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ANNEX 1

ANNEX

to the

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions

State of the Digital Decade 2024

Annex 1: Competitiveness and sovereignty, people, smart greening, policy coherence and synergies

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Introduction

This annex is an integral part of the State of the Digital Decade 2024 report. It maintains the three-chapter structure from the 2023 report, focusing on competitiveness, people and society and smart greening, and introduces an additional chapter on synergising digital policies and spending.

This report also addresses the implementation of the Declaration on Digital Rights and Principles[1]. The Declaration translates the EU's vision of digital transformation into principles and commitments.

Finally, the annex identifies significant gaps and shortages and recommends policies, measures or actions, addressed to all Member States. Such recommendations target areas where additional collective action is required. They advocate for the mobilisation of additional investments and actions to complete the Digital Single Market and boost the dissemination of technologies as well as foster cooperation among Member States.

The analysis primarily relies on the monitoring conducted through the Digital Economic and Society Index (DESI). It is further supported by relevant studies and expert analysis, and the National Digital Decade Strategic Roadmaps submitted by Member States.

1. Key drivers of the EU's digital transformation in 2024

The key drivers identified in the 2023 Digital Decade report[2] remain globally relevant and important in 2024. However, there have been some notable intensifications and shifts. The current analysis and subsequent recommendations are made in the light of those developments.

1.1 A new geopolitical paradigm

Recent months have seen a marked increase in **geopolitical inflection points, driven by escalating conflict, growing fragmentation and power politics**[3]. The consequences of these trends, including the increase in cybersecurity threats[4], disinformation, supply chain disruption, economic coercion and armed conflict, overlap and compound one another[5]. There is no indication that the risks generated by this situation are likely to tail off in the foreseeable future.

The global tech race has intensified in 2024. All major economies, including the EU, the US, China, Japan, and India, are becoming increasingly aware of the economic and national-

[1] SWD 'Digital Decade in 2024: Implementation and perspective', Annex 3. Analysis of national Digital Decade strategic roadmaps, SWD(2024)260: https://digital-strategy.ec.europa.eu/en/news-redirect/833325. The monitoring of the Declaration on Digital Rights and Principles draws on various sources, including an independent support study (https://digital-strategy.ec.europa.eu/en/news-redirect/833359), Commission reporting mechanisms such the monitoring of the Berlin Declaration, and the 2024 Special Eurobarometer Report on the Digital Decade (Eurobarometer 551 'The Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351).

[2] Commission Communication, Report on the state of the Digital Decade 2023, COM/2023/570 final, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2023:570:FIN.

[3] Strategic Compass for Security and Defence, https://data.consilium.europa.eu/doc/document/ST-7371-2022-INIT/en/pdf.

[4] NIS Cooperation Group, Cybersecurity and resiliency of Europe's communications infrastructures and networks: Follow-up to the Nevers Call of 9 March 2022, February 2024, https://digital-strategy.ec.europa.eu/en/library/report-cybersecurity-and-resiliency-eu-communications-infrastructures-and-networks.

[5] Speech of President von der Leyen at the World Economic Forum in Davos 2024, https://ec.europa.eu/commission/presscorner/detail/en/speech_24_221.

security significance of advanced technologies and some countries are pursuing aggressive policies to regulate and, at times, secure technology supply chains[6]. As dependencies on these technologies are growing, their risk of being weaponised increases[7].

Against a backdrop of permanent instability, the EU's greatest assets are its economic power, its internal market, its resilience, and its wide network of trade partners[8]. In this context, the EU is assuming greater **responsibility for its diplomatic leadership and its security and defence** by boosting **investments**[9] and focusing on **innovation,** especially in **dual-use digital technologies**[10] and emerging disruptive technologies[11].

1.2. Fostering competitiveness in a complex economic context

The economic landscape of 2024 is characterised by exceptionally high uncertainty, exacerbated by geopolitical tensions[12]. Additionally, **Europe's economic growth has experienced a slowdown,** while debt levels have continued to rise through 2023 and 2024[13]. Furthermore, electricity prices have stabilised at a structurally high level, being three times as high as in the US and more than twice as high as in China[14]. The reasons include increasing inflation rates, a rise in the frequency and severity of adverse supply-side disruptions, and growing supply chain vulnerabilities for essential resources and technologies. Overall, this has created a more challenging investment environment for digital transformation[15], resulting in the EU lagging significantly behind the US, where productivity gains since 2019 are tenfold in the US (6% compared to 0.6% in Europe)[16].

All these elements highlight the **urgent need for the EU to prioritise action in areas that foster innovation and growth, improve productivity, and mitigate disruptions – in**

[6] Varadajan et al., 'The Unwinding of Global Tech Supply Chains', Boston Consulting Group, March 2023, https://www.bcg.com/publications/2023/the-unwinding-of-global-tech-supply-chains#SnippetTab.

[7] Joint Communication on a European Economic Security Strategy, JOIN/2023/20 final, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=JOIN:2023:20:FIN.

[8] ESPAS, Global Trends to 2040: Choosing Europe's Future, April 2024, https://www.espas.eu/files/espas_files/about/ESPAS-Global-Trends-to-2040-Choosing-Europes-Future.pdf.

[9] A new European Defence Industrial Strategy: Achieving EU readiness through a responsive and resilient European Defence Industry, https://defence-industry-space.ec.europa.eu/document/download/643c4a00-0da9-4768-83cd-a5628f5c3063_en?filename=EDIS%20Joint%20Communication.pdf.

[10] European Commission, White Paper on options for enhancing support for research and development involving technologies with dual-use potential, January 2024, https://research-and-innovation.ec.europa.eu/system/files/2024-01/ec_rtd_white-paper-dual-use-potential.pdf; Keynote speech by the President: EDA Annual Conference 2023, 30 November 2023, https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_23_6207.

[11] A new European Defence Industrial Strategy: Achieving EU readiness through a responsive and resilient European Defence Industry, https://defence-industry-space.ec.europa.eu/document/download/643c4a00-0da9-4768-83cd-a5628f5c3063_en?filename=EDIS%20Joint%20Communication.pdf.

[12] Statement by Commissioner Gentiloni at the presentation of the Winter 2024 Economic Forecast, February 2024, https://ec.europa.eu/commission/presscorner/detail/en/speech_24_844.

[13] McKinsey Global Institute, Accelerating Europe: Competitiveness for a new era, January 2024, https://www.mckinsey.com/mgi/our-research/accelerating-europe-competitiveness-for-a-new-era.

[14] Inaugural lecture of the EMU Lab by Isabel Schnabel, Executive Board of the ECB, at the European University Institute, 'From laggard to leader? Closing the euro area's technology gap', Florence, February 2024, https://www.ecb.europa.eu/press/key/date/2024/html/ecb.sp240216~df6f8d9c31.en.html.

[15] European Commission, The 2024 Annual Single Market and Competitiveness Report, SWD(2024) 77 final - SWD(2024) 78 final, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52024DC0077.

[16] https://www.cfr.org/event/conversation-christine-lagarde-0.

particular in the areas of digital technologies and digital skills[17]. In a broader sense, substantial investments are required to face the challenges of digitalisation, environmental sustainability, population ageing, energy transition the emerging trend of deglobalisation and a reduction of reliance on fossil fuels[18]. Additionally, efforts to strengthen the single market's attractiveness are crucial to reversing the EU's declining competitiveness, which stems from insufficient integration[19]. Such measures are essential for modernising EU's economy and boosting production capacity. Moreover, successfully twinning the green transition with the digital transitions is vital. Achieving these goals will require a dynamic digital transformation.

1.3. Entering a new age shaped by generative AI

While the transformative role of AI has been known for years, **the rise of generative AI in 2023 marked a new phase in the technological revolution** with the possibility of systemic chain reactions for business, citizens, and public administration in terms of both opportunities and risks. Generative AI is massively democratising content generation[20] – including accessibility, modularity, ease of use and human-like features – presenting tangible prospects for a wide use by all people and enterprises and bringing a possible unique acceleration in AI uptake by European citizens, businesses and public administrations[21]. The wide increase of **computing power** now enables **the integration of AI across various aspects of daily life** – cars, mobiles, homes and sport watches among others. This integration is driving systemic innovation, boosting economic efficiency, and enhancing the productivity of business operations. By 2030, the net impact of AI on Europe's economy is projected to contribute an additional EUR 600 billion to a previously estimated EUR 2.8 trillion[22]. Moreover, the deployment of generative AI is expected to generate business value raging from EUR 2.4 to EUR 4.0 trillion annually[23]. This technological shift will also significantly affect jobs and skillsets in ways that are not yet fully anticipated and understood.

Developing of a robust generative AI ecosystem requires the EU mastering the entire technological value chain across all layers. This includes ensuring the simultaneous development of all interdependent components[24], the chips and high-performance computing capacities crucial for training models and foundational data for AI systems, and the researchers

[17] Recommendation (EU) 2023/2113 of 3 October 2023 on critical technology areas for the EU's economic security for further risk assessment with Member States, C(2023) 6689 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202302113.

[18] European Investment Bank, Investment Report 2023/2024: Transforming for competitiveness, https://www.eib.org/attachments/lucalli/20230323_economic_investment_report_2023_2024_en.pdf.

[19] Letta E., Much more than a market – Speed, Security, Solidarity: Empowering the Single Market to deliver a sustainable future and prosperity for all EU Citizens, April 2024, https://www.consilium.europa.eu/media/ny3j24sm/much-more-than-a-market-report-by-enrico-letta.pdf.

[20] European Commission, Opportunities and challenges of Artificial Intelligence Technologies for the Cultural and Creative Sectors, February 2022, https://op.europa.eu/en/publication-detail/-/publication/359880c1-a4dc-11ec-83e1-01aa75ed71a1/language-en.

[21] A survey of over 16 000 citizens and 14 000 businesses found that 38% of companies were experimenting with AI, https://www.unlockingeuropesaipotential.com/executive-summary.

[22] https://www.aboutamazon.eu/news/job-creation-and-investment/ai-adoption-forecast-to-unleash-600-billion-growth-in-europes-economy.

[23] McKinsey, The economic potential of generative AI: The next productivity frontier, 14 June 2023, https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#introduction and https://digital-strategy.ec.europa.eu/en/library/communication-boosting-startups-and-innovation-trustworthy-artificial-intelligence.

[24] Commission Communication on boosting startups and innovation in trustworthy artificial intelligence, COM(2024) 28 final, https://digital-strategy.ec.europa.eu/en/library/communication-boosting-startups-and-innovation-trustworthy-artificial-intelligence.

and specialists who develop these systems. Additionally, it involves cultivating a skilled work force capable of deploying AI in business, including SMEs, and establishing a robust connectivity infrastructure, which encompasses data centres. Investments supported by a well-functioning; deep capital market are also vital. Each of these elements is crucial reinforcing the need for comprehensive progress in all facets of the Digital Decade, to avoid jeopardising the whole initiative.

1.4 Keeping people and societies on board in an increasingly hybrid context

Digital technologies increasingly permeate every aspect of people's daily lives, sometimes with no or more limited offline alternatives. While they derive important benefits from this transformation in their lives it **becomes crucial to tackle the pressing concerns stemming from vulnerabilities and inequities, and more generally to help people adjust to the fast pace of change,** notably through a coherent and strategic approach on digital literacy**.** A substantial share of Europeans feels unequipped or uncomfortable with digital transformation: only 56% of adults have at least basic digital skills and about **100 million European citizens perceive digitalisation as a source of complexity** in their lives. A large majority of Europeans (88%) believing that public authorities should prioritise providing **human support** to help navigate the digital transformation[25]. People also feel vulnerable in the face of **online scams** or unfair practices regarding cancellations, refunds, and price gouging[26]. Finally, concerns over **AI's impact on human contributions, including jobs**, and the **loss of privacy,** are palpable and growing[27].

In 2024, technology continues to test our societies with 72% of Europeans now worried about the potential for manipulation and disruption of elections in the EU through **cyberattacks**[28]. More generally, the exposure of democratic societies to foreign interference is of particular concern this year, - the biggest electoral year in history, with countries worldwide including for 450 million Europeans, voting in pivotal elections. In this context, societal polarisation is emerging as one of the foremost risks for democracies[29], potentially jeopardising our ability to address effectively the pressing global challenges of our time. Therefore, one critical challenge is ensuring that digital technologies and services **enhance – rather than undermine – trust in institutions.**

Preventing interferences that impede societal stability such as disinformation is also paramount. Since May 2023, AI-generated false articles have increased by over 1 000% notably published by a constellation of more than 600 unreliable news and information websites[30]. New breeds of social media bots and tools created by generative AI are spreading **political, election-related disinformation** in ways that are increasingly difficult to detect. More evidence this year has shown that online platforms' recommendation algorithms carry a

[25] Special Eurobarometer 551 'The Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351.
[26] https://www.oecd-ilibrary.org/science-and-technology/consumer-vulnerability-in-the-digital-age_4d013cc5-en.
[27] Edelman R., Technology Industry Watch Out: Innovation at Risk, March 2024, https://www.edelman.com/insights/technology-industry-watch-out-innovation-risk.
[28] The EU in 2023: General report on the activities of the European Union, https://op.europa.eu/en/publication-detail/-/publication/ea6b0987-dd66-11ee-b9d9-01aa75ed71a1.
[29] World Economic Forum, Global Risks Report 2024, https://www.weforum.org/publications/global-risks-report-2024/.
[30] https://www.newsguardtech.com/special-reports/ai-tracking-center/ ; https://www.washingtonpost.com/technology/2023/12/17/ai-fake-news-misinformation/.

political bias that can disproportionately promote content, ultimately nudging public opinions and threatening democracy and social cohesion.

Finally, recent **developments have exemplified the complex interlinkage of digital technologies with public health**. On the positive side, the increased use of AI in health, health data spaces, and increased communication between patients and physicians are opening new opportunities[31]. However, 2023 has also highlighted the negative effects of online interface designs in mental health, as evidenced by addictive behaviours, attention deficits, or desensitisation to violence[32]. Recent analyses regarding children have pointed to a significant shift in childhood experiences, with the rise of a 'phone-centric culture'. This shift, combined with overprotection offline and declining education standards, has been associated with lower PISA mathematics scores and worsening mental health outcomes, including higher rates of addiction, depression, anxiety, and self-harm[33].

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

*The following sections monitor progress on the key **general objectives** for competitiveness, digital sovereignty (which requires technological leadership), cybersecurity, collective resilience and strong digital ecosystems, as well as their respective **targets** (gigabit connectivity, edge nodes, quantum and digitalisation of business, including SMEs, Cloud, AI and Big Data).*

2.1. Building digital technological leadership for future competitiveness

In recent years, **the EU's competitiveness has faced significant challenges, particularly due to its technology related shortcomings**. The EU has **lagged behind in all three key dimensions of innovation, production, and adoption,** especially in **critical technological developments**[34]**.** These deficiencies have notably affected its **performance in digitalisation,** raising concerns[35]. Furthermore, the EU's **lag in the ICT race** has resulted in a decrease in the global revenue share of EU GDP in the ICT market by 10.5% over the decade between 2013 and 2022[36], substantially effecting productivity gains.

When it comes to digital technologies and networks, the US is home to 28% of the world's digital companies, followed by China at 23% and the EU at just 14%. This distribution highlights significant asymmetries in the production of digital services[37]. Notably, 80% of the technologies and services crucial for Europe's digital transformation are still designed and manufactured outside the EU[38]. Furthermore, European platforms have not yet managed to

[31] See notably https://www.economist.com/technology-quarterly/2024/03/27/artificial-intelligence-has-long-been-improving-diagnoses.

[32] https://ec.europa.eu/commission/presscorner/detail/en/ip_24_926; In December 2023, the European Parliament adopted an initiative report which stressed 'the significant impact of addictive design on all individuals, but especially on children and adolescents'.

[33] PISA 2023. Insights and interpretations How smart phones and tablets can impact learning. December 2023.

[34] Commission Communication 'Long-term competitiveness of the EU: looking beyond 2030', COM(2023) 168 final: https://commission.europa.eu/system/files/2023-03/Communication_Long-term-competitiveness.pdf.

[35] Research estimates that digitization and other technological advances could add 0.5 to 1.0 percent to annual productivity growth. MGI, March 2021.

[36] Statista, ICT global market share worldwide 2023, https://www.statista.com/statistics/263801/global-market-share-held-by-selected-countries-in-the-ict-market/.

[37] Centre on Regulation in Europe (CERRE), Digital Industrial Policy for Europe, December 2022, p. 15, https://cerre.eu/publications/digital-industrial-policy-for-europe/.

[38] Centre on Regulation in Europe (CERRE), Digital Industrial Policy for Europe, December 2022, p. 15, https://cerre.eu/publications/digital-industrial-policy-for-europe/.

capture more than 5% of the global value over the past decade. Overall, European companies have minimal presence among global leaders, with only three out of the top 50 ICT companies by market capitalisation[39] being European.

In this context, **a sustained and coordinated effort is essential to strengthen the EU's digital technological leadership, as a key factor in enhancing its competitiveness.** This effort also requires robust governance mechanisms, for European companies and ensure a **level playing field within EU's single market**.

The theme of building technological leadership is central in many **National Digital Decade Strategic Roadmaps** with Member States referencing it when outlining their national contexts, ambitions, and strategies. This aligns with the Digital Decade Policy Programme on building sovereignty and resilience through technological leadership. However, the number of reported measures explicitly contributing to these objectives is rather limited. Member States frequently describe their contribution to technological leadership by citing measures that address the related targets for digital infrastructure and technologies. Most of these measures focus on the development and deployment of sovereign and resilient digital infrastructure and technologies, often through multi-country projects and other cross-border initiatives. This is particularly evident in the areas of high-performance computing, blockchain and security operation centres. Furthermore, some measures reported in the roadmaps support research and development in technologies, networks and infrastructure, including through competence centres and innovation clusters.

2.1.1. Investing in research and innovation

While the EU continues **to stand out as a significant contributor to global scientific advancement**, since 2022 **China has become the new frontrunner**, leading publications in the fields of engineering, enabling strategic technologies and ICT[40]. Meanwhile, the EU is falling behind in patent applications, with only Sweden (thanks to the contribution of Ericsson) being the only EU country among the top ten filers of international patent applications. Chinese applications in 2022 were eight times the number filed in Europe and eight out of ten of the top filers of **international patents are located in North-East Asia**.

Additionally, **the EU has also not met its 3% target levels for total (public and private) R&I investment**[41] which represents only 2.2% of EU GDP.[42] This level is well below that of the US (3.4%) and slightly below China's (2.4%), reflecting a particularly low level of investment in the private sector. This discrepancy is even more pronounced in the ICT sector, where **the EU's spending in the ICT sector was around seven times less than the US** in 2022 (EUR 39.2 billion against 301.5 billion; cf. graph below).

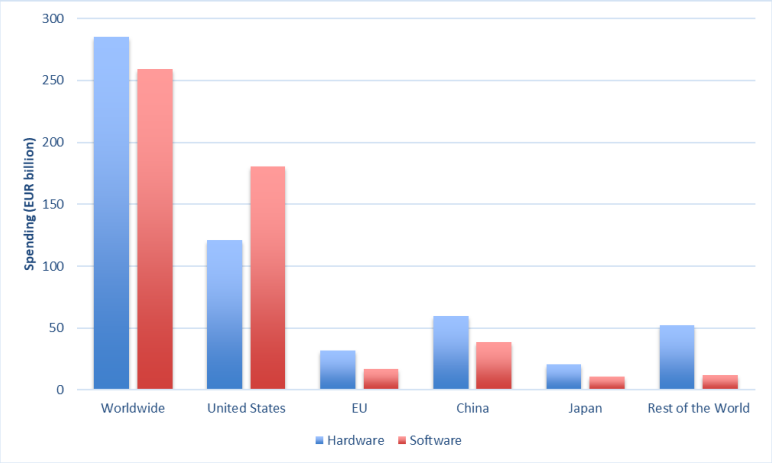
[39] https://companiesmarketcap.com/tech/largest-tech-companies-by-market-cap/.

[40] Horizon Europe strategic plan 2025-2027 analysis, p. 52 – 55, https://op.europa.eu/en/publication-detail/-/publication/b3baec75-fdd0-11ed-a05c-01aa75ed71a1/language-en/format-PDF/source-287596143.

[41] Commission Communication 'A new ERA for Research and Innovation', COM/2020/628 final: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:628:FIN.

[42] Based on the latest available data from 2022 (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=R%26D_expenditure&oldid=627002#Gross_domestic_expenditure_on_R.26D), R&I investment stood at 2.2% of EU GD{. This level is well below that of the US (3.4%) and slightly below China's (2.4%), reflecting a particularly low level of investment in the private sector.

Figure 1. R&D expenditure on information and communication technology (ICT) worldwide in 2022 (Source: European Commission. (2023) and Statista Inc[43])



In the tech race, the EU's companies are aiming for leadership in emerging and disruptive technologies, aiming to enhance their military and intelligence capabilities, while actively pursuing civil-military fusion strategies. To better **protect the EU's strategic assets, interests, autonomy and security,** the Commission has introduced **safeguards** under the Horizon Europe Regulation[44] and investment safeguards under the **European Innovation Council**. Continuing its efforts to address **vulnerabilities and research security risks in the R&I sector**, the Commission proposed a Council Recommendation of 24 January 2024,[45] as part of the European Economic Security Strategy. This proposal **highlights the necessity to advance a shared understanding of vulnerabilities and take steps to address them at an EU level**.

Furthermore, the EU has adopted **guidelines for research involving dual-use items**, to ensure that risks are identified, managed and mitigated effectively by authorities and research organisations.[46] In line with the Economic Security Package of 24 January 2024[47], the Commission has launched a **public consultation on EU-level R&D support involving technologies with dual-use potential[48].** This consultation seeks to assess the adequacy of support in response to existing and emerging geopolitical challenges outlined in the Economic Security Strategy.

[43] https://www.statista.com/statistics/732308/worldwide-research-and-development-information-communication-technology./; https://www.statista.com/statistics/732308/worldwide-research-and-development-information-communication-technology./.

[44] Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, and repealing Regulations (EU) No 1290/2013 and (EU) No 1291/2013.

[45] Proposal for a Council Recommendation on enhancing research security, COM(2024) 24 final: https://research-and-innovation.ec.europa.eu/system/files/2024-01/ec_rtd_council-recommendation-research-security.pdf.

[46] Commission Recommendation (EU) 2021/1700 of 15 September 2021 on internal compliance programmes for controls of research involving dual-use items under Regulation (EU) 2021/821 of the European Parliament and of the Council setting up a Union regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items.

[47] https://europa.eu/newsroom/ecpc-failover/pdf/ip-24-363_en.pdf.

[48] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14060-RD-on-dual-use-technologies-options-for-support_en.

Technological leadership - Recommended policies, measures and actions[49]:

Mobilising investments

Member States are encouraged to effectively increase investment in digital R&I across sectors to achieve the target of 3% of EU GDP[50]. This includes investing in critical infrastructure and technologies, as well as supporting projects of strategic interest for the EU's digital sovereignty.

Completing the Digital Single market

Member States should help plan and coordinate investment and reforms to deepen the Single Market, which is an essential factor for accelerating an EU-based digital transformation.

Member States should engage with the research and innovation sector to increase research security in national research activities, with the aim of managing risks such as undesirable transfer of critical technology, malign influence, and ethical or integrity violations by non-EU countries.

Fostering cooperation between Member States

Member States are encouraged to fully engage in the joint Economic Security risk assessment exercises. This involves coordinated risk assessments of technology security and technology leakage and notably to share the relevant information in their possession.

2.1.2. A functioning Digital Single Market as a public good for EU's productivity

Intra-EU trade in services accounts for only about 8% of GDP compared with about 25% for goods. The past 5 years were marked by intensive legislative activity, creating the conditions for a competitive Single Market. A truly functional Single Market will be critical for progressing towards the Digital Decade objectives and targets. By securing a **level playing field** for all European businesses, the **digital single market is one of the key enabling factors allowing companies to seek new opportunities, grow and achieve the necessary scale to compete at EU level and internationally**, while also providing more tools to navigate difficult times. The Digital Single Market also widens consumer choice, removing artificial barriers within the EU and helps set common values and standards.

The Implementation of the Digital Markets Act[51]. European small-and medium sized enterprises and startups are reliant on large digital platforms: over 1 million EU businesses sold goods or digital services via online platforms in 2023.

The DMA lays down uniform rules to regulate the behaviour of digital platforms acting as gatekeepers between business users and their customers in the EU. This approach entails a shift

[49] Recommendations in this report build on those issued with the first report on the State of the Digital Decade, considering the progress made where possible and acknowledging the short time elapsed between last year's recommendations (end of September) and the submission of Member States' national roadmaps. In many cases, the recommendations of the first report on the State of the Digital Decade are reiterated in the present report, either with same scope, or with a partly different focus and level of detail. This is valid for all recommendations issued in the present report.

[50] Council Recommendation (EU) 2021/2122 of 26 November 2021 on a Pact for Research and Innovation in Europe, OJ L 431, 2.12.2021, p. 1–9.

[51] Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act), OJ L 265, 12.10.2022, p. 1–66, http://data.europa.eu/eli/reg/2022/1925/oj.

from ex-post anti-trust intervention to ex-ante regulation with a set of rules that are changing the way large digital platforms are allowed to operate in the EU.

On 6 September 2023, the Commission designated six gatekeepers - Alphabet, Amazon, Apple, ByteDance, Meta and Microsoft - under the DMA, which were joined by Booking following the designation of 13 May 2024.

In total, 24 core platform services provided by gatekeepers have been designated. These services are important gateways for businesses to reach their consumers.

From 7 March 2024, the first six gatekeepers have to comply fully with the DMA obligations for each of their designated core platform services. If it suspects that this is not the case, the Commission can initiate enforcement actions to ensure compliance. On 25 March, the Commission opened non-compliance investigations against Alphabet, Apple and Meta. Moreover, on 24 June, the Commission also opened new non-compliance investigation into Apple's new contractual terms for developers. The Commission's monitoring of effective compliance by gatekeepers is ongoing.

The effective implementation and enforcement of the recently approved legislation will be a key challenge over the coming years. Moreover, a true capital markets union in particular is key for succeeding in the strengthening of the Digital Single Market and ongoing green and digital transitions[52].

Supporting competitive digital ecosystems and innovative businesses appear as objectives in a large number of **National Digital Decade Strategic Roadmaps**. This corresponds to the objectives of the Digital Decade Policy Programme, aiming at strong digital ecosystems and resilient supply chains.

However, the number of reported measures that explicitly contribute to these objectives is rather limited. Member States most often describe their contribution to competitiveness and resilience by referring to measures addressing the related targets for digital technologies and digitalisation of business. Most of these measures focuses on supporting digital ecosystems and scaling up innovative businesses.

A small number of measures include regulatory action for standard setting, interoperability and fair competition for users, businesses and regions (e.g., Bulgaria, Cyprus, Greece, Croatia, Luxembourg and Sweden), addressing dependencies for critical technologies supply (e.g., Denmark, Germany, France, Spain, and the Netherlands) as well as initiatives in relation to international exchange (e.g., Lithuania and Sweden).

2.1.3. Developing and deploying sovereign and resilient collaborative connectivity and computing infrastructure

The success of the Digital Decade will depend on the EU's capacity to build an ecosystem that is grounded in the convergence between connectivity infrastructure and computing services, including chips manufacturers, electronic communications, network equipment providers, edge

[52] Lagarde, C. 'A Kantian shift for the capital markets union', speech at the European Banking Congress, Frankfurt am Main, 17 November 2023, https://www.ecb.europa.eu/press/key/date/2023/html/ecb.sp231117~88389f194b.en.html, following Commission Communication 'A Capital Markets Union Action Plan for people and businesses-new action plan', COM(2020) 590 final: https://eur-lex.europa.eu/resource.html?uri=cellar:61042990-fe46-11ea-b44f-01aa75ed71a1.0001.02/DOC_1&format=PDF.

and cloud service providers, evolving towards the provision of **collaborative connectivity and computing**.

2.1.3.1. Gigabit connectivity infrastructure

***Eurobarometer 2024**: to facilitate their daily use of digital technologies, **4 out of 5** Europeans stress the need for **better connectivity** through the availability and affordability of high-speed internet connections*[53].

A cutting-edge digital network infrastructure **is a prerequisite and an essential enabler** for developing the services and applications that will benefit European business and consumers as a factor of productivity and economic development. For this reason, **the ambition in the Digital Decade is to provide all Europeans and businesses with Gigabit fixed and mobile networks**. In the Declaration on Digital Rights and Principles, the EU and its Member States also committed that digital connectivity should be affordable for all[54].

The EU is still far from achieving its connectivity targets. Fibre networks, which are critical for delivering gigabit connectivity, **only reach 64% of households,** compared to over 99% in Japan and South Korea[55]. Despite significant progress in some Member States (in particular a 38% increase in FTTP deployment in Greece linked to a catch-up effect) **average annual progress in the EU (+13.5%) remains far too limited to ensure that the target of 100% coverage will be achieved by 2030**, taking into account the cost and difficulty of covering the remaining 36% of households. **Without additional action and investment, less than 90% of the target will be achieved by 2030.**

Moreover, significant discrepancies exist between Member States concerning in particular fibre rollout, which is critical for delivering gigabit connectivity. The discrepancy in the deployment of fibre networks may be explained by a different starting point in terms of the quality and the footprint of legacy infrastructure, the different geography of Member States, and also different approaches of public financing of fibre deployment and regulatory treatment of access to legacy networks. Avoiding unnecessary overbuild of infrastructure, in particular that which is publicly funded, has worked well, for instance in France.

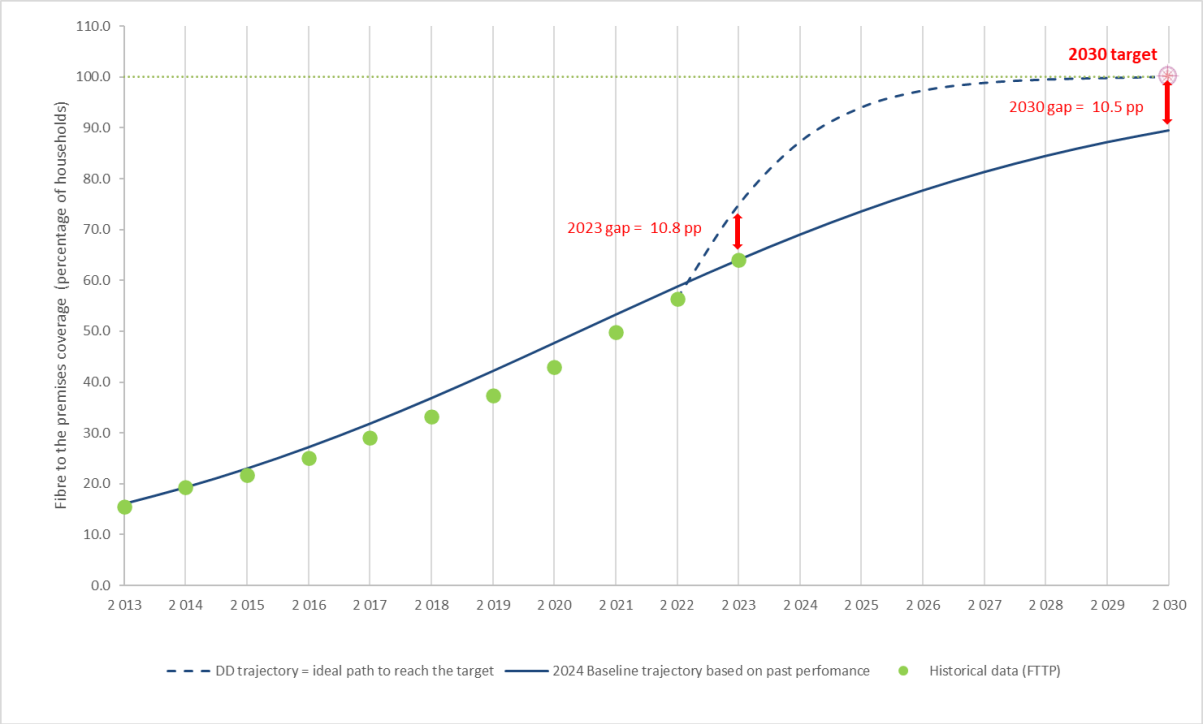
There is still a significant digital divide between urban and rural areas in the European Union. Fixed VHCN coverage (FTTP & DOCSIS 3.1) increased by 11.5 p.p. from 44.2% in 2022 to 55.7% in 2023, which is still much below the overall fixed VHCN coverage of 78.8%. FTTP coverage in rural areas increased by 12.1 p.p. to 52.8% in 2023, lagging behind the overall FTTP coverage of 64.0%. 5G coverage in rural areas is increasing quickly, by 22.7 percentage points (p.p.) within one year, reaching 73.7% in 2023. However, this is still much lower than the overall 5G coverage at 89.3%.

On the demand side, as of 2023, the take-up of at least 1 Gbps broadband in the EU remains very low, at 18.5%[56], while in 20 Member States, less than 10% of consumers

[53] Special Eurobarometer 551 'The Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351. In this document, the study is referred to as 'Eurobarometer 2024'.
[54] 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.
[55] Visionary Analytics, International benchmarking of the digital transformation, March 2024.
[56] Source: Communications Committee (COCOM).

have adopted this high-spread broadband. The take-up of high-speed fixed broadband subscriptions is lower in the EU than in the US (20.44%), South Korea (88.04%) and Japan (84.77%)[57].

Figure 2. FTTP coverage in the EU. Historical data, Digital Decade (DD) trajectory and 2024 baseline trajectory towards 2030



While the rollout of 5G currently reaches 89.3% of EU's population (with just 73.7% coverage in rural areas), it still **fails to deliver advanced 5G performance** widely across Europe. Most of the current 5G deployment can be categorised as 'basic 5G', while higher quality of service and additional functionalities is still needed to meet the demand for more advanced 5G services. This is also a requirement to achieve the computing continuum that includes connectivity, cloud/AI as well as the Internet of Things (IoT).

'Stand-alone' 5G, which ensures high reliability, and low latency, which is crucial for enabling advanced features, is still not deployed on any meaningful scale, except in a very few cases of private networks.

Meanwhile, in 2023, 5G coverage in the 3.4-3.8 GHz band (3.6 GHz band), which is considered the primary pioneer band for 5G in the EU and the only widely available mid-band offering large scale that offers the possibility of large contiguous spectrum portions of 80-100 MHz stood at only 50.6%. This band is critical because it has the potential to achieve high-quality 5G coverage (a good balance between coverage and capacity).

Accelerating deployment is crucial because the availability of high quality dense 5G infrastructure is not only **a major driver for today's EU competitiveness, but also the main basis for the future 6G deployment**, which will reuse large parts of the 5G infrastructure (e.g., fibre backhaul, LEO satellites, etc.).

[57] Share of fibre subscriptions in total fixed broadband in 2022, source: OECD.

In their **National Digital Decade Strategic Roadmaps**, 24 Member States have provided trajectories for the **gigabit connectivity target** and the **5G coverage target**. Most of the national target values (23/24 for gigabit connectivity and 22/24 for 5G) for 2030 encompassing basic 5G and very high-capacity network (VHCN).[58]

In total Member States reported 93 measures contributing to the gigabit target, with a total budget of EUR 82 billion. Most measures focus on regulatory intervention to facilitate network deployment, including the regulation of access and the re-use of physical infrastructure, financial support for deploying networks in commercially non-viable areas (including rural areas and outermost regions) or for deploying backbone networks.

35 measures were reported to contribute to the 5G target, with a total budget of EUR 7 billion. Most of them focus on spectrum management, including spectrum awards, as well as on regulatory intervention to facilitate network deployment.

The deployment of connectivity networks needs to accelerate, as well as their evolution to a **Connected Collaborative Computing Network (3C Network),** as described in the **White paper on connectivity** 'How to master Europe's digital infrastructure needs?' published in February 2024 and subject to public feedback[59].

According to estimates, the increasing softwarisation and cloudification of electronic communications networks require an **additional EUR 80 billion of investment up to 2027**. This is additional to bridging the more than **EUR 200 billion investment gap** required over the next 6 years to achieve the Digital Decade connectivity targets.[60]

These estimates require sustained efforts by private operators and public authorities, going well above the amounts budgeted by the Member States in their national roadmaps to ensure high quality gigabit connectivity with high reliability, low latency and speed that users will need by 2030. More also has to be done to address the unique fragmentation of the European telecom retail markets and provide conditions for scaling up.

The White Paper on connectivity describes the future of the EU's digital network infrastructures and related challenges. It underlines the need to invest in research and technological capability deployment, as well as in secure and resilient digital infrastructures, and to build a real single market for communications networks enabling the expansion of the sector from the traditional consumer internet market towards a computing continuum: from chips and other components for high-speed processors embedded in devices, to edge computing

[58] Based on the Commission Implementing Decision of 30.06.2023 setting out key performance indicators to measure the progress towards the digital targets established by Article 4(1) of Decision (EU) 2022/2481 of the European Parliament and of the Council:
- Gigabit connectivity is measured as the percentage of households covered by fixed Very High-Capacity Networks (VHCN). The technologies considered are those currently able to deliver gigabit connectivity, namely Fibre to the Premises and Cable DOCSIS 3.1. The evolution of the Fibre to the Premises coverage will also be monitored separately and taken into consideration when interpreting VHCN coverage data.
- 5G coverage is measured as the percentage of populated areas covered by at least one 5G network regardless of the spectrum band used.

[59] European Commission, White Paper - How to master Europe's digital infrastructure needs?, February 2024, https://digital-strategy.ec.europa.eu/en/library/white-paper-how-master-europes-digital-infrastructure-needs.

[60] WIK Consult, Investment and funding needs for the Digital Decade connectivity targets, July 2023, https://digital-strategy.ec.europa.eu/en/library/investment-and-funding-needs-digital-decade-connectivity-targets

working cohesively with centralised cloud services and AI-powered applications managing the network.

The **Smart Networks and Services Joint Undertaking** (SNS JU) brings together industry and public bodies under an EU platform for R&I funding towards 5G advanced and 6G systems, to leverage the EU's strength in network supply towards the broader value chain including cloud and software as well as devices and components. The SNS JU initiated 6G research in Europe through the co-funding of 63 research and innovation projects on 5G advanced and 6G networks, encompassing architectures, advanced wireless and optical communication, Non-Terrestrial Networks, and secure and reliable communications.

The White Paper also highlights the importance of **submarine cable infrastructures,** carrying over 99% of intercontinental data traffic, and for which a **Recommendation to Member States**[61] was adopted in February 2024. The recommendation seeks to foster action for accurate mapping of existing cable infrastructures to facilitate an EU-wide assessment of risks, vulnerabilities, and dependencies, in particular on high-risk suppliers. These will be mitigated by a "Cable Security Toolbox", a common governance of cable technologies and cable-laying services, ensuring rapid and secure repair and maintenance of cables, as well as identifying and funding critical intra-EU and global Cable Projects of European Interest (CPEIs).

Connectivity - Recommended policies, measures and actions:

Completing the Digital Single market

Member States are encouraged to work with the Commission to take action to transform the electronic communications sector and allow operators to reach critical size.

Mobilising investments

Member States should take targeted measures to incentivise the take-up of enhanced fixed and mobile networks services, which is itself linked to the development and increased take-up of data intensive applications and use cases, based on e.g., edge computing, AI, and IoT, including by SMEs.

Member States should take targeted measures to promote gigabit take-up by end-users, in particular applying best practices to connect end-users including to innovative applications as well as, where appropriate, support schemes to foster take-up by end-users and ensure affordability for higher quality broadband access.

Member States should consider further public support, combined with European funds, as well as incentivise private investments, to reach market failure areas, and facilitate the development of new 5G use cases based on advanced connectivity and associated new ecosystems, such as Connected and Automated Mobility, Smart Cities, eHealth.

They should ensure sufficient access for new players to spectrum for innovative B2B and B2C applications and encourage operators to speed up the deployment of stand-alone 5G core networks. Member States could explore public private partnerships where suitable, for

[61] Commission Recommendation (EU) 2024/779 of 26 February 2024 on Secure and Resilient Submarine Cable Infrastructures, C/2024/1181, OJ L, 2024/779, 8.3.2024.

instance where the public capital takes the form of guarantees or junior co-investment, on market terms to help the electronic communications sector fund its transformation.

Member States should integrate a strong sustainability dimension in developing and deploying 6G, in particular aligning with the upcoming EU code of conduct and leveraging the EU taxonomy.

Fostering cooperation between Member States

Members States should implement the new submarine cable recommendation as quickly as possible to ensure a coordinated mapping and assessment of our cable infrastructures, establishing a Cable Security Toolbox of mitigating measures as well as a list of Cable Projects of European Interest.

2.1.3.2. Semiconductors

Semiconductors are the 'steam engine' of the digital and green transformation, providing critical applications and infrastructures to smartphones and cars, healthcare, energy, communications, defence, space, and industrial automation. The semiconductor market is expected to double over this decade from its 2021 value, reaching more than USD 1 trillion by 2030.[62] This expansion encompasses areas such as chip design, wafer production, chemical provision, packaging, and capital equipment.

Semiconductors are at the centre of geostrategic interest and industrial and security strategies across the world. Our partners and competitors deploy vast public and private investments and offensive economic measures, to guarantee supply and production capacity for their economies.

The supply chains are globally interconnected but, for most segments, still highly concentrated in Asia, creating dependencies from non-EU chip designers and manufacturers, and packaging (including advanced packaging) facilities, which can result in supply shortages disrupting entire industrial sectors (e.g., automotive, industrial automation, communications).

Box: Harnessing the best Euro-high performance computing (HPC) for AI models. *The rapid advancement of AI services relies heavily on the integration of specialised chips optimised for machine learning algorithms, such as general processing units (GPU). These chips enable efficient processing of vast amounts of data, powering AI applications across various sectors including healthcare, finance, and autonomous vehicles. Similarly, HPC systems, exemplified by projects like JUPITER heavily depend on cutting edge semiconductor technologies to achieve unprecedented computational capabilities, with advanced GPUs playing a pivotal role in accelerating complex simulations and data analysis tasks. JUPITER will be the first EuroHPC exascale supercomputer, located at the Forschungszentrum Jülich campus in Germany and operated by the Jülich Supercomputing Centre. It will be based on Eviden's BullSequana XH3000 direct liquid cooled architecture, integrating NVIDIA technology into its cutting-edge semiconductor chips. This integration underscores the pivotal role of advanced chips in powering groundbreaking simulations and*

[62] McKinsey, Exploring new regions: The greenfield opportunity in semiconductors, January 2024, https://www.mckinsey.com/industries/semiconductors/our-insights/exploring-new-regions-the-greenfield-opportunity-in-semiconductors.

AI applications, marking a significant milestone in Europe's pursuit of technological leadership in HPC and generative AI.

Europe's ambition in the Digital Decade is **to double its share of global production (from 10 to 20%)** and to increase its global leadership in this sector, targeting investments to produce the most advanced semiconductors (2 nanometre process). **The EU can leverage its powerful research** (IMEC, CEA LETI and Fraunhofer) **and technological capacity** (ASML, ASM, chemicals), which are state of art for the most advanced chips thanks to past strategies and investments.

The combined EU27 semiconductor value chain market share in 2022 was EUR 90 billion or 9.8% of global value chain revenues. Revenues went up substantially from the 2019 levels of EUR 57 billion, but market share fell slightly from 9.9% in 2019. The US is currently the market leader (around 40%), followed by Taiwan (15%), South Korea (13.2%), Japan (12.4) and the EU27, whose revenues are 9.8% of the global market by value according to International Data Corporation[63] estimation. By country headquarters, the total combined EU-27 value chain revenues are concentrated in the Netherlands, Germany, France, Austria, Belgium, and Luxembourg. Semiconductor manufacturing contributes 56% of total value chain revenues, with equipment at 29%.

The Digital Decade sets the target that the EU's market share for cutting-edge semiconductors should reach 20% of global revenue by 2030. However, at this stage, cutting-edge semiconductors are still not available on the market and significant investment is planned in EU and will boost manufacturing capability in Europe in the coming years.

Between 2022 and 2023, revenues in the EU declined by 3% (from 90 to 87 billion euros), while global revenues fell by 14% (from 918 to 791 billion euros). **In this challenging context, the next stage for the EU is to reinforce further the semiconductor ecosystem in Europe, from R&I to manufacturing capacity, expanding industrial presence across the supply chain**. In 2024, the EU faces a significant challenge in ensuring a robust production network, necessitating massive financial input. The EU must in particular overcome weaknesses in chip design, manufacturing, and assembly and packaging, as manufacturing in the EU had fallen over time because of outsourcing to foundries outside the EU and the impact of the 2020-21 shortage.

With the EU **Chips Act** which entered into force on 21 September 2023 and the second Important Project of Common European Interest on Microelectronics and Communication Technologies (**IPCEI ME/CT**), and the **Alliance on Processors and Semiconductor technologies,** the EU has taken bold steps to implement its vision of EU becoming a major actor of the manufacturing of world class semiconductors. Achieving the ambitious Digital Decade goals will require a continuous concerted effort from European entities.

In their **National Digital Decade Strategic Roadmaps**, Member States reported a total of 47 measures contributing to this target, with a total budget of EUR 48.6 billion, which is the third highest budget reported for a target. Most of the measures focus on support for research and development and for production capacity and industrial deployment of semiconductors, including via the IPCEI on Microelectronics and Communication Technologies. Moreover, a

[63] https://www.idc.com/about/.

two Member States (Poland, Slovenia) also provide national target values and trajectories for the semiconductor target or for elements contributing to it.

Semiconductors - Recommended policies, measures and actions:

Mobilising investments and fostering cooperation between MSs

Member States should stimulate secure and sustainable domestic chip design and manufacturing capabilities, including by reshoring packaging and assembly activities within the EU, increasing digital skills in advanced technologies across sectors and strengthening engagement with the European ecosystem.

Completing the Digital Single market

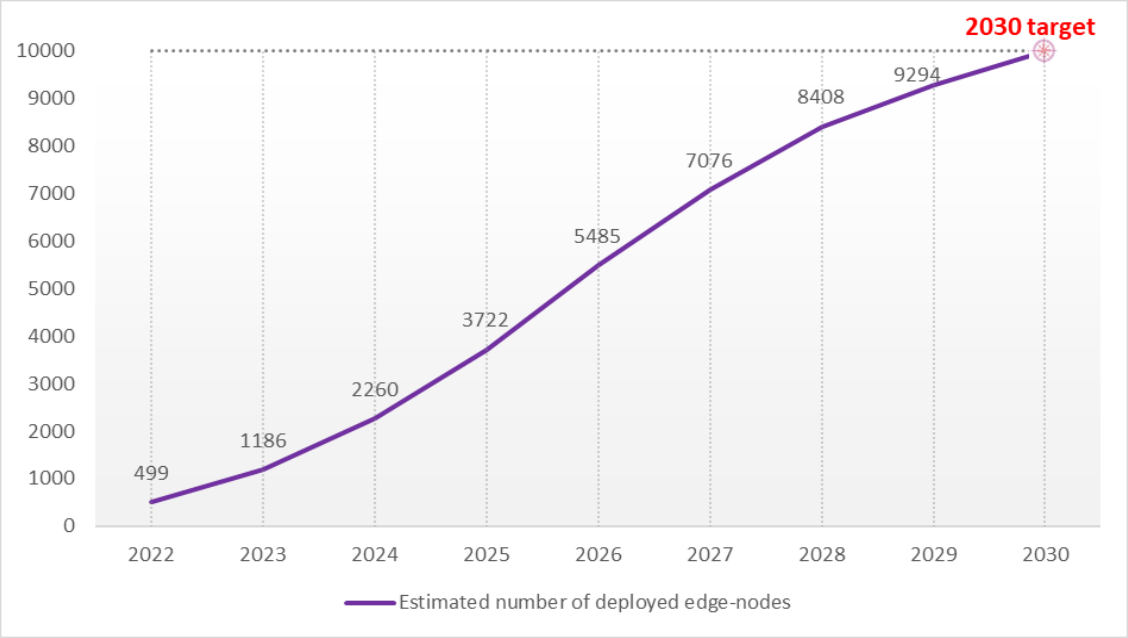
Member States should consider policies to leverage trusted electronics including, as necessary, standards, certification, and common requirements for secure chips, including security requirements and related performance-based specifications in public tenders (e.g., for communications networks or data infrastructures).

Member States should develop a stronger Foreign Direct Investments policy to keep intellectual property in Europe.

2.1.3.3. Edge nodes

The development of Edge nodes represents not only **a paradigm shift towards a decentralised model** of data storage, providing low-latency and privacy-preserving data processing**. It also marks the future of digitalisation infrastructures as an essential building block** for driving innovative and efficient infrastructures grounded on AI-based software, computing and telecommunications networks. This revolution is also an opportunity for the EU to safeguard the security, sovereignty, and technological independence of digital networks as critical infrastructures.

Figure 3: Edge node deployment (EU projection to 2030)[64]



The Digital Decade policy programme aims to deploy **at least 10 000 highly secure, climate-neutral edge nodes**, distributed in a way that guarantees access to data services with low latency (i.e., a few milliseconds) wherever businesses are located.

The total deployment of edge nodes in the EU reached **1186 estimated units in 2023**, an increase from 499 units in 2022. This estimation is still **insufficient to meet the total target**, accounting for only **12% of the edge nodes target for 2030**. Moreover, the market is far from mature with only 12% of this deployment corresponding to production, while 88% is used for testing and research purposes.

According to preliminary findings of the Edge Observatory and IDC figures[65], Europe's edge computing expenditure in 2023 accounted for **22% of global spending** on edge computing (EUR 190 billion in 2023). The United States is expected to spend the most on edge computing, more than 40% of the worldwide total, followed by Europe and China. It is expected that Latin America and China will experience the fastest spending growth over the next five years.

The spread of edge nodes in the EU shows significant geographical disparity with front runners in France, Germany, Italy, and Spain. These member states have the potential to set trends and spread best practices, building in particular on France's fast rate of investment in edge computing infrastructure and adoption of related technologies since the early 2020s, as well as on Spain's procurement practices to foster environmentally friendly procurement building on the 59% of enterprises which consider the environmental impact of ICT services or equipment before selection.

[64] The edge node trajectory is based on findings of the Edge Observatory study (https://digital-strategy.ec.europa.eu/en/policies/edge-observatory)

[65] https://digital-strategy.ec.europa.eu/en/policies/edge-observatory and IDC Worldwide Edge Spending Guide, https://www.idc.com/getdoc.jsp?containerId=IDC_P39947.

Six Member States (Croatia, Greece, Italy, Ireland Poland and Slovenia) provided a trajectory for the edge nodes target in their **National Digital Decade Strategic Roadmaps**. A total of 19 measures contributing to this target, with a total budget of EUR 2 billion, has been reported.

Most of the measures focus on support for **deploying edge nodes**, including for research and/or first industrial deployment purpose Cvia the Important Project of Common European Interest (IPCEI) on Next-Generation Cloud Infrastructure and Services and **support for research and development into edge nodes**.

Edge Nodes - Recommended policies, measures and actions:

Mobilising investments

Member States should support the deployment of secure and sustainable edge nodes as part of their connectivity, IoT and AI strategies.

Completing the Digital Single market

Member States should ensure that the deployment of edge nodes does not create new divides within the single market.

2.1.3.4. Quantum computing

Quantum technologies will transform the EU's industry and society fundamentally, providing for huge productivity gains and revitalising industry, enabling the performance of complex computational tasks, such as modelling biomolecular and chemical reactions, accelerating the accurate diagnosis and treatment of diseases, and protecting communication systems with extremely secure keys. Quantum technologies will be crucial for securing European sovereignty, as highlighted in the European Economic Security Strategy[66], and the Commission Recommendation on critical technology areas for the EU's economic security for further risk assessment with Member States[67].

Since 2018, more than EUR 8 billion has been committed to quantum technologies by the EU and Member States, complemented with the launch of multi-country projects, individual agreements and, most recently, the European Declaration on Quantum Technologies, which is being signed by Member States.

In this context, the first milestone of the Digital Decade target - having **a first computer with quantum acceleration by 2025- is expected to be reached this year. The HPC-QS project[68]** is scheduled to soon deploy two systems manufactured by the French start-up PASQAL, which began as a project funded by the EUR 1 billion Quantum Technologies Flagship, in France (GENCI) and in Germany (Jülich). The continuation of the Quantum Flagship and the ongoing procurement and deployments of additional quantum computing and simulation systems overseen by the EuroHPC Joint Undertaking, as well as the further development and deployment of the European quantum communication infrastructure (EuroQCI), launched in

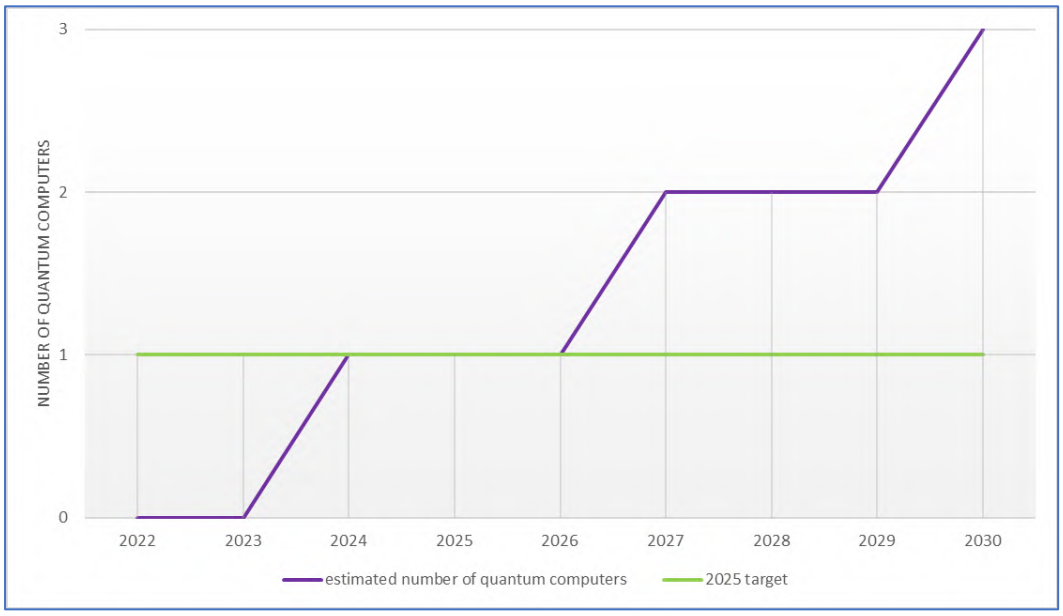
[66] Joint Communication on a European Economic Security Strategy, JOIN/2023/20 final, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=JOIN:2023:20:FIN.

[67] Recommendation (EU) 2023/2113 of 3 October 2023 on critical technology areas for the EU's economic security for further risk assessment with Member States, C(2023) 6689 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202302113.

[68] https://www.hpcqs.eu.

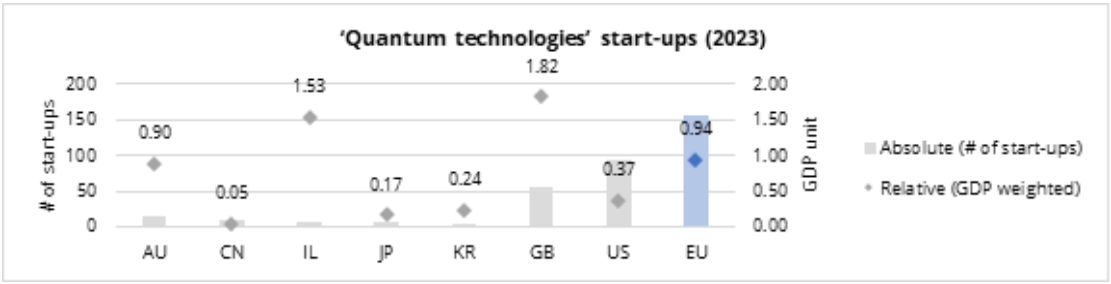
2019, and of advanced quantum sensing infrastructures will help the EU progress toward its 2030 target which is to **have three quantum computers based on European technology**.

Figure 4. Number of quantum computers in the EU. Trajectory towards 2030



The quantum ecosystem is also relatively strong in the EU, with the number of quantum technologies start-ups being the strongest in the world, when GDP weighted.

Figure 5. Quantum technologies start-ups International Benchmarking study[69]



On the other hand, **European public investment in quantum, although promising, has not yet been matched by the private sector**: in 2021, around 25% of quantum industry participants globally were based in Europe, yet the region had received less than 5% of global funding. The European industry needs to identify and invest in quantum use cases that could transform productivity and lead to concrete improvements in everyday life.

Six Member States (Czechia, Germany, Finland, Croatia, Italy and Poland) provided a trajectory for the quantum target in their **National Strategic Digital Decade Roadmaps**, Furthermore, Member States reported 58 measures contributing to this target, with a total budget of EUR 3.7 billion.

Most of these measures focus on support for research and deployment in quantum computing in companies, including via the European High Performance Joint Undertaking, and on support

[69] Study 'International Benchmarking of the Digital Transformation 2024': https://digital-strategy.ec.europa.eu/en/news-redirect/833343.

for deploying quantum technologies. Only a very small number of measures, from Latvia and Croatia, focus on activities supporting 'from lab to market', i.e., commercialising new solutions and services on the market.

While progress to date is promising, **more coordination and joint action are needed to reach the 2030 target**, building on the December 2023 **European Quantum Declaration.**[70]

Quantum - Recommended policies, measures and actions:

Fostering cooperation between MSs:

Member States should advance the objectives of the Quantum Declaration, namely, to collaborate with each other and with the Commission in the strategic and high-potential domain of quantum technologies, with the ultimate aim of making the EU "the quantum valley" of the world.

Member States should coordinate investment in quantum technologies across Member States and strive to address the relatively low level of Europe's private sector investment.

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

The ability of business to harness powerful digital ecosystems and embrace digitalisation is essential for EU's prosperity and competitiveness in the long term. Digitalisation enables businesses to streamline operations, increase efficiency, and adapt quickly to changing market dynamics, while fostering leadership, agility and resilience to market disruptions.

2.2.1. Promoting the digital transformation of EU enterprises

The adoption of digital technologies by business is key to ensure a convergence of productivity between leading and laggard firms and avoid the strengthening of "winner takes all" effect as well as ensure the diffusion of productivity gains across the economy. Reaping the productivity gains of digital technologies not only requires access to secure and affordable technologies but also complementary changes in organisation of businesses, led by management and skills factors[71].

2.2.1.1. Take up of advanced digital technologies

In 2023, the adoption of digital technologies by European companies was still well below the Digital Decade targets, in particular those for the uptake of AI and big data. Under current trends, and without further investment and incentives, the targets will not be met by 2030: the projected baseline trajectory indicates that only **64% of businesses will use cloud, 50% big data and 17% AI**, far from the 75% objective set for 2030.[72] Another major concern is that European cloud providers' **market share has decreased from 27% in 2017 to 13% in Q2 2022**[73]**.**

[70] European Declaration on Quantum Technologies, https://digital-strategy.ec.europa.eu/en/library/european-declaration-quantum-technologies.

[71] Anderton, R., Botelho, V. and Reimers, P. (2023), 'Digitalisation and productivity: gamechanger or sideshow?', Working Paper Series, No 2794, ECB, March 2023.

[72] Commission Communication establishing the Union-level projected trajectories for the digital targets, C (2023) 7500: https://digital-strategy.ec.europa.eu/en/library/communication-establishing-union-level-projected-trajectories-digital-targets.

[73] Sinergy Research Group, *European Cloud Providers Double in Size but Lose Market Share*, 27 September 2022: https://www.srgresearch.com/articles/european-cloud-providers-continue-to-grow-but-still-lose-market-share.

25 Member States provided a trajectory for the take-up of cloud computing services, big data or artificial intelligence in their **National Strategic Digital Decade Roadmaps.** Considering the three technologies individually, Denmark assumed a national target value above 75% for cloud computing services and AI and Sweden for cloud computing services.

Member States reported in total 164 measures contributing to the uptake of cloud computing services, big data or artificial intelligence with a total budget of EUR 10.1 billion. The measures mainly focus on three areas: (i) strengthening ecosystems, information sharing and knowledge exchange on the uptake of cloud/AI/big data; (ii) enabling framework conditions for the uptake of these 3 technologies, including access to training and financial support (for example via funding programmes), (iii) support for developing AI/cloud/big data capabilities, including via R&D for advanced technologies. Measures to promote the roll-out and establishment of viable industrial solutions in the market are significantly less numerous – only Belgium, Denmark, Greece, Romania, Sweden and Slovakia reported relevant measures in their roadmaps.

Take up of cloud services

In 2023 the estimated economic value of European cloud data flows is estimated to be EUR 107 billion, of which EUR 77 billion was in the EU (estimated to increase to EUR 328 billion by 2035). The 2023 European total economic value of cloud data flows is thus greater than each of the respective GDPs of Bulgaria, Croatia, Estonia, Latvia, and Lithuania.

In 2023, despite the European cloud computing market expected to be worth EUR 560 billion,[74] **cloud uptake among enterprises in the EU was just above one in three** (38.9%) with large differences between Member States, company size and cloud service types. This represents an increase of 4.9 percentage points from the last measurement in 2021, corresponding to an annual progress of almost 7%. This remains below the progress of over 9% each year until the end of the decade that would be necessary to meet the target.

[74] Statista, Cloud Computing in Europe – statistics and facts, https://www.statista.com/topics/8472/cloud-computing-in-europe/#topicOverview.

Figure 6. Percentage of enterprises using cloud services in the EU. Historical data, Digital Decade (DD) trajectory and 2024 baseline trajectory towards 2030

The EU needs to accelerate the uptake of cloud services, while ensuring respect of European core values and interests. Dissemination and exploitation efforts and strategies, jointly developed by both public and private actors, need to strongly boost the use of new advanced cloud solutions, such as the ones expected to be developed under the IPCEI-CIS, in particular among SME ecosystems. The Cloud IPCEI Exploitation Office should play a key role in this dissemination in addition to the spillovers and dissemination commitments undertaken by the direct participants in the IPCEI CIS.

In recent years, significant public intervention targeted the European Cloud market's supply side, aiming to foster diversification by promoting the development and deployment of interoperable and trusted cloud-to-edge business offerings tailored to European users' requirements. This was done via investments (for example as part of the IPCEI-CIS or under the DIGITAL programme, which covers the procurement of the smart middleware Simpl), the switching provisions in the Data Act designed to eliminate vendor lock-in practices, and through other initiatives like the European Alliance for Industrial Data, Edge and Cloud.

While this intervention has initiated a move towards a more diverse European cloud market, substantial obstacles remain such as unfair market practices including tying and bundling, unfair contractual relationships limiting customers' negotiation power[75], and telemetry practices where providers leverage their customers' metadata to gain competitive advantages.

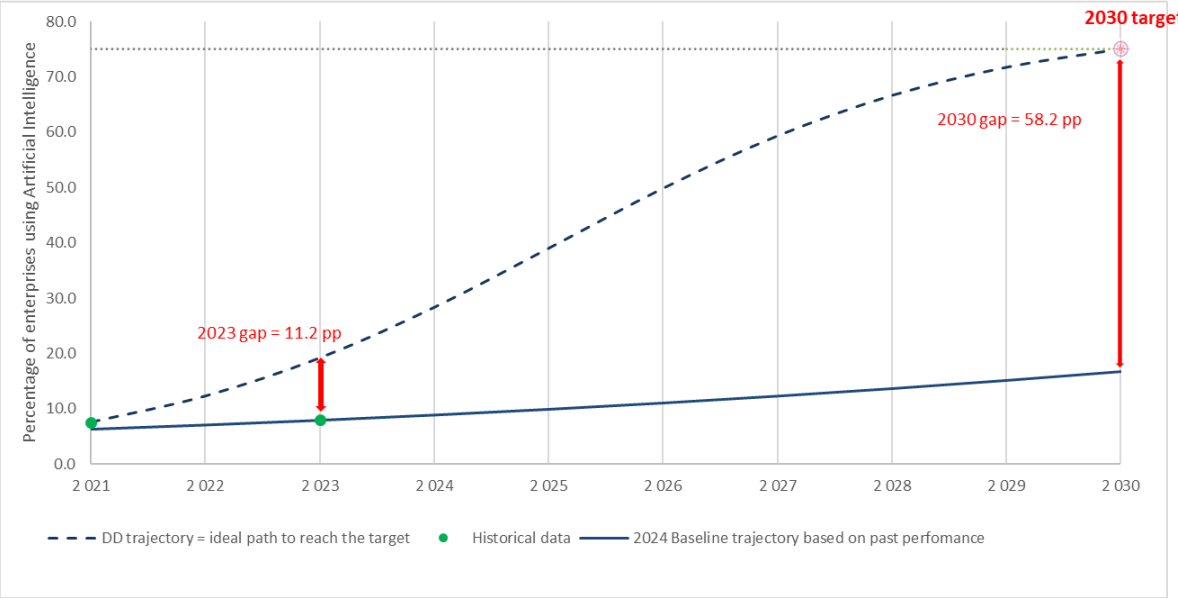
Take up of artificial intelligence

The take up of AI is certainly **the most pressing and crucial element of the business digitalisation in the EU. The adoption of this technology has marked the least progress in 2023. No improvement is perceptible compared to 2021.** From 2021 to 2023, the percentage

[75] European Commission, Study on the Economic Detriment to Small and Medium-Sized Enterprises Arising from Unfair and Unbalanced Cloud Computing Contracts, November 2019, https://commission.europa.eu/publications/study-economic-detriment-small-and-medium-sized-enterprises-arising-unfair-and-unbalanced-cloud_en.It is to be noted that the Data Act, which will apply from 12 September 2025, sets minimum requirements for cloud contracts.

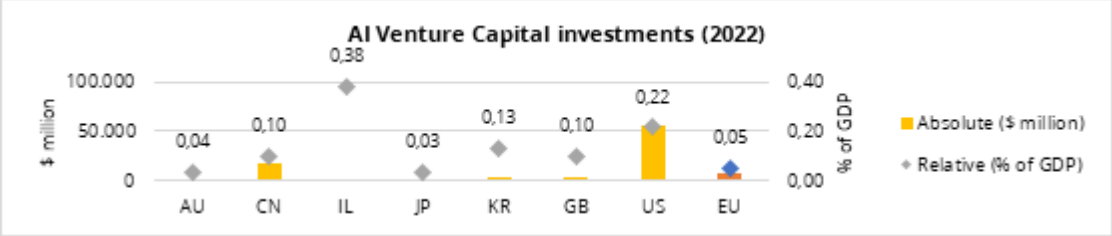
of enterprises using AI saw little change, increasing slightly from 7.6% in 2021 to 8% in 2023. Based on the current rate of progress, the adoption of AI risks to remain below 17% in 2030.

Figure 7. Percentage of enterprises using AI in the EU. Historical data, Digital Decade (DD) trajectory and 2024 baseline trajectory towards 2030



The EU currently lags behind international competitors when it comes to the adoption of emerging technologies, which include AI. Venture capital investment in AI is also low compared to the US and China.

Figure 8. AI venture capital investments International Benchmarking study



2023 was a disappointing year for Europe's venture capital market, including for AI start-ups.[76] Venture capital investment in European start-ups reached EUR 51.7 billion in 2023 but this represented a drop of 45.6% compared to 2022.[77] EU enterprises also continue to experience difficulties to scale up, due to remaining obstacles to the EU's Single Market.

While some encouraging signs exist, such as a high number of enterprises in the EU experimenting with AI, and the high and growing number of start-ups working with generative AI, vigorous action is needed to ensure better progress towards this target.

The EU can build on actions such as the recently adopted **AI innovation package** of 24 January 2024, which will facilitate the creation of AI factories, built around European public

[76] https://pitchbook.com/news/reports/2023-annual-european-venture-report; World Economic Forum, Global Risks Report 2024, https://www.weforum.org/publications/global-risks-report-2024, p. 50 on AI.

[77] https://www.orrick.com/en/Insights/2024/03/Deal-Flow-4-5-Things-We-Learned-About-European-Tech-Deal-Terms-in-2023; https://pitchbook.com/news/reports/2023-annual-european-venture-report.

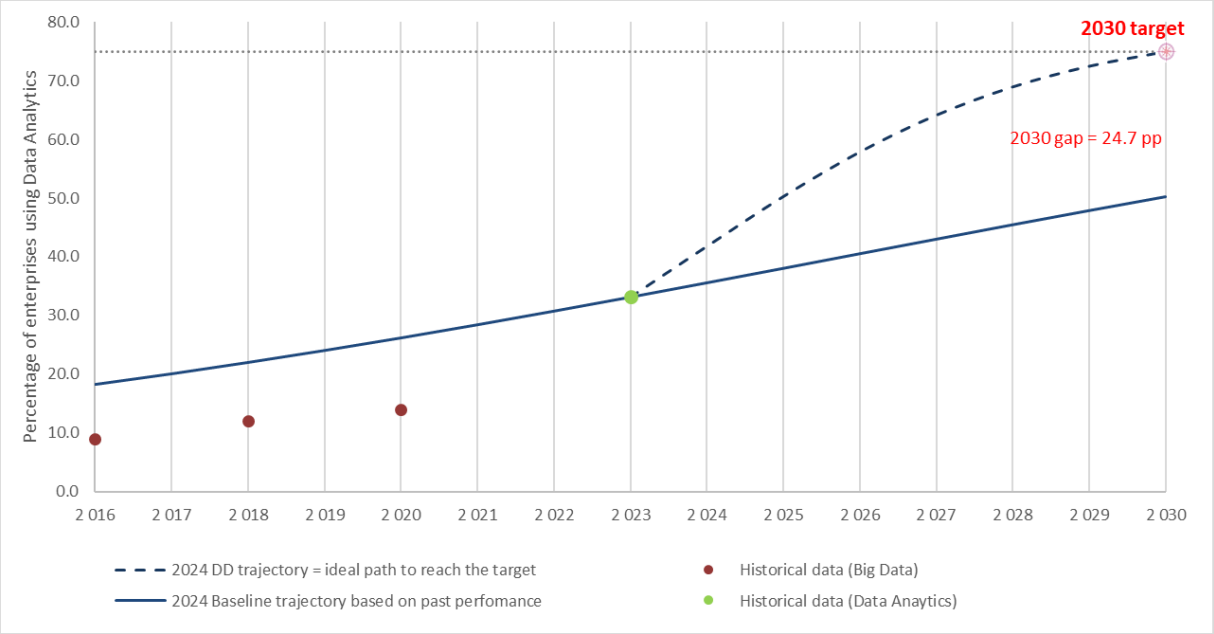
supercomputers, bringing together AI-dedicated supercomputers, associated data centres connected via high-speed networks and the corresponding human capital.

The European Digital Infrastructure Consortia (EDICs), fostering cooperation between Member States, are also laying down a new foundation for AI development. The first two EDICs created by Commission's decision in February 2024 concentrate on AI. One of them is the **Alliance for Language Technologies European Digital Infrastructure Consortium** (ALT-EDIC) which will provide centralised access to language data for the development of European generative AI 'Large Language Models', offering valuable tools to aggregate the required data in particular for Member States with limited language visibility. A third EDIC, **Networked Local Digital Twins towards the CitiVERSE** (LDT CitiVERSE EDIC), will implement a digital ecosystem around shared infrastructure components and state-of-the-art technologies for data, AI-based services and related elements for cloud-based Smart Communities.

Take up of big data/use of data analytics

Data is the fuel for training and improving artificial intelligence (AI) algorithms and it is an essential driver for innovation in AI. In 2023, only 33.2% of European companies have used data analytics, with large discrepancies between Member States. If progress does not accelerate, it is estimated that take up will reach just over 50% by 2030, a full 25 percentage points below the 2030 target.

Figure 9. Share of enterprises using Data analytics in the EU. Historical data, Digital Decade (DD) trajectory and 2024 baseline trajectory towards 2030



More broadly, the latest figures[78] indicate that **the EU data economy increased in 2023 to EUR 544.1 billion**, against EUR 497.8 billion in 2022, representing **4.2 % of EU's GDP**. In a baseline scenario, the value of the EU data economy will increase to **EUR 851.5 billion by 2030** representing 5.8 % of the overall EU GDP.

[78] European Data Market Study (Update October 2023).

The EU data economy employed around **7.66 million data professionals in 2023,** accounting for 4.3 % of total employment. Under the same baseline scenario, it is estimated that by 2030 the number of data professionals will **increase to 9.9 million**, with a compound average growth rate of 3.5 % in 2025-30 period.

The challenge for the years to come will be to swiftly implement all aspects of the **European data strategy**, starting with applying the provisions of the Data Governance Act[79] and Data Act[80], to create legal certainty and ensure a secure and fair legal framework for the data economy. Stakeholders will also need to focus on the concrete deployment and interconnection of the common **European data spaces**, leading to an internal data market with more data availability and more data-driven innovation and policies.

Take up of Cloud-AI-Big Data - Recommended policies, measures and actions:
Mobilising investments

Member States should take policy measures and earmark resources to support the adoption of trustworthy and sovereign AI-enabled solutions by European companies, step up public investment in general purpose/generative AI based and incentivise private investments.

Member States should stimulate national efforts for cloud adoption through cloud-targeted investment and exploitation strategies for advanced cloud solutions among businesses (in particular SMEs) as well as by developing dedicated skilling programmes, including on cloud security and environmental performance.

Member States should foster consistency and synergies when leveraging the Recovery and Resilience Fund for investing in business cloudification.

Disseminating digital technologies

Member States should foster the availability of legal and technical support to procure and implement trustworthy and sovereign AI solutions across sectors.

Member States should ensure that the effort towards greater business cloud uptake is jointly approached by all governmental and business actors.

Member States should boost the uptake of new advanced cloud-edge solutions among SMEs by setting up strategies and activities to fully exploit the IPCEI-CIS, by leveraging the complementarity activities of the Exploitation Office and the spillover commitments already undertaken by the direct participants in this IPCEI CIS. The Member States that do not participate in this IPCEI should actively seek out ways of engagement to benefit from spillovers, liaise with and possibly establish, post approval decisions, collaborations with its interested direct participants or indirect partners.

Completing the Digital Single market and fostering cooperation between Member States:

[79] Regulation (EU) 2022/868 of the European Parliament and of the Council of 30 May 2022 on European data governance and amending Regulation (EU) 2018/1724 (Data Governance Act)., OJ L 152, 3.6.2022, p. 1–44, http://data.europa.eu/eli/reg/2022/868/oj.

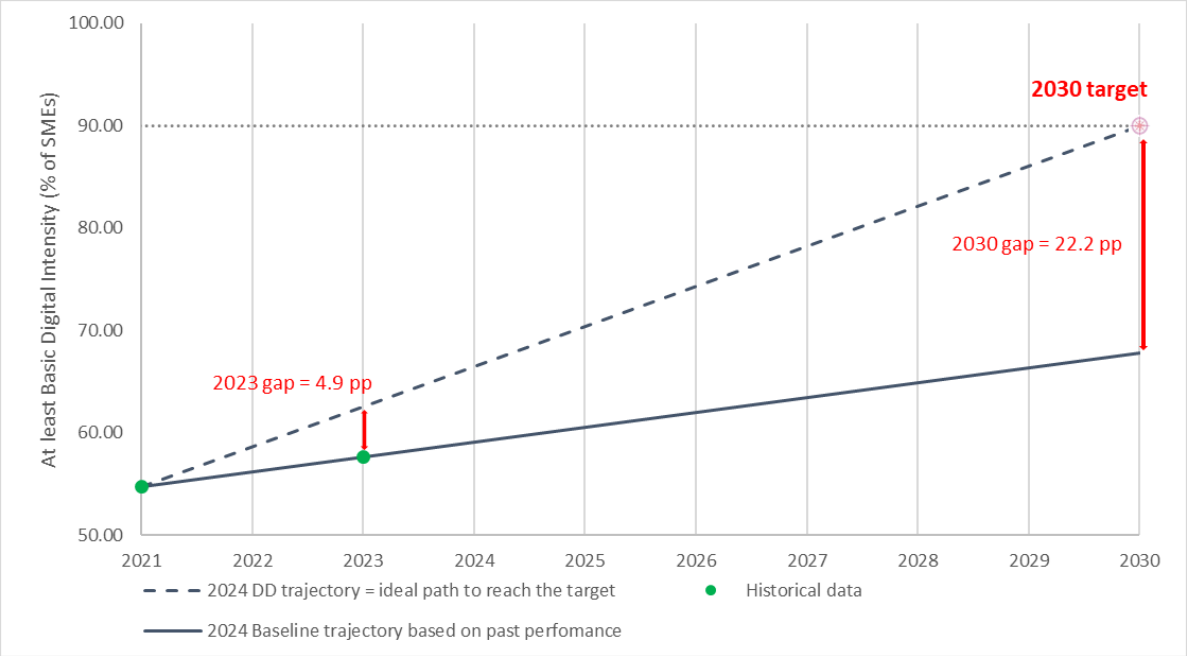
[80] Regulation (EU) 2023/2854 of the European Parliament and of the Council of 13 December 2023 on harmonised rules on fair access to and use of data and amending Regulation (EU) 2017/2394 and Directive (EU) 2020/1828 (Data Act), OJ L 2023/2854, 22.12.2023, http://data.europa.eu/eli/reg/2023/2854/oj .

Member States should continue to foster secure and trusted data sharing, in particular by supporting the deployment of common European data spaces and by implementing relevant data legislation such as the Data Governance Act and the Data Act. In this context, Member States should also take full advantage of relevant newly created EDICs (ALT-EDIC and LDT CitiVERSE EDIC), as well as speed up the creation of other relevant EDICs in preparation (e.g., Mobility and Logistics Data EDIC, the EDIC for Digital Commons*).*

2.2.1.2. Fostering the digitalisation of SMEs

Progress toward the digitalisation of SMEs in 2023 is still insufficient and quite uneven across the EU. Between 2021 and 2023, the only two comparable years so far, the percentage of enterprises with at least basic levels of digital intensity slightly increased to 57.7% from 54.8% in 2021. **This corresponds to a modest annual advancement of 2.6%, which is less than half the pace of growth required to reach the 2030 target**[81]**.** Under a business-as-usual scenario, only 68% of SMEs will be digitalised by 2030, showing that further efforts are needed. It is also at a lower rate than in the US[82].

Figure 10. Digital Intensity Index Historical comparable data, Digital Decade (DD) trajectory and 2024 baseline trajectory towards 2030



This percentage varies greatly among Member States, with more than 75% of SMEs having already reached this level in Finland, Sweden, Netherlands, Malta and Denmark, while less than a third in Bulgaria and Romania.

Over the coming period, the **European Digital Innovation Hubs** (EDIHs) will play a key role in bringing the various European digital initiatives to the actors on the ground, supporting their implementation at local level, while also accompanying businesses in their digitalisation efforts.

[81] European Investment Bank, EIB Investment Survey 2019-2022.

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

25 Member States set in their **National Strategic Digital Decade Roadmaps,** a national value and a trajectory for the percentage of SMEs having reached a basic level of digital intensity. The majority of these national target values are in line with the EU target. Six Member States set a target value below the EU target and four Member States (Germany, the Netherlands, Sweden and Denmark) went above the EU target value.

A total of 126 measures have been reported that contribute to this target, with a total budget of EUR 16 billion. Most focus on support for the uptake and deployment of digital technologies in companies, in particular SMEs, including on providing training to use digital technologies as well as financial support, for example via funding programmes. Other measures focus on strengthening the ecosystem, information sharing and knowledge exchange about digital technologies, including via EDIH. Only a very small number of measures focus on commercialising new solutions and services on the market (e.g. Bulgaria, Portugal).

Digitalisation of SMEs - Recommended policies, measures and actions:
Fostering cooperation between Member States

Member States should strengthen their policies and incentives for accelerating SME's digitalisation, in particular with specific strategies, sharing of best practices and leveraging common projects.

Member States should increase linkages between EDIHs and other networks (e.g., local and national digitalisation frameworks, Testing and Experimentation Facilities, National/European Cybersecurity Competence Centres and High-Performance Computing centres) and communities. The goal is to ensure a cohesive ecosystem that offers comprehensive digital transformation services across various technologies and sectors.

Member States are in particular encouraged to prioritise the integration and adoption of AI within the EDIH framework. This includes providing specialised AI services, facilitating access to, for example, AI Testing and Experimentations Facilities and the AI on demand platform.

Mobilising investments:

Moreover, Member States are encouraged to address the critical challenge of financing by establishing EDIHs as primary gateways for businesses to access public procurement opportunities in digital services and goods, and venture capital, facilitate connections with financial intermediaries and leverage EU support.

Disseminating digital technologies:

Member States should intensify their activities to foster dissemination of the use of digital tools by SMEs, in particular with local actors (business organisation, cities, universities, etc.)

2.2.2. Scaling up innovative enterprises

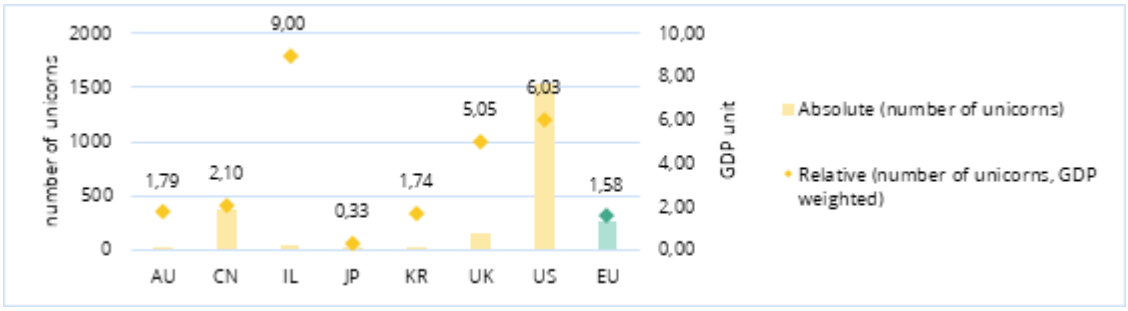
The startup and unicorn ecosystem plays a pivotal role in increasing the EU's competitiveness. These ventures promote economic growth by introducing disruptive technologies, creating new job opportunities, promoting innovation, and attracting investment. They embody agility, creativity, and adaptability, driving traditional industries to evolve and remain relevant in a rapidly changing market landscape. Furthermore, startups serve as a

breeding ground for entrepreneurship, nurturing a culture of risk-taking and innovation essential for long-term economic sustainability.

In recent years, the European ecosystem has been quite successful in increasing the number of unicorns, demonstrating that Europe can develop its own model of startup-ecosystem across the continent, supported by the Digital Decade commitment to at least doubling the number of unicorns compared to the 2022 baseline.

Yet, **the EU is currently home only to approximately 13% of the world's unicorns.** At the end of 2023 there were 263 unicorns in the EU, which was a **5.6% increase compared to 2022** (249 unicorns at the end of 2022). In both percentage and absolute terms this is a significant reduction in the annual growth of the number of EU unicorns compared to 2020 (~30% increase) and 2021 (~62%). Fewer unicorns were created in the EU in 2023 than any year since 2017, against the background of a global contraction in private capital markets throughout 2023.

Figure 11. Unicorns International Benchmarking study

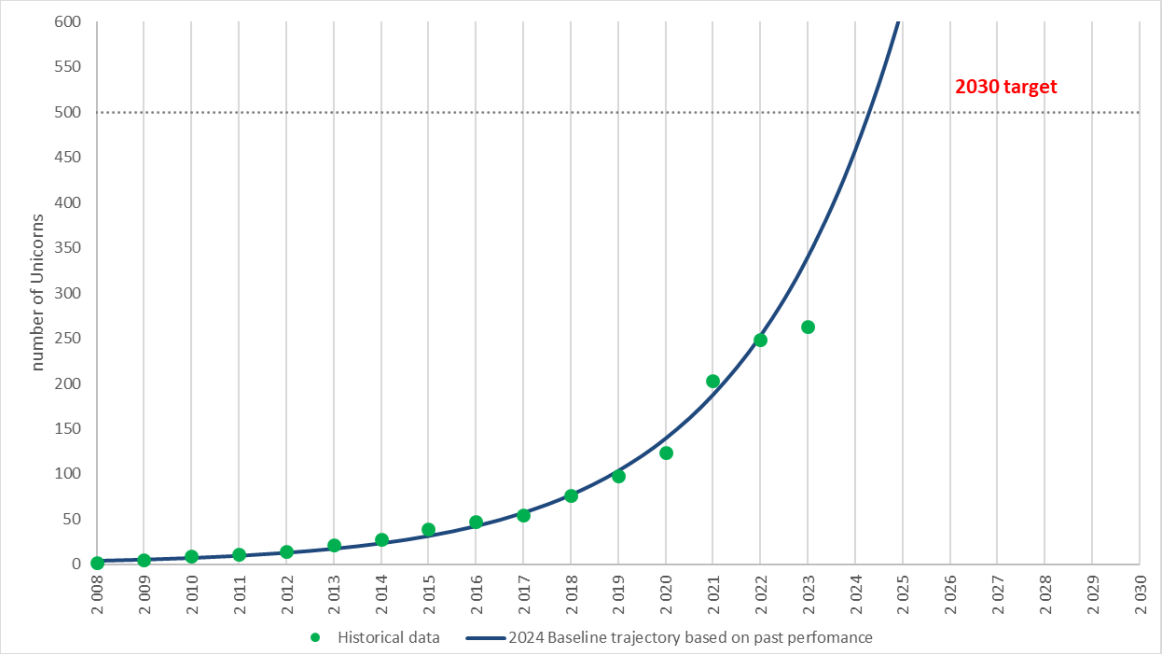


AU: Australia, CN: China, IL: Israel, JP: Japan, KR: Republic of Korea, UK: United Kingdom, US: United States of America, EU: European Union

The difference in absolute numbers of EU headquartered unicorns compared to other key countries remains stark, **with 263 unicorns in the EU[83], 387 in China, and 1,539 in the USA** by the end of 2023. This underlines the need for focused action at both EU and national level, to ensure not only that the 2030 Digital Decade target of 500 unicorns in the EU is met, **but also to sustain growth and match the performance of other parts of the world.**

[83] The Dealroom platform regularly updates the number of unicorns. The number of unicorns in the EU on 29.01.2024 was 263, as downloaded from Dealroom. The UK was excluded from the statistics.

Figure 12. Number of unicorns in the EU. Historical data and 2024 baseline trajectory



15 Member States provided a trajectory for the unicorns and innovative scale-ups target in their **National Digital Decade Strategic Roadmap**. Member States reported in total **100 measures that contribute to this target with a total budget of EUR 26.4 billion**.

Most of the measures focus on access to finance, including new funding opportunities adapted to the different unicorns/scale-up life cycles. Other aspects that are covered include **fostering technology transfer, incubation, spin offs, spin outs and start-up ecosystems**. and supporting **framework conditions and regulation for start-ups,** including relevant strategies and a framework for promoting innovation activities.

Progress toward achieving the Digital Decade is still facing many challenges. Worsening external finance conditions will hit young and innovative companies hard, especially those introducing new market innovations. These firms depend heavily on external funding, making them vulnerable to any tightening of finance accessibility. This dependence, coupled with their exposure to investor risk aversion, heightens uncertainty about their financial stability. It is therefore essential to ensure supportive finance conditions to foster innovation and sustain the growth of these emerging enterprises.

Moreover, a relative lack of private capital for 'big ticket' investments forces too many EU startups to seek late-stage growth capital from venture capital funds outside of Europe[84]**,** with the consequence of often moving their corporate headquarters outside of the EU. The lack of take-up of established best policy practices across Member States leads to fewer opportunities for startups to attract and retain talent, access finance or have their innovations procured in public procurement.

[84] Today more than 90% of the worldwide venture capital investment in AI, which shot up from EUR 2.7 billion in 2022 to EUR 24 billion in 202338, is done in the United States. Attracting investment in European AI startups is crucial for accelerating the deployment of advanced AI solutions.

The challenging picture for delivering conditions that are conducive to unicorn creation is completed by the suboptimal linkages between EU and national research programmes and programmes (which are critical to support the emergence of national champions from EU-funded innovation programmes), and the insufficient support to stimulate the creation of more spin offs from universities.

Unicorns - Recommended policies, measures and actions:
Member States should mobilise public policies – especially in the area of tech transfer and the use of the public procurement budget to procure innovations from startups – to foster the scaling up of start-ups and facilitate the creation of spinoffs from universities and research centres. Progress in these areas should be monitored.

Member States should introduce or improve policy initiatives that aim to increase the amount and diversity of private capital (for example from national pension funds) available for co-investing in high-growth startups.

2.3. Strengthening cybersecurity

The Digital Decade objectives[85] include improving resilience to cyberattacks, contributing to increasing risk-awareness and increasing knowledge of cybersecurity processes, as well as increasing efforts by public and private organisations to achieve at least basic levels of cybersecurity. The Digital Decade Decision provides the possibility to develop specific targets as part of its review planned in 2026[86].

Furthermore, in the Declaration on Digital Rights and Principles, the EU and its Member States committed to take further measures to promote traceable and safe products on the digital single market, and to protect people, businesses, and public institutions against cybersecurity risks and cybercrime, including via cybersecurity requirements for connected products placed on the single market[87].

In 2023**, EU's cyber threat landscape has continued to be strongly impacted by geopolitical events**[88]**,** with operations continuing to target the EU actors, particularly government, military, critical infrastructure, and foreign affairs bodies. Threats include ransomware, supply chain and physical attacks, and sabotage of digital infrastructure.

Cyberattacks and extorsion operations were on the rise in 2023[89]. Ransomware groups are not only targeting corporations but also government agencies and critical infrastructures, with geopolitical motivations. The EU Agency for Cybersecurity ENISA itself recorded more than 2,500 cyber incidents from July 2022 to June 2023, with 220 specifically targeting two or more EU countries. Public administrations and health were the top targets at 19% and 8%, while 6% of all hacks targeted the manufacturing, transport and financial sectors.

In April 2023, the Commission has proposed the **Cyber Solidarity Act**, aiming to strengthen the solidarity at the EU level to better detect, prepare and respond to cybersecurity threats and

[85] See Article 3(1)(k) of Decision (EU) 2022/2481 of the European Parliament and of the Council of 14 December 2022 establishing the Digital Decade Policy Programme, OJ L 323, 19.12.2022, p. 4 ('Digital Decade Decision').
[86] See recital 20 of the Digital Decade Decision.
[87] 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.
[88] ENISA, ENISA Threat Landscape 2023, https://www.enisa.europa.eu/publications/enisa-threat-landscape-2023.
[89] ENISA, ENISA Threat Landscape 2023, https://www.enisa.europa.eu/publications/enisa-threat-landscape-2023.

incidents. The network of National and Cross-border Hubs would serve to increase detection of cybersecurity threats and incidents. The Cybersecurity Emergency Mechanism would enhance preparedness by setting up coordinated preparedness testing and other preparedness actions for important and essential entities. This Mechanism would also include an EU Cybersecurity Reserve consisting of services from a selected pool of trusted private companies providing managed security services, such as incident analysis or incident response coordination.

Four years on, more efforts still need to be made by some Member States to implement **the EU 5G Security Toolbox** and effectively mitigate the risks, posed in particular by high-risk suppliers. In 2023, the Commission also underlined its strong concerns about the risks to the EU security posed by certain 5G suppliers[90] and is working to ensure security and avoid the exposure of its own corporate communications to high-risk suppliers and to reflect its assessment in all relevant EU funding programmes and instruments.

At the beginning of 2024, the Commission adopted **the first-ever European cybersecurity certification scheme[91], in line with the EU Cybersecurity Act**. The scheme offers an EU-wide set of rules and procedures on how to certify ICT products in their lifetime and thus make them more trustworthy for users. This major step promotes Europe's global digital leadership.

On 30 November 2023 the European Parliament and the Council have reached a political agreement on the **Cyber Resilience Act (CRA)**[92], which was adopted by the European Parliament on 12 March 2024 and will enter into force in the course of 2024. The CRA makes the selling of hardware and software products on the European market contingent on compliance with cybersecurity requirements. **It is the first regulation of its kind not only in Europe but also internationally.**

The law introduces security by design obligations for manufacturers of hardware and software products. Acknowledging that manufacturers along the entire supply chain are responsible for security outcomes, it not only covers the final product, such as a laptop or an operating system, but also its hardware and software components. During the transition period of 3 years from the act's entry into force, the **European Standardisation Organisations will be tasked with developing standards** to facilitate compliance by manufacturers, and the Commission will adopt relevant **delegated and implementing acts** as well as guidance to ensure that manufacturers can easily comply with the act.

The **NIS2 Directive[93]** requires Member States to adopt national cybersecurity strategies which must contain policies that directly contribute to meeting the general objective on cybersecurity set out in the Digital Decade, such as policies on promoting active cyber protection and on

[90] Commission Communication 'Implementation of the 5G cybersecurity Toolbox', C (2023) 4049 final, https://digital-strategy.ec.europa.eu/en/library/communication-commission-implementation-5g-cybersecurity-toolbox.

[91] Commission Implementing Regulation laying down rules for the application of Regulation (EU) 2019/881 of the European Parliament and of the Council as regards the adoption of the European Common Criteria-based cybersecurity certification scheme (EUCC), C (2024) 560, https://digital-strategy.ec.europa.eu/en/library/implementing-regulation-adoption-european-common-criteria-based-cybersecurity-certification-scheme.

[92] Political agreement on Cyber Resilience Act, https://ec.europa.eu/commission/presscorner/detail/en/ip_23_6168.

[93] Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148, OJ L 333, 27.12.2022, p. 80–152, http://data.europa.eu/eli/dir/2022/2555/2022-12-27 (consolidated text).

promoting and developing education and training on cybersecurity, cybersecurity skills, awareness raising and research and development initiatives, as well as guidance on good cyber hygiene practices and controls, aimed at citizens, stakeholders, and entities.

Cybersecurity measures are not well reflected in the National Digital Decade Strategic Roadmaps. Some Member States however do include cybersecurity specific measures in their roadmaps. Such measures include cybersecurity-related strategies and action plans, in particular in the areas of awareness raising, cybersecurity skills training and protection of critical infrastructures.

Objective Cybersecurity - Recommended policies, measures and actions:
Mobilising investments
Member States should continue their efforts to take specific measures to address the cybersecurity skills gap.
Completing the Digital Single Market
Member States that have not yet implemented the EU toolbox for 5G Cybersecurity should urgently adopt relevant measures to quickly and effectively address cybersecurity risks.

3. Protecting and empowering EU people and society

Eurobarometer 2024**: **3 out of 4 respondents** consider their **daily use of digital technologies would improve significantly with more education and training** to develop their skills for using digital services. Meanwhile, **4 out of 5 Europeans consider important** that the public authorities shape the development of Artificial Intelligence and other **digital technologies** to ensure they **respect our rights and values,** and **3 out of 4** respondents consider that by 2030, digital technologies will be **important for engaging in democratic life.

***Putting people at the centre of the digital transformation of our societies and economies is at the core of the Digital Decade.** This is reflected in the **European Declaration on Digital Rights and Principles** and in the general **objectives and targets** of the Digital Decade Decision, focused on building a human centred digital space, safeguarding fundamental rights and addressing digital divides, promoting digital skills, empowering democratic life, and protecting vulnerable people, including children. The following sections monitor progress in relation to these objectives and targets which include basic digital skills, ICT specialists, eGovernment services, e-ID and e-Health.*

3.1. Empower people and bring the digital transformation closer to their needs

Eurobarometer 2024 - 3 out of 4 Europeans consider that the digitalisation** of daily public and private services **is making their lives easier.

***- For 9 out of 10 Europeans**, it is important that public authorities ensure **people receive proper human support to accompany the transformation brought by digital technologies** and services in their lives.*

In a context where digital tools are now pervasive in every aspect of our daily lives, Europeans should be able to acquire all basic and advanced digital skills and have the possibility to adjust to changes brought by the digitalisation of work through up-skilling and re-skilling, in

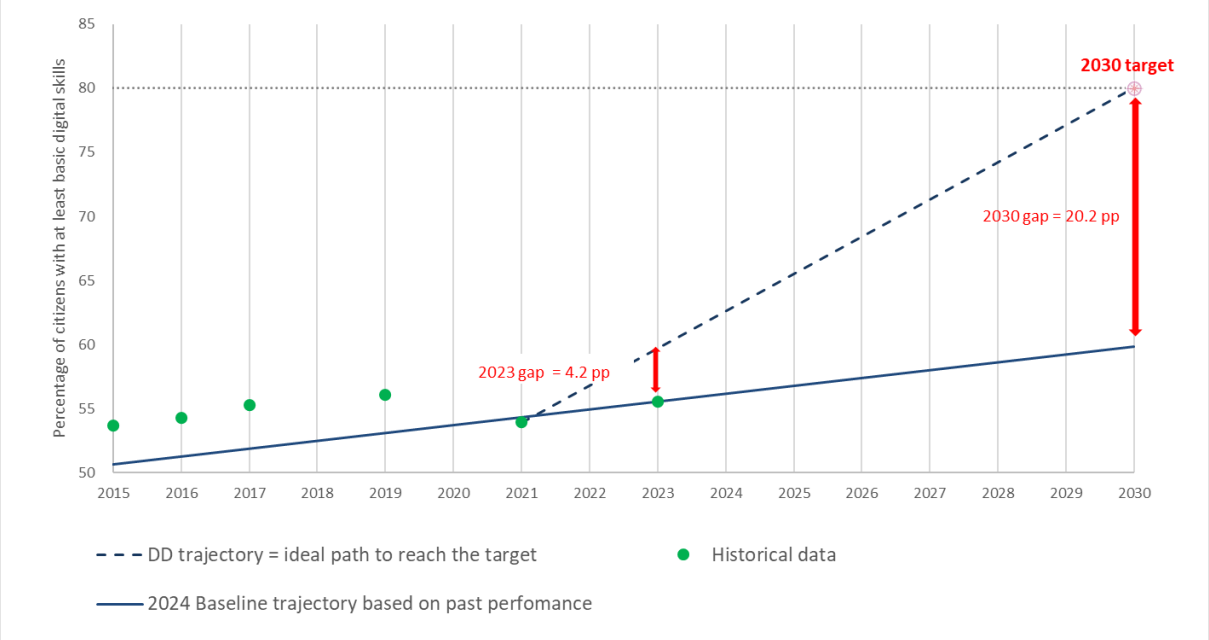
particular in line with the Declaration on Digital Rights and Principles[94]. It is equally essential to provide people with trusted tools, like secure e-ID means, to ensure that digital technologies and online public services, including health services, are accessible to everyone across the EU, including those with disabilities[95].

3.1.1. Equip people with digital skills

A digitally skilled population: at least basic digital skills

A key target of the Digital Decade is to ensure that **at least 80% of individuals aged 16-74 possess at least basic digital skills by 2030**. **In 2023, slightly more than 55.6% of those individuals reported having at least basic digital skills**, with variations across Member States from 82.7% to about 27.7%. Compared to 2021, the EU average level of at least basic digital skills in 2023 **increased by only 1.7 percentage point**, a pace of progress that is **insufficient to reach the 2030 target**. Compared to the ideal trajectory required to reach the 80% target, **the EU is 4.2 percentage points below the 2023 ideal value** needed to be on track. **Without further action, only 59.8% of the population would have at least basic digital skills by 2030 as estimated along the baseline trajectory.**

Figure 13. At least basic digital skills in the EU. Historical data, Digital Decade (DD) trajectory and 2024 trajectory towards 2030



Shortcomings in digital skills do not only concern older population. A **notable portion (30%) of the younger generation** aged 16-24 years **lacks at least basic digital skills**. While the **gender gap** in basic digital skills **continues to narrow** (55% of females versus 57% of males), there are considerable **differences linked with the level of education** (80% of individuals with

[94] 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.

[95] Mazzoni et al., 'Implications of the Digital Transformation on Different Social Groups', *EP studies*, March 2024, https://www.europarl.europa.eu/RegData/etudes/STUD/2024/760277/IPOL_STU(2024)760277_EN.pdf.

high formal education, versus 34% of those with no or low formal education) and **a clear urban-rural divide** (63% of people living in cities versus 48% of people in rural areas).

During its current mandate, the European Commission **has made substantial efforts to advance digital skills** in the **European Pillar of Social Rights Action Plan** and the **Digital Education Action Plan 2021-2027**, advocating for EU-level support to strengthen education and training systems, in particular through the **Structured Dialogue on digital education and skills**. 2023 marked the **European Year of Skills**, which reinforced the importance of acquiring essential skills, including digital skills, to secure quality employment and address workforce shortages. In 2023, another important achievement was the adoption of **a digital education and skills package**, including **two proposals for Council Recommendations:** one on the key enabling factors for successful digital education and training; another on improving the provision of digital skills and competences in education and training. In addition, through the unanimous adoption of the Council Recommendation for Roma equality, inclusion and participation, Member States committed to develop measures to support the acquisition of digital skills by Roma people[96]. Finally, the Commission has mobilised various **funding programmes** to boost digital skills across Europe, such as the European Social Fund Plus[97], Digital Europe Programme (DEP) and Erasmus+[98].

Digital skills are prominent in **National Digital Decade Strategic Roadmaps**. 26 Member States provided a trajectory for the target on basic digital skills that, in most cases, is in line with the EU target value of 80%. Three Member States (Spain, Finland and the Netherlands) assumed a target value above the EU target value. Bulgaria is the only Member State explicitly referring to achieving gender balance for this target. Member States have reported a total of 292 measures that contribute to this target, with a total budget of EUR 24.8 billion. They cover a number of aspects, from digital skills in formal education and upskilling and reskilling programmes for people currently in employment, to actions addressed at vulnerable groups. A very small number of the measures are explicitly focused on improving the gender balance by increasing basic and intermediate digital skills of girls and women (in particular in Portugal, Italy, Cyprus and Austria).

The monitoring of the Declaration on Digital Rights and Principles shows that Member States are quite active in taking measures to provide digital education, training and skills to their citizens[99].

Nevertheless, **increased,** and **focused efforts by the European institutions as well as the Member States are necessary to facilitate the acquisition of digital skills**. In the context of an ageing population and an increasingly technology-driven society, there is a crucial need to

[96] Council Recommendation of 12 March 2021 on Roma equality, inclusion and participation 2021/C 93/01, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOC_2021_093_R_0001.

[97] Under which about EUR 2 billion have been programmed so far exclusively for the support do digital skills, beyond other more general measures that may also involve the development of digital skills through for example the modernisation of education and training systems or the delivery of active labour market policies.

[98] The actions mentioned above are coupled with a number of additional initiatives, spanning from 2019 to 2024, either directly focusing on digital skills or encompassing digital skills as part of broader efforts to enhance skills development. Examples include: Digital Skills and Jobs Coalition and its National Coalitions, the Digital Skills and Jobs Platform, the European Digital Skills Awards, the Pact for Skills, Centres of Vocational Excellence and the EU Code Week.

[99] In terms of number of measures implemented. 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.

follow a **multi-faceted approach** targeting digital skills in primary, secondary and higher education, Vocational Education and Training and lifelong learning, as well as focusing on priority or 'hard-to-reach' groups. Moreover, the current economic landscape and challenges for Europe's competitiveness call for a more coherent and strategic framework of investment, governance, and capacity-building for effective and inclusive digital skills and talent development. This requires a swift adaptation of EU education and training systems to the digital age, to ensure they can play a key role in improving the provision of digital skills at all levels and in a lifelong learning perspective, thus contributing to increase Europe's growth and competitiveness[100].

Basic skills - Recommended policies, measures and actions:
Mobilising investments:

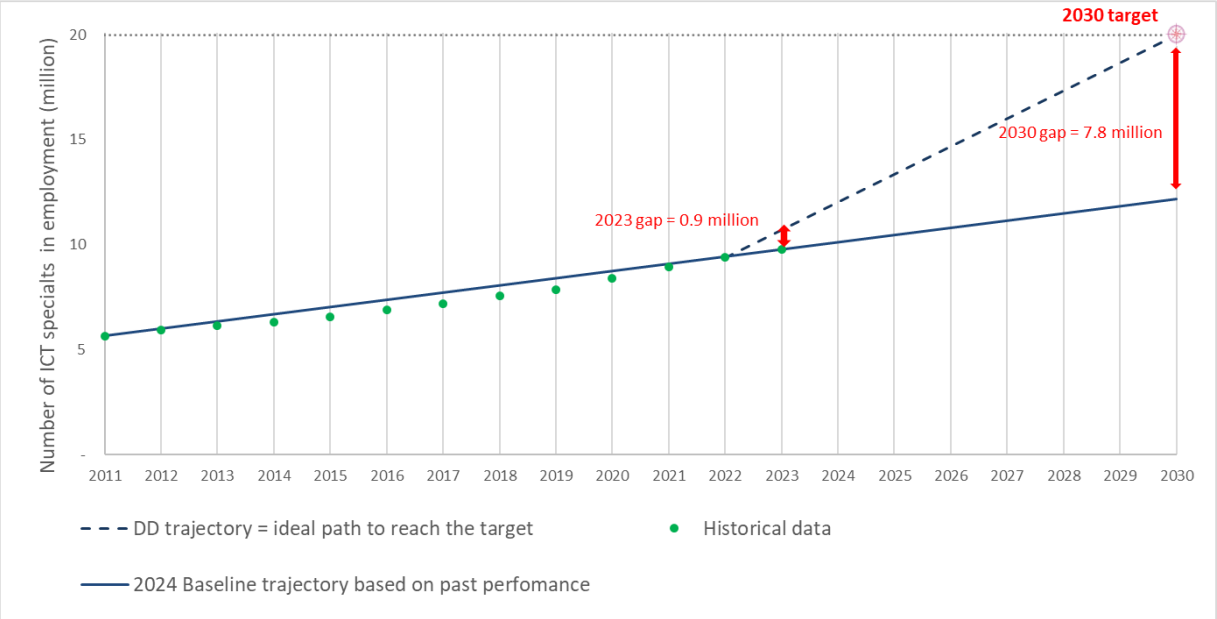
Member States should prioritise investment in digital education and skills in line with the Council Recommendation on improving the provision of digital skills and competences in education and training, including targeted policies for groups most in need including vulnerable groups, the older population, people with little or no formal education, people living in rural areas and people with disabilities.

A highly skilled digital workforce: ICT specialists and advanced digital skills

In an era characterised by rapid technological advancements, **the shortage of ICT specialists is a systemic issue that is essential for reaching all Digital Decade objectives and targets**. It is therefore vital to build up a sufficient talent pool of highly skilled professionals in those key capacity areas. The EU's ambitious Digital Decade target aim to employ at least **20 million ICT experts in the EU by 2030, with more graduates and gender convergence in the sector**.

[100] Commission Communication 'Digital Education Action Plan 2021-2027 Resetting education and training for the digital age', COM/2020/624 final, 2020 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0624.

Figure 14: ICT specialists in employment in the EU. Historical data, Digital Decade (DD) trajectory and 2024 trajectory towards 2030



Over the past ten years, significant advancements have been made in the supply of ICT specialists. **In 2023, nearly 9.8 million ICT specialists were contributing to the EU's employment** representing an annual increase of 4% compared to 2022. However, in 2023, **the EU is 0.9 million specialists below the value that would be needed to be on track towards the 2030 target, as estimated along the baseline trajectory**. According to the current trend, the number of ICT specialists in the EU will be around 12 million in 2030 if no further intervention is put in place. The **gender gap is still substantial and persisting**. In 2023, just 19.4% of ICT specialists employed in the EU were women, also undermining how digital solutions are designed and deployed, with proven negative consequences for social equality and welfare overall. To reach the digital decade targets, the EU is also increasingly reliant on attracting foreign talent. In 2023, 11% of ICT specialists employed in the EU came from third countries, compared to 8% in 2019[101].

European companies already face increased competition for digitally skilled talent, with more than 60% of EU enterprises that recruited or tried to recruit ICT specialists reporting difficulties in doing so in 2022[102] and significant **advanced digital skills gaps in more traditional non-ICT professions**[103].

These issues are **projected to increase and be exacerbated by the global race for digital talents**. For example, the demand for professionals working in AI development and deployment has increased by 33% from 2019 to 2022 in selected OECD countries[104]. Estimates suggest that, to meet future industry demand of **AI skills alone**, between 0.5 and 2.8 million

[101] Eurostat, ad hoc elaboration on Labour Force Survey data.
[102] Eurostat, isoc_ske_itrcrs.
[103] For example, medical doctors who are increasingly relying on advanced digital technologies to provide more accurate diagnoses, or sector specialists needed to unlock the potential of innovative digital solutions in the green transition.
[104] https://digital-skills-jobs.europa.eu/en/latest/news/brave-new-world-oecds-2023-skills-outlook-new-approach-skills.

Europeans will need to acquire these skills over the next five years, while approximately 1.2 to 3.7 million individuals will be required to gain proficiency in **cloud computing skills**[105].

There are many and complex **drivers behind these shortcomings**, including the low number of young people entering science, technology, engineering and mathematics (STEM) or ICT studies, with only 4.2% of all graduates in the EU pursuing degrees in ICT[106]: a shortage of specialised training programmes, misalignment with industry needs and the lack of flexibility of existing learning pathways. Furthermore, the challenges in **attracting and keeping women in tech** impede the needed increase of EU's workforce in ICT. More diverse teams lead to better decision-making and more innovative products and services, positively impacting the usability of technology for diverse users, including women.

One cornerstone of the Commission's strategy was the adoption of the **Council Recommendation on improving the provision of digital skills and competences in education and training**[107]. Advanced digital skills are also supported by multiple **funding programmes**, notably the **DEP**, which includes the development of **specialised educational programmes** at different academic levels[108] as well as **short-term training** courses in diverse key digital areas. Member States are also building the **Cybersecurity Skills Academy**, one of the European Digital Infrastructure Consortia in preparation.

The Commission has recently also taken a set of mutually reinforcing actions to make the EU more attractive to **third-country talent** as well as to boost intra-EU mobility[109]. The Commission is, in particular, proposing to set up **an EU Talent Pool** to facilitate the strategic international recruitment of non-EU jobseekers in shortage occupations[110]. It is also revising the **EU Blue Card Directive**[111] which, among other things, has introduced equivalence as regards skills attested by professional experience and comparable higher education qualifications in some ICT jobs. Finally, through the **Talent Partnerships** with key partner countries, the EU is supporting mobility schemes, capacity building and investments in human capital.

In their **National Digital Decade Strategic Roadmaps**, 24 Member States have outlined trajectories for ICT specialists, with around half aligning with or, in the case of Ireland and Sweden, surpassing the EU goal[112]. Moreover, several Member States indicate that they aim to increase the share of female ICT specialists and Portugal, Sweden and Slovakia even establish national targets for this. These endeavours are supported by a total of 178 measures, amounting to a budget of EUR 9.5 billion and covering several aspects of skills development: from advanced digital skills in formal and higher education, to measures supporting the upskilling

[105] https://advancedskills.eu/wp-content/uploads/2023/10/D2.2_LEADS_GAP_ANALYSIS_v1.0.pdf.

[106] Eurostat, educ_uoe_grad02, https://ec.europa.eu/eurostat/databrowser/view/EDUC_UOE_GRAD02__custom_5451972/bookmark/table?lang=en&bookmarkId=2b0446a9-c20a-4e43-a024-8a75c5afa79e.

[107] https://data.consilium.europa.eu/doc/document/ST-15740-2023-INIT/en/pdf.

[108] Or equivalents at ISCED levels 6-8.

[109] https://migrant-integration.ec.europa.eu/news/european-commission-adopts-skills-and-talent-mobility-package_en.

[110] Proposal for a Regulation of the European Parliament and of the Council Establishing an EU Talent Pool, COM/2023/716 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2023%3A716%3AFIN.

[111] Directive (EU) 2021/1883 of the European Parliament and of the Council of 20 October 2021 on the conditions of entry and residence of third-country nationals for the purpose of highly qualified employment, and repealing Council Directive 2009/50/EC, OJ L 382, 28.10.2021, p. 1–38, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021L1883.

[112] The target of 20 million ICT specialists in the EU corresponds to about 10% of employed people in each Member State.

of the workforce and other support initiatives, emphasising for instance gender balance or the retention and attraction of ICT specialists globally.

Despite these actions, **it will be challenging to reach the 2030 Digital Decade targets on ICT specialists under a business-as-usual** scenario. Urgent action is imperative through a comprehensive and coordinated approach **spanning the entire education and training continuum**, including lifelong learning and leveraging **collaborative efforts among stakeholders**.

ICT specialists - Recommended policies, measures and actions:
Mobilising investments:

Member States should swiftly develop initiatives, strengthen their policy and prioritise action in line with the specific recommendations for addressing the shortage of ICT professionals in the Council Recommendation on improving the provision of digital skills and competences in education and training. They should in particular support early exposure of young people, particularly girls, to STEM, promote VET and lifelong learning in the domain of ICT, increase the academic offer in advanced digital skills, facilitate collaboration among higher education institutions, boost industry integration and foster diversity and inclusion, particularly of women.

3.1.2. Trusted solutions for digital interaction: the EU Digital Identity and the digital euro

With digital transactions and interactions becoming essential in daily lives, EU citizens need more and more easy-to-use, reliable, and safe means for online identification, authentication, for storing and sharing digital attestations, and using electronic signatures. The **EU Digital Identity regulation**, entered into force in May 2024, answers to this need and represents a **game changer** in both **simplifying the life of citizens and businesses**, and **protecting fundamental rights online**, ensuring safety and privacy, giving citizens full control over the data they share, and avoiding profiling, tracing and tracking, in line with EU digital rights and principles.

The swift implementation of the EU Digital Identity Wallets (EDIW) by 2026 is also the condition for the achievement of the **Digital Decade target: by 2030 100% of Union citizens** should have access to a secure electronic identification (e-ID) means recognised throughout the Union, giving users full control over identity transactions and shared personal data.

Currently, notified e-IDs are available in 22 Member States (plus Norway and Lichtenstein), being available to 93% of the EU population. However, the **take-up of e-IDs** is very uneven across Member States. In 2023, 35.7% of individuals in the EU used an e-ID to access services provided by public authorities or public services of their country, from 95% in the Netherlands to less than 1% in Cyprus[113]. The implementation of the EDIW is expected to promote uptake, with a single tool for accessing public and private digital services.

Since April 2023, the DEP finances **4 large-scale pilot projects** to test use cases such as: storing and sharing education credentials, travel documents, like boarding passes, or digital driving licences; accessing digital public services (including cross-border); opening a bank account, accessing it and authorising payments; buying a pre-paid SIM card; signing contracts;

[113] Eurostat, Use of electronic identification (eID), isoc_eid_ieid.

and proving professional affiliations. The wide participation by almost all Member States reflects the recommendations of the 2023 State of the Digital Decade report, which invited Member State 'to prepare to set and implement the EUDIW, in particular through pilot projects and by mobilising the digital ecosystem'.

Finally, the Task Force on Age Verification, set up under the Digital Services Act with Member States, the European Regulators Group for Audiovisual Media Services (ERGA) and European Data Protection Board (EDPB), is currently exploring how to make best use of the Wallet for **age verification purposes**, as a key response to concerns linked to children's exposure to harmful content (cf. below). Age verification supported by the Wallet is also one of the priority use cases in the call for proposals for new pilot projects that are expected to start in 2025.

As the use of banknotes and coins declines, the European Central Bank plans to introduce a digital euro by 2027. The European Parliament and Council are currently examining the legislative framework proposed by the Commission in June 2023 to establish the digital euro and to regulate its essential elements. Once this legislative process is complete, the European Central Bank will decide on its issuance. This pan-European public payment scheme would provide central bank money in digital form, allowing citizens and businesses to make secure, private, and widely accepted payments across the entire euro area. The digital euro, as a public good, aims to ensure our monetary system keeps pace with digitalisation while remaining inclusive. It would establish a new European infrastructure, enabling market players to innovate and develop value-added services. The goal is for the digital euro to be fully interoperable with the European Digital Identity Wallets, supporting various use cases from e-commerce to in-store and peer-to-peer transactions, even without internet connectivity.

Member States's **National Digital Decade Strategy Roadmaps** do not provide a strong focus on the e-ID and Digital Wallets target. Member States reported in total 60 measures contributing to this target, with a total budget of EUR 0.9 billion. Those measures generally concern the deployment of Electronic Identification and Trust Services, including certification processes and regulation, and the implementation of the EDIW, for instance through proof-of-concepts and pilot projects.

EU Digital Identity - Recommended policies, measures and actions:
Mobilising investments:

Member States should give priority to the development of concrete use cases to support users and private and public service providers in the use of the EU digital identity wallet and trust services based on the European Digital Identity Framework.

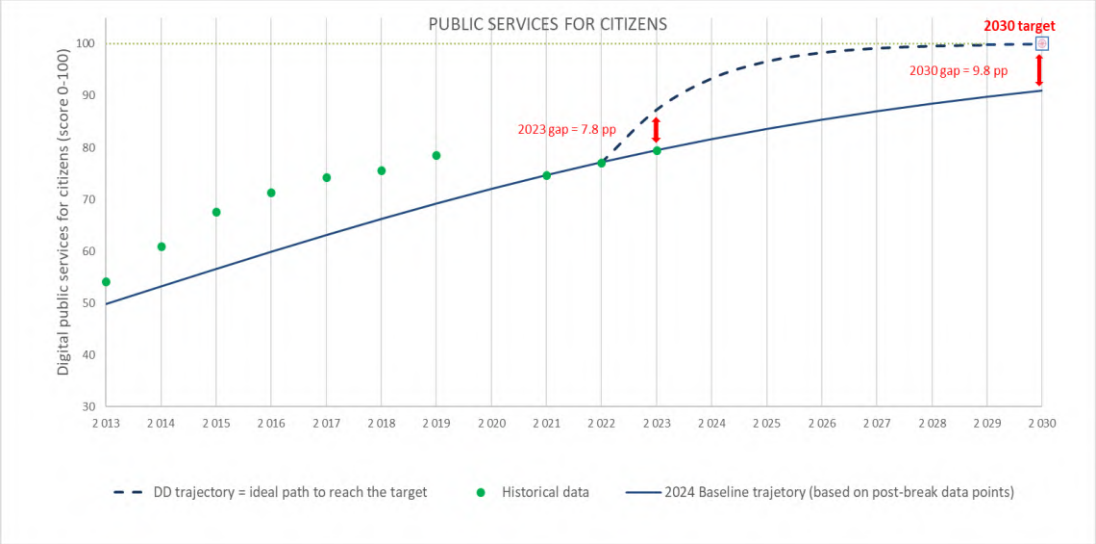
3.1.3. Efficient digital public services user-friendly and accessible to all

Member States are continuing to progress towards the target of making **100% of key public services for citizens and businesses accessible online**. In 2023, the average EU score was **79 out of 100** as regards availability of digital public services for citizens (from 77/100 in 2022**)** and **85** out of **100** as regards **businesses (from 84 in 2022)**. Both values remain below the 2023 value required to be on track towards the 2030 target (7.8 points below for citizens and 5,4 below for businesses). Despite the number of measures taken in Member States to make digital

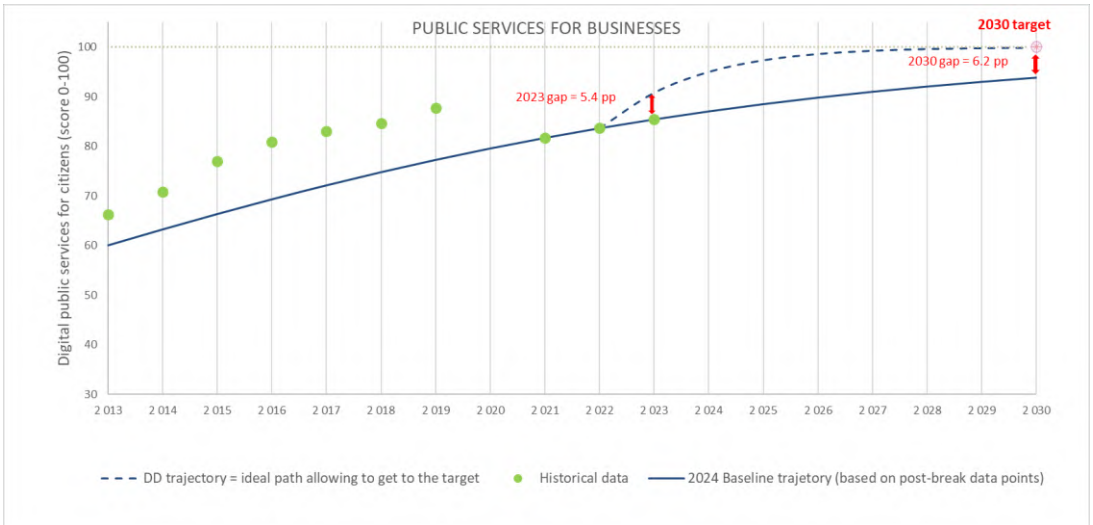
public services accessible to all Europeans[114], in a business-as-usual scenario, **the achievement of the EU target by 2030 remains challenging**.

Figure 15: Online service provision for citizens (top chart) and businesses (bottom chart). Historical data, Digital Decade (DD) trajectory and revised baseline trajectory towards 2030

(a) Share of administrative steps that can be done online for major life events for citizens nationals and foreigners (0 = no steps can be done online; 100 = the whole process can be done online). Historical data, Digital Decade and baseline trajectory



(b) **Share of public services needed to start a business and conduct regular business operations that are available online for national as well as for foreign users (0 = no steps can be done online; 100 = the whole process can be done online). Historical data, Digital Decade and baseline trajectory**



Substantial **gaps remain** in the delivery of digital public services which are **fully user-centric, accessible to users with disabilities**[115], and **sovereign– in a context where** most digital services, e.g., cloud, are developed by non-EU companies.

[114] In terms of initiatives implemented. 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.

[115] Cross- border availability remains limited for digital public services for citizens and for businesses, both reaching a score of around 70 points out of 100 (Source: eGovernment Benchmark, Capgemini).

Digital public services have been one of the main areas of **investment in the Recovery and Resilience Facility with EUR 24.5 billion directly contributing to these targets**[116].

On the legislative side, the implementation of the Single Digital Gateway Regulation[117] has contributed to reduce the administrative burden for the EU citizens and businesses with the single digital gateway user interface, the *Your Europe* portal giving access to a wide range of online information and public services. Furthermore, the recent launch of the *Once Only Technical System (OOTS)* will allow connecting administrations across the member state and the cross-border exchange of public documents and data. Both the single digital gateway and the OOTS make it easier for citizens and to study, move, work, retire and for companies, notably SMEs, to do business across the EU.

In April 2024, the **Interoperable Europe Act**[118] entered into force and, with mandatory **interoperability assessments**, will boost the availability of **user-centric** and **cross-border** key digital public services. The **Data Act** will **mitigate concerns related to the dependency of public administrations on technological solutions** provided by foreign vendors like hyperscale cloud providers. Steps forward have also been taken on digital accessibility, a fundamental right for people with disabilities, which saw a significant shift following the adoption of the Web Accessibility Directive in 2016.

Finally, Member States strengthened their collaboration across the EU, developing common infrastructure and leveraging advanced technologies for cross-border services. The **EDIC in the field of connected public administration** (**IMPACTS**) is under preparation, and the **European Blockchain Partnership and European Blockchain Services Infrastructure** (**EUROPEUM**) has been established.

In their **National Digital Decade Strategic Roadmaps**, 21 Member States provided a trajectory for digital public services for citizens and businesses. 21 national target values are in line with the EU target value, which is 100% of key public services accessible online. Member States reported in total 238 measures contributing to this target, with a total budget of EUR 14 billion. These measures cover different domains: from increasing trust and satisfaction of the public on electronic services, to measures to support interoperability.

Reducing administrative burden has been a key priority of the European Commission[119] **especially as regards SMEs**. Embracing digital transformation and leveraging innovative

[116] JRC report 'Mapping EU level funding instruments 2020-2027 to Digital Decade targets - 2024 update' (Signorelli et al., 2024). This amount increases to EUR 49.5 billion if all measures under the 'e-government services' intervention field, according to the methodology of Annex VII of the RRF Regulation, are considered.

[117] Regulation (EU) 2018/1724 of the European Parliament and of the Council of 2 October 2018 establishing a single digital gateway to provide access to information, to procedures and to assistance and problem-solving services and amending Regulation (EU) No 1024/2012, OJ L 295, 21.11.2018, p. 1–38, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.295.01.0001.01.ENG.

[118] Regulation (EU) 2024/903 of the European Parliament and of the Council of 13 March 2024 laying down measures for a high level of public sector interoperability across the Union (Interoperable Europe Act) OJ L, 2024/903, 22.3.2024, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R0903. Mandatory interoperability assessments, collaborative efforts to develop interoperability solutions through GovTech partnerships and participation in interoperability sandboxes, and the proactive enhancement of interoperability skills within the public sector are just a few examples of the multifaceted strategy envisioned by the Act.

[119] As part of efforts to reduce burdens for businesses and administrations, the Commission has committed in its long-term strategy for competitiveness published in March 2023 to rationalise reporting obligations and reduce such burdens by 25%, without undermining the related policy objectives.

technologies for efficient public services can unlock significant time and cost savings while improving the overall effectiveness and responsiveness of public policies.

Digitalisation indeed has the potential to significantly streamline bureaucratic processes and cut through red tape in Europe with electronic documentation and signatures, online government services, data sharing and integration, automated data verification systems, automated compliance and reporting and digital identity.

Digitalisation can have even more profound impacts by enabling **a significant shift in regulatory approach cutting red tape and allowing more innovation, such as the use of** regulatory sandboxes, as implemented in in the financial industry. By creating a safe space for experimentation, regulators can collaborate with stakeholders including innovative enterprises, to understand emerging technologies, assess potential risks, and develop appropriate regulatory frameworks that balance innovation with consumer protection and systemic stability. The potential for regulatory shift could be explored in areas such as **healthcare, financial services, mobility or agriculture,** with a view to providing not only a more agile framework but also to improve data-based and AI powered-high quality information for users and beneficiaries. **Digitalisation has thus the potential to foster a regulatory shift as well as to radically simplify regulatory compliance** while providing for new services, for example in the area of precision agriculture, traceability and farm management essential for the farmer's competitivity and to foster their positive footprint on the environment. In this respect **a European Digital Infrastructure Consortium for AgriFood** is also under consideration among Member States.

***e-Government services - Recommended policies, measures and actions*:**
Mobilising investments and completing the Digital Single market:

Member States should focus investment and regulatory measures to develop and make available secure, sovereign and interoperable digital solutions for online public and government services, including possibly in the context of public procurements.

Disseminating digital technologies:

Member States should monitor the effective use of online public services by national and, possibly, by cross-border users as well as possible gaps, including between urban and rural areas.

Member States should intensify their efforts to ensure that everyone, including older people and people with disabilities, has equal access to online public services.

Member States should work with the Commission on ways to ensure digital technologies and tools are put at the service of more agile, red-tape free, data-based regulatory frameworks.

Fostering cooperation between MSs:

Member States are invited to make further progress with their multi-country commitments and cooperation in the field of connected public administration and the European Blockchain Services Infrastructure, through the EDICs recently established.

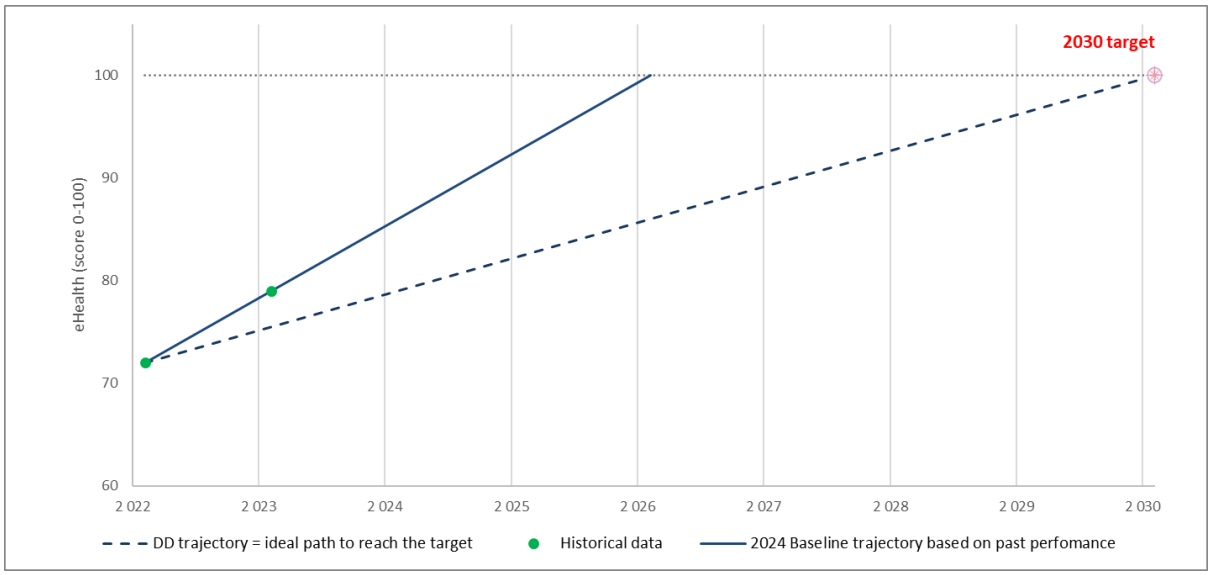
3.1.4. Leverage on digital technologies for health

The **use of health data and of advanced technologies** have great potential to improve **access to health services** by citizens, increase the quality and efficiency of healthcare, develop **personalised approaches** and support **research and innovation**[120]. According to the findings of the Eurobarometer 2024, **four out of five respondents consider digital technologies to be important by 2030 for accessing or receiving healthcare services** (e.g., telemedicine, artificial intelligence supporting diagnosing diseases).

During the pandemic, the EU Digital COVID Certificate (EU DCC), developed in record time and risen as global standard, is a notable example: more than 2.3 billion certificates were issued EU-wide and a total of 78 countries were connected to this European solution, which significantly contributed to the global fight against the disease, protecting EU citizens' health, and restored their right of free movement.

The Digital Decade Policy Programme establishes the target of **100% of Union citizens with access to their electronic health records**. In 2023, the EU scored 79/100 up from 72/100 in 2022, corresponding to an annual growth rate of 9.7%[121]. All Member States now have some form of electronic health access service in place, be it regional or national, and have improved the extent of accessible health data categories, access technology and means, and the access opportunities for certain categories of people. The current value is above the expected value of the trajectory in 2023. At this pace, the target will be reached in 2026.

Figure 16: e-Health composite indicator. Historical data and DD trajectory



In their **National Digital Decade Strategic Roadmaps**, 22 Member States provided a trajectory for the target on the availability of electronic medical data. 21 national target values are in line with the EU target value, which is 100% of citizens have access to their electronic

[120] Notably reflected in the Council Recommendation of 8 December 2022 on access to affordable high-quality long-term care, 2022/C 476/01, calling for rolling out accessible technology and digital solutions to support autonomy and independent living.

[121] The score is calculated on the basis of the indicators that capture the following dimensions: 1. the nationwide availability of online access to electronic health data; 2. the categories of accessible health data; 3. the availability of authentication schemes, type of front-end solutions and coverage; 4. accessibility for certain categories of people, like vulnerable groups.

health records. 93 measures contribute to this target, with a total budget of EUR 5.5 billion, with focus on health data access for citizens, including portal solutions and applications for mobile devices, regulations, roadmaps and cross-border projects.

The successful conclusion of the political negotiations on the **European Health Data Space Regulation** is an important milestone to further reinforce progress in this area and empower and benefit citizens by further developing secure access to electronic health data nationally and across borders, contributing to more efficient healthcare delivery, and improving the quality and accessibility of health data for secondary use for research, innovation and health policy making purposes.

The Commission has put forward several initiatives on **health data infrastructure** and **research and innovation in the area of health**. The **European Cancer Imaging Initiative**, launched in December 2022 is federating cancer imaging and clinical data across 12 European countries to support innovation in clinical decision-making and prediction; the **1+ Million Genomes Initiative** is establishing secure access to genomic and linked clinical data through the European Genomic Data Infrastructure and a European reference genome, the Genome of Europe; and the **European Virtual Human Twins Initiative**, launched in December 2023, which aims to accelerate personalised care through advanced modelling, with applications in drug discovery, clinical research, and medical training.

Recently, the attention on the health dimension of digitalisation has also focused on the fact that particularly certain online interface designs can have **negative impacts on health**, in particular mental health, as result of excessive connectivity and related stress, addiction risks, or exposure to violent and inappropriate content[122]. Recently adopted legislations, notably the Digital Services Act, offer tools to address such risks (see section below).

e-health - Recommended policies, measures and actions:

Completing the Digital Single market: Member States should ensure that access to electronic health records, with a minimum set of health-related data stored in public and private electronic health record systems, is technologically enabled and easily accessible for people (via a patient portal or patient mobile app). In alignment with the goals of the European Health Data Space, this minimum set should include electronic health record summaries, electronic prescriptions and dispensations, as well as electronic results and reports including medical imaging studies, laboratory results, and hospital discharge reports.

Member States should cooperate to fully deploy the innovation potential of health data by maximising the use of existing and future health data initiatives and infrastructure, investing in the research and deployment of advanced technologies such as high-performance computing and trustworthy AI applications in healthcare, while strengthening cybersecurity measures.

Fostering cooperation between MSs:

[122] See European Parliament resolution of 5 July 2022 on mental health in the digital world of work and Commission Communication on a comprehensive approach to mental health, COM(2023) 298 final, https://health.ec.europa.eu/publications/comprehensive-approach-mental-health_en. Regarding risks for children and adolescents, see also https://www.hhs.gov/surgeongeneral/priorities/youth-mental-health/social-media/index.html#:~:text=Children%20and%20adolescents%20who%20spend,symptoms%20of%20depression%20and%20anxiety.and SWD 'Digital Decade in 2024: Implementation and perspective' with annexes, SWD(2024)260: https://digital-strategy.ec.europa.eu/en/news-redirect/833325, section 4.2.1.

Member States are invited to make further progress in setting up the proposed EDICs in the area of genomics and cancer imaging data with a view to driving innovation in personalised healthcare and AI solutions in cancer care.

3.2. Protect people and a build safe and human centric digital environment and technologies

*The **general objectives set out in the Digital Decade Decision** emphasise the fostering of a human-centred, fundamental-rights-based, inclusive, transparent and open digital environment[123]. Furthermore, the **Declaration on Digital Rights and Principles** encompasses principles and commitments for accessing a trustworthy, diverse and non-discriminatory digital environment. It underscores in particular the role of very large online platforms in mitigating risks arising from their services, including disinformation.*

3.2.1. Build safe digital environments and safeguard fundamental rights online

The misuse of online platforms and their algorithms can facilitate and amplify the spread of hate speech, violent extremism, and terrorist content, posing threats to individuals or specific target groups. Recent events, like the Middle East crisis, provided yet another reminder of how online platforms can be used for incitement to terrorism and dissemination of illegal hate speech. According to Eurobarometer 2024's findings, risks linked to misuse of personal data, the proliferation of fake news and disinformation are one of the main issues of concern encountered online, while non-justified removal of content and non-transparent content moderation practices were the two least mentioned issues.

In 2023, 33.5% of EU individuals reported having encountered hostile or degrading online messages targeting specific groups because of their political and social views, racial or ethnic origin, or sexual orientation, highlighting the widespread nature of online hate speech[124].

In the Declaration on Digital Rights and Principles, the EU and Member States have committed to tackle all forms of illegal and harmful content online, in full respect for fundamental rights, notably freedom of expression.[125]

The implementation of the Digital Services Act[126]. Since April 2023, the Commission designated 24 Very Large Online Platforms (VLOPs) and Very Large Online Search Engines (VLOSEs). 17 February 2024 marked the DSA's entry into full application. From this date, the Member States were required to designate and adequately empower their Digital Service Coordinators (DSCs)[127] and the new rules started to apply to all online intermediaries, irrespective of their size. Although at its early stages, the DSA already started to have a notable impact. Enforcement actions addressed to VLOPs and VLOSEs have been already taken by the Commission. In December 2023 and April 2024, the Commission opened **formal proceedings** respectively **against X and Meta (for both Facebook and Instagram)**, which, among others,

[123] See Article 3(1)(a) Digital Decade Decision.
[124] Eurostat, Individuals - encountering hostile or degrading online messages (isoc_ci_hm).
[125] 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.
[126] Regulation (EU) 2022/2065 of the European Parliament and of the Council of 19 October 2022 on a Single Market For Digital Services and amending Directive 2000/31/EC (Digital Services Act), OJ L 277, 27.10.2022, p. 1–102, https://eur-lex.europa.eu/eli/reg/2022/2065/oj.
[127] Deadline for the designation was 17 February 2024, but not all Member States have designated the DSCs, see https://digital-strategy.ec.europa.eu/en/policies/dsa-dscs.

concerned the dissemination of illegal content in the EU and the effectiveness of measures taken to mitigate risks to civic discourse and electoral processes. Formal proceedings were opened against **TikTok** (in February and April 2024) and **Meta (for both Facebook and Instagram**, in May 2024**)** in areas related to the management of risks related to negative effects on physical and mental health and children's rights, notably as a result of addictive design, 'rabbit holes' or access to harmful content. In the second case against TikTok, concerning addictive features of TikTok Lite, the Commission communicated to TikTok its intention to suspend the relevant features in the EU pending the assessment of their safety: as a result, TikTok announced unilaterally to withdraw the relevant features; the non-compliance case remains nonetheless open and the investigation is ongoing. In March 2024, **AliExpress** was also added to the group of VLOPs against which the Commission opened formal proceedings. Among other things, the proceeding concerned issues such as the lack of enforcement of the terms of service prohibiting certain products posing risks for consumers' health, such as fake medicines, the compliance with the DSA obligation to allow all users to notify illegal content on the platform, and with the transparency obligations. Finally, in June 2024, following a request for information from the Commission, **LinkedIn** decided to voluntarily discontinue a functionality on which there was a suspicion that it would violate the DSA ban on targeted ads based on sensitive personal data, like sexual orientation, political opinions, or race.

Protecting fundamental rights and empowering democratic values online is an aspect that a small number of **National Digital Decade Strategic Roadmaps** took into account (Belgium, Croatia, Greece, Luxembourg, the Netherlands, Romania, Slovenia). The measures include activities aiming to protect from disinformation, manipulation and harmful content. Please note that these elements are also relevant to section 4.3 below.

Beyond **strong supervision and enforcement**, it will be crucial to **monitor emerging trends** and **deepen knowledge and research** into **complex issues such as the dynamic interplay between digital tool usage, exposure to harmful content, and mental health and well-being**, in terms of addiction, depression anxiety, self-harm, depression.

Objective safeguarding rights - Recommended policies, measures and actions:

Completing the Digital Single market:

Members States should accelerate action that is necessary for the implementation of the regulatory framework, particularly the DSA. They should focus on establishing the necessary governance system at national level and to foster close cooperation and engagement with the Commission, the newly created European Board for Digital Services, Digital Services Coordinators and civil society.

Mobilising investments:

Member States should step up effort to develop research and knowledge on – and monitor the trends in – the online domain, notably on the interplay between digital tool usage, exposure to harmful content, and mental health (including on children and adolescents).

3.2.2. Protect and empower children (including via age verification)

Protecting children is a key priority for the Digital Decade. In the Declaration on Digital Rights and Principles, the EU is committed to empower children to make safe and informed choices, including by promoting positive experiences for children and protecting them against harmful content and abuse[128]. The risks related to illegal and harmful content presented above are even more pertinent to children, as young people frequently use digital products and services designed for adults. Digital services, from social media to interactive games, can expose children to risks such as addiction, unsuitable content, bullying, grooming, dangerous challenges, child sexual abuse or radicalisation, and some of these phenomena are surging across the EU. Statistics from the Insafe helplines run by the EU-funded Safer Internet Centres (SIC) show that there has been **a 34% increase in the number of reports from young people about cyberbullying between 2022 and 2023**[129], while the number of reports to the INHOPE hotlines of suspected child sexual abuse material from the public also increased by one third[130]. Other sources show a dramatic increase (+320%) of grooming reports, including financial sextortion, in EU countries quadrupling from 2022 to 2023, settling at over 32 thousand online enticement reports in the EU alone[131].

On 7 June 2023, the Commission **Communication on a comprehensive approach to mental health** put mental health on par with physical health, as part of a strong European Health Union[132], and it flags the potential negative effect that digital tools can have on children's well-being and health, calling for a safer and healthier digital space for children. The combination of the significant amount of time spent online by children with the sophisticated and invasive digital techniques used by advertisers poses new and **serious challenges for the protection of children**, from mental health issues to unhealthy food, tobacco and emerging products and alcohol marketing. In this regard, some precautionary action might be also needed, linked to the absence of evidence that the online space is sufficiently safe for children and teens.

The **Audiovisual Media Services Directive (AVMSD) and Digital Service Act (DSA)**, in addition to the **General Data Protection Regulation (GDPR)**, seeks to protect the privacy and safety of minors, e.g., by banning targeted advertisement addressed to minors based on profiling, and requiring VLOPs and VLOSEs to assess and mitigate systemic risks of their services to children's rights as well as negative effects of their services on people's mental or physical well-being.

To better protect children online, in May 2022 the **Commission also adopted** a **proposal for a Regulation on preventing and combating child sexual abuse (CSA)**[133] while the **2022**

[128] 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.
[129] See INSAFE helplines trends: Quarter 4 2023, https://www.betterinternetforkids.eu/practice/articles/article?id=7218998.
[130] See INHOPE annual report 2023, https://inhope.org/media/pages/articles/annual-reports/6a4f5f6bd2-1710410986/inhope-annual-report-2023.pdf.
[131] See CyberTipline 2023 report, https://www.missingkids.org/gethelpnow/cybertipline/cybertiplinedata.
[132] Commission Communication on a comprehensive approach to mental health, COM(2023) 298 final, https://health.ec.europa.eu/publications/comprehensive-approach-mental-health_en.
[133] Proposal for a Regulation of the European Parliament and of the Council laying down rules to prevent and combat child sexual abuse, COM/2022/209 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A209%3AFIN&qid=1652451192472.

Better internet for kids strategy (BIK+) supports children's empowerment and provides resources for awareness campaigns and offers helpline and hotline services.

Finally, the **Task Force on Age Verification** is currently exploring the use of the **EU Digital Wallet** for an EU-wide, interoperable, secure and privacy preserving solution to prove users' age.

Protecting children online is also a well-established priority at national level and, in recent years, in most Member States there have been notable developments and an increasing attention to children's online safety, health and as well-being online, sexual exploitation, and cyberbullying[134]. A very small number of **National Digital Decade Strategic Roadmaps** (mainly Poland and Romania) cover protecting children online, reporting specific measures planned or already in place. When reported, the measures include legislative action and the development of relevant strategies, but not specific funding.

Going forward, **greater attention** is needed, as reflected by the **growing perception that children need to be better protected online (the 2024 Eurobarometer survey showed a 10 percentage points increase in one year**). This would encompass a more solid understanding of the complex interlinks between digital tools and well-being of children as well as concrete and bold action[135], design of technical solutions, strong enforcement of the existing legislation, strengthened information on existing rules, awareness raising on risks and proactive measures to minimise them.

Objective: protecting kids - Recommended policies, measures and actions:

Completing the Digital Single market:

Member States should work with the Commission to ensure secure, privacy preserving, user-friendly and interoperable digital identity solutions and trust services, including for age verification, to enable the development of a harmonised solution from 2025 across the EU, notably leveraging the EDIW.

Cooperation

Member States are encouraged to continue coordinating with the Commission to increase protection, digital empowerment and safety of children online, notably in the implementation of the European Strategy for a Better Internet for Kids Plus. Special attention should be given to awareness-raising initiatives concerning new challenges to child safety and well-being raised by artificial intelligence, virtual worlds, overexposure to digital content, digital threats (such as hate speech, cyberbullying, harassment, child sexual abuse, grooming, and violent content), or aggressive marketing, including through child protection safeguards by design.

Member States should step up effort to cooperate on protecting children from the risks that the use of digital technologies has on their health including with better monitoring and research.

[134] BIK Policy Map - BIK Portal, www.betterinternetforkids.eu.

[135] See notably SWD 'Digital Decade in 2024: Implementation and perspective' with annexes, SWD(2024)260: https://digital-strategy.ec.europa.eu/en/news-redirect/833325, sections 4.1.4 and 4.2.1.

3.2.3. Promote responsible and human-centric AI systems

The emergence of General Purpose and Generative AI models (GPAI) has led to both unprecedented potential and heightened risks including malfunctioning systems endangering physical safety, opaque decision-making processes, privacy infringements, criminal exploitation of data, discriminatory algorithms, and the proliferation of AI-generated disinformation.

In response to these challenges, the **landmark European AI Act** was officially adopted in April 2024. This pioneering regulation is the world's first horizontal AI legislation and seeks to address societal challenges, rights and safety, including ethical considerations while establishing effective yet proportionate requirements for **AI systems operating within the European Union**. Provisions within the AI Act include prohibitions on AI systems posing unacceptable risks (considered as a clear threat to the safety, livelihoods and fundamental rights), minimum quality standards for AI systems and use cases that pose a high risk to fundamental rights (such as in healthcare, education, and policing), enhanced transparency measures, and mechanisms for individuals to file complaints regarding AI-related harms. The monitoring of the Declaration on Digital Rights and Principles[136] shows that parallel efforts to address AI are made at national level, including through soft law codes or co-regulation. Many other regions in the world have been inspired by the European approach and are now considering legislative measures looking at the EU's experience and expertise.

Promote human centric and responsible AI systems is an aspect that a small number of **National Digital Decade Strategic Roadmaps** (Belgium, Germany, Greece, the Netherlands, Sweden) took into account in their roadmaps. The measures support the development of safe and non-discriminatory AI systems, including in social services, education and R&D projects in SMEs.

Looking ahead, **successful implementation of the AI Act is paramount**. Collaboration with Member States, SMEs, and other stakeholders will be essential to ensure effective implementation, including through the development of technical standards, guidance documents, and common principles.

Objective Human centred - Recommended policies, measures and actions:
Completing the Digital Single market:

Members States should accelerate action that is necessary to accompany the implementation of the AI Act. This requires notably to foster close cooperation and engagement with the Commission, the newly created AI office and National regulators, and civil society.

Member States should step up their efforts to develop research on human-centric AI systems.

3.3. Promote and preserve our democracy

*Achieving the **Digital Decade general objectives** and upholding **the European Declaration on Digital Rights and Principles** is essential for the EU's democratic systems, as these aim to counter **the spread of online misinformation and disinformation. This effort** ensures that*

[136] 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.

citizens can make informed choices and have ***cross-border access to reliable information, provided by high-quality, independent and transparent media.***

3.3.1. Address disinformation and preserve election integrity

Disinformation has been identified as one of the biggest destabilising factors for our societies going into the future[137], including in the EU where 38% of EU citizens listed 'false and/or misleading information circulating online and offline' as the biggest threat to democracy[138] in 2023. According to the Eurobarometer 2024, 45% of Europeans consider fake news and disinformation to be one of the issues encountered online with the biggest personal impact on them.

The proliferation of disinformation poses a significant threat to civic discourse and the integrity of electoral systems in the EU. The COVID-19 pandemic and then the political developments of 2023, notably the Russia's ongoing invasion of Ukraine and the Israeli-Palestinian conflict, further fuelled disinformation, linked in particular to **foreign information manipulation and interference (FIMI)**[139]. The spread of disinformation has the potential to amplify **societal and political polarisation,** as well as **distrust in institutions, including in electoral processes.** On top of the earlier recognised patterns of mis- and disinformation, **the recent rise of generative AI** has brought novel threats, such as its use to facilitate the creation of disinformation or spread it through chatbot hallucinations and deepfakes.

In the last years, the European Commission proposed **two main pillars of the strategy against disinformation: the Digital Services Act,** according to which VLOPs and VLOSEs must take appropriate mitigation measures in case their functioning poses the risk of amplifying disinformation, **and the Code of Practice on Disinformation**, which is now in process of being converted into a Code of Conduct under the DSA. In March 2024, the Commission adopted **guidelines on the mitigation of systemic risks for electoral processes** setting out the measures that it expects to be adopted by VLOPs and VLOSEs to comply with the DSA. Three formal proceedings for breaching the obligation to counter the spread of disinformation have already been opened under the DSA, notably against X and Meta's Facebook and Instagram.

In December 2023, the Commission adopted the **defence-of-democracy package**, consisting of proposals and recommendations to address challenges such as foreign interference, to encourage civic engagement and democratic participation in the EU. In line with the Declaration on Digital Rights and Principles, the Commission Recommendation of 12 December 2023 asked Member States to take measures to promote inclusive participation and resilience against disinformation and cyber threats[140]. The monitoring of the Declaration on Digital Rights and Principles also shows that, due to the challenge of tackling harmful content itself, most Member States' efforts rely on improving citizens' media literacy and critical

[137] Disinformation was considered the number 1 risk in the short term by the World Economic Forum's Global Risks Report 2024 and, along with influence operation campaigns, as one of the top 10 threats for this decade in ENISA's report Foresight Cybersecurity Threats for 2030, https://www.enisa.europa.eu/publications/enisa-foresight-cybersecurity-threats-for-2030.

[138] Eurobarometer, March 2023, https://europa.eu/eurobarometer/surveys/detail/2966.

[139] EDMO, Disinformation narratives during the 2023 election in Europe report, November 2023, https://edmo.eu/wp-content/uploads/2023/10/EDMO-TF-Elections-disinformation-narratives-2023.pdf.

[140] Recommendation (EU) 2023/2829 of 12 December 2023 on inclusive and resilient electoral processes in the Union and enhancing the European nature and efficient conduct of the elections to the European Parliament, C/2023/8626, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023H2829.

thinking through various educational activities, that are key prerequisites for building our society's resilience towards disinformation along in the long term[141].

The Commission has funded the **European Digital Media Observatory (EDMO)** to join efforts by academia, civil society and public authorities to strengthen media literacy and build societal resilience to online disinformation.

Objective protecting democracy - Recommended policies, measures and actions:
Mobilising investments:

Member States should foster the growth of a community that would tackle different challenges linked to disinformation, like fact-checking, media literacy and research activities, such as engaging in more research on disinformation, regarding structural, psychological, sociological, and technological factors driving it. Member states could in particular foster the growth of fact-checking services to contribute to the new digital media ecosystem as well as invest in developing technological tools that can help users better detect and contextualise disinformation.

Member States should create and implement a strategy for countering foreign information manipulation and interference (FIMI) campaigns. They should continue working on identifying FIMI campaigns, while also creating efficient and effective channels for the exchange of data.

Promoting cooperation:

Member States should explore the establishment of a European Observatory on the Digital Divide to analyse, from a comparative perspective, the issue of digital divide on vulnerable social groups across the EU.

Member States are encouraged to continue supporting the Commission in the effective enforcement of the Digital Services Act in relation to the fight against disinformation, especially by providing supporting data.

3.3.2. Access to media and media pluralism

Empowering independent media actors to provide reliable information online and people to seek out such information is key to strengthening democratic societies' resilience in the digital age.

TV remains the most used media to access news, however online media are catching up, while the printed press is dropping to just less than 1/5th of the population consuming it everyday[142]. The first European Media Industry Outlook from May 2023[143] shed a light on key trends in the media industry, also showing that media increasingly operate under the logic of an attention economy, whereby different forms of content (news, advertising, entertainment) compete to capture attention.

[141] 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.
[142] European Commission, Media use in the European Union – Report, Standard Eurobarometer 98 – Winter 2022-2023, https://data.europa.eu/doi/10.2775/608948.
[143] European Commission, European Media Industry Outlook, SWD(2023) 150 final, May 2023, https://digital-strategy.ec.europa.eu/en/library/european-media-industry-outlook.

The **European Media Freedom Act** (EMFA), which entered into force on 7 May 2024, aims to improve the functioning of the single market for media services as they become increasingly digital and inherently cross-border. This strengthened EU media law framework will be promoted by the new independent European Board for Media Services.

The EMFA includes unprecedented safeguards for media and journalists against political interference, as well as rules ensuring that media can operate more easily across borders, without undue pressure and benefiting from the digital transformation of the media space. With its provisions on the provision of and access to media services online and transparency rules on media ownership, the act will lead to more **diverse range of quality media content enabling pluralistic public debates**, in line with the Digital Decade objectives and the Declaration on Digital Rights and Principles.

The EMFA comes together with other initiatives supporting media freedom and pluralism, such as the **proposed Directive to improve the protection of journalists and human rights defenders from abusive court proceedings (SLAPPs)** and recommendations on internal safeguards for editorial independence and ownership transparency in the media sector and the protection, safety and empowerment of journalists. **It has synergies with the DSA, the Code of Practice on Disinformation and other digital regulation**. Finally, actions to promote the digital transformation of media industry, its pluralism, quality journalism, fact-checked information and media literacy are supported under the Commission's **Media and Audiovisual Action Plan**[144] and dedicated funding[145], notably the **Creative Europe programme**.

Objective protecting democracy - Recommended policies, measures and actions:

Member States should foster media freedom and pluralism to help citizens to access a diverse online information and news space, by supporting the industry and cooperating with other Member States and with the European Commission.

4. Leveraging digital transformation for a smart greening

Eurobarometer 2024:** the twinning of the digital and green transitions is considered a key factor in Europe's digitalisation. **Four out of five people in Europe consider it important that the public authorities ensure that digital technologies serve the green transition.

*The Digital Decade objectives aim to ensure the sustainability and resource-efficiency of digital infrastructures and technologies. **It also highlights several infrastructure sustainability targets** such as the development of edge nodes and semiconductors. Together with the **European Declaration on Digital Rights and Principles,** the Digital Decade seeks to promote sustainable digital technologies, products and services, as well as providing access to information on environmental impact and energy consumption. Furthermore, it encourages*

[144] Commission Communication 'Europe's Media in the Digital Decade: An Action Plan to Support Recovery and Transformation', COM/2020/784 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0784.

[145] In particular, the Creative Europe programme has allocated EUR 75 million for the first time in support of actions such as media pluralism, media literacy and quality journalism. Further EUR 20 million per year are spent to increase the professional media coverage of EU affairs so that citizens can access quality information on topics of their interest.

the adoption of digital technologies that have appositive impact on the environment and climate[146].

4.1. The nexus between green transition and digital transformation

Global warming concerns have grown in recent months, and environmental hazards continue to dominate the risk landscape. Temperature records continued to be broken in 2023 and climate change and biodiversity loss are among the world's biggest challenges in the next decade, according to the World Economic Forum's 2024 Global Risks Perception Survey (GRPS) and the Munich Security Report 2024[147]. Europe is particularly exposed as the fastest warming continent in the world, with several regions such as Southern Europe being hotspots for multiple climate risks[148].

With climate change concerns, assessing the environmental effect of technologies' growing proliferation and use has become paramount. While challenges persist in measuring impacts and determining the assessments that should occur, data robustly shows technologies' footprint on the environment is set to enlarge. Digitalisation is a resource-intensive process (energy, water and raw materials extraction), and while some technologies are revealing sustainability paths, the so-called 'twin transition' is not yet guaranteed in practice.

The monitoring of the Declaration so far reports a limited number of measures taken by Member States in relation to developing sustainable technologies and technologies that have a positive impact on climate and the environments, such as standards and labels[149].

The perception of the role that the digital transformation and the adoption of technologies is playing is growing, both regarding the need to reduce the ICT footprint and achieve productivity growth and efficiency gains for companies, as well as breakthroughs in energy-efficiency, net-zero and clean technologies. Figures released by the International Energy Agency (IEA) suggest that global electricity demand rose considerably in 2023 and is expected to grow at ai much faster pace in the next two years, in line with the global demand for Internet services and AI[150]. Electricity consumption from data centres, AI and the cryptocurrency sector could double in the next two years, as large storage capacities and efficient processing techniques are required to feeding AI systems. But today's data centres are not designed to support this: greater energy and storage capacities will need to be built[151].

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[146] 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.

[147] World Economic Forum, Global Risks Report 2024, https://www.weforum.org/publications/global-risks-report-2024;Bunde T., Eisentraut S., Schuette L.(eds.), Lose-Lose ? Munich Security Report 2024, https ://securityconference.org/assets/01_Bilder_Inhalte/03_Medien/02_Publikationen/2024/MSR_2024/MunichSecurityReport2024_Lose-lose.pdf, chapter 7.

[148] https ://www.eea.europa.eu/en/newsroom/news/europe-is-not-prepared-for.

[149] Less than 5% of national measures taken to implement to the commitments of the Declaration. 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.

[150] https://www.iea.org/energy-system/buildings/data-centres-and-data-transmission-networks; https://www.iea.org/reports/electricity-2024.

[151] https://www.reuters.com/technology/european-data-centres-grapple-with-ai-driven-demand-space-2024-02-27/

More generally, there is a growing sense that digital transformation can steer a '**smart green transition"** which is enabled by and supports a more competitive European economy.

4.2. Towards Sustainable digital infrastructures

*Eurobarometer 2024: The perception of the role of digital technology to fight climate change is increasing- **3 out of 4 Europeans** consider that **digital technologies** will be **playing an important role in helping to fight climate change**, showing a 10% progress in one year, as they were only 2 out of 3 respondents in the Eurobarometer 2023.*

The digital sector remains a significant source of energy consumption, emissions and waste. Today, it accounts for approximately 7-9% of global electricity consumption, forecasted to rise to 13% by 2030[152], and for increasing amounts of e-waste[153].

For example, in the case of France, the vast majority (79%) of the carbon footprint of the digital sector comes from digital devices (including smartphones, computers, tablets), especially at the production stage. However, recent trends suggest that the GHG emissions of device manufacturers are slowly decreasing (-5.4% between 2021 and 2022), while the data centres' which represented only 16% of the emissions, have increased over 2021-2022 with +14% of GHG emissions, +15% electric consumption, and +20% water consumption[154]. A prospective study[155] evaluated that, in a no-policy change scenario**, the carbon footprint of the digital sector would increase by +45% by 2030.** This large increase is driven by the **growth in data flows, mainly videos**, itself supported by a growing number of data centres. The latter could represent 22% of digital GHG emissions in 2050, despite the use of technologies ensuring better energy efficiency.

A substantial share of digital energy and resource consumption is expected to be linked to AI, as reported by the OECD[156]. This is due likely massive increase in data storage and processing. Recent estimates predicting that at a global level, the **electricity consumption of data centres could double between 2022 and 2026**[157]. Depending on the technology used, cooling of data centres can also have a significant impact on water use and hence need to be addressed on the path towards sustainable digital infrastructures.

In terms of the circular economy, the use of recycling remains limited as in the EU, 10.4% of people reported recycling their mobile/smart phones, 9.7% for laptops and tablets and 12.8% for desktop computers. At business level, almost one in two enterprises (48.7%) have

[152] According to the Strategic Foresight Report 2022, the Action plan on Digitalisation of Energy Systems and eWaste Monitor.

[153] E-waste (electronic waste) is any electronic device or equipment that is obsolete, energy intensive, or has reached the end of its life, such as old computers, mobile phones, tablets, smart TVs, telecommunication equipment, and other electronic devices. UNITAR, Global E-Waste Monitor, https://ewastemonitor.info/gem-2020/

[154] ARCEP, Enquête annuelle 'Pour un numérique soutenable' – édition 2023, https ://www.arcep.fr/cartes-et-donnees/nos-publications-chiffrees/impact-environnemental/enquete-annuelle-pour-un-numerique-soutenable-edition-2023.html.

[155] ARCEP, 'Etude ADEME – Arcep sur l'empreinte environnementale du numérique en 2020, 2030 et 2050', https ://www.arcep.fr/la-regulation/grands-dossiers-thematiques-transverses/lempreinte-environnementale-du-numerique/etude-ademe-arcep-empreinte-environnemental-numerique-2020-2030-2050.html.

[156] OECD, Measuring the environmental impacts of artificial intelligence compute and applications: The AI footprint, OECD Digital Economy Papers No. 341, 2022, https://doi.org/10.1787/7babf571-en

[157] International Energy Agency, Electricity 2024: Analysis and forecast to 2026, January 2024, https://iea.blob.core.windows.net/assets/6b2fd954-2017-408e-bf08-952fdd62118a/Electricity2024-Analysisandforecastto2026.pdf.

considered the environmental impact of ICT services and equipment before selecting them and applying some measures, affecting the paper or energy consumption of the ICT equipment[158].

In 2023, the EU has set **eco-design minimum efficiency requirements** for smartphones, tablets and earlier for servers and computers that are currently under review. The revision of the Energy Efficiency Directive[159] included, for the first time, provisions on the energy performance of data centres. New planning and assessment rules have been adopted with a view to encouraging new data centres to be located where waste heat can be reused, and energy and water needs for cooling be reduced. In addition, the Delegated Regulation 2024/1364[160] sets out the rules to monitor the energy performance of data centres and to collect and publish data, including also on the energy and water footprint of data centres.

The Commission also conducted in 2023 a study led by its JRC to identify common indicators for measuring the environmental footprint of electronic communications services[161]. The final report includes a selection of possible indicators to be used as a basis for future **Code of Conduct for sustainable telecommunications networks**, which should be finalised by the end of 2025.

Energy-efficient semiconductors are critical for reducing the energy consumption of electronic devices, playing a pivotal role in global efforts to mitigate carbon emissions. **This is an area where the EU has a clear global leadership.** Several developments, supported by the EU and Member States, will contribute to accelerate progress toward carbon neutrality. First, the **miniaturisation of chips** will considerably increase their energy efficiency. In particular, the leading European technologies developed by ASML and Imec will enable to design 3 nm chips that will deliver 35% of efficiency gains as compared with 5 nm ones. Second, **low-power processors will** lead to groundbreaking energy savings in AI technologies based on edge. Third, the use of new materials – so called wide-bandgap materials such as Silicon Carbide and Gallium Nitride are also expected to improve performance and energy efficiency.

Investment will be critical to incentivise the move towards more resource-efficient digital technologies. The Recovery and Resilience Facility thus supports measures that leverage digital technologies to support the green transition, such as the digitalization of transport systems, including railways and urban transport, or the deployment of Smart Energy Systems (including smart grids and ICT systems).

The **EU Taxonomy Regulation** Delegated Act on climate mitigation and adaptation has set clear criteria that will help steer investment towards greener data centres and proven green digital solutions as a sustainable economic activity. Over the summer of 2024, the Commission

[158] Eurostat, What do people do with their old ICT equipment?, https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20231124-1#:~:text=Almost%20half%20of%20people%20(49,threw%20it%20away%20without%20recycling.

[159] Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955, OJ L 231, 20.9.2023, p. 1,http://data.europa.eu/eli/dir/2023/1791/oj.

[160] Commission Delegated Regulation (EU) 2024/1364 of 14 March 2024 on the first phase of the establishment of a common Union rating scheme for data centres, OJ L, 2024/1364, 17.5.2024, http://data.europa.eu/eli/reg_del/2024/1364/oj.

[161] Baldini, G., Cerutti, I. and Chountala, C., Identifying common indicators for measuring the environmental footprint of electronic communications networks (ECNs) for the provision of electronic communications services (ECSs), Joint Research Centre, 2023, https://publications.jrc.ec.europa.eu/repository/handle/JRC136475.

will publish an EU Cloud Rulebook as a single point of reference for relevant rules applicable to the cloud, including on sustainability.

In February 2024, the Commission launched a feedback period for stakeholders on the **White Paper titled 'How to master Europe's digital infrastructure needs?'**[162]. As set out in one of the several scenarios, the Commission may consider facilitating greening of digital networks through promoting the timely switch-off of copper networks and moving to a full fibre environment and more efficient use of networks (codecs) throughout the Union territory. It includes engaging with the industry to further improve the usability and potential scope of the EU Taxonomy for green investments, metrics to estimate the net carbon impact of digital solutions, and the cooperation of all players of the digital network ecosystem to reduce their carbon footprint, including concrete actions such as codecs performance labels.

Sustainable digital infrastructures and technologies are an aspect that only a small number of **National Digital Decade Strategic Roadmaps** (mainly Belgium, France, Germany, Greece, the Netherlands, Luxemburg, Slovenia and Slovakia) have addressed. The largest part of the measures focuses on the development and use of energy- and resource-efficient technologies and infrastructure, ranging from reducing e-waste to measures supporting circular and digital business models. Developing measurements and monitoring the environmental impact of digital technologies, including in design of new e-services, is also taken into account through a small number of measures.

Greater coordination is possible between national roadmaps and **National Energy and Climate Plans** (NECPs). In December 2023, the Commission has published its assessment of EU Member States' draft NECPs and issued recommendations to assist Member States in raising their ambitions in line with EU targets for 2030. Several links between digitalisation and sustainability were made in the assessment, notably digitalisation as an enabler to integrate renewables in the grid, and cybersecurity as a key requirement for a secure and robust energy system. Overall, Member States' draft updated plans lack measures and funding to implement the EU action plan to digitalise the energy system as well as on digital and green skills[163].

4.3. The digitalisation for the green transition is entering into concrete delivery.

The digital transformation is playing an essential role in the efforts to reduce the environmental footprint and achieve the European Green Deal, with a potential to reduce the total GHGs by 15%-20% before 2030 (WEF, GESI), if properly used and governed.

In this regard**, 2024 is a delivery year with very substantial and concrete outcomes.**

- One of the current priorities has been to deliver a **science-based methodology** to measure the net environmental impact of digital solution, to enable the collection of evidence as a basis to develop policies. **Launched in 2021 by the Commission** the European Green Digital Coalition[164] (EGDC) was established to bring main ICT stakeholders to develop

[162] European Commission, White Paper – How to master Europe's digital infrastructure needs?, February 2024, https://digital-strategy.ec.europa.eu/en/library/white-paper-how-master-europes-digital-infrastructure-needs.

[163] Commission Communication 'EU wide assessment of the draft updated National Energy and Climate Plans An important step towards the more ambitious 2030 energy and climate objectives under the European Green Deal and RePowerEU', COM (2023) 796 final, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=comnat:COM_2023_0796_FIN

[164] https://ec.europa.eu/commission/presscorner/detail/en/QANDA_22_6229; https://www.greendigitalcoalition.eu/; EGDC support the work of the coalition and benefit from its work, and, 45 SMEs whose CEOs committed also to the goals of the EGDC by signing the EGDC declaration.

science-based methodology to quantify the net environmental impact of digital solutions, to demonstrate its usability in use cases, and to develop guidelines for major sectors. **The EGDC has successfully delivered all goals in March 2024** and will engage as of Q4 of 2024 with stakeholders of climate critical sectors, namely energy, transport, construction, agriculture, health, smart cities, and manufacturing, to develop eligibility criteria to support such digitalisation with sustainable finance.

- The Commission is **supporting a range of AI-driven projects** through Horizon Europe and DEP to optimise resource utilisation, minimise waste, and curb energy use across various sectors.
- Digital tools are playing a key role to foster coordination and cooperation at local level. The newly established **European Digital Infrastructure Consortium** CitiVERSE will contribute to build smart and green cities, fully in line with the twin digital and green transition and the **New European Bauhaus** of creating inclusive, aesthetic and sustainable cities. By the same token, the **European Digital Innovation Hubs (EDIH) network** promotes a sustainable approach to digitalisation in all the activities and services they provide at regional level to SMEs and local public administrations. The European Green Deal Data Space will be implemented as of Q4 2024 and it will boost a data economy to achieve Green Deal Objectives in the area of Circular Economy, Biodiversity, Climate change/ adaptation and Zero Pollution. The EU today is home to **114 hubs addressing both the green transition and digital** or derivatives of those policy priorities.
- Destination Earth (DestinE), a digital twin of the Earth supported by the European Commission, is on the **eve of being launched and open to users mid-2024.** With its groundbreaking features enabling to model, monitor and simulate natural phenomena, hazards and the related human activities with a unique level of accuracy, speed and interactivity, DestinE will assist users in designing accurate and actionable adaptation strategies and mitigation measures.

- The Commission supports the electricity grid operators (DSOs and TSOs) to **develop a digital twin of the European grids**. This will foster cooperation between grid operators, help drive and coordinate public and private investments, and facilitate standardisation efforts.

The contribution of digitalisation to the green transition is an aspect that a small number of **National Digital Decade Strategic Roadmaps** (mainly Croatia, Cyprus, Denmark, Germany, Greece, Romania, Slovakia, Slovenia, Sweden) took into account. The measures include various application fields, including edge computing and data centres, tourism, energy efficiency of buildings, high-speed connectivity networks and mobility.

4.4. The way forward

Building on the growing citizen's perception and overall political support in Europe on the important potential of the digital transformation to foster a smart green transition[165] and on the achievement realised in 2023, the priority is to develop synergies and move from

[165] See Special Eurobarometer 551 'The Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351; Council conclusions on Future of Digital Policy: https://www.consilium.europa.eu/en/press/press-releases/2024/05/21/eu-digital-policy-council-identifies-main-priorities-for-the-next-legislative-cycle/pdf/) and on Cybersecurity Policy: https://www.consilium.europa.eu/en/press/press-releases/2024/05/21/cybersecurity-council-approves-conclusions-for-a-more-cyber-secure-and-resilient-union/adopted at the Telecom Council on 21 May 2024.

small scale pilots and initiatives to large scale projects based on cooperation between public and private actors.

Objective smart greening - Recommended policies, measures and actions:

National Roadmaps:

Member States should consider wider deployment of digital solutions in supporting the sustainability targets of climate critical sectors such as energy, transport, buildings, and agriculture. This will also support the competitiveness and growth of the EU green digital tech market.

Completing the Digital Single market:

Member States should accelerate and intensify their preparatory action necessary to report con data centre sustainability building on the Energy Efficiency Directive.

Member States, in cooperation with European Commission and relevant stakeholders, should develop a methodology to assess the carbon footprint and enablement of digital infrastructures, and in particular, the energy consumption of edge nodes, with the view, by end of 2025, to progress towards Digital Decade metrics to improve the sustainability of digital infrastructures and energy efficiency of edge computing.

Member States should use the European Green Digital Coalition methodology released in April 2024 to measure avoided GHG emissions due to the use of digitally enabled solutions in sectors such as energy, transport, buildings, agriculture, health, smart cities, and manufacturing. These measurements will provide the necessary evidence for eligibility of climate (green) financing for digitalisation of climate critical sectors.

Mobilising investments:

Member States should intensify the work with the European Commission and institutional financial actors on eligibility criteria for green finance to support the deployment of digital infrastructures and solutions that demonstrate positive sustainability impact.

5. Building coherence and synergizing digital policies and spending

*The Digital Decade includes a joint commitment to ensure that digital policies, measures and programmes which are relevant for EU's digital transformation are taken into account in a coordinated and coherent way to fully contribute to **Digital Decade objectives**, while avoiding overlaps and minimising administrative burdens. This section monitors progress towards these objectives.*

5.1. Horizontal implementation through national roadmaps

The first round of national roadmaps marks a successful starting point for discussing, aligning, and sharing pathways for digital transformation across Member States along a common vision. For the first time, the EU can count on national roadmaps for all 27 Member States. Four countries (Czechia, Germany, Greece, and Latvia) have also thoroughly and explicitly integrated the recommendations from the State of the Digital Decade Report 2023 into their

roadmaps. Nevertheless, a comprehensive assessment[166] demonstrates that substantial horizontal improvements and adjustments in the national roadmaps are needed to align them with the benchmarks set out in the Digital Decade Policy programme, as per the Commission guidance published in 2023.

Strategic Digital Decade National Roadmaps - Recommended policies, measures and actions

Members States should ensure that all EU targets are covered by national targets and trajectories, reflecting EU's level of ambition.

Member States should ensure that those national targets and objectives are translated into more ambitious measures, including budget considerations.

Member States should present an analysis of the impact that these measures create to ensure a more sustained progress towards these targets and objectives.

Member States should pay greater attention to the challenges concerning the achievement of general objectives (i.e., human centred digital space, competitiveness, resilience, sovereignty, inclusiveness, sustainability and greening, coherence of the action) and on the necessary measures that should be taken, including as regards to the implementation of the Declaration on Digital Rights and Principles.

Member States should associate stakeholders in appropriate consultation in the adjustment of the national roadmaps.

5.2. Striving for an effective, efficient and red-tape free implementation of the digital regulatory environment

The need to reduce the administrative burden both in the implementation and enforcement of existing legislative acts and when reflecting on new legislative initiatives has been increasingly raised by the Commission and Member States[167]. They have called for synergies, the avoidance of duplication and the adoption of a coordinated approach in managing the existing governance structures, as well as stressing the need for coherence between digital and cybersecurity policy. The following areas could be explored to promote the implementation of the digital acquis, as follows:

- The possibility to **consolidate part of the digital acquis** in some areas – building on the experience of the European Electronic Communications Code which merged five directives into a single legal document.
- Making full use of the follow up to the **White paper on the future of connectivity** adopted in February 2024, regarding the simplification of the telecom regulatory framework against a background of a convergence between telecom and cloud-edge services.
- Undertaking a **comprehensive mapping of reporting obligations** across the entire digital acquis, building on the initial work already done in 2023, with a view to **simplify reporting**

[166] SWD 'Digital Decade in 2024: Implementation and perspective' with annexes, SWD(2024)260: https://digital-strategy.ec.europa.eu/en/news-redirect/833325, Annex 3.

[167] See Council conclusions on Future of Digital Policy (https://www.consilium.europa.eu/en/press/press-releases/2024/05/21/eu-digital-policy-council-identifies-main-priorities-for-the-next-legislative-cycle/pdf/and on Cybersecurity Policy (https://www.consilium.europa.eu/en/press/press-releases/2024/05/21/cybersecurity-council-approves-conclusions-for-a-more-cyber-secure-and-resilient-union/) adopted at the Telecom Council on 21 May 2024.

obligations, leveraging the experience of sandboxes, and building on the new possibility of digital reporting.

- Ensuring a **swift implementation of the acts, guidelines, codes of practice** and other legal initiatives which the European Commission and its new AI Office will have to adopt over the next few months to prepare the ground for the AI Act.

Last but not least, the **'whole-of-government' approach** promoted by the Digital Decade can reduce boundaries between government agencies and facilitate the seamless exchange of data and information between the various systems, thereby **simplifying processes for businesses and citizens.**

The new Comitology committee (for implementing acts) and the Digital Decade Board (DDB) as an Expert group (for collaboration and cooperation activities with Member States) were established by Decision of the Commission in 2023. The DDB was designed **as a central point for Member States and granted with a broad mandate covering potentially all issues and discussions related to digital transformation**, including with regards to governance and reporting obligations, and multi-country projects.

In 2023 and 2024, the Commission and the Member States discussed ways to **give the DDB a strategic role**, to build on the Board's mandate, and upgrade its positioning as a reference for decision-makers and political leaders under the impulse of the Spanish, Belgium and soon Hungarian Presidency of the EU Council.

The Digital Decade Policy Programme could in particular play a role in promoting synergies between the work of sectorial boards (such as the European Board for Digital Services under the DSA, or the AI Board) and in **analysing and clarifying how various EU laws and their governing bodies, such as expert groups, will intersect with one another**, ensuring a better understanding of those interactions by stakeholders, especially SMEs.

Objective fostering coordination and coherence - Recommended policies, measures and actions

Completing the Digital Single market:

Members States should cooperate with the Commission to implement tools and solutions to promote consistency in the application of existing legislative acts and to explore ways to reduce administrative burdens, in particular for SMEs.

Member States should exchange best practices on consolidation and codification of the existing digital regulatory framework together with the Commission.

Members States should cooperate with the Commission to develop synergies and improve coordination of existing EU laws with their various governance structures and entities to increase the overall efficiency and coherence of EU legislation while contributing to the improvement of compliance and the reinforcement of the Single Market.

Member States should fully leverage the DDB's role and expertise to help support the implementation of digital acquis.

5.3. Synergising funding for digitalisation

Several EU programmes - such as Horizon Europe, DIGITAL, CEF digital, RRF, and InvestEU – are essential to achieve the objectives and targets of the Digital Decade.

The **significant scale-up of EU investment in digital technologies** delivered through programmes and instruments in the Multi-annual Financial Framework (MFF) 2021-27 creates opportunities to improve efficiencies, including the cross-fertilisation of industries. It also opens a window to reinforce European innovation by exploring and exploiting technologies at the interface between the civil, defence and space industries, such as artificial intelligence, cloud and quantum computing, as set out in the **Action Plan on Synergies between the European civil, defence and space industry** of February 2021.

Building on the conclusions of the Council May 2024[168], the creation of synergies requires adequate planning, designing, and programming of EU funding programmes, aligning strategic priorities, and harmonising rules. Synergies can be developed and fostered in three main areas.

First, **complementary funding** enables different programmes to participate in the same project. Complementary funding was possible for many of the European Digital Innovation Hubs (EDIH), funded under the DEP in combination with the European Regional Development Fund due to the very strong regional dimension of the EDIH.

Second, **sequential funding** addresses successive projects built on each other, upstream or downstream, notably between Horizon Europe, Digital Europe Programme (DIGITAL or DEP) and Connecting Europe Facility (CEF2 – Digital) to prepare, deploy and connect digital infrastructures. Horizon Europe supports research, technological development, demonstration, piloting, proof-of-concept, testing and innovation - including pre-commercial deployment - for innovative digital technologies. The DEP focuses on large-scale digital capacity and infrastructure building to support the uptake and deployment of critical existing or tested innovative digital solutions across the EU. The CEF2 - Digital supports the deployment of very high-capacity backbone networks and 5G networks, both corridors and smart communities, necessary to deploy digital services and technologies across the EU. Another example of sequential funding is the action being put into place to allow for the migration of innovation from **the civil to the defence sector,** in the context of spin-in or spin-off calls.

Third, **alternative funding** enables one programme or instrument to take up high-quality project proposals from other programmes, in particular through the **Seal of Excellence**, which recognises the value of a project and encourages other funds to benefit from the high-quality evaluation process. Under **Horizon Europe**, the **European Innovation Council (EIC) Accelerator Seal of Excellence** offers a wide variety of funding opportunities by using synergies with other EU and national programmes such as NextGenerationEU or Cohesion funds. **The DEP awards the Seal of Excellence** notably for the European Digital Innovation Hubs (EDIHs). 151 EDIHs are funded by the DEP and over 70 Seals of Excellence EDIHs have been funded by the European Structural and Investment Funds (ESIF) or the RRF. In 2023, **CEF Digital** also attributed Seals of Excellence to a number of projects submitted in

[168] In its conclusions, the Telecom Council of 21 May 2024 underlined the importance to streamline funding programmes' procedures and called to promote synergies in order to improve the clarity and predictability of the EU legislative framework to enhance legal certainty, and to ensure a level playing field for all actors involved, including SMEs and start-ups.

Call 2 for Global Gateways, which could not otherwise be funded due to lack of budget. **Building on the success of the Seal of Excellence, the Strategic Technologies for Europe Platform (STEP) Regulation[169] has introduced the Sovereignty Seal**. The Sovereignty Seal will be awarded to projects meeting the minimum quality requirements (including eligibility, exclusion, and award criteria) in the selection process under the DEP, the European Defence Fund, the EU4Health programme, Horizon Europe, or the Innovation Fund.

Last but not least, synergies can also take place between grants and repayable forms of support such as loans, guarantees and equity investment to address particular market failures or investment gaps. The InvestEU Fund can be combined with grants or financial instruments (or both), funded by the centrally managed EU budget or by the EU Innovation Fund. Such a **streamlined investment process enables visibility of the project pipeline and maximises synergies across relevant EU programmes in areas such as digitisation**. This is the case with the **blending operations between DEP and InvestEU**, where the InvestEU guarantee is increased to provide targeted equity support in the field of strategic digital Technologies or chips.

Objective fostering coordination and coherence - Recommended policies, measures and actions:
Mobilising investments:

Member States should cooperate with the Commission to develop further synergies across the funding programmes that are mobilised for EU's digital transformation, to avoid duplication and pursue complementarities.

Member States should maximise the impact of the EU budget by supporting in particular projects with strong cross-border dimension which have received Seals of excellence or should further extend their coverage, thus ensuring European investments act as an accelerator for upcoming initiatives to achieve the Digital Decade's objectives and targets.

Member States should cooperate with the Commission to promote a streamlined investment process to ensure the visibility of project pipelines and maximise existing synergies.

5.4. Increase cooperation across levels, including involving cities and regions more in the Digital Decade

One of the major issues faced by the EU's digital transformation, as reflected in the monitoring of objectives and targets, is the lack of dissemination of digital technologies beyond hot spots including some large cities as shown by the persisting digital divide and the lack of digitalisation of businesses, especially SMEs. As shown by the 9th Cohesion Report[170] regional convergence is still lagging as capital regions often concentrate investments, human capital and digital infrastructures while other regions, remote and rural areas, struggle to boost economic activity and face demographic challenges. A **successful Digital Decade will**

[169] Proposal for a Regulation of the European Parliament and of the Council establishing the Strategic Technologies for Europe Platform ('STEP') and amending Directive 2003/87/EC, Regulations (EU) 2021/1058, (EU) 2021/1056, (EU) 2021/1057, (EU) No 1303/2013, (EU) No 223/2014, (EU) 2021/1060, (EU) 2021/523, (EU) 2021/695, (EU) 2021/697 and (EU) 2021/241, COM/2023/335 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52023PC0335.

[170] European Commission, Ninth Report on Economic, Social and Territorial Cohesion, April 2024, https://ec.europa.eu/regional_policy/information-sources/cohesion-report_en.

not be possible without greater attention to inclusiveness and the involvement of all actors at all levels. Institutionally, the multiple references to regions in the policy programme demonstrate the objective of the European Parliament and the EU Council to ensure an inclusive approach for the digital decade that goes beyond EU and national level.

Regions and municipalities share many of the key challenges obstructing the digital transformation whether on infrastructure, smart governance, smart mobility, start-up ecosystems, open data or digital sustainability. A recent survey[171] undertaken by the EIB shows that access to digital and technical skills represent major obstacles to the digital transformation of more than half (58%) of municipalities in the EU. More generally, local and regional authorities play an important role in the delivery of Union's initiatives as 70% of EU legislation needs their intervention to be implemented[172].

The Digital Decade Policy Programme and the Declaration on Digital Rights and Principles are an opportunity to increase regions and cities' contribution to the EU's digital transformation, providing a common language and a comprehensive framework, enabling alignment on priorities defining the 'European way' based on cooperation and a governance mechanism that creates new opportunities for Member States, regions and cities to partner up and intensify their action, including via projects such as the LDT-CitiVERSE-EDIC.

Conversely, the specific experience and capacities of regions and cities are critical for a successful Digital Decade with a wealth of practical experience, knowledge, innovative solutions based on everyday contacts with people and businesses that can also help better monitor the Declaration on Digital Rights and Principles, tackle issues such as the **digital divide** and ensure that the benefits of digitalisation can reach all local groups, including SMEs. **Local observatories** and **Observatories of Digital Divide** are promising channels through which regions and cities are hosting a breeding ground of information from the public on the challenges of digitalisation in their daily lives, and on digital divides[173]. The **Cities Coalition for Digital Rights**[174], a network of cities committed to promoting and defending digital rights in the urban context can also play a key role in implementing the Declaration on Digital Rights and Principles.

At local level, the grassroot **Living-in.EU movement** set up by European cities has embraced the Digital Decade to lead digital transformation in regions, cities and local communities. It is supported by the Committee of the Regions and by the European Commission via the DEP. Set up in 2019, the movement is growing constantly and boasts more than 150 signatories and over 130 institutional supporters, representing already 10% of the EU population. The Living-in-EU movement initiated **LORDIMAS,** a tool developed to measure digital maturity at the local level, which could be further aligned with the Digital Decade to help national and EU-level policymakers provide better policy support and targeted funding. However, regions and cities' **current modes of disseminating best practices and success stories lack the efficiency** of a framework and the internal engineering needed to share their experiences and knowledge more effectively, in particular with regards to the smallest communities. Cities across the EU would

[171] European Investment Bank, Digitalisation in Europe 2022-2023: Evidence from the EIB Investment Survey, https://www.eib.org/en/publications/20230112-digitalisation-in-europe-2022-2023.
[172] See Mons Declaration of the European Committee of the Regions (CoR), March 2024.
[173] https://eurocities.eu/latest/a-digital-divide-observatory-by-european-cities/.
[174] https://citiesfordigitalrights.org/thecoalition.

benefit from actual dissemination projects, including deadlines, financial means, and, by design, a mechanism to replicate the best practices for smaller cities.

Objective fostering coordination and coherence across levels - Recommended policies, measures and actions:
Member States should cooperate with the Commission to stimulate a closer and bidirectional dialogue with regions and cities including through existing networks; and to identify, collect and disseminate best practices, notably reflecting the Declaration of Digital Rights and Principles. This should build on existing 'Local Observatories' which could act as the main vehicle for collecting best practices and disseminating them across governance levels.

Member States should improve data collection and monitoring of the digital transformation at the local level in support of the Digital Decade Policy Programme.