU's digital decade target and while demonstrating a very limited dynamic.** In 2023, 45.3% of the population had at least basic digital skills, putting Latvia below the EU average of 55.6%. This can be explained by post-COVID-19 effects with a drop in the population's digital activity who did less teleworking or used e-commerce less between 2021 and 2023. For the other skills indicators, such as above basic digital skills and basic digital skills in content creation, Latvia also performs below the EU average, except for internet use where it scores slightly above the EU average.

**Based on Latvia's current performance it will be a challenge to achieve the 2030 target.** The national target is set at 70%, which is below the EU target of 80%. Considering Latvia's current rate of progress, reaching the national target (70%) or the EU target (80%) will require a substantial effort.

**Since 2021, Latvia has identified the development of digital skills as a national priority.** During 2023, Latvia has implemented ambitious plans to improve at least basic digital skills focusing on education and training programmes for all ages and in various stages of life. Specifically, Latvia has implemented measures focused on the employed, adult learning, individual learning account approach, digital self-service and education in cybersecurity (through the establishment of the National Coordination Centre) with a total budget of EUR 7 million from national funding and EUR 49.1 million from EU funding. In order to promote the development and improvement of digital skills for adults, in 2023 a regulatory framework has been developed for the creation of a unified system for the assessment of digital skills, identification of learning needs, planning and evaluation, stipulating that the content and achievable learning outcomes of educational programs aimed at acquiring digital competences are structured according to the descriptions of the European Population Digital Competence Framework (DigComp) and the levels of competence acquisition also in non-formal education programs.

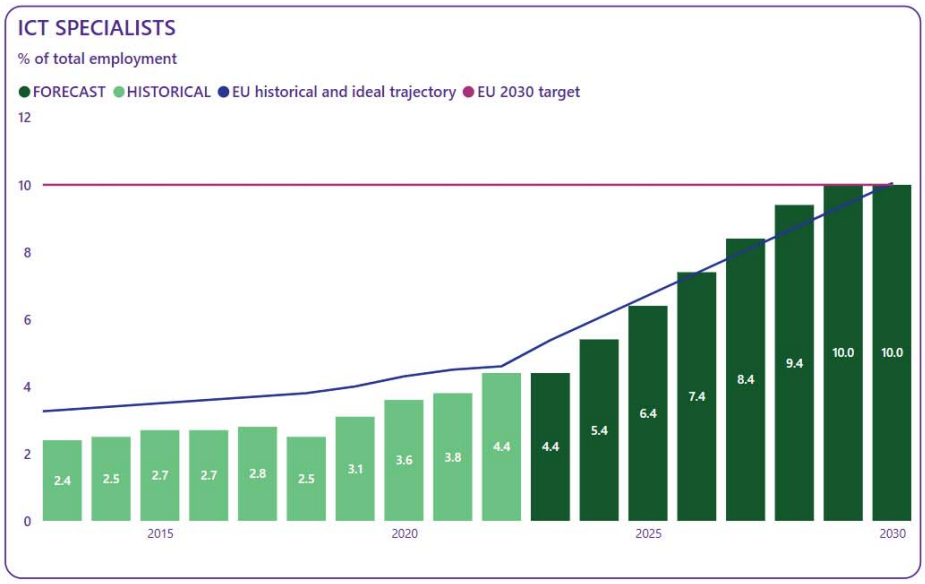
**Latvia is focusing on introducing e-learning as a part of their Recovery and Resilience Fund funded measure Development of Digital Skills in Society.** As a result of the project implementation: 1) a systemic approach to the development of people's digital skills will be introduced in local governments; 2) the gap between the supply of public and private electronic services and the skills of inhabitants to use it has been reduced; 3) a digital self-service skills e-learning course has been developed and implemented; 4) 200 teachers/mentors from all local governments have been trained; 5) an increased share of the population with advanced digital self-service skills (40 000 inhabitants trained).

**To improve the basic digital skills of the population, Latvia is providing education material and information campaigns.** To increase the population's digital skills to use ICT solutions, in 2023, Latvia has implemented further measures to the 'Information and ICT architecture governance system for public administration – round 2'. These measures include distance-learning programmes for digital agents, methodical materials and video tutorials, as well as an extensive communication campaign on e-services. In June and November 2023, the campaign had more than 1 100 agents and leaders participate. In addition, senior digital skills was discussed in the project 'Alone, but in Communication? Digital inequalities in care and intergenerational relationships for seniors living alone (EQUalCare)'.

**Latvia is also considering the woman's perspective, especially in form of private initiatives.** Riga TechGirls, a Latvian NGO, has provided more than 15 reskilling programmes with more than 2 000 women participating in its programme since 2016. In addition, the Latvian Information and Communication Technology Association (LIKTA) participates in the Women4IT, a multi-stakeholder partnership implemented in 7 countries, that is funded by the European Economic Area Grants and the Norway Grants Fund for Youth Employment, which focuses on developing the digital skills of young women who are at-risk-of-exclusion from the job market by becoming more attractive to employers.

**The population's lack basic digital skills at all levels and the low participation in education at all levels are two challenges identified by Latvia to reach the 2030 target.** The lack of digital skills not only requires measures targeted to each group (including age, gender, educational level etc.), but also hinders the digitalisation of businesses. The low participation of Latvia's population in educational activities, creates barriers to increasing the population's basic digital skills. In contrast, to the high digitalisation of public services for people and businesses, it is important to continue focusing on improving at least basic digital skills and to ensure that no one is left behind. In addition, it is important to consider that the Eurobarometer shows that 72% of Latvians believe that more education and training to develop skills for using digital services is important and would significantly ease their daily use of digital technologies.

### 3.1.1.b ICT specialists





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 4.4 | 5.4 |
| DESI 2024 | 4.4 | 4.8 |
| AVERAGE ANNUAL GROWTH % | 0.0 | 4.3 |

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

**Latvia has untapped potential to the EU's Digital Decade target on ICT specialists while demonstrating limited dynamic.** In 2023, the number of ICT specialists in terms of share of total employment stands at 4.4% (same as in 2022), which is below the EU average. Based on the current rate of progress (4.8%), reaching the target by 2030 will require an intensification of efforts. With 24% of women being ICT specialists, putting Latvia above the EU average, yet still behind the front-runners (Bulgaria, Estonia, and Romania).

**Latvia estimates that it will have 9.8% of ICT specialists by 2030, which is around the EU target of ~10%.** Latvia has set a target that will require more than doubling its current value by 2030. Looking at the historical evolution of the number of ICT specialists, the target set in the roadmap is ambitious. The long time series provided by the Eurostat's Labour Force Survey shows that the percentage of ICT specialists employed in Latvia varied between 2.5% and 4.4% in 2018-2022. However, if the number of Latvian ICT specialists is to match the annual growth of 2018-2023 till 2030, Latvia needs to intensify its efforts.

**In 2022, 59.2% of businesses employing 10 or more people reported that they had hard-to-fill vacancies for jobs requiring ICT specialist skills, which despite being a high number, is below the EU average (62.8%).**

**In its roadmap, Latvia introduces three measures running mainly till 2027 with specific targets to increase the number of ICT specialists by 13 000.** This is a considerable number given that the total **number** of ICT specialists was 39 000 in 2023. Latvia presents four measures (three of them new), to increase the amount of ICT specialists with a national budget of EUR 13.1 million (granted EUR 6.8 million and planned EUR 6.3 million) and EU funding of EUR 90.36 million (granted EUR 37.62 million and planned EUR 52.74 million). The Programme for the development of advanced digital skills aims to **establish** three centres of excellence to develop digital skills focusing on quantum computing, high-performance computing, and language technologies. In total 3 000 new professionals with advanced digital skills will be trained, 29 new study modules will be developed, and 55 scientific publications published. Furthermore, the Ministry of Economics is developing a Human Capital Development Strategy to increase the number of ICT specialists by 10 000 by focusing on adapting job supply to match the job market needs. The strategy will for example focus on strengthening science technology engineering and mathematic (STEM) skills, promoting regional job mobility, attracting highly skilled workers, creating incentives to invest in employees' upskilling, improving employee reskilling opportunities and people to learn new digital skills, and investing in robotisation and talent management. In addition, the strategy will also focus on user-centred data management that provides

information accumulation and analytics for data driven decision-making, which will contribute to human capital development and accessibility policies, and coordinated interdepartmental cooperation of for job market transitions.

Based on these measures, it is estimated that Latvia will reach 52 000 ICT specialists by 2027, which based on today's figure would equate to around 5.8% of Latvians in employment in 2027. This would put Latvia in a difficult position to reach the Digital Decade target by 2030.

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

#### 3.1.2.a e-ID

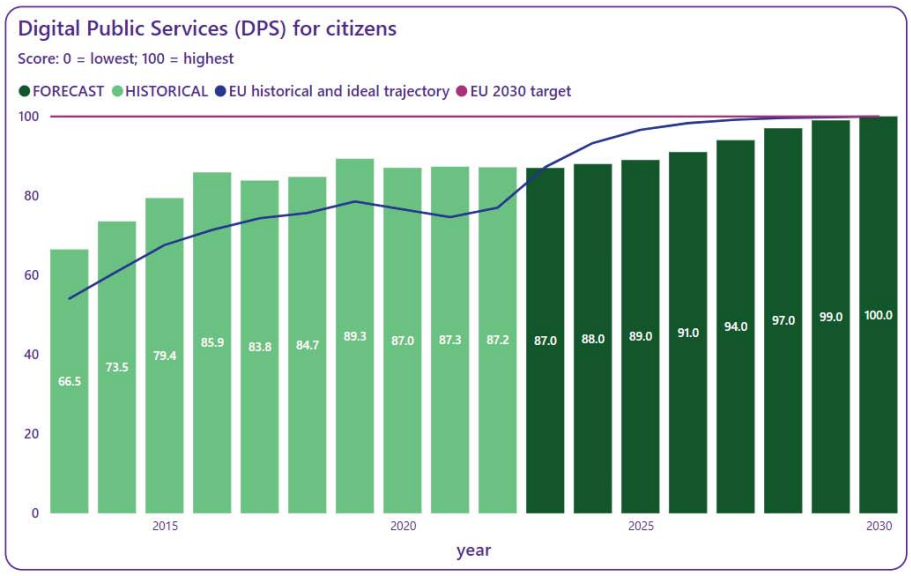
**Providing e-ID solution is a priority in Latvia, as shown by its implementation of an e-ID and eSignature mobile that under national law must be legally equivalent to presenting a personal identification in person.** During 2023 the national law was further amended to ensure the possibility to receive private e-services. Moreover, the obligation on private e-services providers to accept national e-ID or eSignature mobile led to an increase in identity checks through these tools by 30% during a 1-year period. In addition, Latvia participates in the Nordic-Baltic e-ID (NOBID) project that aims to harmonises e-ID solution in eight Nordic and Baltic countries and to provide cross border access to digital services.

**The usage of Latvian e-ID is significantly above the average EU usage.** Eurostat data of 2023 shows that 70.2% of Latvians have used e-ID to access online services over the last 12 months, placing the country significantly above the EU average of 41.11%.

Given that Latvian Radio and Television Centre (LVRTC) eSignature mobile corresponds to a higher security level than notified in the e-ID scheme, Latvia has identified a potential risk that for cross-border use the service might not be available due to the difference in security requirements.

**Latvia is participating in the pilot project NOBID focused on the use of EU Digital Identity Wallet for Payments – supporting the implementation of the European Digital Identity Wallet (EUDI Wallet).**

#### 3.1.2.b Digitalisation of public services for citizens and businesses





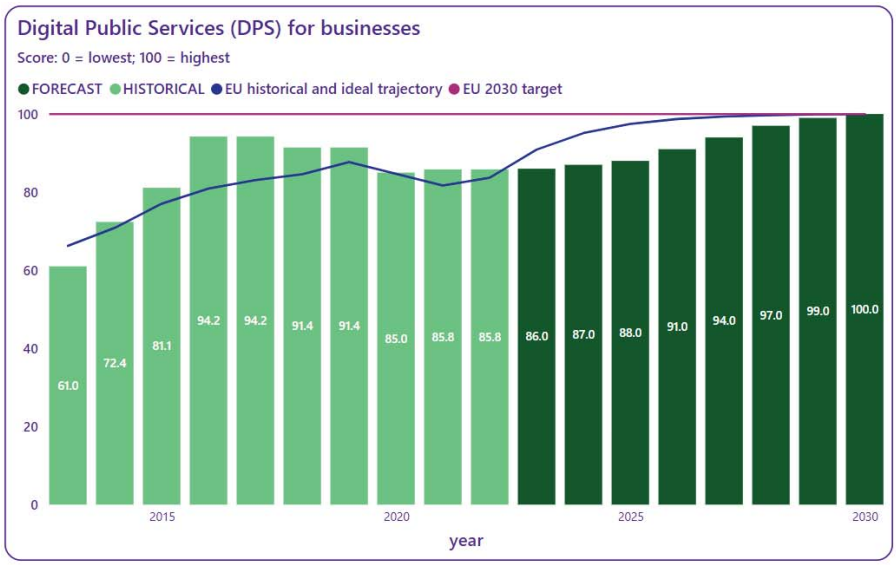
**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 87.0 | 87.2 |
| DESI 2024 | 88.2 | 79.4 |
| AVERAGE ANNUAL GROWTH % | 1.2 | 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 | 86.0 | 90.9 |
| DESI 2024 | 87.2 | 85.4 |
| AVERAGE ANNUAL GROWTH % | 1.6 | 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

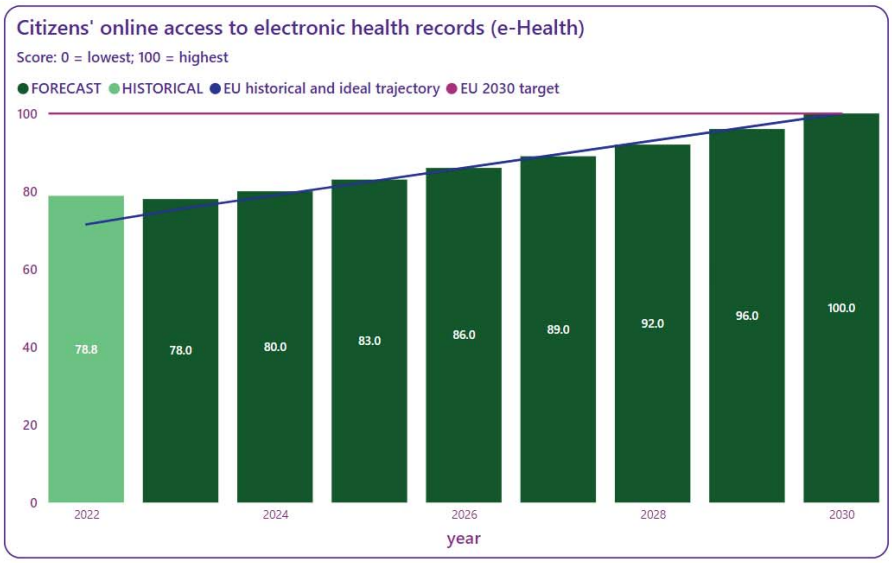
**Latvia brings a very strong contribution to the EU's digital decade target in digitalisation of key public services for citizens, while demonstrating limited dynamic. In addition, the country brings a positive contribution to the EU's Digital Decade target on digitalisation of key public services for businesses while showing a positive dynamic.** On both public services for people (88.2%) and businesses (87.2%), Latvia ranks above the EU average (79.4%, 85.4%). Furthermore, in public services for people and businesses Latvia is showing growth (1.2%, 1.6%) below EU average (3.1%, 2.0%), whereas for businesses the country is above the EU average. In addition, 78.4% of the Latvians are e-Government users, standing above the EU average. These figures correspond to the Eurobarometer results showing that 81% of Latvians believe that digital technologies will be important to accessing public services online. The country's target of reaching 100% is in line with the EU target and based on its current performance and progress, Latvia is likely to reach its target by 2030.

**Latvia is continuously improving its public service catalogue and e-service delivery environment, latvija.gov.lv.** During 2023, the website has been upgraded to significantly improve availability and a shared solution for developing e-forms was created. The portal implements the Single Digital Gateway Regulation. Latvia has implemented several measures to increase the number of digital public services for the citizens. The network of the Single state and municipal client support centres provides possibility to citizens to apply for services digitally by authorising a client to submit an e-application on his/her behalf and by organising a remote video consultation with an institution's specialist for those with limited digital skills. Since 2023, centralised examination certificates, decision on passing the state language proficiency test can be issued electronically. It is now possible to confirm bank payments via the E-paraksts mobile application (e-signature mobile app which before was only possible with bank authorisation tools).

**The challenges identified by Latvia are insufficient use of centralised applications and use of the 'once-only' principle in public administrations, resulting in more digitally fragmented government.** Other challenges are that users: (i) do not make enough use of possibilities to request and receive electronic services due to a lack in digital skills; (ii) are unable to purchase a tool to access such services; and (iii) need to solve non-standard situations in requesting services, which cannot be solved electronically by submitting a service request.

**The roadmap presents three Recovery and Resilience Fund funded measures that aim to streamline public administration data.** First, make it available and located in a single data dissemination platform (DAGR). Second, increase the usefulness and user-friendliness of latvija.gov.lv, reform a of service delivery (a digital one-stop-shop). Third, implement ICT sector projects to increase access to key public services. This will be supported by funding amounting to EUR 7.3 million and a grant of EUR 17.6 million from the Recovery and Resilience Fund.

### 3.1.2.c e-Health





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 78.0 | 75.5 |
| DESI 2024 | 84.8 | 79.1 |
| AVERAGE ANNUAL GROWTH % | 7.6 | 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

**With an overall e-health maturity score of 84.8, compared to the EU average of 79.1, Latvia brings a positive contribution to the Digital Decade targets and showing a positive dynamic. Latvia had a maturity score of 78.8 in 2022.** A centralised, nationwide access service is technically available in Latvia. 80-100% of the national population is technically able to access the online access services for e-health records through online portal(s), logging in using an e-ID compliant with eIDAS Regulation. A mobile application is not available. Latvia scores 86 on categories of health data, compared to a European average of 74. In Latvia, all data categories investigated in this framework are made available to citizens. For more than half the categories, data are provided in a timely manner. Medical imaging reports, medical images, and hospital discharge reports are now timely available compared to last year. The country's lowest-scoring sub-indicator in this thematic layer is health records summary data, with a maturity score of 71. Furthermore, 8 out of 9 applicable categories of healthcare providers supply relevant data. The types of connected healthcare providers have expanded since 2022, with private mental health facilities and public rehabilitation centres now contributing data to the national electronic health record system.

**The digitalisation of the healthcare sector is a priority for Latvia, as evidenced by aligning the national 2029 Digital Health Strategy with the Digital Decade target and Latvia's continuous expansion of the features of its national e-Health portal, Eveseliba.** Latvia continues to expand the services of Eveseliba by adding new features and health data categories. According to the Digital Decade Eurobarometer, 38.3% of Latvians access their personal health records online, above the EU average (24.35%) and 81% believe that in the future using digital technologies to access and receive healthcare services will be important in their daily life by 2030. In addition, digital skills are required in the professional education standard of doctors, doctors' assistant, and nurses responsible for general healthcare. In 2022, only 52.7% of Latvians use the internet to seek healthcare information and 22.9% made an appointment with a general practitioner via a website.

The e-health system provides a numerous types of data functionalities for health professionals: the patient's summary (for example, data on detected allergies, performed surgical operations, diagnosed chronic diseases), e-prescription, e-referral, visual diagnostic results, sick-leave certificate, vaccination information, emergency call data. Health professionals can deny a patient the right to view certain medical data if, the doctor has information or facts that the receipt of information would significantly endanger the life or health of the patient or other persons. Since 2024, the health care institutions are required to provide in the national electronical health record system also laboratory examination results performed, as well all data on vaccinations.

In the e-health portal, the patient can access their and their dependents health data, and perform other activities such as, specify contact information, contact persons, apply for a European Health Insurance card, authorise another person to access data, manage permissions for the use of organs and tissues for transplantation, use of the body after death, view the records of the data access audit reports, prohibit health professionals access to their health records. In the e-health system pharmacists can dispense the prescribed medicines, as well as prepare statistical reports.

**The digitalisation of the healthcare sector is a priority for Latvia, as evidenced by aligning the national 2029 Digital Health Strategy with the Digital Decade target and Latvia's continuous expansion of the features of its national e-Health portal, E-veseliba.** Latvia continues to expand the services of E-veseliba by adding new features and health data categories. According to the Digital Decade Eurobarometer, 38.3% of Latvians access their personal health records online, above the EU average (24.35%), and 81% believe that in the future using digital technologies to access and receive healthcare services will be important in their daily life by 2030. As of November 2023, patients can access e-prescriptions, sick-notes, visual diagnostic results, COVID-19 vaccination, and examination data, in addition to already established centralised access to e-Health records. In addition, digital skills are required in the professional education standard of doctors, doctors' assistants, and nurses responsible for general care. In 2023, only 52.7% of Latvians use the internet to seek healthcare information, and in 2022 merely 22.9% made an appointment with a general practitioner via a website.

**Latvia identifies three different challenges to reach the Digital Decade goal.** First, a lack in the patients and medical staff's digital skills. Second, fragmented e-Health data in the ICT environment. Third, a lack of human resources capacity for the development of e-Health management in the Ministry of Health and its institutions. Latvia has created strategies focusing on tackling these challenges by developing digital skills and knowledge of health workers through educational measures, further development of a central interoperable national e-health infrastructure, providing additional funding to attract more human resources and creating a national competence centre for digital health.

April 2024, the Cabinet of Ministers supported setting up of the Digital Competence Centre for health sector to promote the development of digital health and ensure strategic management of the digital health ecosystem.

**To increase digital skills in the healthcare sector, the NGO Riga TechGirls, provided a free online training course for healthcare workers consisting of 25 lessons (of which 4 were practical) in-patient experience design, data processing in healthcare, digital tools in healthcare, and available technologies with 1 721 registered participants.**

Latvia developed and launched the new common digital epidemiological system (EPID system). The EPID system helps the Centre for Disease Prevention and Control to ensure more effective performance of response to infectious disease cases and outbreaks, as well as provides wider opportunities to analyse the epidemiological situation, identify public health threats and organize the necessary preventive and anti-

epidemic measures. The total cost for the project was EUR 613 228 (partly funded by the European Union Solidarity Fund).

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

According to the Eurobarometer, 71% of Latvian's are aware that their offline rights apply offline also should apply online, which is above EU average (62%). Perhaps as a correlation, Latvia experiences less hate speech online than other EU Member States. In the last 3 months of a Eurostat survey 31.5% of Latvians encountered messages online that were considered hostile or degrading, lower than the EU average of 33.5%. Furthermore, according to the Eurobarometer, only 74% of Latvians believed that shaping the development of Artificial Intelligence and other digital technologies to ensure respect of individuals rights and values should be important for the public authorities, which is below the EU average of 78%.

Latvia is prioritising online consumer protection by focusing on the implementation of the Digital Services Act. In 2023, the Latvian Consumer Rights Protection Centre (CRPC) organised the Fair digital markets and services in the future conference. The conference focused on discussions regarding well working cooperation mechanisms and the challenges of how the legislative framework will shape digital services in the future. The conference had over 130 participants from the European Commission, public authorities, NGOs, and the business sector.

# 4 Leveraging digital transformation for a smart greening

**Latvia is at the start of implementing green policies in its digital transition.** 42% of the Latvian Recovery and Resilience Plan will support climate objectives, most of them aimed at green digital transformation. The 2021-2027 Environmental Policy Guidelines steers Latvia in protecting the environment and a part of those guidelines focus on the circulation of dangerous substances (used in digital equipment).

**The roadmap clearly points out horizontal initiatives that consider the objective of promoting the green transformation.** Examples of this are measures to support adult learning based on their individual needs, digitalisation of public administrations, e-ID, e-health, establishing a national cloud programme, initiatives which by default lessen, for example, people's need to travel to institutions, receiving receipts, decreasing the amount of paper.

**Latvian businesses and people are generally not sensitive to the green transition of the digital sector**. In Latvia, 35.9% of businesses considered the environmental impact of ICT services, or ICT equipment, before selecting them and applying some measures, affecting the paper or energy consumption of the ICT equipment (2022), which is below the EU average (48.7%). Latvians tend to recycle less of their ICT devices (4.0% for laptops and tablets, 5.4% for desktops, 5.8% for old mobile or smartphones) than the EU average (9.7%, 12.8%, and 10.4% respectively). In addition, the Digital Decade Eurobarometer showed that 72% of Latvians think it is important to ensure that digital technologies serve the green transition, and only 55% believe that digital technologies will be important to help fight climate change which is below the EU average of 81% and 74%, respectively.

**Latvia is participating in the second IPCEI Microelectronics and communications technology (ME/CT) and IPCEI CIS.** Latvia is an associated participant in the IPCEI ME/CT, which aims to enable the digital and greens transformation. It aims to do this by creating innovative microelectronics communication, energy-efficient solutions as well as resource electronics systems and manufacturing methods. Latvia is an indirect partner to IPCEI CIS that it says to contribute to advancing digital and green transition in Europe by developing cloud and edge to further increase data processing capabilities, software, and data sharing tolls that is turn is energy efficient. These are two examples of EU-level collaboration to consider the environmental impact while transitioning to the digital era, and therefore contributing to the digital decade objectives.

In the context of REPowerEU, Latvia stands to receive an additional EUR 135 million in non-repayable support (including a reallocation of EUR 10.9 million from the Brexit Adjustment Reserve). The measures are aim at accelerating of the synchronisation of the national electricity network with the Continental Europe network, integration of Renewable Energy Sources (RES), digitalising, securing and modernising distribution networks, and electricity transmissions.

| **Best practice: green ICT procurement** |
| --- |
| **A notable Latvian measure combining the green and digital transition is the green ICT procurement.** In Latvia, the purchase of ICT goods and services is subject to mandatory Green public procurement (GPP) criteria as set out in the national regulations. It is mandatory to include the GPP criteria for all ICT e-catalogues in the National Centralised Electronic Procurement System (EPS) which includes computer equipment and its installation, server equipment and data storage, installation of server equipment and data storage, software, software development and support services, software rental and software usage training, printing, and copying equipment, demonstration equipment and installation. In 2023, the GPP requirements were updated to consider new technological developments. Furthermore, as result of this |

measure, each catalogue and item requiring the GPP compliance is marked with a visual tag in the EPS system.

# Annex I – National roadmap analysis

## Latvia's national Digital Decade strategic roadmap

The National Strategic Roadmap of Latvia was submitted 31 January 2024 and was officially approved by the Cabinet of Ministers on the 30 January 2024, Digitālās desmitgades stratēģiskais ceļvedis Latvijai līdz 2030.gadam (varam.gov.lv).

The roadmap is complete and presents targets and trajectories on all but FTTP and edge nodes. Most of national targets match the 2030 EU targets except for at least basic digital skills (70% versus 80%), VHCN (53% versus 100%) and overall 5G coverage (70% versus 100%).

The table below reflects a best effort attempt to categorise the measures and budget as presented in the Latvia's roadmap.

| Digital Decade Target/objective | Budget (EUR Million) | Number of measures |
|---|---|---|
| Connectivity Gigabit | 52.4 | 7 |
| Connectivity 5G | - | - |
| Semiconductors | 152.1 | 3 |
| Edge nodes | - | - |
| Quantum computing | 14.5 | 2 |
| SME take up | 385.2 | 5 |
| Cloud/AI/Big Data uptake | 185.2 | 4 |
| Cloud only uptake | - | - |
| AI only uptake | - | - |
| Big data uptake | - | - |
| Unicorns | 483.0 | 3 |
| Basic Digital Skills | 103.5 | 5 |
| ICT Specialists | 70.7 | 4 |
| eID | 0.4 | 1 |
| Key Public Services | 92.7 | 7 |
| e-Health | 0.0 | 6 |
| Objectives | - | - |
| **Total** | **1 539.7** | **47** |

Latvia presents a non-exhaustive set of main policies and measures contributing to the EU's Digital Decade targets. The measures presented also cover several types of objectives: technological leadership, sovereignty, competitiveness, cybersecurity, fundamental rights and green transition. In total, the measures presented amount to approximately EUR 1.54 billion. Overall, the vision set out in the roadmap is comprehensive, despite a lack of funding targeted to 5G connectivity, and edge nodes. In addition, a substantial part of the roadmap's budget will contribute to the increase of SME take-up and start-up ecosystems. The roadmap clearly states if the measures have been funded by EU, national or private investments. A weakness of the roadmap is that it presents the four identical RRF measures for SMEs and cloud / AI / big data take-up together at one spot in the roadmap. The roadmap would have benefited from a clearer description of how these measures contribute to each take-up, especially considering their often-low starting values and high trajectory. Furthermore, the addition of the percentage of women

regarding ICT specialists and detailing the gigabit connectivity in percentage instead of households would have been beneficial. In addition, the roadmap's interplay between the digital and green transition could be improved. The roadmap clearly discusses how each KPI corresponds to green transition. However, by having that specific focus, it sometimes loses the overall perspective and overall measures targeting the green and digital transition. The roadmap commendably discusses all the recommendations from last year's digital decade report and make recommendations based on them. The roadmap clearly presents and discusses the feedback its received from its stakeholders.

Overall, the roadmap is coherent with efforts being made in all the dimensions of digitalisations. However, some aspects might require further development. For example, the increase of basic digital skills could benefit from more ambitious measures and targets, as Latvia's low level of basic digital skills effects many of its other targets.

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

## MCP and EDICs

Latvia participates in several multi-country projects.

Latvia is a member of already established EDICs for Alliance for Language Technologies (ALT-EDIC) and the Local Digital Twins towards the CitiVERSE EDIC[10]. Latvia is also engaging in discussion on the setup of possible future Cancer Image Europe (EUCAIM) EDIC, within an informal Working Group.

Latvia is an associated participant in the IPCEI ME/CET, and an indirect partner participant in the IPCEI Next Generation Cloud Infrastructure and Services. Latvia is also participating in the European Digital Identity Wallet (EUDI Wallet). In addition, Latvia participates in four Connecting Europe Facility (CEF) projects: 5G Northern Europe Transport Corridors, 5G Corridor Study for Latvia, Estonia and Lithuania, 5G for protection of Lives and Public Health in Riga, and Baltic Ring.

## EU funding for digital policies in Latvia

The Latvian Recovery and Resilience Plan earmarks EUR 416 million (23% of the total allocation) to the digital transformation. According to the Joint Research Centre's[11], EUR 384 million of the Latvian Recovery Resilience Plan directly contributes to achieving the Digital Decade targets. Out of Latvia's cohesion policy funds, EUR 364 million contribute directly to the Digital Decade targets according to the same mapping study. The largest digital measure of the Recovery Resilience Plan is dedicated to the digitalisation of key public services: EUR 123 million, which almost corresponds to a third of the total funding.

[10] *information updated on 31 May 2024*

[11] JRC report "Mapping EU level funding instruments 2020-2027 to Digital Decade targets - 2024 update" (Signorelli et al., 2024)".


# State of the Digital Decade in 2024

## Lithuania

# 1 Executive Summary

**Lithuania brings a positive contribution** to the EU's digital decade objectives and targets, in view of a successful digitalisation that fosters competitiveness, resilience, sovereignty, European values and climate action.

In **2023, Lithuania made notable progress** in increasing the level of digital skills of its population and the number ICT specialists in employment, as well as improving 5G coverage. However, **challenges persist** particularly in the uptake of advanced technologies, such as AI and Cloud, by enterprises and in creating synergies between the digital and green transitions.

Digitalisation is a priority for Lithuanian authorities, included in the **National Progress Plan 2021-2030** that sets out the country's development directions, priorities, and principles in the different areas of state governance. Moreover, one of the five axes in the State Progress Strategy **Lithuania's vision for the future of Lithuania 2050** is a connected country with sustainable and well-balanced development.

According to the Special Eurobarometer 'Digital Decade 2024'[12], **75% of Lithuanian citizens consider that the digitalisation of daily public and private services is making their lives easier**, which is slightly above the EU average (75%).

Lithuania is one of the members of the already established **European Digital Infrastructure Consortium** (EDIC) for the **Alliance for Language Technologies** (ALT-EDIC). In addition, Lithuania is developing the Statutes and other relevant documents of the possible future Genome EDIC and the possible future Connected Public Administration EDIC, within their informal working groups[13].

**The Lithuanian Recovery and Resilience Plan (RRP) includes 23.3% (EUR 724 million)[14] of its budget to foster the digital transition**. Its update, including a REPowerEU chapter, was approved in November 2023. The Lithuanian RRP presents a variety of measures to help businesses and citizens, improve public services, and speed up the digital transition in Lithuania through actions to digitalise the public and private sectors, support innovation and research, etc. Under cohesion policy, an additional EUR 309 million is allocated to the country's digital transformation[15].

[12] Special Eurobarometer 551 on 'the Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351

[13] Information last updated on 31 May 2024.

[14] The share of financial allocations that contribute to digital objectives has been calculated using Annex VII to the Recovery and Resilience Facility Regulation.

[15] 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] | Lithuania | | | EU | | Digital Decade target by 2030 | |
|---|---|---|---|---|---|---|---|
| | DESI 2023 | DESI 2024 (year 2023) | Annual progress | DESI 2024 (year 2023) | Annual progress | LT | EU |
| **Fixed Very High Capacity Network (VHCN) coverage** | 78.0% | 78.1% | 0.1% | 78.8% | 7.4% | 98% | 100% |
| **Fibre to the Premises (FTTP) coverage** | 78.0% | 78.1% | 0.1% | 64.0% | 13.5% | x | - |
| **Overall 5G coverage** | 90.1% | 98.9% | 9.8% | 89.3% | 9.8% | 100% | 100% |
| **Semiconductors** | | NA | | | | | |
| **Edge Nodes** | | 3 | | 1 186 | | x | 10 000 |
| **SMEs with at least a basic level of digital intensity** | 56.7% | 60.0% | 2.9% | 57.7% | 2.6% | 90% | 90% |
| **Cloud** | 27.7% | 33.6% | 10.1% | 38.9% | 7.0% | 75% | 75% |
| **Artificial Intelligence** | 4.5% | 4.9% | 4.3% | 8.0% | 2.6% | 75% | 75% |
| **Data analytics** | NA | 40.5% | NA | 33.2% | NA | 75% | 75% |
| **AI or Cloud or Data analytics** | NA | 53.5% | NA | 54.6% | NA | | 75% |
| **Unicorns** | | 2 | | 263 | | 6 | 500 |
| **At least basic digital skills** | 48.8% | 52.9% | 4.1% | 55.6% | 1.5% | 80% | 80% |
| **ICT specialists** | 4.4% | 4.9% | 11.4% | 4.8% | 4.3% | 6.9% | ~10% |
| **eID scheme notification** | | Yes | | | | | |
| **Digital public services for citizens** | 83.9 | 86.7 | 3.4% | 79.4 | 3.1% | 100 | 100 |
| **Digital public services for businesses** | 94.4 | 95.9 | 1.7% | 85.4 | 2.0% | 100 | 100 |
| **Access to e-Health records** | 92.0 | 95.4 | 3.8% | 79.1 | 10.6% | 100 | 100 |

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

## National Digital Decade strategic roadmap

With respect to **Lithuania's** contribution to the Digital Decade, its roadmap demonstrates **high ambition.** Based on this document, the country intends to dedicate **some effort** to achieve the Digital Decade objectives and targets.

**The Lithuanian roadmap is generally coherent and very ambitious in achieving the Digital Decade targets**. It includes 2030 targets and trajectories for all KPIs except for FTTP and Edge nodes. They are all aligned with the EU targets, except for ICT specialists, which stands well below the EU targets. The roadmap covers all the objectives of the Digital Decade, such as a human-centred digital space, resilience and security, sovereignty, green, and protection of the society with a high level of ambition, focusing on human centricity, sovereignty, and the green dimension.

The roadmap includes 22 measures with a total budget of almost **EUR 1.5 billion,** taking into account the RRF, other EU funds and the national budget, which equate to around 2% of its GDP. Regarding the ICT specialists, more ambition is required in order to reach the EU target.

**Recommendations for the roadmap**

Lithuania should, when submitting adjustments to its national roadmap in accordance with Article 8(3) of the DDPP Decision:

- **TARGETS**: (i) Propose a target and develop a trajectory for Edge nodes. (ii) Clarify whether the target and trajectory of the 'Ultra-fast broadband coverage' corresponds to FTTP networks only or if it includes other types of VHCN. If so, please formalise a target and develop a trajectory for the missing technologies. (iii) Align **the level of ambition of target** for the number of **ICT specialists with the EU target**.
- **MEASURES**: (i) Strengthen or better tailor the measures contributing to targets that are the most difficult to achieve especially as regards skills, ICT specialists, take up of AI and big data analytics; (ii) Propose measures in Semiconductors, Edge nodes and Quantum computing; (iii) Review the budget description of all presented measures, ensuring completeness and accuracy; (iv) Review description of measures to provide information on expected impacts; (v) Provide more information on the implementation of digital rights and principles (and Digital Decade general objectives), including what national measures contribute to it.
- **CONSULTATION:** Provide more details on the consultation of stakeholders.

## Digital rights and principles

The Special Eurobarometer 'Digital Decade 2024' reveals key insights into Lithuanian perceptions of digital rights. Despite a 5-point decrease since last year, 57% of Lithuanians believe the EU protects their digital rights, above the EU average of 45%. Confidence in digital privacy rose to 52%, slightly above the EU average. Concerns, although increased by 5 and 10 points, respectively, over control of one's digital legacy (31%) and online safety for children (46%), still remain below the EU average. Many Lithuanians value digital technologies for connecting with friends and family (84%). These findings underscore the need for more prominent presence of digital rights and principles in Lithuania's roadmap and digital strategies[16].

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

For its technological leadership and competitiveness, **Lithuania can rely on good infrastructures** with a positive deployment dynamic, notably in 5G coverage, with 98.9% of the populated areas covered.

The indicators on the digitalisation of enterprises (basic intensity of SMEs and take-up of data analytics, AI, and cloud) show a generally positive dynamic, in particular in the basic intensity of SMEs. **Lithuania prioritises its start-up ecosystem, which is one of the engines of the Lithuanian economy**, contributing significantly to the country's innovation and technological progress. It ensures that Lithuanian companies can grow and become European champions able to compete globally. Lithuania also relies on its digital industry linked to **semiconductors production, especially lasers**, which form an indispensable part of the chip production chain and potentially quantum computers.

**Recommendations – Lithuania should:**

- **CONNECTIVITY INFRASTRUCTURE:** (i) Intensify efforts in the deployment of gigabit network, promoting public and private investments, especially in rural areas; (ii) Ensure sufficient access of new players to spectrum for innovative business-to-business (B2B) and business-

[16] 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.

to-consumer (B2C) applications and encourage operators to speed up the deployment of 5G stand-alone core networks.

- **CYBERSECURITY:** Continue the implementation of the 5G Cybersecurity Toolbox to ensure secure and resilient 5G networks.
- **AI/CLOUD/DATA ANALYTICS:** (i) Review the mix of measures to support the adoption of advanced digital technologies to guarantee the achievement of the ambitious targets; (ii) Stimulate the adoption of next generation cloud infrastructure and services by companies of all sizes, including by liaising with the Cloud IPCEI Exploitation office and/or the coordinators and the Member States participating in the IPCEI-CIS.

## Protecting and empowering EU people and society

**Lithuania is well equipped to deliver an inclusive digital transition, but it will require sustained efforts to continue to raise the population's level of digital skills and train ICT specialists.** The population's digital skills level remains slightly below the EU average while the share of ICT specialists has increased significantly over the last year. It is important given the Lithuanian economic dynamism where the ICT sector has an important role. The digital public services for citizens and businesses stand above the EU average, reflecting the country's high level of digitalisation. At the same time, the Eurobarometer 2024 results show the excellent rate of digital progress and future ambition perceived and expected by its citizens.

**Recommendations – Lithuania should:**

- **BASIC DIGITAL SKILLS**: Continue implementing initiatives to improve digital skills to ensure that no one is left behind.
- **ICT SPECIALISTS:** Continue implementing its efforts to increase the number of ICT specialists.

## Leveraging digital transformation for a smart greening

**The Lithuanian authorities do not yet focus on creating synergies between the digital and green transitions.** This contrasts with 82% of Lithuanians, who think that ensuring digital technologies serve the green transition should be an important consideration for public authorities, according to the Eurobarometer 2024.

Although innovation for sustainability is one of the objectives of the National Progress Plan 2021-2030, and the roadmap presents a measure linked with sustainability, no specific progress in this respect has been reported in 2023. However, it should be noted that the RRP allocates 37.4% of its budget to climate targets, although these are not directly linked to fostering the digital transition.

**Recommendations – Lithuania should:**

- Lithuania should be more ambitious in synergising the digital and green transitions, focusing on the contribution that digital can bring toward sustainability, and also leveraging advanced technologies and scaling up successful initiatives, as well as proposing decarbonization measures and encouraging initiatives in responsible green technologies.
- 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.

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

**With significant support from EU funding, Lithuania has been increasingly putting digitalisation at the centre of its economy's transformation, fostering its technological leadership and competitiveness.** The country's favourable environment for start-ups and innovative scale-ups is undoubtedly contributing to this, as Lithuania shows the highest growth rate in the region in this field.

**To boost the thriving digital sector and reach the EU's Digital Decade targets, Lithuania is deploying connectivity infrastructure as an essential enabler.** Although leading in 5G, the fibre broadband roll-out has scope to improve in order to reach the target by 2030. The country also aims to digitise its businesses, and shows a positive performance although there is still scope to improve, particularly in adopting Artificial Intelligence (AI) and the cloud. Cybersecurity also occupies a central place in Lithuania's plans, having approved the 2023- 2030 National Cybersecurity Development Programme, which reflects the changing nature and growing scale of cyber threats.

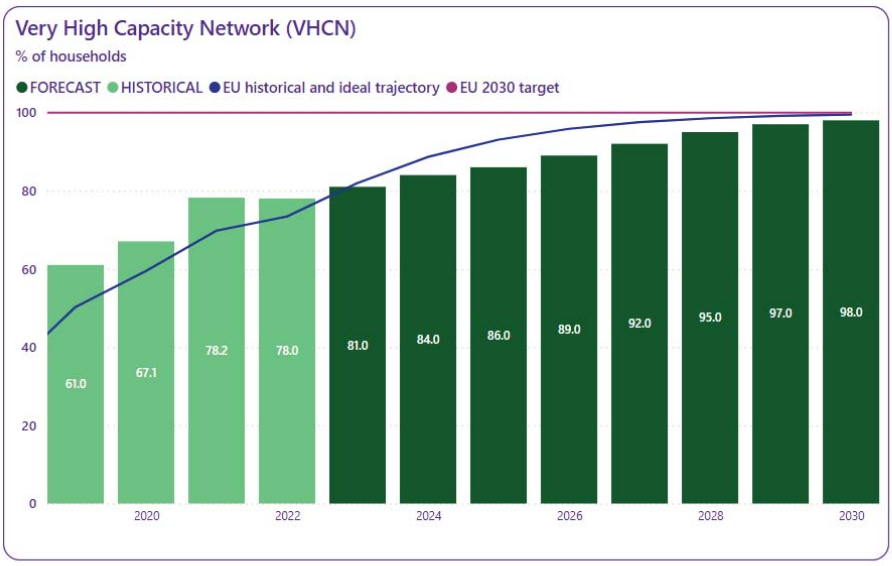
**Producing semiconductors, and in particular lasers, is an area of growth for Lithuania's digital industry.** However, Lithuania's prospects regarding deploying edge nodes needs to be reconsidered.

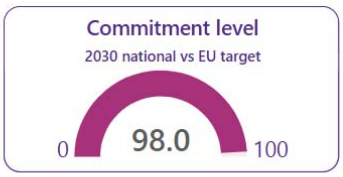
## 2.1 Building technological leadership: digital infrastructure and technologies

**Lithuania is well ahead in 5G deployment and coverage while in the VHCN and FTTP connectivity infrastructure has not seen much progress in 2023**. According to the Eurobarometer 2024, 78% of Lithuanians consider that the availability and affordability of a high-speed internet connection would significantly improve their daily use of digital technologies.

**The Lithuanian roadmap is silent on measures to achieve to the edge nodes, semiconductors and quantum computing targets.** However, the country is taking very positive steps in the production of semiconductors and in its synergies with quantum computing, which contributes to ensuring the EU’s digital sovereignty.

### 2.1.a Connectivity infrastructure (Gigabit)



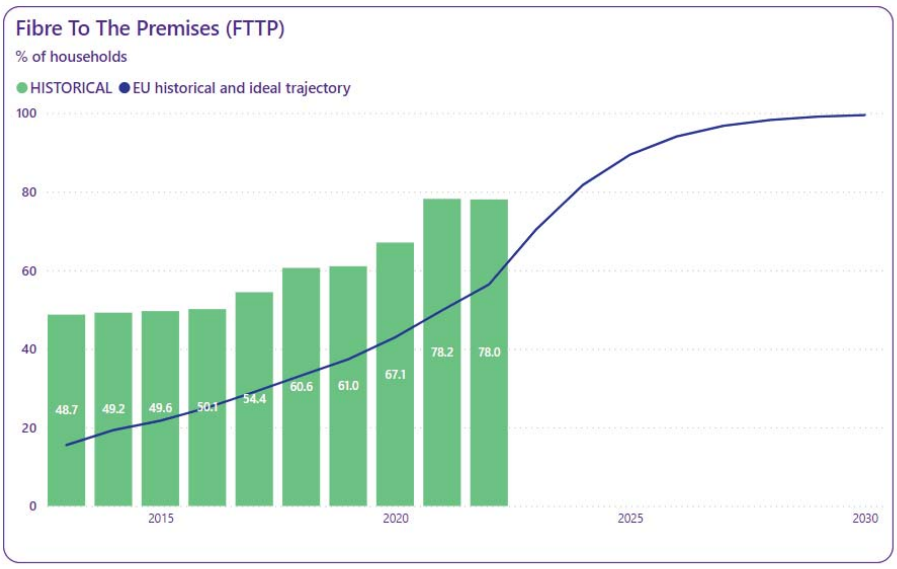




2023 state of play and recent progress

| | Country level | EU level |
|---|---|---|
| FORECAST | 81.0 | 82.0 |
| DESI 2024 | 78.1 | 78.8 |
| AVERAGE ANNUAL GROWTH % | 0.1 | 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





2023 state of play and recent progress

| | Country level | EU level |
|---|---|---|
| FORECAST | | 70.3 |
| DESI 2024 | 78.1 | 64.0 |
| AVERAGE ANNUAL GROWTH % | 0.1 | 13.5 |

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

**With 78.1% of households currently covered by VHCN and showing a limited performance, Lithuania has untapped potential to contribute to EU's Digital Decade target in VHCN.** The country is slightly below the EU average (78.8%) and has not shown any growth in 2023, while the EU average stood at 7.4% of average annual growth.

**The FTTP coverage has also remained at 78.1% since 2021.** Although, in this case it stands still above the EU average, meaning that Lithuania contributes positively to the EU target.

**Although the broadband coverage in Lithuania had been increasing over the last 4 years, it has stalled at 78%, as the main measures are focused on 5G.** In terms of coverage, there are 1 438 000 households in Lithuania, of which over 316 000 (22%) still need to be covered by broadband networks.

**The Lithuanian roadmap sets a target of 98% of 'Ultra-fast broadband coverage' by 2030.** It is unclear if this corresponds to VHCN or only to FTTP. For the purpose of this report, it is assumed that it refers to VHCN. Consequently, the target and trajectory for the FTTP is missing. There is one measure to 'promote the development of advanced electronic communications technologies and next generation communication networks' (including 5G). The measure has a total budget of EUR 101.4 million and includes four initiatives that need to be implement by the of 2029. However, given the current rate of progress and the starting point, more effort is needed to reach the target by 2030 of all end users at a fixed location being covered by a gigabit network up to the network termination point.

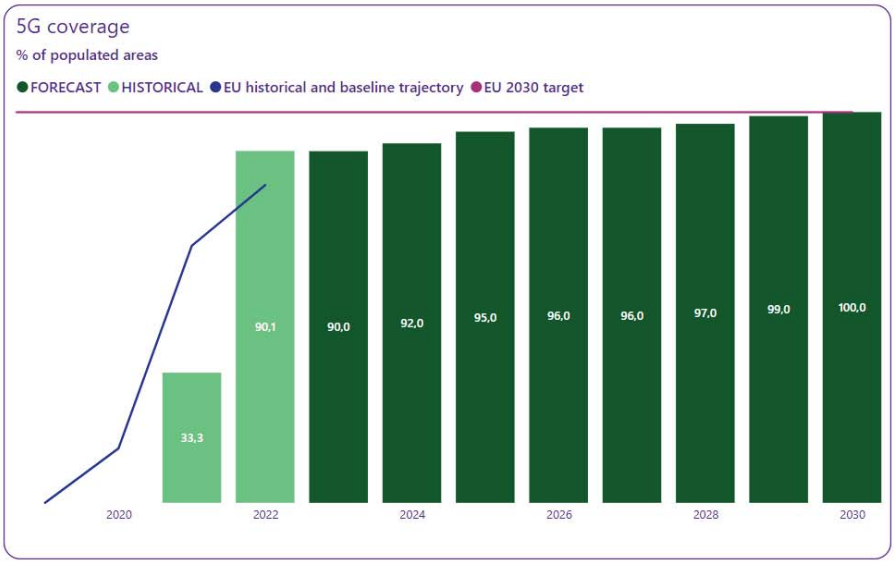
**During 2023, the national authorities continued to implement the project 'Development of Next Generation Access Infrastructure' through the construction of telecommunication towers and the deployment of fibre in remote areas where high-speed broadband was still unavailable.** During the project implementation, 1 235 km of new fibre-optic cable lines and 25 telecommunication towers were built, 310 existing communication infrastructure objects were connected to the network and the necessary network equipment was installed to provide wholesale telecommunication services in rural areas. Once this works is completed, about 47 390 households will be located in white areas and about 273 880 households across the country will be connected to the next-generation access network.

**According to the renewed National Broadband Plan, further measures will be implemented to boost the development of gigabit broadband infrastructure and to broaden the coverage of white areas with at least 100 Mbps broadband speed.**

**The national Communications Regulatory Authority (RRT) has obliged three operators to ensure the provision of universal electronic communications services in some municipalities.**

**Last year's Digital Decade recommended that Lithuania increase its efforts to roll-out gigabit connectivity in rural areas.** The country should continue and step up its efforts to develop a good dynamic and reach the desired target by 2030.

### 2.1.b Connectivity Infrastructure (5G)





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 90,0 | |
| DESI 2024 | 98,9 | 89,3 |
| AVERAGE ANNUAL GROWTH % | 9,8 | 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

**Lithuania contributes very strongly to the 5G coverage target in the EU's Digital Decade objective, showing positive dynamic.** With 98.9% of populated areas covered by 5G, the country exceeds the EU average (89%) while the average annual growth is in line with the EU value.

**The roadmap set a target of 100% of populated areas covered by 5G technology in 2030, including the single measure for connectivity that has already been mentioned.** The country's target matches the EU value and based on both a strong starting point and the current rate of progress, the country could reach the target before 2030.

**During 2023, the government[17] recognised the development of 5G mobile connectivity as a project of national importance, which implies faster and more efficient planning and implementation process.** In 2023, the Ministry of Transport and Communications continued to implement the 2020-2025 National 5G Roadmap. It should be noted one of its measures aimed to create conditions to ensure 5G coverage on automobile trunk roads. This led to an amendment to the Law on Roads enabling the national road administrator to build communication towers on the roads, state-owned land. Lithuania has also implemented an amendment to the Law on Electronic Communications and related laws, by which trustees of state property will be required to enter an easement transaction with network operators to facilitate the deployment of 5G infrastructure (exceptions and compensations are in place).

**The Ministry of Transport and Communications is actively developing the 5G sandbox regime, a crucial initiative aimed at creating a secure environment for testing and practical application of innovative communication ideas based on 5G technology.** This initiative is designed to attract ideas from start-ups, businesses, and science, encouraging a collaborative environment. To further support this, a financial

[17] https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/acc5823010ee11ee9ac6bb8cb9c06455?jfwid=-cfknnqzv9

assistance mechanism has been established, not only for the design of ideas but also for their testing and development, with a specific focus on field trials. EUR 24.5 million has been allocated for this measure from the Recovery and Resilience Fund. In 2023, competitive calls for proposals were launched, resulting in funding for projects planned by 8 start-ups and a consortia of 17 from the business, science, and public sectors. The projects are set to start in 2024, marking a significant step towards enabling innovation in the 5G sector.

**The national authorities granted funding and entrusted the preparation of the investment project 'Development of 5G connectivity in the international transport corridors (Via Baltica)' as part of the '5G TEN-T transport corridor' project.** This strategic project aims to transform the 'Via Baltica' highway into an international 5G transport corridor together with partners from Latvia and Estonia. This will ensure uninterrupted coverage and quality 5G connectivity, which should in turn encourage the development of autonomous transport and intelligent transport systems on the 'Via Baltica'. For this purpose, a joint application of the Baltic States for CEF financial instruments is being prepared. The Lithuanian Road Administration and Lithuanian mobile network operators will implement the project by installing additional communications infrastructure.

### 2.1.c Semiconductors

**The Lithuanian roadmap does not include any measures related to the production of semiconductors.** However, the roadmap acknowledges its importance as part of Europe's economy and sovereignty, especially in the context of growing demand for new technologies. It also highlights the presence of companies in the Lithuanian semiconductor market that specialise in the production of discrete semiconductor devices or supply components of equipment used in chip manufacturing infrastructure, particularly lasers, to foreign manufacturers along the semiconductor value chain.

**During 2023, the Lithuanian semiconductor market maker group 'TTELTONIKA' signed a EUR 14 million agreement with the Taiwanese Institute of Industrial Technology[18].** The agreement allows Lithuania to use the Taiwanese Institute's licences for semiconductor chips manufacturing technology devices, and will provide Lithuania with assistance in the development of detailed projects and training for staff. Therefore, TTELTONIKA plans to construct a semiconductor component plant and a research centre, expecting the value of its production to be around EUR 10 billion by 2040.

**On R&I, Lithuania has long been involved in fundamental research and niche technologies in semiconductor physics.** Currently, the applied research of semiconductors carried out at Vilnius University (VU), Kaunas University of Technology (KTU), Vilnius Gediminas Technical University (VGTU) research institutes and National Centre for Physical Sciences and Technology (NFTMC), reflects the accumulated scientific achievements and skills.

### 2.1.d Edge nodes

**According to the Lithuanian authorities, the country does not have to carry out activities focused on edge nodes.** This is because the average mobile internet latency in Lithuania already reaches 10-20 milliseconds. However, as highlighted in the recent EU Commission's White Paper as well as other sources ,such as the Roadmap of the European Cloud alliance, the deployment of edge nodes is a crucial enabler to develop network infrastructures of the future. Therefore, the Lithuanian authorities' perspective can be very misleading.

Lithuania could include edge node deployment in their plans and investment programmes taking into account that edge computing is a critical enabler of Artificial Intelligence, future networks roll-out and the internet of things, and that the deployment of edge nodes could boost all these areas.

[18] https://teltonika-iot-group.com/newsroom/agreement-with-taiwanese-partners-on-semiconductor-technologies/

### 2.1.e Quantum technologies

**The country is taking positive steps despite the roadmap not including any measures in quantum computing** stating that quantum supercomputers are particularly expensive and inappropriate for small countries such as Lithuania to develop on their own.

**Concerning the most significant commercial potential in this area, Lithuania is using laser technologies to develop parts of quantum computers as there are already examples where Lithuanian lasers are being used for components in quantum supercomputers or quantum nodes.** Therefore, by being innovative this area, Lithuania can take-up a niche in the quantum computing value chain by exploiting the leadership of the country's laser ecosystem. As a consequence, the Lithuanian Association for Quantum Technologies was established in November 2023 to develop the quantum technology ecosystem and bring together scientific and business organisations working to develop quantum technologies and its boost international competitiveness.

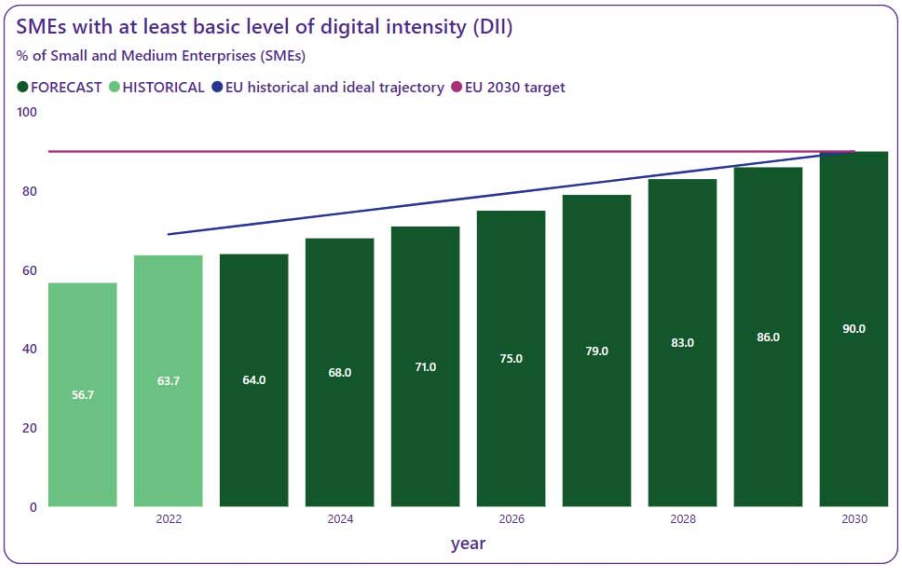
**Lithuania also aims to integrate into the quantum ecosystem of R&D tools through international cooperation formats.** This would contribute to the EU's quantum objective through its scientific activities, the development of quantum communication infrastructure and the adaptation of solid fields. For example, the country joined the European Quantum Infrastructure Initiative (EuroQCI) in 2019. And in 2023, it successfully joined the European Digital Innovation Hubs (EDIH) project (which is designed to support businesses and organisations in adopting digital technologies and boosting innovation). There are three European Digital Innovation Hubs (EDIHs) in Lithuania. One of Hubs, the EDIH VILNIUS, specialises in High-Performance Computing.

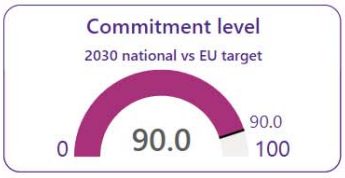
## 2.2 Supporting EU-wide digital ecosystems and scaling up innovative enterprises

**Lithuania contributes very positive to the EU digital ecosystem, particularly with its good position regarding unicorns and innovative scale-ups**. The country maintains its ambition in this field to boost the start-up ecosystem to drive the Lithuanian economy. According to the Eurobarometer for 2024, 87% of Lithuanians consider that ensuring that European companies can grow and become European champions able to compete globally should be important to the public authorities, which is above the EU average (82%).

**Although more effort is needed, Lithuanian SMEs are experiencing a favourable time due to the basic digital intensity, which enables e-commerce and online sales.** On the take-up by businesses of AI, big data, or cloud, Lithuania remains below the EU average, showing a limited dynamic. However, glimpses of its potential can be observed.

### 2.2.a SMEs with at least a basic level of digital intensity




**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 64.0 | 71.6 |
| DESI 2024 | 60.0 | 57.7 |
| AVERAGE ANNUAL GROWTH % | 2.9 | 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

**With 60% of SMEs with at a least basic level of digital intensity, Lithuania contributes positively to the EU's Digital Decade objective while showing a limited dynamic but with good progress**. The country is above the EU average both in percentage of SMEs (57.7%) and average annual growth (2.9% vs 2.5%). There are other indicators that also shows the positive landscape of the Lithuanian SMEs as they stand significantly above the EU average in e-commerce (30.6% vs 19.1%) and in SMEs total turnover from e-commerce (13.7% vs 11.9%).

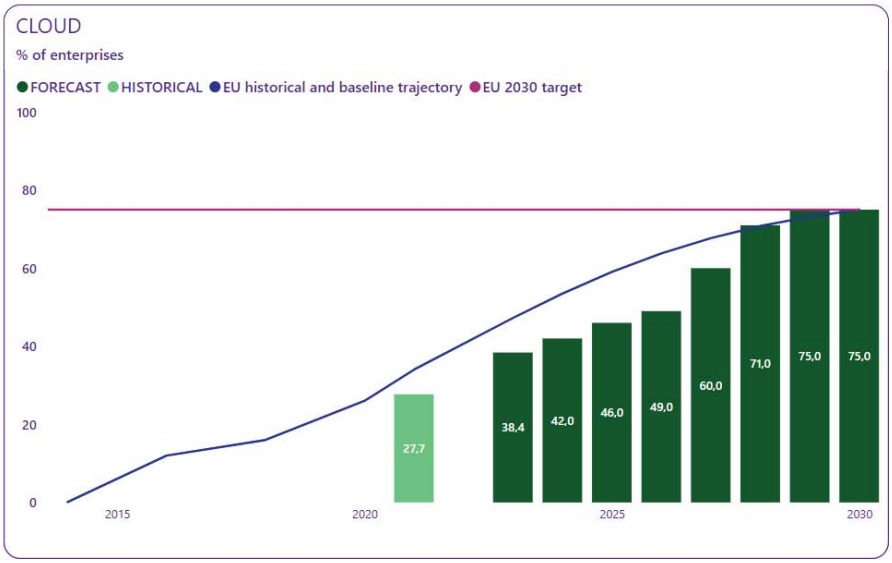
**The roadmap sets the target of 90% of SMEs, which equals the EU's target. However, given the starting point and its current rate of progress, achieving the target by 2030 will requires that efforts are stepped up.** Lithuania has around 100 000 SMEs, and the roadmap includes two measures that are already being implemented and that will be finished by 2029. One measure, with a total budget of EUR 4.6 million, aims to increase and improve tax compliance, addressing the challenges of the tax gap. The other measure, with a budget of EUR 121.2 million, aims to encourage the digitalisation of SMEs and seeks to promote the development of the start-up ecosystem.

**In 2023, Lithuania implemented several measures to increase the number of SMEs with at least basic digital intensity.** For example, the call for the digitisation of SME amounting to EUR 12 million of funding was launched in June 2023 and closed in November 2023. Many bids were received since the amount exceeded by two and a half times the call's budget. The plan is to sign the project contracts in 2024.

**One of the three European Digital Innovation Hubs (EDIHs) in Lithuania is the EDIH4IAE.LT**. The Hub helps with the digital transformation of SMEs, businesses, and public bodies in the agri-food, energy, and industry sectors. During 2023, the EDIH4AE.LT consortium helped more than 400 businesses and public bodies in Lithuania.

### 2.2.b Take up of cloud/AI/big data

- **Cloud**





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 38,4 | 47,3 |
| DESI 2024 | 33,6 | 38,9 |
| AVERAGE ANNUAL GROWTH % | 10,1 | 7,0 |

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

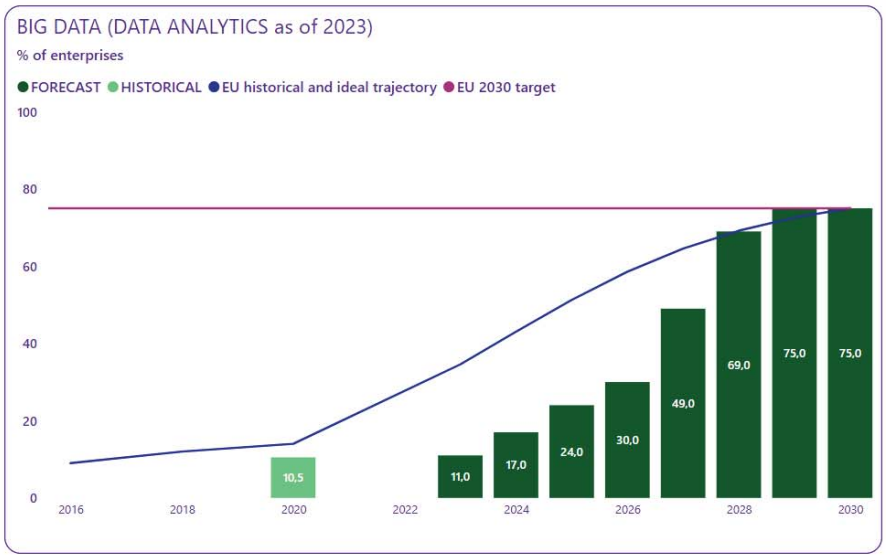
Note: The source of national forecast values is the 2023 country roadmap

**With 33.6% of its enterprises taking-up cloud solutions, Lithuania has untapped potential to contribute to EU's Digital Decade target while showing a positive dynamic.** The country is below the EU average (38.9%) while its average annual growth exceeds the EU's target (10.1% vs 7%).

The roadmap sets a target of 75% of enterprises take-up cloud computing solutions by 2030, which is in line with the EU target. However, bearing in mind Lithuania's starting point and the current rate of progress, reaching the target by 2030 will require that efforts are stepped up.

**To promote sustained competitiveness of its enterprises, Lithuania could ensure business' access to the next generation of cloud and edge computing capacities to-be-developed and deployed as part of the IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI-CIS).** To this end, Lithuania could liaise with the Cloud IPCEI Exploitation office and/or other EU Member States participating in IPCEI so that it benefits from the EU-wide spillover.

- **Data Analytics (Big Data)[19]**





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 11,0 | 34,6 |
| DESI 2024 | 40,5 | 33,2 |
| AVERAGE ANNUAL GROWTH % | | |

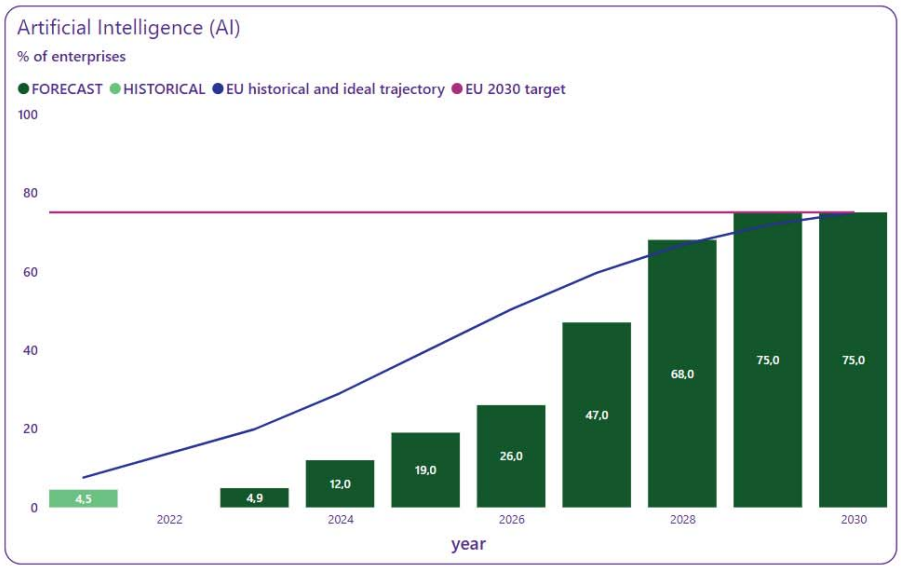
Annual growth cannot be computed in this case because Big Data was replaced by Data Analytics in 2023. The two indicators are not comparable.

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

**With 40.5% of its enterprises taking-up big data solutions, Lithuania contributes very strong to EU's Digital Decade target, exceeding the EU average (33.2%).**

The roadmap set a target of 75% of enterprises using big data by 2029, which is in line with the EU target. Given the starting point and its current rate of improvement, the country is on track to meet the target before 2030.

- **Artificial Intelligence (AI)**





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 4,9 | 19,9 |
| DESI 2024 | 4,9 | 8,0 |
| AVERAGE ANNUAL GROWTH % | 4,3 | 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

[19] 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.

**With 4.9% of its enterprises taking-up Artificial Intelligence solutions, Lithuania has scope to improve its contribution to the EU's Digital Decade targets while demonstrating limited dynamic.** The country is below the EU average (8%) while its average annual growth exceeds the EU's target (4.3% vs 2.6%).

**The roadmap sets a target of 75% of enterprises taking-up AI solutions by 2029, which is in line with the EU target.** However, bearing in mind the starting point and the current rate of progress, reaching the target by 2030 will require that efforts are stepped up.

- **Take-up by enterprises of AI or Big data or Cloud**

**Taking the three technologies together (adoption of either AI, cloud or data analytics), Lithuania stands at 53%, slightly below the EU average of 54.6%.** Performance could be boosted in the next few years if the country wants to continue contributing significantly to the EU target. The roadmap contains only two measures that promote businesses to digitalise and incentivise the transition of businesses towards climate neutrality, accounting for EUR 23 million.

In 2023, the national authorities implemented several measures to encourage the take-up by enterprises of AI, big data or cloud, i.e., launching financial incentives for business service centres to develop and deploy robotics process automation and AI solutions

### 2.2.c Unicorns, scale-ups and start-ups

**The start-up ecosystem is one of the drivers of the Lithuanian economy, contributing significantly to the country's innovation and technological progress.** It is one of the fastest-growing start-up ecosystems in central and eastern Europe, with the total value of Lithuanian start-ups growing almost 17 times between 2017 and 2022. According to the information provided by the Lithuanian authorities, there are about 1 000 start-ups and 3[20] unicorns (Vinted, Nord Security and Baltic Classifieds Group), which is a relatively high given the population size of the country. Lithuania's start-up ecosystem is recognised worldwide, with Lithuania ranked 10th in the Global Fintech index and 17th in StartupBlink Global Ecosystems for 2023. Lithuania's start-up ecosystem is known worldwide for fintech start-ups, accounting for over 250 fintech companies. It also has significant potential for start-ups in cybersecurity, mobility, life sciences, etc.

**The roadmap is very ambitious on developing the start-up ecosystem**, going beyond the Digital Decade target of doubling the number of unicorns in the EU by 2030. The roadmap sets out three measures that, up to 2030 and with a total budget of EUR 132.8 million, aim to establish a coherent framework for promoting innovation activities, encouraging enterprises to digitalise, promoting entrepreneurship, and creating incentives for business growth.

**In 2023, the Ministry of Economy and Innovation announced a EUR 15 million call for funding start-ups in the Vilnius region to develop AI, blockchain technologies, robotics process automation solutions and products.** The funding allows start-ups to create various AI solutions, including data analytics aimed at more efficient medical diagnostics, smoother traffic flow management, etc. Project funding was available to very small, small, or medium enterprises operating in the capital region, i.e., start-ups. The uniqueness of this measure is that projects are funded with 100% intensity, and there is also no age requirement for the company, so newly established companies can also use the tool. The measure for start-ups in the Vilnius region is implemented according to the plan 'New Generation Lithuania', funded by the EU's Recovery and Resilience Fund.

[20] According to data downloaded from Dealroom platform at the beginning of 2024, there were only two unicorns in Lithuania.

**It should be noted that the financial markets development promoted by the Bank of Lithuania and its Newcomer's Programme won the prestigious Global Impact Award of the FinTech RegTech Global Awards 2023[21], organised by the online news outlet and journal Central Banking.**

### 2.3 Strengthening cybersecurity & resilience

**As companies rely increasingly on digital technologies, their risk of exposure to cyberattacks is increasing, just like their need for preparedness in this area.** Lithuanian businesses seem less prepared than their EU peers, as 5.2% reported being insured against ICT security incidents in 2022 (EU average 25%), and 88.1% reported using ICT security measures (EU average 91.8%).

**On people's perception, 85% of Lithuanians think that building efficient and secure digital infrastructures should be a priority for the public authorities, according to the Eurobarometer for 2024.**

**In September 2023, Lithuania approved the Ministry of National Defence's** National Cybersecurity Development Programme 2023- 2030**, which reflects the changing nature and growing scale of cyber threats and contributes to strengthening Lithuania's resilience and cybersecurity.** The programme aims to strengthen the cybersecurity infrastructure of the public sector and strategic state companies, investigate computer-related crimes, improve skills and education in cybersecurity, develop public-private sector partnership initiatives, and deepen international cooperation. The projects will be implemented until 2026 and funded through the Recovery and Resilience Fund initiative 'New Generation Lithuania' with an allocation of EUR 40.2 million. Some projects will also seek to improve the public awareness on cybersecurity.

**The national authorities developed initiatives to raise awareness of cybersecurity threats**, such as the Cyber Champions Summit in April 2023, the 'Cyber Shield OpEx' exercise in October 2023, and train public employees.

**Lithuania has also continued to collaborate with other countries in projects, such as PESCO 'Cyber Rapid Response Teams and Mutual Assistance in Cyber Security' (CRRT) and the Regional Cyber Defence Centre (RCDC).** Lithuania also participates actively in the International Counter Ransomware Initiative (CRI). In particular, the country has worked to ensure information-sharing through the Malware Information Sharing Platform (MISP) among members of the CRI.

**During 2023, Lithuania started to turn the NIS2 Directive into national law.** As part of this process, many meetings were held with both the public and private sectors. The Directive requires that measures are put in place to ensure a high level of cybersecurity that is common across the EU. In addition, Lithuania took action to establish a Cyber Defence Command under the Armed Forces, which is ongoing.

**In the private sector, there were also many initiatives.** For example, Google and the Innovation Agency conducted a six-part online security training for Lithuanian businesses including cyber threats, how phishing attacks work, how to respond to incidents and what actions to take to minimise the damage caused by a security incident.

[21] https://www.centralbanking.com/awards/7958921/global-impact-award-bank-of-lithuania

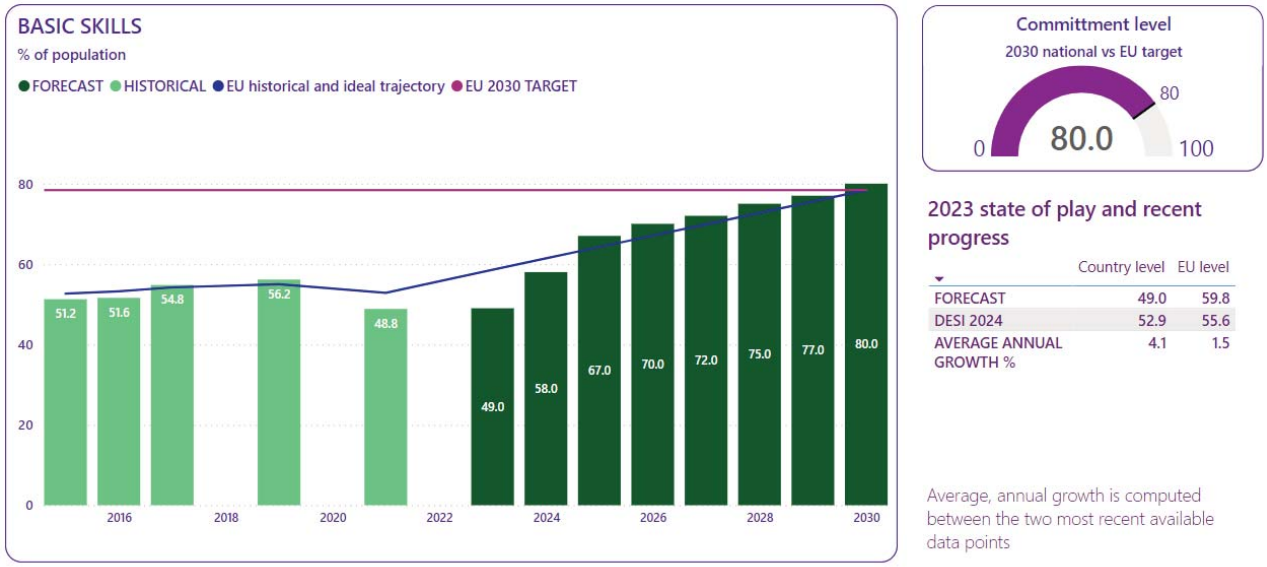
# 3 Protecting and empowering EU people and society

## 3.1 Empowering people and bringing the digital transformation closer to their needs

**Lithuania considers equipping people with the skills they need to be an important priority, with 80% of people aged 16-74 having at least basic digital and ICT skills.** In particular, the demand of ICT specialists is a source of concern for the national authorities given the importance of the digital sector in its economy. In 2022, 62% of businesses recruited or tried to recruit ICT specialists. According to the Eurobarometer 2024, 88% of Lithuanians think it is important for public authorities to help people get proper support to adapt to digital technologies and services. In addition, 82% consider that accessing public services online will be important in their daily life by 2030. This perception is aligned with the very strong contribution that Lithuania brings to the EU's Digital Decade target on digitalisation of public services, standing above the EU average in both for people and businesses.

### 3.1.1 Equipping people with digital skills

#### 3.1.1.a Basic digital skills




Note 1: Data break-in-series in 2020

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

**With 52.9% of its population having basic digital skills while showing a very strong dynamic, Lithuania has scope to contribute further to the EU's Digital Decade target on basic digital skills.** The current attainment for the country is below the EU average (55.5%). However, its average annual growth rate is significantly above the EU level (4.1% vs 1.5), which reflects positive progress and suggests the measures that have been implemented are having an effect. On gender balance, more women have basic digital skills than men (28% vs 24%).

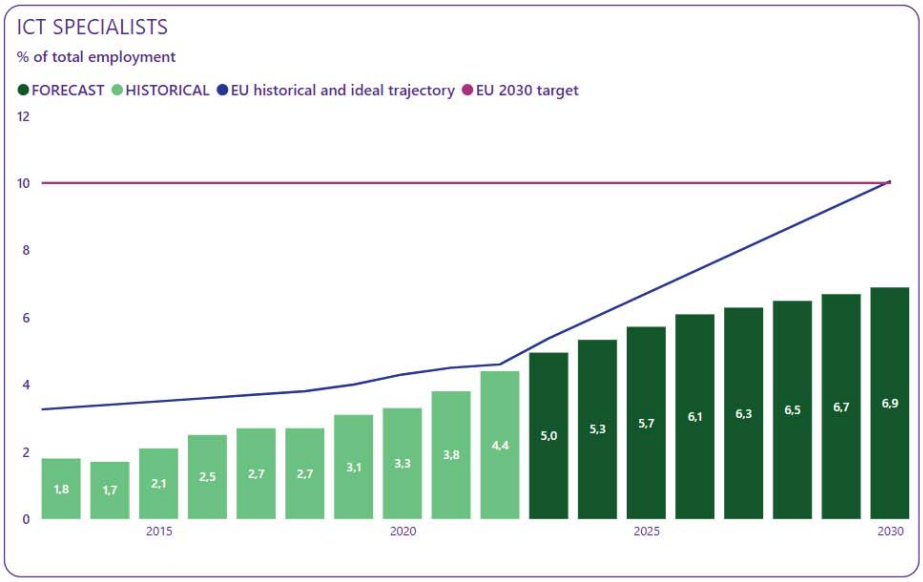
**With a high level of ambition, the roadmap sets a target of 80% of its population with basic digital skills by 2030, which meets the EU target.** Although the country has a reasonable growth rate, the low starting point means that Lithuania will have to step up its efforts to reach the target by 2030. The roadmap sets out six measures oriented towards improving basic digital skills until 2026, with an overall budget of EUR 160 million. They are aimed at improving the digital skills of vulnerable people, improving the digital skills of teachers to carry out EdTech digital educational transformation, putting in place a one-stop shop for career plans and boosting skills, strengthening cyber resilience among the population, developing tools to safely use the

internet, and promoting entrepreneurship and creating incentives for businesses focused on improving children's digital skills.

**A key measure that Lithuania has been implementing in 2023 is the programme to improve the population's digital skills.** The programme especially targets those belonging to socially vulnerable groups, such as people with disabilities, older people, and people on lower incomes. It was approved at the end of 2022 and is one of the priorities of the State Digital Development Programme of the Ministry of the Economy and Innovation for 2021-2030.

**Moreover, in 2023 the Communications Regulatory Authority (RRT) started implementing the project 'Digital Decade: No one is forgotten', which aims to bridge the digital divide for older people.** The project will continue for several years, and it requires that RRT experts travel to communities across Lithuania to inform older people of how to use digital services and to protect themselves from fraud. The RRT has also organised several events along other partners to raise further awareness about the benefits of digitalisation or about the protection of minor online.

### 3.1.1.b ICT specialists





2023 state of play and recent progress

| | Country level | EU level |
|---|---|---|
| FORECAST | 5,0 | 5,4 |
| DESI 2024 | 4,9 | 4,8 |
| AVERAGE ANNUAL GROWTH % | 11,4 | 4,3 |

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

**Lithuania contributes positively with 4.9% of ICT specialists, standing slightly above the EU average (4.8%), and showing a very positive dynamic with an annual progress of 11.4%.**

**In its roadmap, Lithuania presents eight measures that aim to increase the number of ICT specialists.** They combine medium-term and long-term perspective, mainly running until 2026 or 2030, respectively. However, it sets a target of attaining 6.9% ICT specialists by 2030, which contrasts with the positive progress shown last year.

**The total budget for the eight measures is EUR 395 million, which amounts around 26% of Lithuania's budget reported in its roadmap.** The measures reported are focused on creating a market-responsible vocational education system, ensuring accessible modern education content and efficient education and training systems for all, improving the experience and integration of non-Lithuanian born students to address the low retention rate and the employment of vulnerable groups, promoting the supply of talent and skills for the smart economy, creating a coherent framework for the promotion of innovation activities,

implementing missions backed science and innovation programmes, and investing in ICT Centres of Excellence and research.

**During 2023, Lithuania has implemented several programmes to increase the level of ICT specialists in the job market.** Among them, Lithuania approved financial incentives for employees and employers to attract more highly qualified specialists from abroad, including skilled foreign nationals and Lithuanian expats entitled to apply for a financial incentive covering their relocation costs to Lithuania. It seems successful, as in 2022-2023, 489 relocation costs were paid to individuals and 40 relocation costs were paid to companies.

Concerning the ICT graduates, in 2022, 5.0% of all Lithuanian graduates were ICT graduates (4.0% were male and 1% were female, in line with the EU average for female ICT graduates); this is above the EU average (4.5%) and represents an increase by 0.3 percentage points compared to last year.

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

#### 3.1.2.a e-ID

**Lithuania has one national e-ID scheme, the Lithuanian National Identity Card (e-ID / ATK), which is notified under the Regulation (EU) 910/2014 on electronic identification (eIDAS Regulation) with assurance level high.** On its use by the Lithuanians, 66.8% used e-ID for private purposes during the last 12 months, while 60.4% used it to access public services. Both figures stand well above the EU average (41.1% and 35.7%, respectively), reflecting the effort of the national authorities to implement electronic identification.

**Lithuania participates in two European consortia piloting the cross-border use of EU Digital Identity Wallet: Multi-Country Digital Credential for Europe (DC4EU) and PilOTs for European Digital Identity wALlet (POTENTIAL).** Lithuanian stakeholders are present in them when proceeding to the grant agreement preparation stage. Taking the example of POTENTIAL, it aims to test the deployment of a digital identity wallet to simplify and secure online procedures for Europeans, to facilitate the processing of procedures by administration services, and to fight against identity theft. It involves 19 EU Member States and Ukraine, including 38 ministries, 34 state operators, 9 research centres, 51 large companies and 12 start-ups. The development and testing of the European digital identity wallet will take place over 26 months, divided in two phases. The first phase for testing national solutions, until October 2024 and the second phase for cross-border tests aimed at securing the interoperable nature of the different solutions. The consortium benefits from EUR 16 million of EU funding.

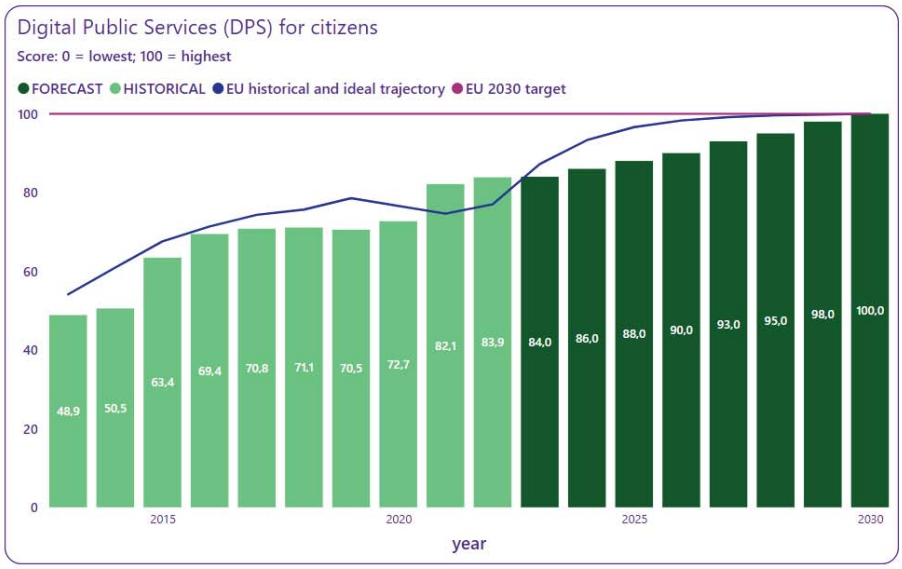
**The roadmap includes a measure to reach the EU's Digital Decade target of 100% of Europeans having access to secure electronic identification (e-ID) means recognised across the EU.** It will enable them to have full control over identity transactions and shared personal data. It aims to develop technological solutions and tools to enable safe and convenient access services.

**In 2023, an amendment to the** Law on Electronic Identification and Trust Services for Electronic Transactions **was adopted.** The amendment set the basis to consolidate electronic identification and reliability assurance services, and creates the conditions for efficient and consistent operation of the market of electronic identification and reliability assurance services. Based on the changes, new requirements appear for electronic identification service providers providing services both at national and European level. These changes are important in preparing for the implementation of the European Digital Identity Regulation. In December 2023, legislation was adopted to allow the RRT to become the supervisory body for qualified electronic identification service providers.

**Moreover, in November 2023, the call 'Solution of digital security' for public institutions was launched with a budget of EUR 8 million.** It aims to promote the use of electronic identification tools and trust services, and

it targets SMEs, people with disabilities, residents in rural areas, public sector employees, public institutions, and people living and working abroad.

### 3.1.2.b Digitalisation of public services for citizens and businesses





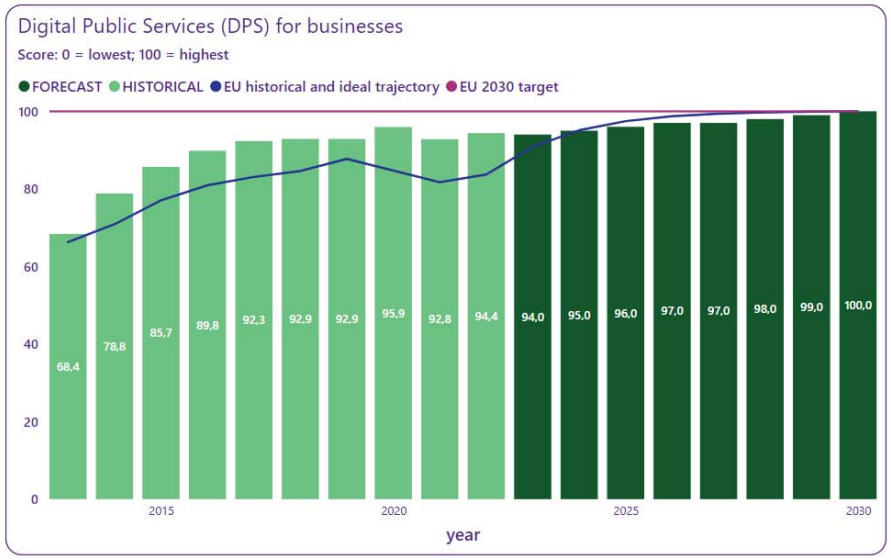
**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 84,0 | 87,2 |
| DESI 2024 | 86,7 | 79,4 |
| AVERAGE ANNUAL GROWTH % | 3,4 | 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 | 94,0 | 90,9 |
| DESI 2024 | 95,9 | 85,4 |
| AVERAGE ANNUAL GROWTH % | 1,7 | 2,0 |

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

Note 1: Data break-in-series in 2020

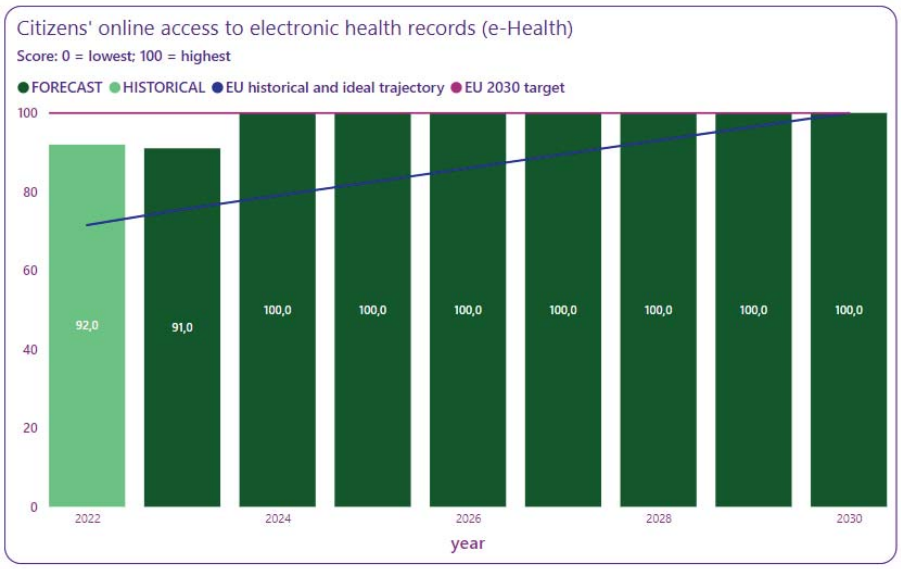
Note 2: The source of national forecast values is the 2023 country roadmap

**Lithuania contributes strongly to the EU's Digital Decade target on the digitalisation of public services while showing a positive dynamic.** On the Digital Public Services, the country stands well above the EU level (86.7 vs 79.4) while also showing an average annual growth exceeding the EU average (3.4 vs 3.1). In addition, the key performance indicator (KPI) on Digital Public Services for businesses confirms the country's lead as it also ranks well above the EU level (95.9 vs 85.4). However, in this case the average annual growth rate is below the EU average (1.7 vs 2.0), which is to be expected due to the high level of attainment that Lithuania already reached.

**The roadmap sets a score of 100 for both indicators, which meets the EU's targets**. Taking into account the good starting points and current rates of growth, Lithuania could reach its targets on Digital Public Services for people and business before 2030. With a total budget allocation of EUR 388.3 million, the roadmap contains three measures to boost public services by developing technological solutions and tools to safely use online services, promoting the availability and reuse of data, and the efficient management of public information resources to increase the number of public institutions receiving consolidated information technology services.

**Lithuania has continued implementing measures to improve Digital Public Services**. In 2023, the Ministry of Economy and Innovation announced a call of for the digitisation of services provided by the public sector, amounting to EUR 94.5 million. It includes the creation of new electronic services in state institutions, state companies and municipalities, the modernisation of existing ones and the creation of other digital tools. In addition, in 2023 new electronic services were created and implemented in the Population Register of the Republic of Lithuania, which can be used not only by Lithuanians, but also by people who have temporary or permanent residence permits in Lithuania. By the end of 2023, an updated version of the Law on State's Information Resources Management was adopted by Parliament. It establishes a new governance model to develop shared information systems, ensure data quality, exchange data, and create user-friendly electronic services. The legislation also broadened the possibilities of using cloud services to develop state information resources to build a more resilient hybrid infrastructure. Also in 2023, the e.Government gateway portal was updated to improve user experience, giving them the opportunity to find information about all electronic and non-electronic public and administrative services in one service directory.

### 3.1.2.c e-Health





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 91,0 | 75,5 |
| DESI 2024 | 95,4 | 79,1 |
| AVERAGE ANNUAL GROWTH % | 3,8 | 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

**Lithuania scores at 95.4 in e-Health, standing above the EU average (79.1) and showing an average annual growth of 3.8%.**

A centralised, nationwide access service is available in Lithuania. 80-100% of the national population is technically able to access the online access services for eHealth records through an online portal, logging in using an eID compliant with eIDAS Regulation. Regarding access opportunities for certain categories of people, Lithuania scores 100 compared to a European average of 77 and does follow the Web Content Accessibility Guidelines.

Lithuania scores 92 on categories of health data, compared to a European average of 74. The country's lowest-scoring sub-indicator in this thematic layer is electronic results and reports, with a maturity score of 75. Lithuania has shown further growth in maturity by making data on medical devices/implants available to citizens. Doctors can enter data about implants and medical devices in the patient's health record summary. Of the data categories investigated in this framework, only medical images are not made available to citizens.

All categories of healthcare providers investigated in the eHealth survey supply relevant data to the online access service for electronic health records. 11 out of 11 applicable categories of healthcare providers supply relevant data. Compared to 2022, mental health facilities and geriatric nursing homes are newly connected.

**Lithuania aims to attain a score of 100 in e-Health for 2030, which is in line with the EU's target.** With a total budget of EUR 115.59 million, the roadmap presents two measures on the availability of e-Health records aimed to improve the quality and accessibility of healthcare services and to implement the Digital Health System Development Action Plan for 2023-2027.

**Best practice: e-health portal**

Lithuanian citizens have digital access to all their health data (prescriptions, inpatient visit data, referrals, vaccinations, birth or death certificates) through the national e-health system patient portal. The project of the national e-health information system development action plan for 2023-2027 was launched in 2023. Within the project's scope, a mental health subsystem is being created to ensure citizens' access to new mental health data. In addition, the functionality related to the health of pregnant women, mothers, and newborns, as well as ambulatory nursing services at home services and their health records, is being expanded.

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

**On the promotion of responsible and human-centric AI systems, 77% of Lithuanians consider that shaping the development of AI and other digital technologies to ensure they respect our rights and values should be important for public authorities.** On this point, the Bank of Lithuania organised training sessions for its staff to introduce them to the basics of responsible generative AI adoption.

**According to Eurobarometer 2024, 58% of Lithuanians consider the principle of getting access to safe and privacy-friendly digital technologies well implemented in Lithuania (EU average: 55%).** In addition, 79% were aware that rights that apply offline should also apply online (standing well above the EU average: 62%). And 57% think the EU protects their rights well in the digital environment (also standing well above the EU average: 45%).

**On consumer protection online, one of the main tasks of the national Consumer Rights Protection Authority is to protect businesses and consumers.** The Authority does this by monitoring the online environment and providing them with advice, emphasising what you need to be aware of when buying online, what requirements apply to e-commerce tools, what rights and obligations apply to traders and consumer in distance contracts, etc. In this context, the Authority swept 320 websites in 2023 (by monitoring and responding to complaints or consumer disputes). In cooperation with the consumer association, the Alliance of Consumers, a further 251 websites were swept, amounting to a total of 571 websites. In around 90% of cases, infringements that were detected have either been resolved or are currently being addressed. In other cases, infringement procedures have been launched. Also in 2023, the State Consumer Rights Protection Authority, together with the European Consumer Centre in Lithuania, started negotiations with the founders of Scamadviser on the creation of a Lithuanian version of 'CheckMyLink' (a preventive measure

for online consumers) involving private businesses (e.g. commercial banks, telecommunications companies) or other institutions in this process.

**To protect people from illegal content and hate speech, the Bank of Lithuania continues to monitor and update the list of unlawful financial service providers.** Ten webpages were found to be illegal and were blocked in 2023.

**The Eurobarometer 2024 results show that the 'insufficient protections for minors' is one of the online issues Lithuanians feel very strongly about.** 46% consider that principle of ensuring safe digital environments and content for children has not been well implemented (below EU average: 53%). In 2023, the Lithuanian State Data Protection Inspectorate published recommendations, 20 steps for children and adolescents on how to ensure the safety of personal data online, which provide detailed guidance such as checking the settings of social network profiles and the information published on social networks. In addition, Lithuania implements the Safer Internet project under the European Commission's Digital Europe Programme. The project aims to promote safer internet use and new online technologies, particularly for children, and to fight illegal and unwanted content. The project is implemented by four partner public institutions, where RRT is responsible for the activities of the internet hotline. The objective of RRT' Švarus internetas' (Clean Internet) internet hotline is to accept the reports of internet users who encountered content related to the sexual abuse of children, violence or bullying, pornography, distribution of narcotic substances, incitement to racial or ethnic hatred, etc.

**On the EU's Digital Decade target to ensure online participation in democratic life is possible for all, the Eurobarometer 2024 shows that 72% of Lithuanians consider digital technologies will be important by 2030 for engaging in democratic life.** This represents a rise of 10 points compared with last year results. Lithuanians also pointed to fake news and disinformation as the online issue they felt had the biggest personal impact on them. In 2023, Lithuania created a special training system online[22] to develop citizenship and better engage voters in political life. It also has the portal 'Voter's page' aimed to make the election process a smoother and more convenient experience for voters.

[22] https://www.rinkejopuslapis.lt/

# 4 Leveraging digital transformation for a smart greening

**Lithuanian businesses are generally attentive to the impact of ICT equipment while Lithuanians consider digitalisation as important in supporting the green transition.** 47.5% of businesses in Lithuania consider the environmental impact of ICT services or ICT equipment before selecting them and applying some measures, affecting the paper or energy consumption of the ICT equipment, which is slightly below the EU average of 48.7%.

**Lithuanians' propensity to recycle old digital devices is in line with the EU. About 10.4% of the population recycles mobile phones, 8.4% of laptops and tablets, and 12.4% of desktop computers (10.4%, 9.7%, and 12.8%, respectively, at the EU level).** In addition, Lithuanians support digitalisation to tackle climate change and support the green transition. According to the Eurobarometer 2024, 64% of Lithuanians consider that digital technologies are important in the fight against climate change (standing well below the EU average of 74%). And 82% of Lithuanians also think that using digital technologies to serve the green transition should be an important for public authorities (in line with the EU average of 81%).

**The roadmap does not focus on the synergies between the green and digital transitions.** There is however a measure linked with it, which encourages businesses to move towards a climate-neutral economy. The measure has a total budget of EUR 3.5 million to establish a platform to share industry knowledge and solutions (Industry 4.0 Lab). On the other hand, the 2021-2030 National Progress Plan (which is a comprehensive strategy that sets goals to modernise the country and provides the basis to secure national funding and ensure its coherence with EU funding) includes as one of its 13 goals the growth of research, technology and innovation to promote a sustainable development. It is in line with the EU's Digital Decade target of ensuring that digital infrastructure and technologies become more sustainable, resilient, and energy- and resource-efficient. The aim is to minimise their negative environmental and social impact and contribute to a sustainable circular and climate-neutral economy and society in line with the European Green Deal. In addition, it should be noted that the Lithuanian Recovery and Resilience Plan allocates 37.4% of its budget to climate targets, although these are not directly linked to ensuring the digital transition.

**The national authorities are not implementing many measures to ensure the sustainability of digital infrastructures or to encourage the contribution of digital to the green transition.** However, a few exceptions exist, such as the Guidelines for sustainable cities developed by The Ministry of Environment. These guidelines include a 'Compass', which is a digital, openly accessible evaluation tool for monitoring and evaluating the current state of sustainability in Lithuania cities. The ambition is to adopt the compass as a monitoring tool for territorial plans and automate the monitoring process, which will lead to reducing the administration burden for municipalities and will bring easy-to-read open data for experts and the public alike[23].

**The telecoms operators are moderately committed to minimising their environmental impact by complying with the international standards on improving energy efficiency.** A target to reach zero carbon emissions by 2030 or 2050 across the entire chain of activity, implementing transparent climate reporting, and recycling 30% of its previously sold mobile phones has been set.

[23] https://www.arcgis.com/home/item.html?id=ad78842cf38e42998745f0d01e7a3edd#visualize

# Annex I – National roadmap analysis

## Lithuania's National Digital Decade strategic roadmap

**The roadmap was formally submitted in mid-March 2024 after being approved on 13 March 2024 by the government, through Protocol Decision No. 10 (cl. 2).** A public consultation process was launched in November 2023. It is available online in Lithuanian and English.

The table below reflects a best effort attempt to categorise the measures and budget as presented in the Lithuania's roadmap.

| Digital Decade Target/objective | Budget (EUR Million) | Number of measures |
|---|---|---|
| Connectivity Gigabit | 101.4 | 1 |
| Connectivity 5G | - | - |
| Semiconductors | - | - |
| Edge nodes | - | - |
| Quantum computing | - | - |
| SME take up | 149.1 | 1 |
| Cloud/AI/Big Data uptake | 23.0 | 2 |
| Cloud only uptake | - | - |
| AI only uptake | - | - |
| Big data uptake | - | - |
| Unicorns | 132.8 | 3 |
| Basic Digital Skills | 159.0 | 5 |
| ICT Specialists | 395.9 | 8 |
| eID | 16.7 | 1 |
| Key Public Services | 387.6 | 3 |
| e-Health | 115.6 | 2 |
| Objectives | - | - |
| **Total** | **1 481.1** | **26** |

**It contains 22 measures that contribute to the EU's Digital Decade targets, presenting 12 targets and trajectories where FTTP and edge nodes are missing.** The total funding planned, taking into account all funding sources (the RRF, the EU Funds and the state budget) amounts to EUR 1 488.84 million. The planned investments for dimensions up to 2030: EUR 557.4 million for the digitally-skilled population and highly-skilled digital professionals; EUR 101.4 million in secure, performant, and sustainable digital infrastructure; EUR 309.5 million for digital transformation of businesses; and EUR 520.6 million for Digitalisation of public services.

# Annex II – Factsheet on multi-country projects and funding

## MCP and EDICs

Lithuania is one of the members of the already established **European Digital Infrastructure Consortium** (EDIC) for the **Alliance for Language Technologies** (ALT-EDIC). In addition, Lithuania is developing the Statutes and other relevant documents of the possible future **Genome** and the **Connected Public Administration EDICs**, within their informal working groups.

Lithuania also takes part in the **'5G TEN-T transport corridor' project**. This strategic project aims to transform the 'Via Baltica' highway into an international 5G transport corridor together with partners from Latvia and Estonia, ensuring uninterrupted coverage and quality of 5G connectivity and thus encouraging the development of autonomous transport and intelligent transport systems on this road. For this purpose, a joint application of the Baltic States for CEF financial instruments is being prepared.

## EU funding for digital policies in Lithuania

**The Lithuanian Recovery and Resilience Plan (RRP) includes 23.3% (EUR 724 million)[24] of its budget to foster the digital transition, having EUR 684.1 million directly linked to the Digital Decade objectives and targets**[25]. Its update, including a REPowerEU chapter, was approved in November 2023. The Lithuanian RRP presents a variety of measures to help businesses and citizens, improve public services, and speed up the digital transition in Lithuania through actions to digitalise the public and private sectors, support innovation and research, etc. As of May 2024, implementation of the Lithuanian RRP is advancing as evidenced by payment requests that successfully led to the disbursement of EUR 1.35 billion. Additionally, under cohesion policy, EUR 309 million is allocated to the country's digital transformation[26].

[24] The share of financial allocations that contribute to digital objectives has been calculated using Annex VII to the Recovery and Resilience Facility Regulation.

[25] 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)).

[26] 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


# State of the Digital Decade 2024

## Luxembourg

# 1 Executive summary

**Luxembourg brings a very strong contribution** to the EU's Digital Decade objectives and targets, in view of a successful digitalisation that fosters competitiveness, resilience, sovereignty, European values and climate action.

**In 2023, Luxembourg made notable progress** in the share of ICT specialists in employment and in increasing 5G coverage, including in the 3.4-3.8 GHz band. However, **some challenges** persist in at least basic digital skills and the adoption of advanced technologies (e.g., cloud) by enterprises.

**Luxembourg fully subscribes to the EU's 2030 objectives for a digital transition which places people at the centre of the digitalisation of our EU society**. The country performs already well in many of the Key Performance Indicators (KPI) and sets national targets for 2030 in line with the EU targets. Over the past few years, there has been more focus on digital issues and their growing political importance, which has resulted in the development and implementation of several initiatives to improve the digital performance of the country. Luxembourg can already rely on a very broad deployment of gigabit infrastructures and a very large number of ICT specialists in employment. The country also presents a high number of online public services for both people and businesses, including an e-health record for all. However, the availability of electronic medical data remains low. Luxembourg is currently placing cybersecurity at the core of its strategy for technological development and is developing a national data strategy. When it comes to the basic level of digital intensity of SMEs, the results in 2023 are still far from the EU target 2030, despite showing a positive dynamic.

According to the **'Special Eurobarometer Digital Decade 2024'**[27], 88% of the respondents in Luxembourg consider that the digitalisation of daily public and private services is making their lives easier (above the EU average 73%).

**Luxembourg is very active in collaborating at EU level.** Luxembourg is a member of the Local Digital Twins towards the CitiVERSE (LDT Citiverse) EDIC, the EUROPEUM-EDIC on blockchain and the Alliance for Language and Technology EDIC (ALT-EDIC), all already established. Luxembourg is developing the Statute and other documents for the possible future Mobility and Logistics Data EDIC and for the possible future Connected Public Administration EDIC (IMPACTS EDIC). Luxembourg offered to be the hosting Member State of the possible future Genome EDIC. The country is also participating in multi-country projects including IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI-CIS) with seven indirect partners, EuroHPC, and POTENTIAL[28].

**Luxembourg's Recovery and Resilience plan (RRP) allocates 29.6% of its total RRP budget to the digital transformation** (EUR 24.5 million)[29] with a strong priority given to the modernisation of the public administration through digitalisation and the digitalisation of SMEs. Under Cohesion Policy, an additional EUR 6.8 million (18% of the country's total Cohesion Policy funding) is allocated to the country's digital transformation[30].

[27] Special Eurobarometer 551 on 'the Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351

[28] Information last updated on 31 May 2024.

[29] The share of financial allocations that contribute to digital objectives has been calculated using Annex VII to the Recovery and Resilience Facility Regulation

[30] 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] | Luxembourg | | | EU | | Digital Decade target by 2030 | |
|---|---|---|---|---|---|---|---|
| | DESI 2023 | DESI 2024 (year 2023) | Annual progress | DESI 2024 (year 2023) | Annual progress | LU | EU |
| **Fixed Very High Capacity Network (VHCN) coverage** | 93.3% | 94.7% | 1.5% | 78.8% | 7.4% | 100% | 100% |
| **Fibre to the Premises (FTTP) coverage** | 76.2% | 78.9% | 3.5% | 64.0% | 13.5% | 100% | - |
| **Overall 5G coverage** | 93.2% | 99.6% | 6.9% | 89.3% | 9.8% | 100% | 100% |
| **Semiconductors** | | NA | | | | | |
| **Edge Nodes** | | 8 | | 1 186 | | x | 10 000 |
| **SMEs with at least a basic level of digital intensity** | 53.9% | 57.8% | 3.6% | 57.7% | 2.6% | 90% | 90% |
| **Cloud** | 29.0% | 32.6% | 6.0% | 38.9% | 7.0% | 75% | 75% |
| **Artificial Intelligence** | 13.0% | 14.4% | 5.2% | 8.0% | 2.6% | 75% | 75% |
| **Data analytics** | NA | 32.4% | NA | 33.2% | NA | 75% | 75% |
| **AI or Cloud or Data analytics** | NA | 52.0% | NA | 54.6% | NA | | 75% |
| **Unicorns** | | 2 | | 263 | | x | 500 |
| **At least basic digital skills** | 63.8% | 60.1% | -2.9% | 55.6% | 1.5% | 80% | 80% |
| **ICT specialists** | 7.7% | 8.0% | 3.9% | 4.8% | 4.3% | 10% | ~10% |
| **eID scheme notification** | | Yes | | | | | |
| **Digital public services for citizens** | 94.8 | 94.8 | 0.0% | 79.4 | 3.1% | 100 | 100 |
| **Digital public services for businesses** | 96.7 | 96.7 | 0.0% | 85.4 | 2.0% | 100 | 100 |
| **Access to e-Health records** | 67.2 | 76.1 | 13.3% | 79.1 | 10.6% | 100 | 100 |

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

## National Digital Decade strategic roadmap

With respect to **Luxembourg's** contribution to the Digital Decade reflected in its roadmap, it is demonstrating a **high ambition** and, based on this document, intends to allocate **significant effort** to achieve the Digital Decade objectives and targets.

**The roadmap of Luxembourg sets out a quite detailed plan of actions with 12 targets and trajectories demonstrating willingness to contribute to the EU's Digital Decade common objectives and targets**. Most of the national targets and trajectories for 2030 are provided, except for edge nodes and unicorns. All targets presented are in line with EU target values.

The roadmap is consistent with the objectives of the Digital Decade including policies and measures addressing inclusion, resilience, cybersecurity, technological sovereignty, and sustainability.

The total budget of the measures presented in the national roadmap is estimated at EUR 309.5 million (about 0.39% of GDP) with priorities set on digital skills for all, support to national and European start-ups and scale-ups ecosystem with the goal to increase the number of European unicorns. A large number of measures is also dedicated to reach the objectives of the Digital Decade, in particular in cybersecurity, sovereign cloud, digital innovation, safety online, and accessibility of online services.

### Recommendations for the roadmap

When adjusting its national roadmap in line with Article 8(3) of the Digital Decade Policy Programme (DDPP) Decision, Luxembourg should:

- **TARGETS**: (i) examine the opportunity of providing a target and trajectory for **unicorns**, (ii) provide a target and trajectory for **edge nodes**.
- **MEASURES**: (i) review and reinforce, if deemed necessary at this stage, measures to contribute to the targets that are the most challenging to reach, such as the **digital skills for all, the basic level of digital intensity for SMEs**, (ii) provide **more information on the implementation of digital rights and principles**, including what national measures contribute to it.

## Digital rights and principles

The Special Eurobarometer 'Digital Decade 2024' reveals key insights into Luxembourg's perceptions of digital rights. Despite an 8-point decrease since last year, 56% of Luxembourgers believe the EU protects their digital rights, still above the EU average of 45%. Confidence in digital privacy is at 66%, higher than the EU average of 51%. Concerns have increased over the control of one's digital legacy (28%) and online safety for children (40%), both rising by 10 and 2 points respectively. Positive trends include the high importance of digital technologies for accessing public services online and connecting with friends and family (90%), significantly above the EU average of 83%. 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[31].

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

**For its technological leadership and competitiveness,** Luxembourg can rely on a strong connectivity infrastructure with very high level of coverage in VHCN and 5G. Luxembourg is on track to reach the 2030 EU targets for VHCN and 5G and is closely monitoring if the white areas can be covered by 2030. In terms of SMEs with basic level of digital intensity (57.8%), Luxembourg performs broadly at the EU level (57.7%). Recent annual progress might not be sufficient to reach the EU target of 90%, even though several measures are set out in the roadmap for the coming years. For businesses, in particular small ones, Luxembourg plans to make the adoption of advanced technologies easier by lowering the technical knowledge and financial entry barriers for businesses to use advanced technologies such as cloud, AI and data analytics. Luxembourg is also focusing on cybersecurity and setting up a sovereign national cloud to give businesses, including SMEs, located in Luxembourg maximum security and guarantees to deploy further in a data-driven economy.

### Recommendations – Luxembourg should:

- **CONNECTIVITY INFRASTRUCTURE**: Ensure sufficient access of new players to spectrum for innovative business-to-business (B2B) and business-to-customer (B2C) applications and encourage operators to speed up the deployment of 5G stand-alone core networks.
- **CYBERSECURITY**: Continue the implementation of the 5G Cybersecurity Toolbox to ensure secure and resilient 5G networks.
- **DIGITALISATION OF ENTERPRISES:** Aim to reach the 2030 target by adopting further measures, when necessary, to convince less digitalised SMEs to engage in a digital transition to boost their growth.

[31] 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.

- **CLOUD/AI/DATA ANALYTICS:** (i) Consider further awareness-raising measures and/or training directed at SMEs to adopt AI and data analytics as means to boost competitiveness. (ii) Support 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 liaising with the direct participants to develop a country-specific dissemination strategy reaching beyond the participating organisations.

## Protecting and empowering EU people and society

Luxembourg can rely on a high percentage of ICT specialists in employment (8.0%). Furthermore, in 2023, 60.1% of the population in Luxembourg had at least basic digital skills, which is above the EU average (55.6%). However, recent annual progress is slow, although equipping people with digital skills and fostering digital inclusion is a priority for Luxembourg. Dedicated measures are also in place to empower people, in particular the young ones, to use digital technologies safely and responsibly. Luxembourg is a front-runner in terms of digitalised public services for people (94.8) and businesses (96.7), already close to the 2030 EU target. It already has a national e-ID scheme in place to which citizen have access. The national EU Digital Identity Wallet is currently under development and is estimated to be in place in 2024. Luxembourg has an overall e-health maturity score of 76.1 in 2023, below the EU average 79.1. Although all citizens in Luxembourg have by default an electronic health record, the volume of health data accessible remains limited.

### Recommendations – Luxembourg should:

- **BASIC DIGITAL SKILLS**: Strengthen the strategy to develop the population's basic digital skills.
- **E-HEALTH:** (i) Make the data types of e-prescription and e-dispensation available to people through the online access service; (ii) Ensure that all data types are made available in a timely manner; (iii)Enhance the authentication method for logging into the online access service by using a notified e-ID; (vi) Increase the supply of health data by onboarding more categories of healthcare providers.

## Leveraging digital transformation for a smart greening

In the national roadmap of Luxembourg, some measures which are in line with the general objectives, related to energy efficiency of digital sector, and the use of digital technologies for energy efficiency and sustainability of products and processes are mentioned. Reduction of energy costs are foreseen in line with the broad e-governance strategy of Luxembourg, hosting the GovCloud in data centres highly efficient in terms of energy use and cooling. The rollout of smart meters started in 2016 and is about to be completed.

### Recommendations – Luxembourg should:

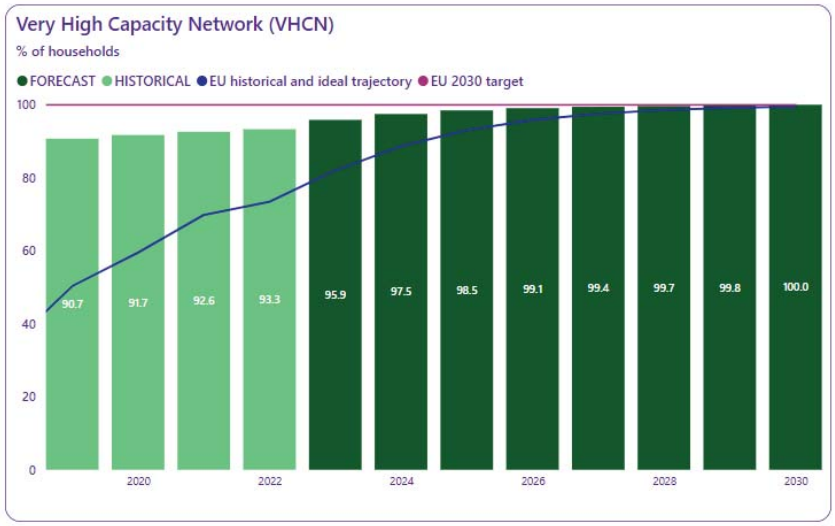
- Develop a coherent approach to twinning the digital and green transitions. First, promote improvements in energy and material efficiency of digital infrastructures, in particular data centres. Second, support the development and deployment of digital **solutions that reduce the carbon footprint in 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.

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

**Luxembourg benefits from a strong connectivity infrastructure with wide coverage in Very High-Capacity Network (VHCN) and 5G**. Luxembourg is on track to reach the 2030 EU targets for VHCN and 5G, while still facing the challenge of covering the remaining geographical white spots and the low share of households having fixed broadband subscriptions of at least 1 Gbps services. Regarding technological leadership and resilience, Luxembourg is strengthening its digital capacities, notably with the MeluXina supercomputer and the Luxembourg Quantum Communication Infrastructure Laboratory. Furthermore, Luxembourg's ecosystem hosts innovative companies providing key value-chain elements in the semiconductor industry. Luxembourg is also leading initiatives to strengthen capabilities in cybersecurity for enterprises, and to create the framework for businesses to strive in the data economy.

## 2.1 Building technological leadership: digital infrastructure and technologies

### 2.1.a Connectivity infrastructure (gigabit)



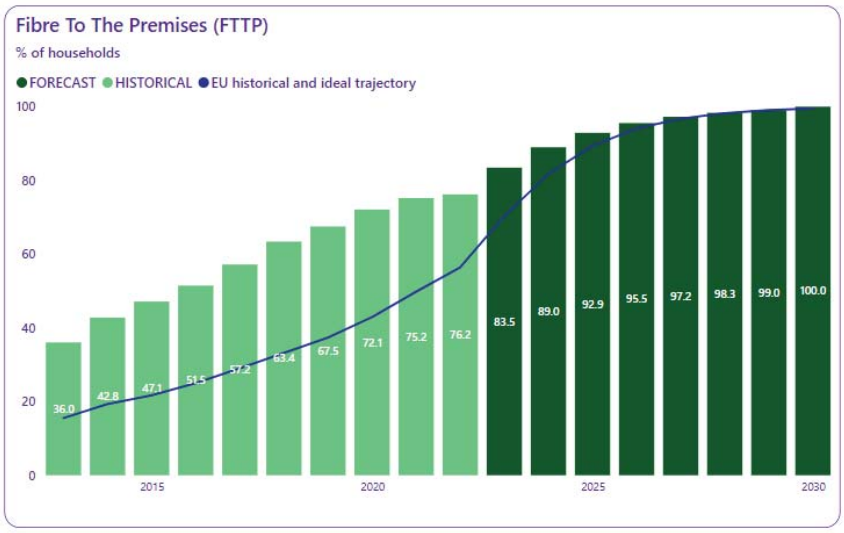


**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 95.9 | 82.0 |
| DESI 2024 | 94.7 | 78.8 |
| AVERAGE ANNUAL GROWTH % | 1.5 | 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





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 83.5 | 70.3 |
| DESI 2024 | 78.9 | 64.0 |
| AVERAGE ANNUAL GROWTH % | 3.5 | 13.5 |

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

**Luxembourg brings a very strong contribution to the EU's Digital Decade target for the deployment of VHCN to deliver gigabit connectivity for all with 94.7% of household's coverage in 2023**. While the VHCN coverage is very high in the country compared to the EU average (78.8%), the average annual growth (1.5%) is considered as representing a limited progress compared to other EU countries' recent average annual progress (7.4%). This is explained by the particularly high percentage of households covered by VHCN in Luxembourg which makes additional progress more difficult. The VHCN coverage of households leaving in sparsely populated areas (80.3%) is also above the EU average (55.6%). Furthermore, the FTTP coverage in the country stands at 78.9%, above the EU average (64.0%). However, the share of fixed broadband subscriptions of at least 1 Gbps services (9.9%) is lower than the EU average (18.5%), while the share of fixed broadband subscriptions of at least 100 Mbps (78.8%) is above the EU average (65.9%).

**In its Roadmap, Luxembourg aims at reaching 100% gigabit connectivity coverage by 2030, which is aligned with the EU target**. Given the current coverage, the trajectory seems to represent a reachable goal, although the result observed in 2023 (94.7%) is slightly below the forecast made in the national roadmap for the same year (95.9%). Covering the remaining white spots is a key objective of the national strategy for ultra-high-speed broadband 2021-2025. Luxembourg is currently monitoring the coverage, as well as analysing if there are signs of proof of failure and lack of private investments for the last percentages of households still to be covered, in order to decide if any specific measure need to be taken to reach the 2030 targets.

**In 2023, given the high level of coverage of VHCN in Luxembourg, the focus was put on measure contributing to the uptake of existing networks, in line with the recommendation from the 2023 State of the Digital Decade report.** The connectivity vouchers launched in 2023, aimed at beneficiaries of the cost-of-living allowance, will be repeated in 2024. The goal is to incentivise people to subscribe to fixed connectivity.

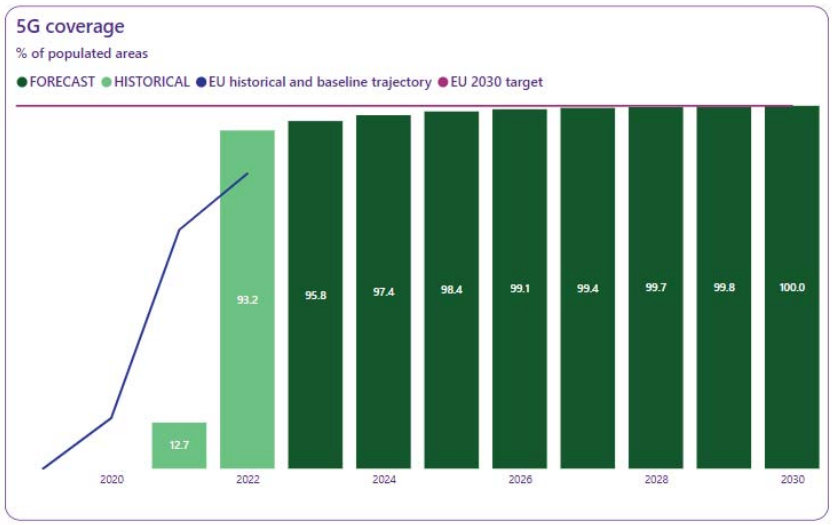
**In 2023, the copper network was progressively switched-off by the telecom operators, while being replaced by fibre**. The national regulatory authority, *Institut Luxembourgeois de Régulation* (ILR), estimates that the migration from copper to fibre will be completed by 2030. The plan envisages that each year in March there is a commercial closure, after prior notice to the consumer. A large communication campaign has been put into place in a joint approach between the ILR and the operators.

**Best practice: Campaign for the copper switch-off**

In order to achieve a successful copper switch off with a large level of migration by the customers, an information campaign was launched by the ILR in close cooperation with the telecom operators to inform customers on the exact timeline of the copper switch off as well as all alternative solutions available.

All operators participated to a joint meeting to elaborate a common and impartial strategy for customers. All operators treat customers in the same way, by sending the same communication to all. Six months before the switch off, customers will receive a letter explaining why the migration is important and how it will happen. Six weeks before the disconnection, they will receive a second letter. The ILR has also put into place an online tool where people can see if there will be changes for them in the coming year by indicating their postal code.

### 2.1.b Connectivity Infrastructure (5G)





2023 state of play and recent progress

| | Country level | EU level |
|---|---|---|
| FORECAST | 95.8 | |
| DESI 2024 | 99.6 | 89.3 |
| AVERAGE ANNUAL GROWTH % | 6.9 | 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

**Luxembourg brings a very strong contribution to the EU's 2030 digital decade target on 5G connectivity reaching 99.6% coverage of populated areas in 2023 and showing a very strong dynamic**. It represents an annual growth of 6.9%. Of these, 63.1% of populated areas in Luxembourg are covered by the 3.4-3.8 GHz band, which enables advanced applications requiring a wide spectrum bandwidth, standing above the EU average (50.6%). The share of the mobile broadband uptake is also very high in Luxembourg with 97% of people aged 16-74 having a mobile connection, while the EU average is at 89.9%.

**In its Roadmap, Luxembourg aims to reach 100% of 5G coverage by 2030, which is aligned with the EU target of 100%.** Given the current results, and the fact that in 2023 Luxembourg surpassed its trajectory's national yearly estimation of 95.8%, the country is on track to reach the 2030 Digital Decade target, although Luxembourg acknowledges the last areas might be costly to cover.

**In 2023, the national operators announced that they have almost covered the whole territory with mobile 5G network.** They have coverage obligations in the spectrum licences. In terms of 5G pioneer bands assigned, Luxembourg scores 60.8% compared to 73.4% at EU level. In Luxembourg, the 26 GHz is not yet used. In 2023, the ILR conducted a public consultation and concluded that there was not yet enough interest for the 26 GHz band.

**As the country is already very advanced in digital technology infrastructure, special attention is given to emerging challenges**, such as the quality of the 5G connectivity within energy efficient buildings or in trains.

**In 2023, private stakeholders participated in an EU project funded by Connecting Europe Facility (CEF) Digital,** Melusina, to analyse the provision of 5G connectivity and services on the Metz-Luxembourg railway line. The project was finished in 2023, and a follow-up is planned for the implementation.

### 2.1.c Semiconductors

**Luxembourg's ecosystem hosts innovative companies providing key value-chain elements in the industry of semiconductors.** However, given Luxembourg's territorial limitations, the country is unlikely to build up a semiconductor industry.

**In 2023, Luxembourg had no specific measures in place, but was keeping a watchful eye on enterprises innovation projects which are suppliers for the semiconductor industry**. Currently Luxembourg has two suppliers for the semiconductor industry. Due to the excellence of Luxembourg's industry and research in

materials and coating technologies, the country would like to increase the number of companies, including start-ups, to four in 2030.

#### 2.1.d Edge nodes

**The Edge Observatory's first data report has estimated the number of edge nodes deployed in 2023 in Luxembourg to eight.** The total estimation for the EU is 1186. the Edge Observatory presents an estimated target value of 134 edge nodes deployed by 2030 in Luxembourg.

**In 2023, the first two highly secure and resilient edge-nodes in cybersecurity have been created to kick-start the open cybersecurity data economy in Luxembourg**. As the nodes are fully based on open-source technology, they can be replicated in any European region and further strengthen cross-border collaboration in operative cybersecurity and governance (as provided for in the Network and Information Security Directive, NIS2). More edge nodes are planned to be added in the coming years to cover the needs of sectors such as the financial and health sectors, smart cities, mobility, and smart grid.

**Luxembourg's participation with seven indirect partners to the IPCEI-Next Generation Cloud Infrastructure and Services (CIS) launched in December 2023** will contribute to creating European technology to set up and operate a European cloud-edge-continuum. The project was notified by seven EU Member States with 19 projects from 19 direct participants, which are part of the wider IPCEI-CIS ecosystem involving more than 90 indirect partners, including large, medium and small-sized enterprises, start-ups, and research organisations located in five additional EU Member States (Belgium, Croatia, Latvia, Luxembourg, and Slovenia). The IPCEI-CIS is expected to be a catalyst for participating EU Member States. Its objective is R&D&I and first industrial deployment of the software, not involving geographically-balanced deployment of already mature edge nodes.

#### 2.1.e Quantum technologies

**In 2023, Luxembourg started to form a consortium of European companies, relying on European supply chains** to respond to the EURO-HPC call for interest to select the hosting and operation of European quantum computers integrated in HPC supercomputers. The call closed 31 March 2024.

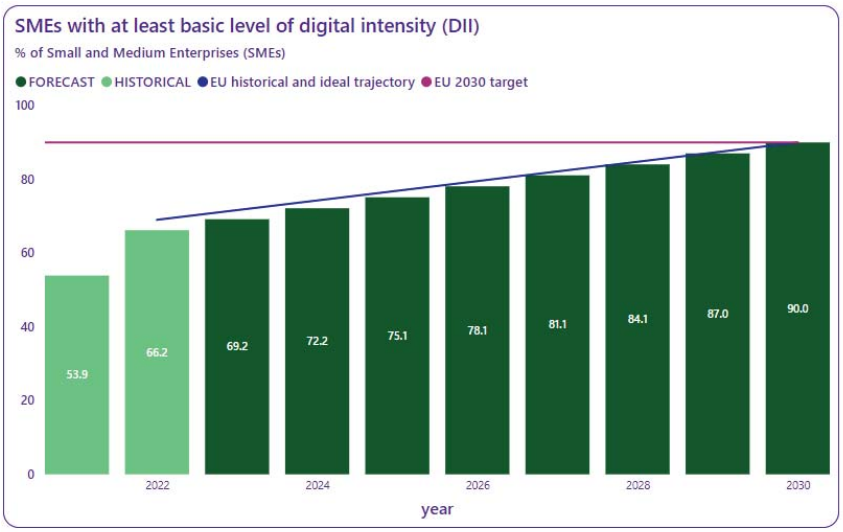
**In the context of the European initiative EuroQCI, Luxembourg has started the national project LuxQCI, to develop and build a quantum communication infrastructure that will be in interconnected with the EuroQCI**. After successfully connecting two points within the laboratory using a 50 km fibre optic cable coil, the University of Luxembourg, the Interdisciplinary Centre for Security, and the Reliability and Trust (SnT), put in place the connection between two geographically distant points (33 km) in 2023. The two points were the campus of the University of Luxembourg in Luxembourg-Kirchberg and the campus of the University of Luxembourg in Belval.

### 2.2 Supporting EU-wide digital ecosystems and scaling up of innovative enterprises

**Luxembourg intends to speed-up the digital transition of its economy and contribute to supporting the EU-wide digital ecosystems**. Based on the national strategy for a competitive and sustainable economy 2025, Luxembourg's roadmap sets out several initiatives to boost the altruist, economic and scientific valuation of available interoperable data. Luxembourg wants to democratise cloud-edge technology through spillovers generated by its participation in the IPCEI-CIS to create a European cloud-edge continuum based on European values. Given that advanced technologies such as cloud, data analytics and AI are often very costly and complex for SMEs, Luxembourg intends to embrace the challenge to lower the technical knowledge and financial entry barriers for any organisations wanting to join a data economy by promoting open-source technologies, data space governance models and standards for interoperability. Furthermore, the manufacturing sector and industry can count on the European Digital Innovation Hub in Luxembourg, L-DIH,

for its digital transformation and move towards industry 4.0. Supporting national and European start-ups and scale-ups is also a priority for the country.

### 2.2.a SMEs with at least a basic level of digital intensity





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 69.2 | 71.6 |
| DESI 2024 | 57.8 | 57.7 |
| AVERAGE ANNUAL GROWTH % | 3.6 | 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

**Luxembourg brings a positive contribution to the EU's Digital Decade target on the digitalisation of SMEs while showing a positive dynamic**. In 2023, with 57.8% of SMEs having at least a basic level of digital intensity, Luxembourg performs at the EU average (57.7%). This represents an average annual growth of 3.6% compared to the year 2021, the last comparable year in terms of methodology for measuring the basic digital intensity of SMEs.

**In its roadmap, Luxembourg aims at reaching 90% of SMEs with at least a basic level of digital intensity which is in line with the EU target 2030.** This represents a very ambitious goal given that the 2023 result (57.8%) is below the forecasted value of the national trajectory for the same year (69.2%) and based on the recent annual growth rate it will be difficult to reach the target.

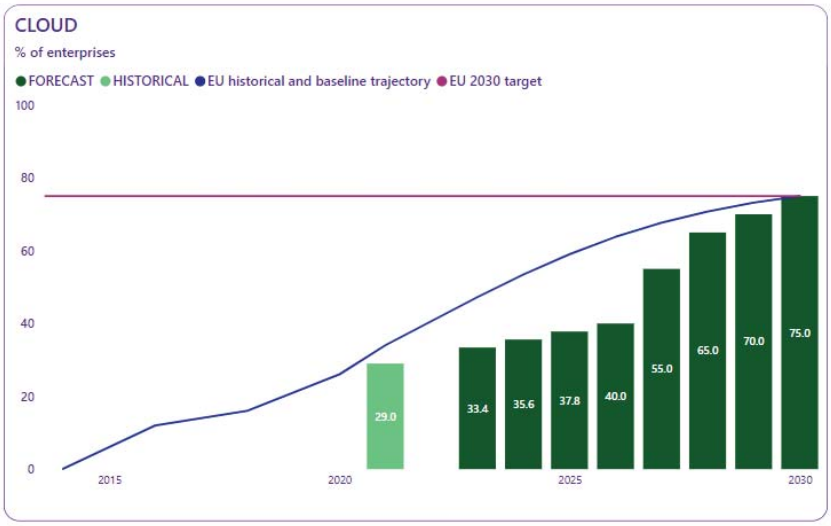
**In 2023, the Luxembourgish SME ecosystem continued to concentrate efforts on the developing existing measures.** The online marketplace '*Letzshop.lu*' supported by the government and co-funded by partners implemented a new tariffication model, which facilitates the onboarding of new companies onto the platform. The model also gives them the opportunity to offer Luxembourgish retail companies an easy online commerce solution at a reasonable cost. The objective is to make retailers aware of the benefits of digitalisation and e-commerce and help them take their first steps in e-commerce as well as to diversify their distribution channels to increase the percentage of SMEs selling online.

**In 2023, the Luxembourg Chamber of Commerce and the Chamber of Skilled Trades and Crafts offered SME's support in their digitalisation process.** The support was given through dedicated workshops and practical guidance for SMEs on more innovation-driven subjects, including AI and generative AI, whereas in previous years, topics were more focused on social media.

**Since March 2023, it is mandatory for all economic operators to issue and send electronic invoices that comply with the legal obligations in public procurement and concession contracts**. Electronic invoicing is already significantly contributing to the automation and digitalisation of business processes linked to invoicing and accounting in the private sector.

### 2.2.b Take up of cloud/AI/data analytics

- **Cloud**





2023 state of play and recent progress

| | Country level | EU level |
|---|---|---|
| FORECAST | 33.4 | 47.3 |
| DESI 2024 | 32.6 | 38.9 |
| AVERAGE ANNUAL GROWTH % | 6.0 | 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

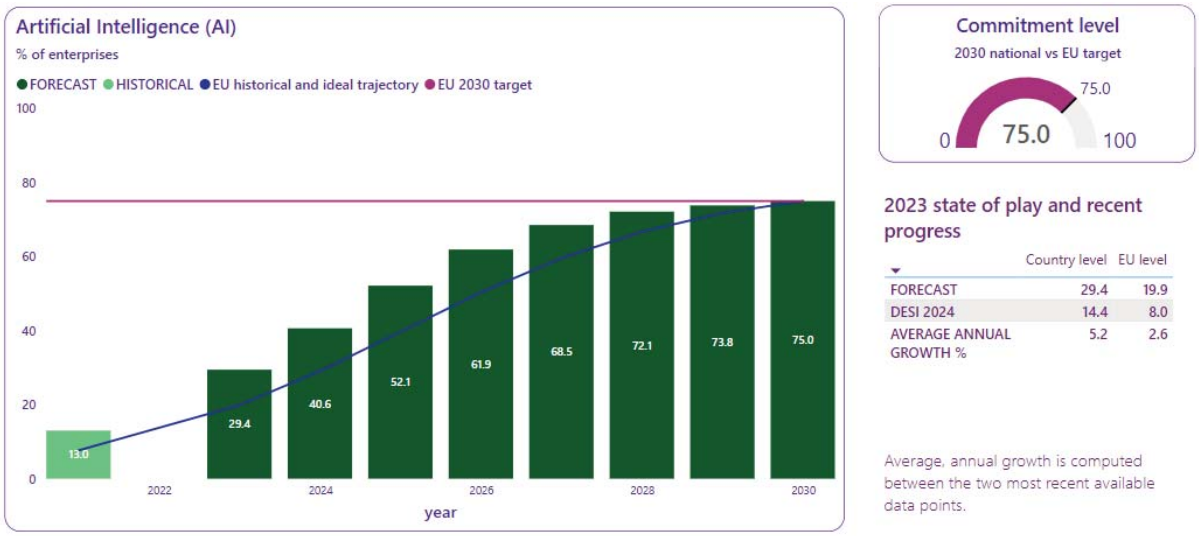
**Luxembourg has untapped potential to contribute to the EU's Digital Decade target while showing a positive dynamic.** The take-up of cloud services by enterprises in Luxembourg progressed in 2023 to reach 32.6%, standing below the EU average (38.9%), and showing an annual progress growth of 6%, slightly below the EU average annual progress growth (7%).

**Luxembourg's national target 2030 is in line with the EU target 2030 of 75% of enterprises having adopted cloud services.** The roadmap presents several measures to increase the creation of suitable, affordable, and secure cloud services for enterprises, in particular SMEs. Given that the first measures set out in the roadmap will be implemented in 2024, the impact on SMEs cloud onboarding will be delayed as a result. This is visible on the trajectory that shows a strong increase between 2027 and 2030.

**Luxembourg cloud providers will provide the first online cloud-based services adapted to the Luxembourg context by 2025**. The take-up of cloud services by SME's are expected to start then.

**In October 2023, two private sector Luxembourgish companies announced their collaboration to** set-up a national sovereign cloud. Its creation will dramatically reduce latencies of Luxembourg's cloud users. The maximum distance from any entity in Luxembourg to this cloud provider will be below 50 km leading to very low latencies for all users.

- **Artificial Intelligence**




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 %).

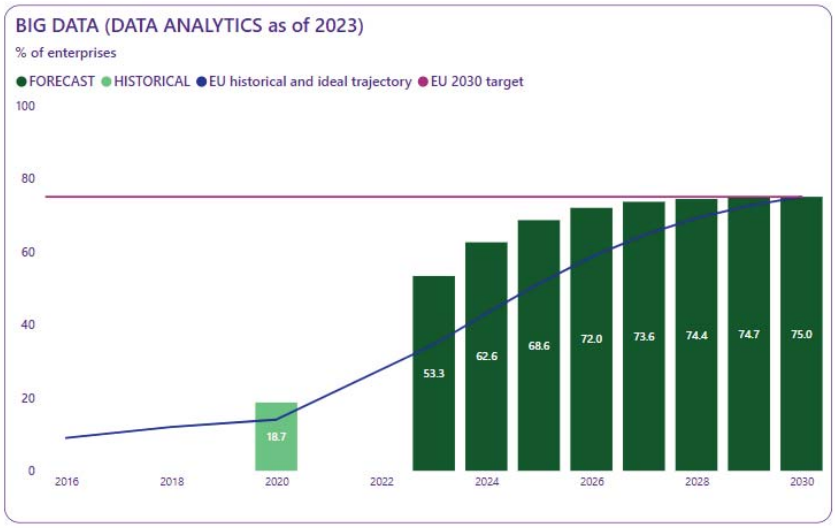
Note 2: The source of national forecast values is the 2023 country roadmap

**Luxembourg brings a very strong contribution to the EU's Digital Decade target and shows a positive dynamic.** The take-up of AI by enterprises in Luxembourg progressed in 2023 to reach 14.4%, showing an annual average growth of 5.2%.

**Luxembourg presents a national target for 2030 at 75% of enterprises adopting AI, in line with the EU 2030 target.** Although there is no historical data for this indicator, the trajectory seems to be ambitious. But Luxembourg considers that the uptake of AI by enterprises is expected to be quick due to the use of Large Language Models. The creation of AI applications based on own data however should be slower.

**No specific measures dedicated to support the use of AI by enterprises are planned.** However, the broad initiative which will be developed in the coming years to lower the technical knowledge and financial entry barriers for any entity wanting to join a data economy by promoting open-source technologies, data space governance models and standards for interoperability will give a boost to the uptake of AI by SMEs.

- **Data analytics (Big Data)[32]**





2023 state of play and recent progress

| | Country level | EU level |
|---|---|---|
| FORECAST | 53.3 | 34.6 |
| DESI 2024 | 32.4 | 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, Luxembourg has untapped potential to contribute to the EU's Digital Decade target.** In 2023, 32.4% of enterprises in Luxembourg reported using data analytics, below the EU average (33.2%). Progress cannot be assessed as the indicator definition evolved since the last collection in 2020.

**In its national roadmap, Luxembourg presents a level of ambition (75%) for 2030 which is in line with the EU target**. Luxembourg estimates that the percentage of companies using data analytics is likely to be similar to the percentage of companies buying cloud services as both indicators are largely connected. Once SME applications adapted to the Luxembourg context will be available in the cloud, SME will use them, and data will be available for additional services like for instance accounting, tax and Enterprise Resource Planning (ERP) services as well as fraud detection in big data applications.

**In December 2023, the Luxembourg National Data Services (LNDS) was launched creating the necessary infrastructures to boost the data economy and to support responsible re-use of public sector data**. LNDS will be a catalyst for the national research and innovation ecosystem to fully utilise the potential of data, providing data services for public and governmental institutes to answer to the growing interest for data-driven innovation.

- **Take-up by enterprises of cloud or AI or data analytics**

**Luxembourg stands at 52% when measuring together the adoption of either AI, cloud or data analytics, standing below the EU average (54.6%).**

### 2.2.c Unicorns, scale-ups and start-ups

**In 2023, Luxembourg had two unicorns[33].** In its roadmap, Luxembourg has not set a specific target for unicorns given the small size of the country. However, supporting national and European start-ups and scale-ups is a priority for the country, contributing to the Digital Decade goal to increase the number of unicorns in the EU.

[32] 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.

[33] Source: Dealroom (date of extraction 29/01/2024)

**In June 2023, Luxembourg presented the roadmap for the future development of Luxembourg's start-up ecosystem '**From Seed to Scale'. The aim is for Luxembourg's Startup Ecosystem to reach a new stage of maturity, with an additional focus on scale-ups. The roadmap is structured around five main axes: (1) continuing early-stage start-up support, (2) creating a national ecosystem that is better connected, stronger and more visible, (3) improving access to talent for start-ups and scale-ups, (4) creating the right environment for scale-ups, (5) ensuring a start-up ecosystem anchored at the heart of the EU. Building on previous initiatives for start-ups, Luxembourg has a natural propensity to be a 'test bed' for innovative companies that will subsequently grow operations in other larger EU countries, which could potentially point to few unicorns despite a dynamic ecosystem.

**A new pilot programme to support scale-up has been announced in 2023 and will be implemented by the national innovation agency Luxinnovation**. The first three innovative Luxembourgish companies have been selected. Last year, cybersecurity also became part of the 'digital ventures' accepted in the national accelerator programme Fit 4 Start.

**In 2023, Luxembourg launched two financing instruments supporting the growth of startups and scale-ups.** First, the Luxembourg Future Fund II was launched in March, providing continuity to its predecessor, the Luxembourg Future Fund, which reached maturity. With EUR 200 million in capital, of which EUR 40 million was provided by the European Investment Fund and EUR 160 million provided by the national public-sector banking institution SNCI, it aims to attract SMEs and international investors focused on technology to Luxembourg. Second, the sub-fund 2 of the Digital Tech Fund was launched in June. The seed fund is structured as a public-private partnership and supports ICT start-ups based in Luxembourg. The first sub-fund of the Digital Tech Fund is a success as it invested EUR 20 million in 13 companies that consequently managed to attract financing of EUR 120 million.

### 2.3 Strengthening cybersecurity & resilience

**Luxembourg put the cybersecurity of enterprises at the heart of the digital transition strategy of the economy.** Enterprises can become more vulnerable when increasingly relying on digital technologies. The risk of exposure to cybersecurity threat is increasing, just like the need for preparedness. In 2022, 4.3% of enterprises in Luxembourg reported ICT service outage due to cyberattacks (e.g., ransomware, denial of service attacks), which is above the EU average (3.5%). Over the same year, 19.4% of enterprises reported having developed or reviewed their ICT security policy within the previous 12 months.

**In 2023, the Luxembourg House of Cybersecurity published its** market study on cybersecurity challenges and opportunities **in Luxembourg's SME sector**. Published for the first time, it gives detailed information about cybersecurity threats and opportunities for SMEs. The National Cybersecurity Competence Centre (NC3) in the context of the European Cybersecurity Competence Centre (ECCC) was also launched in 2023.

**Luxembourg launched in 2023 a sovereign Chat Application** LuxChat. The access to the application was first reserved to civil servants, then rolled out to the cybersecurity community and is now accessible for anyone working or living in Luxembourg. It allows its users to instantly communicate, between two or more people, while guaranteeing data sovereignty on Luxembourg territory and a high level of security thanks to end-to-end encryption of all communications.

**Seven key national digital service providers took part in 2023 to a nationwide cyberattack exercise to test their procedures for cyber incident management**. The exercise was organised by the regulator, *Institut Luxembourgeois de Régulation* (ILR) and the Computer Incident Response Team (CIRCL).

**The** Peppol **secure eDelivery network contributes also to the strengthening of cybersecurity**. This common delivery network chosen to enable the automated issue, transmission and receipt of electronic invoices is the result of a European project. It was set up to allow the secure transmission in structured format (XML) of all

the documents to be exchanged in the context of public procurements. The e-invoice is exchanged via Peppol. The network allows cross-border exchanges of information by encrypting communications between two access points.

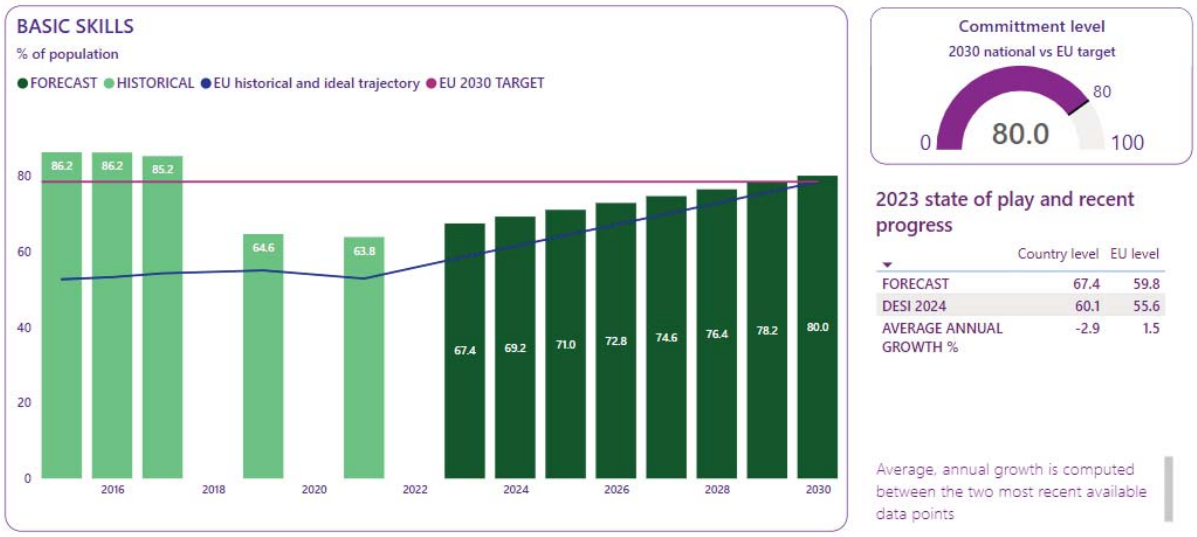
# 3 Protecting and empowering EU people and society

## 3.1 Empowering people and bringing the digital transformation closer to their needs

**Equipping people and 'hard to reach populations' with basic digital skills and fostering digital inclusion is a priority identified in Luxembourg's National Action Plan for digital inclusion**. Luxembourg's transversal policy coordination among skills stakeholders is important to govern policy action where key digital skills providers claim the adaptability of education and training to respond to changing skills needs in a highly digitalised societal environment and labour market. Investment in advanced digital education and training programs is growing significantly as well as participation in advanced IT trainings with an on-going trend. The Luxembourg Safer Internet Centre, a joint-ministerial initiative, is dedicated to empowering people, in particular young people to use digital technologies safely and responsibly. Luxembourg is a front-runner in terms of digitalised public services for people and businesses by almost reaching in 2023, the EU 2030 targets. It already has a national eID scheme in place to which the public have access. The national EU Digital Identity Wallet is currently under development and is estimated to be in place in 2024.

### 3.1.1 Equipping people with digital skills

#### 3.1.1.a Basic digital skills




Note 1: Data break-in-series in 2020

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

**Luxembourg brings a positive contribution to the EU's Digital Decade target, while demonstrating a very limited dynamic.** In 2023, 60.1% of the population had at least basic digital skills in Luxembourg. This stands above the EU average (55.6%) but behind the front-runners. The indicator slightly decreased compared to 2021 (63.8%) while the EU average slightly rose during the same period. The decrease could however be explained by post-COVID-19 effects with a drop in the population's digital activity (e.g., less teleworking, distance learning or e-commerce) compared to 2021.

**In its national roadmap, Luxembourg sets the target at 80% of the population having at least basic digital skills in 2030, standing in line with the EU target for 2030**. The starting point of the trajectory towards 2030 is above the EU average. Luxembourg has already started implementing several measures targeted at different groups of population in need to increase their level of digital skills. With ongoing efforts, it will contribute to reaching the ambitious EU target 2030, but it is too early to assess if this will be sufficient to reach that target.

**In the school year 2023-2024, Luxembourg introduced a new path to prepare students for the evolving digital working environments.** Secondary school students can choose emerging digital fields with classes in data science and communication: learning how to analyse data (collection, processing, and interpretation) and communicate it.

**In 2023, the National Employment Agency (ADEM) offers training courses to help jobseekers develop basic digital skills**. Training enables jobseekers to get familiarised with a computer, learn about the most used software and prepare their application electronically, as using a computer has become an essential part of jobs. In 2023, 51 jobseekers took part in the training 'Digital Fundamentals', 71% of them were women. The age distribution was as follows: (i) Jobseekers aged 16-29 years: 6%; 30-44 years: 31%; 45 years and older: 63%.

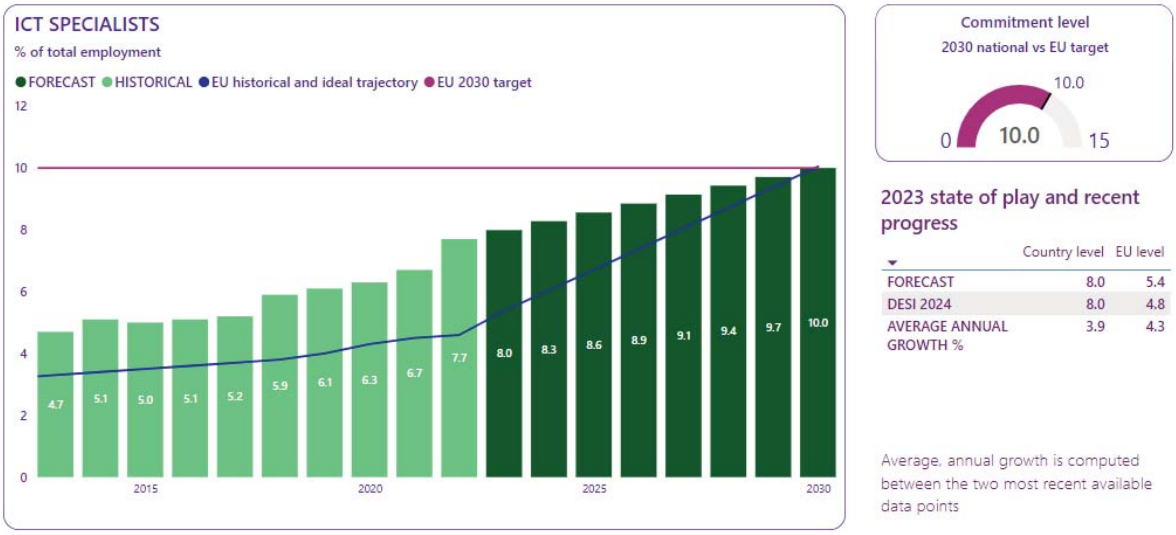
**ADEM also introduced a draft bill 'Skills-Plang' in June 2023, in response to the rapid and significant changes in the job market driven by technological, regulatory, environmental, and societal shifts**. The Skills-Plang aims to make jobseekers more attractive to employers and prevent unemployment. This initiative builds on the insights from the pilot project 'Luxembourg Digital Skills Bridge' and focuses on providing intensive training for employees at risk of job automation. Although the bill has not yet been voted on, it addresses the gap in current training support, offering more substantial financial and methodological assistance to employers for targeted employee development.

**Furthermore, and in line with the 2023 recommendation, Luxembourg plans to reach out to employers to encourage workforce participation in digital training**. A free of charge digital skills assessment tool combined with a new more attractive online training programme for basic digital skills will be promoted among employers and employees, in the coming year.

**To be inclusive in providing basic digital skills, the Ministry of Digitalisation has signed an agreement in June 2023 with a non-profit association '*Erwuessebildung*', an adult skills training centre**. It continues a collaboration launched in 2021 while providing additional courses on basic digital skills. Training for IT trainers are also given. The various courses are made available free of charge to organisations operating in the social sector to make them accessible to the biggest number of people across the country.

**In terms of market developments, 2023 has seen the rapid development of tools based on generative AI and AI in adaptative learning settings having a major impact on education systems**. In November 2023, the 'EdTEch' conference focused on the impact of AI on the evolution of education. On this occasion, 14 start-ups, teachers and educational decision makers had the opportunity to learn more about the latest trends in education technology.

### 3.1.1.b ICT specialists




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

**Luxembourg brings a very strong contribution to the EU's Digital Decade target and show a positive dynamic.** With 8% of ICT specialists in employment, standing well above the EU average (4.8%), Luxembourg is one of the front-runners in the EU. The country shows an average annual growth of 3.9%, slightly below the EU average progress (4.3%). Furthermore, Luxembourg had one of the highest rates of ICT graduates in the EU (8.6%) in 2022, while the EU average was at 4.5%.

**In its national roadmap, Luxembourg sets a national target of 10% of ICT specialists in total employment by 2030, in line with the EU target of 10%**. The national trajectory for ICT specialists forecasted a point for 2023 (8%) which is fully in line with the result observed (8%), showing good reason to estimate that the target could be reached by 2030.

**In September 2023, a new law to address the shortage of skilled workers, in particular in the IT sector, entered into force.** It introduces significant changes to the employment of non-EU nationals and aims to considerably simplify their employment when already residing in Luxembourg. In this respect, the National Employment Agency (ADEM) annually publishes a list of professions facing significant shortages of skilled workers based on objective data. This measure is helping to facilitate the recruitment of ICT specialists in Luxembourg, given that IT professions are on the list of professions facing significant shortages.

**Training in continuous professional education to help fill the severe need for skilled IT-trained professionals was also increased in 2023**. The Digital Learning Hub (DLH) launched in 2022, offered 432 courses and received 5052 registrations targeting professionals also in new areas of digital skills (e.g., management and governance; or data and AI).

**In 2023, the ADEM also offers training courses to develop technical IT skills in a context of upskilling or reskilling**. Training courses, such as Junior Full Stack Developer, Python or Java Developer were addressed to jobseekers wishing to direct their careers towards the new professions in web and mobile technologies.

**Luxembourg's education landscape continues to increase offers in future IT specialist related study programmes.** The University of Luxembourg's 2020-2039 strategic framework defines their ambition to become a prime destination for students and teachers who seek a degree and career in digital skills and digital transformation, offering multiple IT specific endeavours, but also numerous Bachelors, Masters, Certificate programmes and Doctoral Programmes that train IT specialists in all aspects.

**Luxembourg also offers multiple IT related short cycle programmes** (BTS), which are professionally oriented courses at a higher education level. BTS programmes give a quicker access to academic world of IT, while preparing for the job market and still offering the opportunity to do further studies.

T**o complement the academic landscape, Luxembourg is also fostering the offer of international private institutions and learning certificates**. Luxembourg by reducing administrative hurdles in setting up learning certificates provides the different learning providers with more flexibility to respond quickly to the ever-changing IT landscape. It also increases the quality assurance endeavours to improve the overall quality of the study programmes.

**On ICT specialists and gender convergence,** the disaggregated indicator for ICT specialists shows that in Luxembourg 22.5% of ICT specialists are women, while the EU average is 19.4%. Currently, the Ministry of Gender Equality and Diversity is conducting a study to identify why enrolment rates of female students in ICT trainings and studies in Luxembourg are relatively low. The results of the study will suggest future actions or projects to improve these rates. The Ministry also offers a series of free workshops to schools and day care centres that focus on explaining different aspects of ICT subjects in fun, interactive ways and on getting students interested in the subject.

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

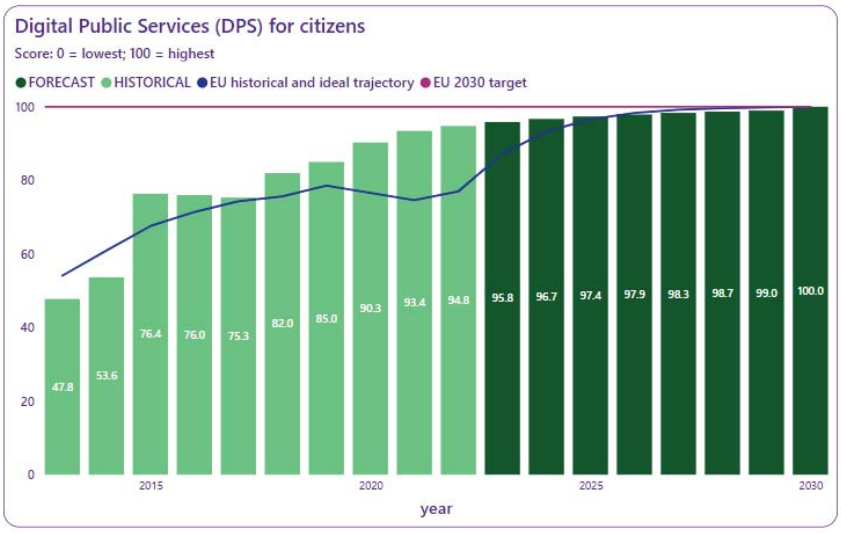
#### 3.1.2.a eID

**Luxembourg already has a national eID scheme in place to which the public have access.** The national EU Digital Identity Wallet is currently under development and is estimated to be in place in 2024. Luxembourg notified to the European Commission an eID at Level of Assurance 'High' under the eIDAS regulation since 2018.

**In 2023, the Ministry for Digitalisation continued to promote the national GouvID app launched in 2022**. It allows the people of Luxembourg to use their physical identity card and its electronic certificates both for online authentication and remote electronic signature on the eGovernment Portal MyGuichet.lu. At the end of 2023, the GouvID app had been installed on more than 58 000 devices for the first time. At the same time, the MyGuichet.lu app has been downloaded 373 000 times.

**In 2023, the Ministry for Digitalisation joined three EU Large Scale Pilot Consortia for the European Union Digital Identity Wallet: '**POTENTIAL'**, '**EWC' **and '**DC4EU'. Each Pilot is testing the EU Digital Identity Wallet in a variety of everyday scenarios, relevant to people's daily lives. Luxembourg is contributing to the following use cases: eGovernment services, bank account opening, mobile driving licence, qualified electronic signature.

### 3.1.2.b Digitalisation of public services for citizens and businesses





**2023 state of play and recent progress**

| | Country level | EU level |
|---|---|---|
| FORECAST | 95.8 | 87.2 |
| DESI 2024 | 94.8 | 79.4 |
| AVERAGE ANNUAL GROWTH % | 0.0 | 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

**Luxembourg brings a very strong contribution to the EU's Digital Decade target for the digitalisation of public services for citizens scoring 94.8 in the indicator for public services available online, well above the EU average score of 79.4**. Although no recent annual progress has been observed (0.0%), this can be explained by the fact that Luxembourg is very close to the Digital Decade target as measured by the 'e-government benchmark'.

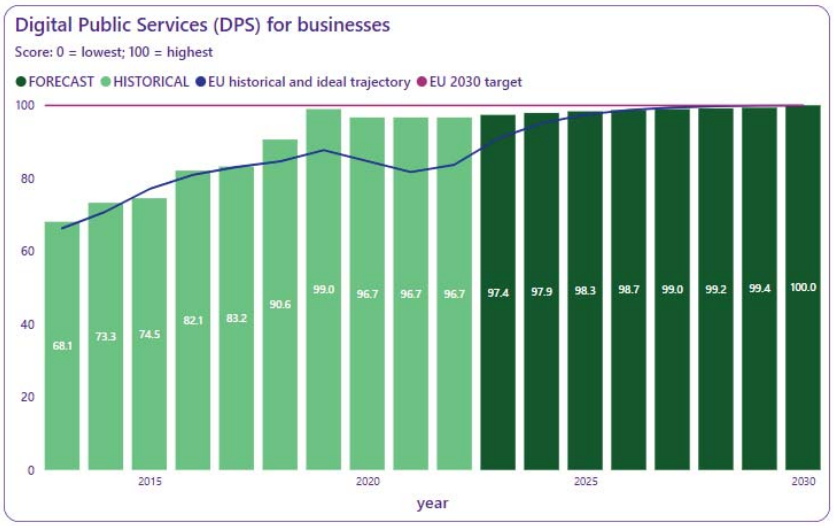
**For Luxembourg, e-government has been a priority for many years already.** Since 2013, the interactive platform MyGuichet.lu has been part of Guichet.lu, which was launched in 2008, and provides a comprehensive national digital platform for citizens, businesses and the government. They can access administrative information and use digital administrative services through this platform. The creation of a Ministry for Digitalisation in 2018 underlined the political will to speed up the digital transformation process. Besides, Luxembourg has a Government IT Centre (CTIE), which is the administration of the Ministry of Digitalisation responsible for the development and provision of IT services for the Luxembourg Government, ministries, and public administrations. The country's strengths and assets include a centralised Government ICT structure, interoperable back offices and effective infrastructures (such as GovCloud) for administrations. However, even though Luxembourg has good results when it comes to the digitalisation of public services, the overwhelming amount of data and potential interoperability issues are challenging.

**In its roadmap, Luxembourg, puts forward several measures based on the national strategy 'Electronic Governance 2021-2025' to increase the use of digital technologies to modernise and digitally transform ministries and public administrations**. These measures, going beyond meeting the targets, are in line with the broad objectives of the Digital Decade to make public services efficient, interoperable, safe and accessible for all.

**In 2023, The Ministry for Digitalisation is working on a legislation that allows for the 'Once-only' principle in the public sector**. These building blocks are two important elements to further develop the digitalisation of public services. The Luxembourg Coalition Agreement also provides for the development of a national data strategy.

**In view of further inclusion, in 2023, the Ministry for Digitalisation launched a legal and technical feasibility study for a digital proxy to enable a third party to carry out digital administrative procedures on behalf of**

**a relative**. The objective is to make digital public services accessible in a trusted and secure online environment for all. The proxy would be emitted for specific procedures and not for all at the same time. For example, separate mandates would need to be granted for procedures related to employment, and for fiscal procedures.





2023 state of play and recent progress

| | Country level | EU level |
|---|---|---|
| FORECAST | 97.4 | 90.9 |
| DESI 2024 | 96.7 | 85.4 |
| AVERAGE ANNUAL GROWTH % | 0.0 | 2.0 |

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

Note 1: Data break-in-series in 2020

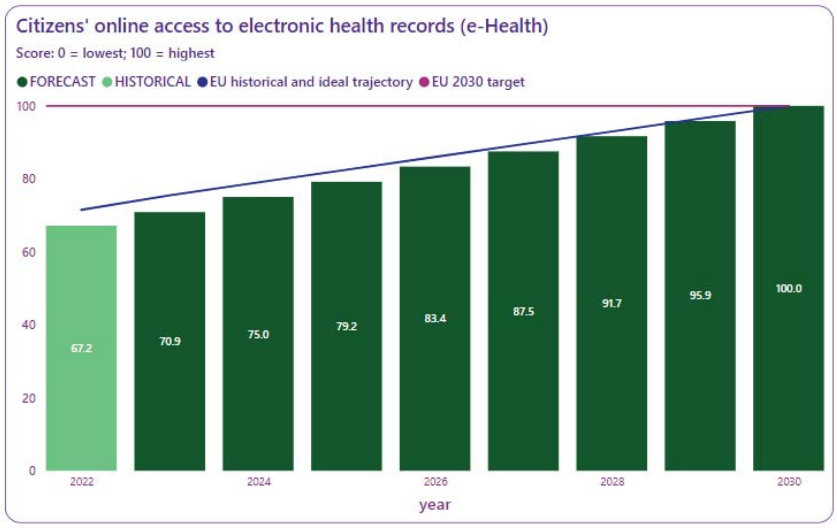
Note 2: The source of national forecast values is the 2023 country roadmap

**Luxembourg brings a very strong contribution to the EU's Digital Decade target for digitalisation of public services for business scoring 96.7 in the indicator for public services available online, well above the EU average score of 85.4**. Although no recent annual progress has been observed (0.0%), this can be explained by the fact that Luxembourg is very close to the Digital Decade target of 100% online delivery of key public services, as measured by the 'e-government benchmark'.

**Since 2023, people and businesses benefit from a new, more interactive, and accessible web interface for MyGuichet.lu.** One of the main new features is the principle of responsive design. The web interface can now be adapted to any type of device (smartphone, tablet, or computer via the Internet browser) and use all the functions wherever and whenever they want. They also have the option of using the MyGuichet.lu mobile application if they want to benefit from the native functions of mobile devices. However, unlike before, they are not obliged to do so if they want to complete their procedures on their smartphone or tablet. Major efforts have been made to improve accessibility. The online help has been overhauled to provide users with the best possible guidance. The data shows that by the end of 2023, the number of app downloads stood at 373 000.

**Furthermore, in 2023, the CTIE helped transform the Luxembourg Customs Clearance System (LUCCS).** This is one of the 12 projects implemented to introduce an integrated digital solution and back-office applications in a government department. This often involves far-reaching organisational changes that go beyond the digitisation of procedures and processes. Introducing a new IT system for the Customs and Excise Agency has profoundly changed the administration's business architecture and has led to organisational and operational changes. It has had an impact on all business areas of customs but was necessary for example, to cope with the increase in logistical volumes and to speed up the clearance of goods, logistical flows. In 2023, the new customs clearance system was officially commissioned and four of the IT projects were completed: (i) managing the entry of goods into the EU; (ii) managing procedures for importing goods; (iii) controlling imports before goods arrive; and (iv) managing goods in transit.

### 3.1.2.c e-Health





2023 state of play and recent progress

| | Country level | EU level |
|---|---|---|
| FORECAST | 70.9 | 75.5 |
| DESI 2024 | 76.1 | 79.1 |
| AVERAGE ANNUAL GROWTH % | 13.3 | 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

**Luxembourg has an untapped potential to contribute to the EU's Digital Decade target on e-health, while showing a positive dynamic.** With a score of 76.1 in 2023, Luxembourg stands below the EU average 79.1, although it shows an annual growth rate (13.3%) higher than the EU average annual growth (10.6%).

**In its national roadmap, Luxembourg sets a target for e-health at 100 in line with the EU target**. The roadmap presents an analysis of major issues following the results of last year e-health composite indicator and defines two major action areas: (i) development of digital (e-health) literacy; and (ii) improve accessibility to eSanté services (for vulnerable groups).

**In 2023, dissemination activities were organised for all,** since an electronic health record (EHR) is automatically created (opt-out mode) for all Luxembourg citizens (and all cross-border workers), and the latter receive their personal credentials to activate their eSanté account allowing them to access their shared health file '*Dossier de soins partagés'* (DSP). Therefore, everyone has in theory the possibility to view and manage their health data. To inform people about the DSP and encourage them to activate their e-health account, various dissemination activities were organised in the course of 2023. By the end of 2023, about 183 000 patients had enrolled to consult their health data. A single-entry point via MyGuichet.lu is planned and expected to raise the number of adopters.

**In 2023, a financial incentive scheme was put in place to stimulate software editors to implement two programmes for the digitalisation of the reimbursement of doctors' invoices** (accelerated reimbursement, and direct immediate payment). This did not have any direct impact on people's access to the EHR, but it can be considered a stimulator of people's awareness to e-health tools in general, and a contributor to people's general uptake of digitalisation tools (as well as editors and healthcare professionals).

## 3.2 Building a safe and human-centric digital environment and preserving our democracy

**Luxembourg's commitment to build a safe, human centric and inclusive digital environment for the population is represented in 40 initiatives included in the National Action Plan for digital inclusion since 2021**. In 2023, the Ministry for Digitalisation published the results of a study on the impact of digital developments 'Digital Inclusion: An identification of the factors at the origin of the digital divide'. The results and the recommendations made by the Luxembourg Institute of Socio-Economic Research (LISER) will serve as basis to revise the National Action Plan, adapting it to the current needs of the society and technological developments.

**Actions to inform consumers about their rights online took place in Luxembourg in 2023**. The Ministry of Consumer Protection published various guides and tips aimed at informing consumers about their rights online, going from online shopping, to contracting online, distance marketing of financial services, or the right of withdrawal. In December 2023, the European Consumer Centre (CEC), in collaboration with the Ministry in Luxembourg also made a communication campaign focusing on online purchases and the assistance available from the CEC in case of problems.

**On the risks of online hate speech, in Luxembourg 45.8% of individuals** who used internet in the last 3 months encountered messages online that were considered hostile or degrading towards groups of people or individuals, while the EU average stood at 33.5%, in 2023, according to Eurostat figures.

**In 2023, a broad governmental initiative for the responsible use of digital technology and online safety, BEE SECURE became a best practice.** In this context, an awareness-raising campaign to fight against hate speech #NOHATEONLINE was organised in the school year 2022/23. At the heart of the campaign was the portal, nohateonline.lu containing general recommendations to combat hate speech on the Internet and a quiz to allow users to reflect on the limits of freedom of speech and expression. Influencers played an important role, by sharing testimonials and the #NOHATEONLINE call-to-action with their community.

### Best practice: BEE SECURE – the Luxembourg Safer Internet Centre

BEE SECURE, a government initiative, aims to raise public awareness on safely and responsibly using digital technology, and to empower children, young people and their entourage (parents, teachers, educators and others) through targeted information.

In 2023, BEE SECURE training promoted and supported critical thinking regarding internet-related content and practices, essential for good risk management in information and communication technology (ICT) usage. It provided 1225 training sessions for primary and secondary schools' classes, as well as sessions for teenagers, teachers and educators.

In November 2023, BEE SECURE launched a campaign to raise awareness of basic cybersecurity principles, in response to a rise in online fraudulent activity, including phishing, sextortion and account hacking. It also provides an anonymous reporting platform, the BEE SECURE Stopline, where three categories of illegal content can be reported anonymously.

# 4 Leveraging digital transformation for a smart greening

**The national roadmap of Luxembourg put forward measures contributing to the green transition in line with the general objectives** to reduce the energy costs of digital technologies, and the development of more sustainable solutions.

**Reduction of energy costs workplace-related is an objective of the Government IT Centre in line with the broad governance strategy of Luxembourg**. The Government IT Centre is responsible for the centralised acquisition of office equipment for all ministries and administrations. It has implemented three key measures to reduce energy costs and improve the efficiency of office equipment management. Firstly, they have replaced small office printers with large, centralised multifunction printers in administrative offices, incorporating secure printing systems to prevent unnecessary document printing. Personal printers are also being replaced with more energy-efficient inkjet printers. Secondly, through the introduction of the 'Digital Workplace' concept, agents are provided with standardised equipment, including laptops and telephony software, which promotes flexible working while reducing the energy consumption associated with desktop computers. Thirdly, they encourage equipment donations in line with circular economy principles, ensuring that surplus equipment benefits people in need.

**The Government IT-Centre has been operating a private sovereign cloud since 2016.** It is managed according to the Infrastructure as a Service (IaaS) principle, providing administrations with a centralised infrastructure. This centralised cloud fits in perfectly with a policy of rationalising costs and saving energy, given that administrations do not operate their own infrastructures. In view of the huge need to digitalise public administrations, the Government IT-Centre is considerably expanding its range of IT solutions in the form of software as a service (Saas). Together with partner ministries identified as key users, the Government IT-Centre selects the IT solution best suited to their needs and develops standard functionalities common to a large number of public authorities. The Government IT-Centre hosts its IT infrastructure in data centres managed according to a sustainable policy.

**Luxembourg will extend the scope of its tax relief measures to investments and expenditure made by companies as part of their digital transformation or their ecological and energy transition from the 2024 taxation year**. The modernisation of the tax relief for investment is an additional measure to support companies in their twin transition.

**In recent years, the national statistical service (STATEC) has put in place a methodology to assess Luxembourg's integrated National Energy and Climate Plan (PNEC).** STATEC models made it possible to simulate major economic trends and quantify past and future measures that impact energy consumption and greenhouse gas emissions. This analysis compares the respective trajectories against the emissions targets and assesses the potential impact at the macroeconomic level.

**In 2023, driven by the Luxembourg Ministry of the Economy, the 'Circularity Dataset Standardization Initiative' aims to establish an official standard for communicating data on the circular economy properties of products,** in consultation with other standards organisations and to maintain an ecosystem around it. The goal is to set-up an international communication scheme of circular properties of products in a bottom-up manner within a value-chain.

**Luxinnovation developed in 2023 the** sustainability enablers mapping to find and adopt the right products, services, solutions and technologies that can help companies innovate to become more sustainable and reduce their footprint. In particular, digital-solutions providers that help other companies to become more sustainable by digitalising their production, processes or support services or by adopting more sustainable digital solutions (e.g., green data centres) have been identified.

**Enterprises and people in Luxembourg are generally sensitive to the green transition of the digital sector**. In Luxembourg, 49.7% of enterprises considered 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, which is higher than the EU average (48.7%) (Eurostat). People in Luxembourg tend to recycle more their ICT devices (12.4% for laptops and tablets, 17.3% for desktops) than the EU average (9.7% and 12.8%, respectively), but for their old mobile or smartphone (11.1%), it is less than the EU average (10.4%).

In Luxembourg, the telecoms operators are also contributing to reduce the environmental footprint of the digital sector notably by adopting more recent technologies. The Luxembourg telecoms operators are in the process of replacing the old 3G technologies in the 2.1 GHz band with 4G LTE technologies. The transition results in a more effective utilisation of spectrum and a lower energy requirement per Mbit/s. They also promote the migration to fibre or the recycling of users' mobile phones.

# Annex I – National roadmap analysis

**Luxembourg's national Digital Decade strategic roadmap**

The roadmap of Luxembourg, submitted to the Commission in October 2023, is mostly complete and presents 12 national trajectories and targets by 2030, only targets for edge nodes and unicorns are missing. The national targets set for connectivity, digital skills, digital transformation of public services, e-health, and most of the targets for digital transformation of businesses, match the EU 2030 targets. The roadmap has been published https://smc.gouvernement.lu/dam-assets/dossiers/digital-decade/240611-digital-decade-national-strategic-roadmap-for-luxembourg.pdf. Stakeholders' consultation was carried out upstream of the development of the roadmap, as it is heavily based on existing national strategies for which public and private stakeholders where consulted. The table below reflects a best effort attempt to categorise the measures and budget as presented in the Luxembourg's roadmap.

| Digital Decade Target/objective | Budget (EUR Million) | Number of measures |
|---|---|---|
| Connectivity Gigabit | 9.1 | 1 |
| Connectivity 5G | 0.0 | 2 |
| Semiconductors | - | - |
| Edge nodes | 8.0 | 4 |
| Quantum computing | - | - |
| SME take up | 10.7 | 5 |
| Cloud/AI/Big Data uptake | 14.7 | 3 |
| Cloud only uptake | - | - |
| AI only uptake | - | - |
| Big data uptake | - | - |
| Unicorns | 200.0 | 3 |
| Basic Digital Skills | 18.9 | 6 |
| ICT Specialists | 2.6 | 9 |
| eID | 0.6 | 1 |
| Key Public Services | 1.2 | 8 |
| e-Health | 0.2 | 6 |
| Objectives | 43.5 | 24 |
| **Total** | **309.5** | **72** |

Luxembourg's roadmap analyses the current situation, and a comprehensive set of strategies, measures and initiatives addressing the objectives and targets of the Digital Decade to transform the country into a digitally advanced and inclusive society by 2030. The roadmap is built on existing strategies for the digital transformation of Luxembourg. An estimate of the budget indicated for measures and programmes described in the roadmap (allocated and planned budget) is EUR 309.5 million.

In terms of overall expected impact, Luxembourg embraced the vision of the Digital Decade in its policies and strategies and had already taken a certain number of significant measures designed to digitally transform the country in almost all the areas covered by the Digital Decade. In the roadmap, the broad objectives of the Digital Decade are well identified, and measures and actions are mapped accordingly.

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

## MCPs and EDICs

Luxembourg is active in 5 EDICs already set up or in the making.

Luxembourg is a member of the Local Digital Twins towards the CitiVERSE (LDT Citiverse) EDIC, the EUROPEUM-EDIC on blockchain and the Alliance for Language and Technology EDIC (ALT-EDIC), all already set up.

Luxembourg is developing the Statute and other relevant documents for the possible future Mobility and Logistics Data EDIC and for the connected public administration EDIC (IMPACTS EDIC). Luxembourg offered to be the hosting Member State of the possible future Genome EDIC.[34]

The country is also participating in multi-country projects including IPCEI on Next Generation Cloud Infrastructure and Services (IPCEI-CIS) with seven indirect partners, EuroHPC, and POTENTIAL.

## EU funding for digital policies in Luxembourg

EU funds support the digitalisation efforts in the EU Member States. Luxembourg's Recovery and Resilience Plan (RRP) allocates 29.6% of its total RRP budget to the digital transformation (EUR 24.5 million). According to the Joint Research Centre's study[35], the total digital budget from the RRP (EUR 24.5 million) directly contributes to achieving of the Digital Decade targets. Out of the Cohesion Policy funds received by Luxembourg, EUR 4.3 million directly contribute to the Digital Decade targets according to the same mapping study.

The largest investment is dedicated to the digitalisation of public services (EUR 12.7 million). The first payment request occurred in June 2023 for EUR 20.2 million, and included digital milestones, related to advanced digital technologies with the Luxembourg Quantum Communication Infrastructure Laboratory (LuxQCI) and to the digitalisation of the public sector with the development of the "MyGuichet.lu" mobile application.

[34] Information updated on 31 May 2024

[35] 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))