



EU and Greece towards the Digital Decade 2030

A review ahead and beyond of
EU elections for a competitive digital Europe

Convergence - Growth - Inclusiveness

May, 2024

Supported by

Google

Table of Contents

1. The Global Digital Industry landscape	3
2. The EU ahead of Digital Decade 2030	6
3. The Greek path to Digital Decade 2030.....	9
4. Challenges towards Europe’s Digital Decade.....	18
4.1. Protecting our democracy and fighting the digital divide.	18
4.2. Achieving a net zero economy.....	21
4.3. The digital transformation as key driver for competitiveness and growth.....	25
4.4. Boosting digital skills and literacy.....	28
4.5. The AI as the Steam Engine of the Fourth Industrial Revolution.....	30
ANNEX A - The state of play of digital transformation in the Member States	

Executive Summary

Digital society and digital technologies bring with them new ways to learn, entertain, work, explore, and fulfil ambitions. They also bring new freedoms and rights and give EU citizens the opportunity to reach out beyond physical communities, geographical locations, and social/economic conditions.

However, there are still many challenges associated with the digital transformation. The digital world should be based on European values – where no one is left behind, everyone enjoys freedom, protection and fairness. Europe's Digital Decade is where everyone has the skills to use everyday technology, from citizens, public organizations and small businesses to improve parts of their business operations. Connectivity reaches people living in villages, mountains and remote areas, so everyone can reach online opportunities and participate in the benefits of the digital society.

The EU must seize the opportunity in the context of Digital Decade 2030 to set the policy framework that will support the European Union's long-term competitiveness. The broad adoption of digital technologies, Artificial Intelligence in particular, will be key for achieving the targets of Digital Decade 2030, and a sustainable economic development. Paired with an enabling policy framework and effective implementation, the EU could significantly increase the appeal of its Single Market and attract more investments to overcome deficiencies in the next decade digital journey.

In this context, Greece as part of the EU should define its national roadmap to the Digital Decade 2030 by harnessing the current dynamics on digital transformation, along with the unique funding opportunity by the RRF and other EU programmes and initiatives. In order to follow the rest of EU countries, Greece should step up with significant reforms and investments that levers the high educated workforce, the vibrant startup ecosystem and the competitive advantages in specific economic areas like tourism, pharmaceuticals and shipping, and become more competitive, resilient and inclusive.

1. The Global Digital Industry landscape

Ranking as one of the largest industries, **the global ICT market was forecast to reach a size of EUR 6 trillion in 2023**¹. However, the EU's share of global revenue in the ICT market has drastically fallen in the last decade, from 21.8% in 2013 to 11.3% in 2022, while US's share increased from 26.8% to 36%. Currently, the EU relies on foreign countries for over 80% of digital products, as well as for services, infrastructures, and intellectual property. For example, the US and the EU are up to 75-90% production-dependent on Asia for semiconductors².

Regarding the investments in digital infrastructures EU is behind compared to its key trading partners. Public investment in the US has recently reached USD 90 billion only in the context of the Infrastructure Investment and Jobs Act and American Rescue Plan. To compare, in the EU, whilst unprecedented funds have been made available to support progress towards the 2030 connectivity targets, these amount to just over EUR 23 billion in grants available, under EU Programmes for the 2021-2027 programming period, including around EUR 16 billion under the RRF. Moreover, between 2014 and 2021 EUR 53.71 billion of state aid for broadband had already been approved by or communicated to the Commission. In terms of total fixed capital investment in fibre and 5G per capita adjusted to GDP, only EUR 104 were invested in the EU against EUR 260 in Japan, EUR 150 in the US and 110 in China. A JRC study on international benchmarking of digital investments presents a similar picture, finding that private investments (gross fixed capital formation) on telecommunication equipment by the US's ICT sector reached EUR 590 bn between 2014 and 2020, representing the double the amount invested by the EU's ICT sector (EUR 277 bn), and 1.8 times the amount invested by the EU after GDP correction.

Regarding **the most transformative digital technology, the AI**, the EU is lagging behind the United States (US) and China in private investment³ and the level of adoption of AI technologies by companies and by the general public is comparatively low compared to the US. The US also attracts more AI talent and researchers and is the world leader in patent applications, while China leads the race on data collection and data access (i.e. the raw material for most AI technologies) and has made significant progress in developing new hardware equipment such as supercomputers. Furthermore, the US and China are leading in regards patents on quantum-computing technologies, while Europe's level of investment in blockchain technologies and IoT is comparatively low⁴.

For example, in quantum computing 50% of the top companies are in the US, 40% in China and none in the EU. In 5G, China captures nearly 60% of external funding, the US 27%, Europe 11%. In artificial intelligence, the US captured 40%, Europe 12% and Asia (including China) 32%. In biotech in 2018–20,

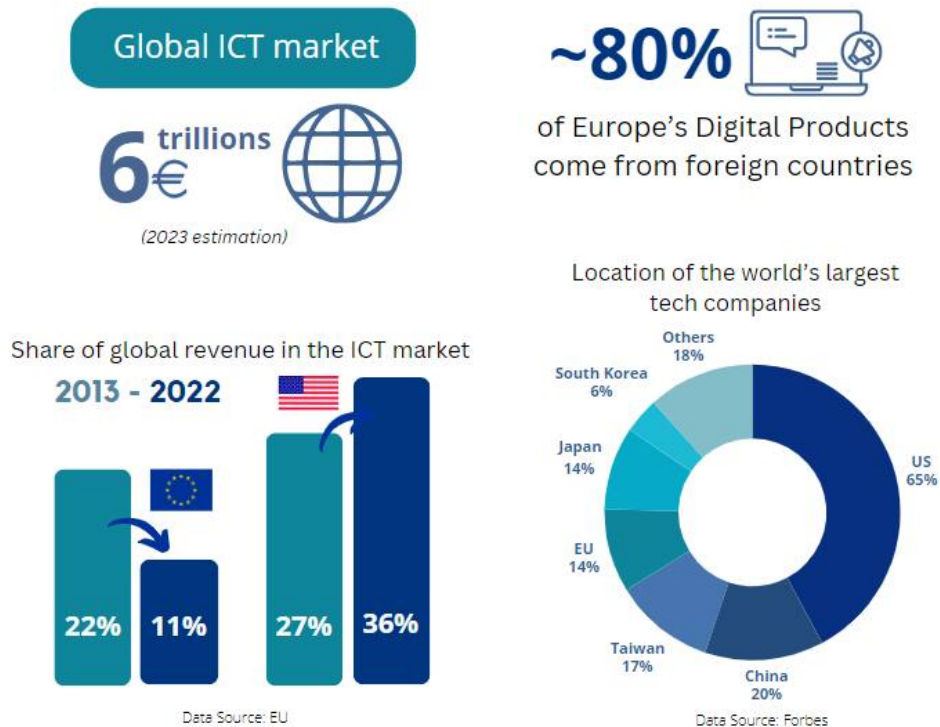
¹ Report on the state of the Digital Decade 2023, E.C., 2023

² Calza, E., Dalla Benetta, A., Kostić, U., Mitton, I., Moraschini, M., Vázquez-Prada Baillet, M., Cardona, M., Papazoglou, M., Righi, R., Torrecillas Jódar, J., López Cobo, M., Cira, P.P, De Prato, G., Analytical insights into the global digital ecosystem (DGTES), Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/811932, JRC132991

³ European Commission, Communication Artificial Intelligence for Europe, April 2018

⁴ European Parliamentary Research Service, Digital sovereignty for Europe, Tambiama Madiega, July 2020.

the US spent \$260 billion, Europe \$42 billion, China \$19 billion⁵. Overall, more than 40% of the largest companies located in US, more than 12% located in China and only 9% located in Europe (same percentage with Japan which have the 1/3 of the economy size).



But why is Europe left behind in this technology race?

The answer to this question has a lot of aspects and refers to a multi-dimensional problem. First of all, EU member states **lack a common position on tech issues** or even a shared understanding of the strategic importance of digital technologies, such as on broadband rollout or application of AI.

At the same time **EU tends to regulate more than allow innovation dynamics** shape the digital future of EU. Strong regulation frameworks like GDPR may protect EU internal market from the US domination in the fields of cloud services and data management but suppress at the same time the development of EU digital solutions and growth of Europe's tech businesses. Therefore, the EU cannot continue to rely on its regulatory power but must become a tech superpower in its own right. **Referees do not win the game.**


Another key disadvantage of Europe lies in the lack of significant European digital corporations with global influence. The increasing geopolitical competition over tech issues has made clear that this lack of national champions represents a big disadvantage in the struggle for European sovereignty. This partially results from the fact that research and scientific achievements is not translated always into innovation to create market advantages of EU businesses and foster economic growth.

⁵ McKinsey Global Institute (2022). Securing Europe's future beyond energy, May 2022

To overcome the lag in the technology, race the EU has stepped up action to re-assert its technological leadership and facilitate digital transformation while fostering its resilience. Building on the world's largest integrated market area, the EU has boosted action to address strategic dependencies, notably on critical raw materials, semiconductors, IT software (cloud and edge software), and cybersecurity technologies and capabilities.


In this context the EU launched the **Digital Decade 2030** policy programme in 2020 to accelerate the Union's digital transformation and ensure that it is in line with the EU's values, reinforcing digital leadership while promoting human centered, inclusive and sustainable digital policies, empowering citizens and businesses. The Digital Decade Policy Programme 2030 sets out a **structured governance framework** between the Commission and the Member States to ensure that the Union jointly achieves its ambition. The implementation process kicks off with the Commission developing, together with the Member States, projected trajectories for each digital target at the level of the EU. Then, Member States

Digital Decade 2030 Targets



Skills

ICT specialists: 20 million + gender convergence
Basic digital skills: min 80% of population



Digital Transformation of Businesses

Tech up-take: 75% of EU companies using Cloud, AI or Big Data
Innovators: Grow scale-ups & finance to double EU Unicorns
Late adopters: More than 90% of SMEs reach at least a basic level of digital intensity



Secure and sustainable digital infrastructures

Connectivity: Gigabit for everyone
Cutting Edge Semiconductors: double EU share in global production
Data- Edge + Cloud: 10.000 climate neutral highly secure edge nodes
Computing: First computer with quantum acceleration



Digitalisation of public services

Key Public Services: 100% online
e-Health: 100% of citizens have access to medical records online
Digital identity: 100% of citizens have access to digital ID

will propose national Digital Decade strategic roadmaps, where they define their respective contributions to the general objectives and digital targets and describe the policies, measures and actions to collectively achieve them.

2. The EU ahead of Digital Decade 2030

The EU stands at a pivotal moment with the Digital Decade 2030, holding the **potential to unlock EUR 2.8 trillion, equivalent to 21% of the current economy**⁶. Strengthening the competitiveness of the European economy through the green and digital transformations has been the EU's strategic goal over the last years. The EU's tech sector is growing rapidly, but many companies haven't fully taken advantage of existing technologies such as the cloud. Adoption of digital technologies in European companies is 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.

Another critical aspect of Digital Decade is the **capacity of workforce to drive digital transformation** in public and private sector. A shortage of digital skills is impeding growth for the most digitally advanced companies. The progress over the last five years in improving basic digital skills or the number ICT specialists has been slow, and based on current trends the targets are unlikely to be met. In 2019, only 56% of adults in the EU had at least basic digital skills. The EU will need more than three times higher growth to reach the target of 80% (the current growth rate is only 0.9%). Regarding the ICT professionals the EU will have 13.5 million by 2030 under the current trends, which is far from the target of 20 million by 2030. This shortage of ICT experts leads to delays in developing new products and services, hampering innovation and growth in all industrial ecosystems, far beyond the ICT sector.

Regarding **connectivity** EU have made significant progress, with 59% households already covered by fixed Very High-Capacity Networks (VHCN). Although, more work is needed to be done in other categories of digital infrastructures like 5G where only 14% of populated areas in the EU were covered by a 5G network (Eurostat 2020). The planned investments – mostly private- in the EU member states, is expected to cover the investment gap to reach the set deployment target by 2030.

Investments in **semiconductors industry** are also critical due to geopolitical issues and the importance of chipsets usage in several market segments like highly automated cars, cloud, Internet of Things, connectivity, space, defense and supercomputers. Currently, the EU shares of global revenues for semiconductor chips is only around 6% for the computing and communication segments⁷ and 10% of the global microchips market⁸. For this reason, the EU launched the European Chips Act to mobilise more than €43 billion of public and private investments and address semiconductor shortages and strengthen Europe's technological leadership.

Regarding the **digitalisation of the public sector** the EU is a world leader for digital government. The UN's Online Services Index rates Estonia, Denmark, and Finland, second, third, and fourth in the world respectively. The online availability of public services has been growing steadily over the last decade, accelerated by the COVID-19 pandemic during which digital interaction had to become the norm. A number of Member States are already close to the 100% target.

⁶ Unlocking Europe's Digital Potential, Public First

⁷ Proposal for a Decision of the European Parliament and of the Council establishing the 2030 Policy Programme "Path to the Digital Decade". EC 2021.

⁸ https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-chips-act_en

However, **progress is uneven** across and within Member States. Currently the investments on eGovernment solutions are at 4% of total public procurement across Europe, whereas a level of 10% is needed to reach full speed modernisation of public services⁹. For this reason, under the Flagship ‘Modernise’ of the RRF, Member States’ plans, approved on 2021, will invest over EUR 40 billion in e-government, digital public services and local digital ecosystems.

EU Programmes and Initiatives to support Digital Decade 2030

- **Digital Europe Programme (DEP):** with a budget of €7.5 billion, DEP aims to accelerate the economic recovery and shape the digital transformation of Europe’s society and economy.
- **Connecting Europe Facility (CEF):** Complementary to the DEP, the CEF is aimed at supporting investment in key projects in the areas of transport, digital and energy infrastructure with an overall budget of €33.71 billion.
- **Green Deal Industrial Plan:** The act seeks to ensure a simpler and fast-track promoting European strategic projects and developing standards to support the scale-up of technologies across the Single Market.
- **Innovation Fund:** A funding programme of a total budget of €6.5 billion for the demonstration of innovative low-carbon technologies.
- **Horizon Europe:** is a 7-year funding programme of €95.5 billion for research and innovation, focused on artificial intelligence and robotics, next generation Internet, high performance computing, big data, 6G and other key digital technologies.

EU countries' progress towards the Digital Decade 2030 targets varies widely. Member States should adapt their strategies, steer investments and take the necessary policy initiatives to reach the Digital Decade targets. This endeavor should rely on close cooperation with Member States to ensure collective progress and know how transfer from Digital Decade “leaders” to countries struggling to reach the digital targets. A more detailed overview regarding the performance of EU member states towards the Digital Decade is presented in Annex A.

⁹ Results of EU wide benchmarking of innovation procurement investments and policy frameworks across Europe | Shaping Europe’s digital future (europa.eu): <https://digital-strategy.ec.europa.eu/en/library/results-eu-wide-benchmarking-innovation-procurement-investments-and-policy-frameworks-across-europe>



Digital Decade Leaders



Finland in digital skills: Finland excels in digital skills, with 79% possessing basic proficiency, closely approaching the 80% Digital Decade target. The country surpasses EU Digital Decade targets with 7.6% of ICT specialists in total employment. Finland's commitment to digital education, seen in programs like the New Literacies Programme, contributes significantly to its skilled workforce.



Denmark in businesses digital maturity: Leading in business digitization, Denmark surpasses EU averages in AI, cloud, big data, and basic digital intensity (89% of SMEs with basic digital density, with EU at 69%). Support for start-ups and fostering a vibrant ecosystem contributes to ongoing innovation.



Spain in digital infrastructures: Spain excels in fixed VHCN (93%) and fiber-to-the-premises (91%), while having a 5G coverage of 82%, emphasizing rural acceleration needs.



Estonia in digital public services: As a global leader in digital public services, Estonia boasts 97% of internet users accessing e-Government services. The country actively shares its expertise internationally, emphasizing innovation procurement and addressing accessibility challenges for all citizens.



Digital Decade Challengers



Latvia in digital public services: Latvia has made significant progress in digital public services for citizens in public services, with a score of 87 compare to EU average of 77.



Romania in connectivity: Romania with 95% coverage on fixed very high capacity network (VHCN) is above the EU average (73%) making a positive contribution to reaching the Digital Decade target.



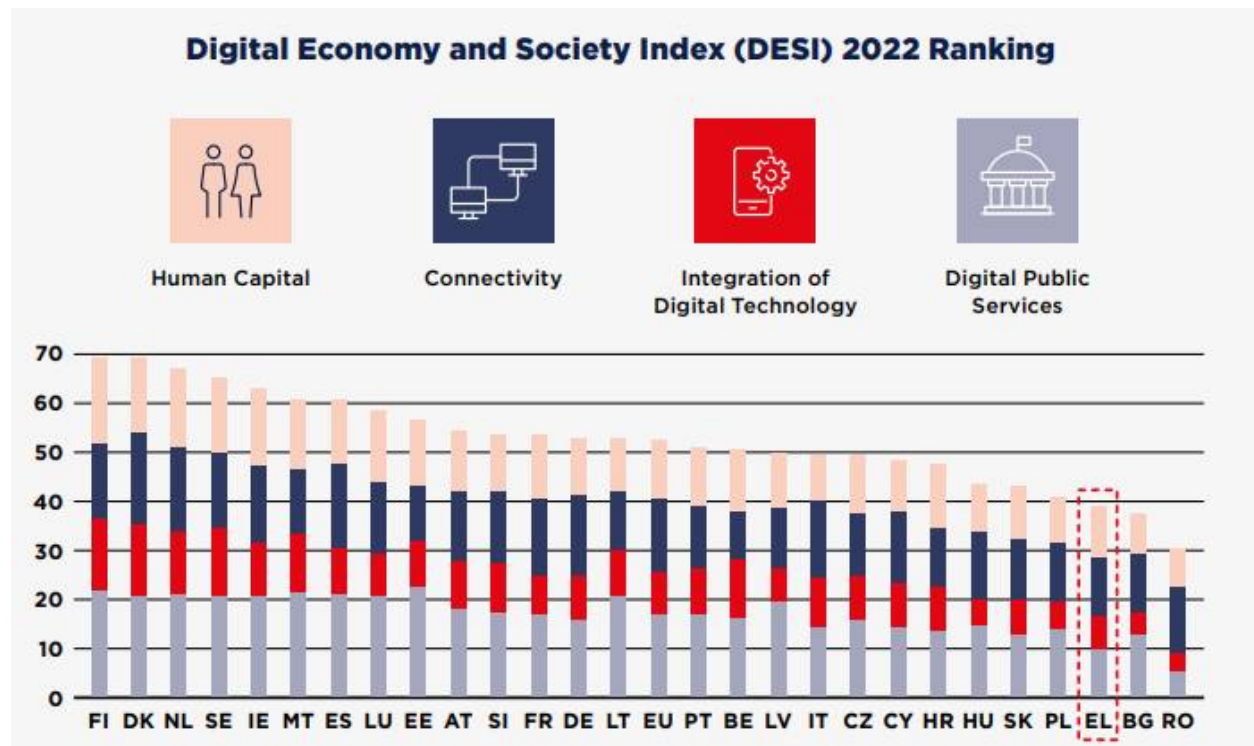
Malta in digital skills: Malta has made remarkable progress in digital skills, with 61% possessing basic proficiency, surpassing the EU average. Challenges persist among certain demographics, prompting Malta's strategic response in the 2022-2025 eSkills strategy.



Portugal in businesses digital maturity: Business digitalization in Portugal is robust, with 70% of SMEs showing basic digital intensity, surpassing the EU average.

3. The Greek path to Digital Decade 2030

Greece's digital transformation performance, as measured by the Digital Economy and Society Index (DESI), was severely impacted by the protracted financial crises that severely hindered the nation's economy and society between 2009 and 2018. Greece continues to be among the European nations with comparatively **low levels of digital maturity**, but during the past five years, the situation has been gradually improving, and Greece is rapidly catching up to other EU nations in terms of digital maturity, showing an **upward convergence trend**. The data of the DESI 2024, is particularly optimistic this year for Greece, as it is among the three EU member states (along with Poland and Italy) that managed to show the most **digital progress**.



Source: European Commission, DESI 2022

Greece is ranked 25th in the DESI 2022 index (same position as last year) among 27 EU member states.

The recent pandemic highlighted the necessity emphasizing the importance of digital transformation in fostering economic recovery and resilience. Greece's National Reform Program 2023 outlines all significant initiatives and commitments aimed at accelerating the nation's digital transformation in key areas including public administration, fiscal policy, healthcare, employment, education, and justice. It also continuously tracks these initiatives' advancements to guarantee a quicker convergence.

On the strategic perspective Greece has created a **comprehensive and contemporary national digital transformation strategy, which is outlined in the "Digital Transformation Bible 2020-2025,"** a strategic document. This strategic document lays out a clear agenda for the nation's digital transformation, primarily through the creation of a portfolio of almost 300 cross-sectoral and domain-specific projects

and initiatives. These projects are meant to facilitate the achievement of the nation's strategic objectives.

In this context Greek efforts to transform its digital economy over the past few years have shown notable progress in the public digital services that the government provides to businesses and citizens. These efforts are also anticipated to make a major contribution to the nation's digital competitiveness and the associated goals of the Digital Decade.

Although, there are critical sectors of the economy and public administration that Greece is already lagging behind and needs to step up, not because they contribute to Digital Decade targets, but because they are essential parts of the Greek economy and competitiveness of the Greek businesses.

For example, concerning the modernisation of the **Justice System**, it well documented that the bureaucracy and delays in trials and decisions are affecting not only the Greek economy but is also a deterrent factor for foreign investments. At the same time, the lack of digital skills of Greek farmers along with a shortage of digital infrastructure and investments are lagging behind the digital transformation of the **agricultural sector**, creating a negative impact in the competence and growth of the sector.

In order to overcome these significant challenges, Greece has an opportunity ahead to use available **financial resources** within the framework of significant funding programmes as the National Strategic Reference Framework (NSRF) 2021–2027 "Digital Transformation Operational Programme" and the RRF (Recovery and Resilience Plan) for Greece. To this end, any delays on the implementation of the already planned projects will put in risk especially the RRF funding and at the same time will increase the distance of Greece compared to other EU countries towards the Digital Decade.

Main Funding Programmes for Digital Transformation



Complementary to the public investments, the private sector plays a critical role in digital transformation, investing in digital infrastructures, reskilling/upskilling of ICT professionals and digital hubs/centers.



Google announced the creation of **the first Cloud Region In Greece**, specifically in Athens, with the ultimate goal of accelerating the digital transformation of the country. According to data from AlphaBeta Economics, by 2030, this project is estimated to contribute a total of **\$2.2 billion to the national GDP**, while supporting the creation of more than 19,400 new jobs.

In addition Google.org announced in 2024 its support to **ICLEI Europe with 1 million euros** to promote **data-driven environmental and climate actions** in Greek cities. ICLEI Local Governments for Sustainability will use the funding to launch an open call where organizations can apply for up to €275,000 for their eligible projects. The financial support concerns member cities of the EU Mission for Climate Neutral and Smart Cities that have signed the EU's "Mission for adaptation to climate change". Such cities in Greece are: Athens, Thessaloniki, Kalamata, Ioannina, Trikala and Kozani.

Finally, the **Grow Greece with Google** program launched in 2020, Google aimed to support Greece's recovery through technology. This effort has resulted in the training of over 275,000 professionals and small and medium enterprises in Greece so far. In 2021, a year after its launch in the US and New Zealand, Android Earthquake Alerts began its pilot operation in Greece as well. In 2023, Google expanded its flood forecasting system to Greece.

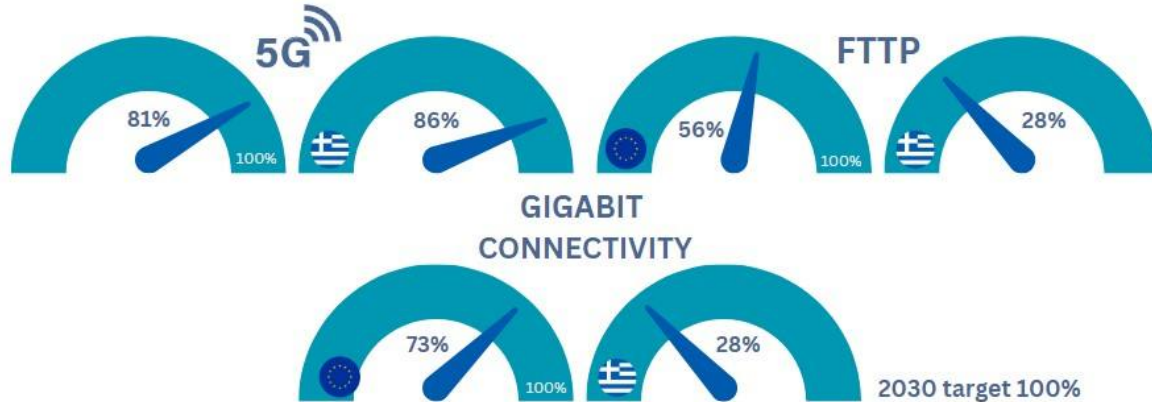
More than 5.6 billion euros will be invested by the private operators in Greece for upgrading the telecommunications networks in Greece. In addition, the strategic geographical position of Greece, which is a hub connecting Europe with Africa, the Middle East and by extension Asia, contributes to the attraction of private technology investments. Large multinational tech corporations like Google, Microsoft, Digital Realty, Amazon, CISCO announced so far more than 1 billion euros of investments for the construction data centers and innovation hubs.

The Greek performance in Digital Decade 2030 sectors



Connectivity

Greece ranks low in fixed internet access speed for both households and mobile internet, while offering poor connectivity in several areas. Currently, Greece ranks 22nd in the EU with an overall score of 49.6, which is quite low compared to the EU average of 59.9. The country's geomorphology (i.e., numerous islands and mountainous areas) and demographic profile (extended and sparsely populated rural areas) significantly increase the required investments in order to achieve global gigabit coverage. Although there are areas with significant progress like the 5G connectivity, where with a coverage of 86% is above the EU average (81%), more progress is needed, especially in terms of at least 100 Mbps fixed broadband (reaching 9% from 3% in 2020, with EU average 41%) and further improvement of 5G coverage to ensure access to high-speed connectivity across the country. The country's performance for 2023 compared to the Digital Decade targets for 2030 is presented in the following figures:



Measures and actions

The key objectives of the measures, actions and policies applied is the transition to fast broadband connections and pave the road towards 5G technology and to implement investments that focus on digital transition and particularly on very-high-capacity digital infrastructure, with a view to increasing mobile and fixed broadband coverage and take-up.

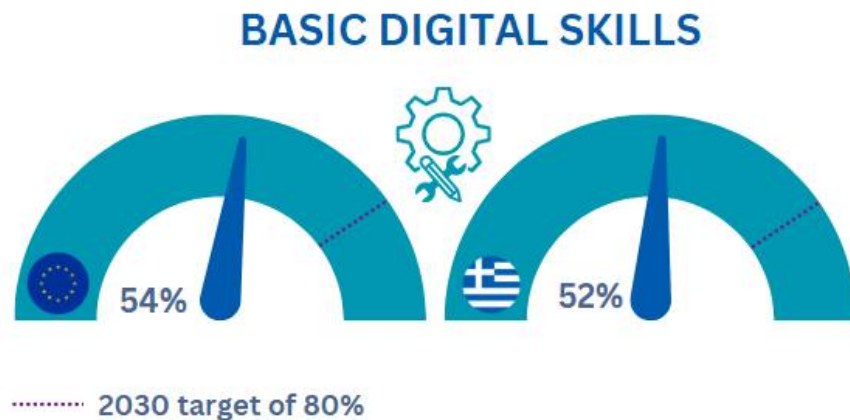
In 2022, Greece adopted its **National Broadband Plan 2021-2027** with the goal to promote the use of fixed very high capacity and 5G networks as catalysts and accelerators of the country’s digital transformation. In this context the **Super-Fast Broadband (SFBB) project** aiming at stimulating the demand for services provided over high-speed internet connections was successfully completed in September 2022. Almost 140 000 vouchers were issued to support households and businesses, showing significant consumer demand¹⁰. Another project, the **Ultrafast Broadband project**, one of the largest Public-Private Partnership (PPP) projects in Europe (870 MEUR), focused on ultra-highspeed Internet in areas that were not included in the planning of private investments. It is estimated that about 830,000 households and businesses, in areas that were not included in the planning of private investments, will benefit from Ultra-Fast Broadband, ensuring the possibility of an Internet speed of up to 1Gbps. Along with the previous programmes, several other actions have been implemented like the public auction for the 5G spectrum in 2020 (372 MEUR), stimulating investments in the 5G infrastructures and services until the end of 2027, the **“Smart Readiness Programme”** addressing the problem of lack of the necessary infrastructure in existing buildings to access ultra-high speed broadband services and the **“Phaistos” Investment Fund** supporting Greek business and other legal entities to develop products, solutions, and services for the 5G industry.

¹⁰ Digital Decade Country Report 2023 Greece, EC

Digital Skills

Regarding the human capital, Greece ranks 22nd among the 27 EU countries, with a score below the average. In the area of basic digital skills, Greece is very close to the EU average (54%) with a percentage of 52% (statistic for people aged 16-74). However, the statistics are extremely optimistic when looking at the 16-24 age group, as 88% of young people have at least basic digital skills, much higher than the EU average (71%). In addition there was a significant increase in the percentage of people using the internet once a week (82%). Overall Greece as the EU is not close to the Digital Decade target of 80% of population with basic digital skills by 2030.

In the labor market there is a significant **shortage of ICT professionals in Greece**. According to a study published in December 2022¹¹, it is estimated that an additional 120 000-140 000 ICT specialists will be needed in 2023-2030. The main reasons for this are the limited number of ICT graduates and the brain drain as a result of the economic crisis in Greece. At the same time, the number of ICT projects under implementation through RRF, catapulted the demand for ICT professionals.



Measures and actions

Greece is currently implementing several measures that will contribute to increasing the level of basic digital skills and the resilience of the population regarding digital transition. In 2022, Greece adopted and started implementing major **legislative reforms to improve people's digital skills**, as well as upskill and reskill the workforce, for having a flexible and specialised labour force. These fundamental reforms, accompanied by investments projects under the RRP, are part of the strategy to increase the number of digitally skilled people and ICT specialists in Greece and address current skills mismatch between qualifications and jobs.

¹¹ Study on the sufficiency of ICT specialists in the Greek labour market, Federation of Hellenic Information Technology & Communications Enterprises (SEPE), December 2022.

More specific the reforms of the **Public Employment Service** (DYPA) (namely “Labour force skilling, reskilling and upskilling through a reformed training model for the working population” and “Strengthening the apprenticeship system”) and the Ministry of Education and Religious Affairs through RRF will further upgrade the Vocational Education and Training (VET) in Greece and create opportunities to respond effectively to unemployment and address labour market imbalances. At the same time **the new Strategy for Lifelong Skilling** will act as a cornerstone in the effective delivery of the upskilling and reskilling programmes.

Regarding the programmes under implementation currently in Greece, the programme ‘**Go forward**’ (302 MEUR) was launched at the end of 2022 to increase the digitally skilled population and support the employability of 150 000 beneficiaries. At the same time many other programmes support the re-skilling and up-skilling of targeted populations like employees in the tourism sector, employees in the public sector.

Furthermore, The **National Coalition for Digital Skills and Jobs** became an important player in the digital skills strategy in 2022, with its role and mission set out in law and its connection to the European Digital skills and jobs Platform. In this framework, the National Coalition for Digital Skills and Jobs supports and coordinates several actions regarding the upgrade of basic digital skills of the population.

In addition, and towards the upgrade of digital competences of the population, the Ministry of Digital Transformation launched in 2020 the **National Academy of Digital Competences**, a flagship initiative for the investment in human resources as a key component of the country's digital transformation.

- The aim of the National Academy to provide citizens with opportunities to upgrade the level of proficiency of their digital competences, through the offer of free Massive Open Online Courses that take into consideration their skills gaps and personal needs.
- The National Academy operates based on the 3 following pillars:
- the in-house development of MOOCs and the hosting of MOOCs by recognized educational providers
- the implementation of a methodology for the holistic approach of educational activities: alignment of content based on European Digital Competence Frameworks, formation of profiles of digital competencies, creation of learning paths based on asserted needs, implementation of micromodules and microcredentials.
- the design and implementation of educational initiatives for the digital empowerment of vulnerable and threatened social and professional groups in synergy with co-competent agencies.

For the moment the National Academy for Digital Competences includes more than 327 on-line courses in 35 different thematic axes.

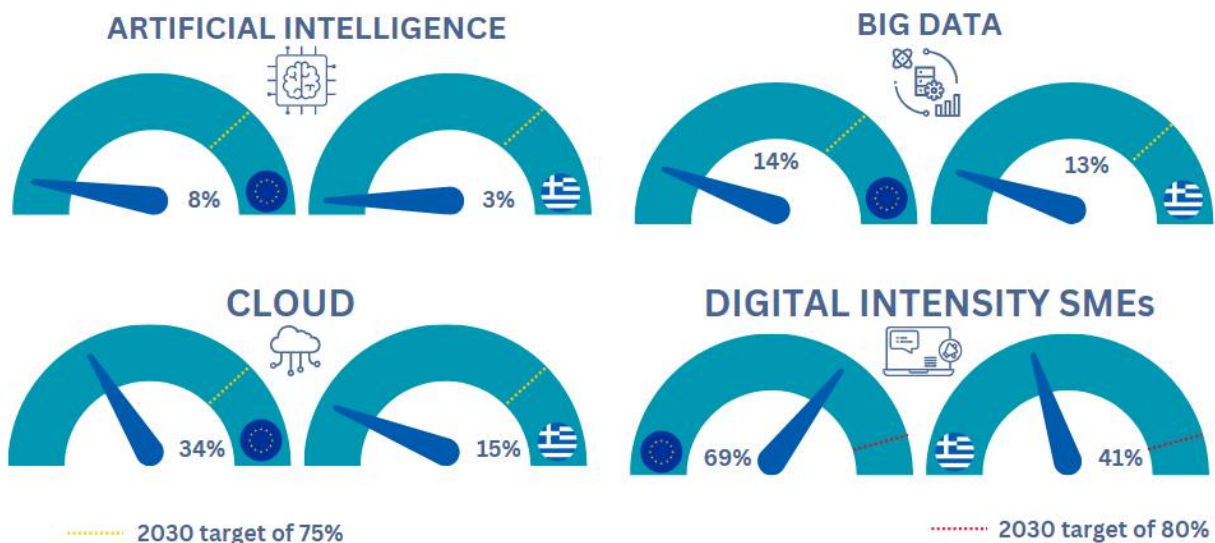
An upgraded version of the National Academy will be ready by the end of 2025. The state-of-the-art platform will be equipped with technological educational tools for the development of innovative

courses and will deploy AI to provide more advanced and personalized services to the citizen, such as chatbot for the evaluation of digital skills and the proposal of personalized personal paths.

Digitalisation of businesses

Regarding the integration of digital technologies into business activities, Greece ranks 22nd in the EU. The level of digital intensity of SMEs in Greece is 41%, still far from the EU average of 69%. Although Greek SMEs take advantage of the opportunities offered by e-commerce (20%) more than the EU average (18%). Regarding the adoption of advanced digital technologies, **Greek businesses have a lower performance than the EU average**: in 2020, 13% were using big data analysis (EU average: 14%), 15% were using cloud services in 2021 (EU average: 34%), and only 3% were using AI (EU average: 8%). According to the Deloitte research¹², the **adoption of AI** in Greek businesses of all sectors of the economy is still at an early stage, with around 15% of the businesses surveyed answering that they have started experimenting with this advanced digital technology, even though 8 out of 10 businesses believe that adopting AI solutions can improve efficiency and boost their growth.

However, a recent study by the Hellenic Federation of Enterprises (SEV)¹³, reports that Greek enterprises moved five times faster than the average EU enterprise (9.2% rate vs 1.9% in EU) and are now at a 70% digital maturity level in EU, indicating an upward trend. 85% of the enterprises are involved in at least one Digital Transformation initiative, but 36% face resistance to change. The most important burdens in the digitalisation of businesses are **internal resistance and lack of digital culture**, ability to finance and lack of digital skills and know-how.



¹² Study: The Impact of Gen AI on the Greek economy, SEPE Digital Economy Forum 2023

¹³ https://www.sev.org.gr/wp-content/uploads/2023/06/2023-06-30_SPECIAL-REPORT_Psifiaki_Orimotita_Epexeirisewn_final.pdf



Measures and actions

Greece the last years took several measures to accelerate the digital transformation of businesses. Most of the programmes are being implemented within the framework of the National Recovery and Resilience Plan “**Greece 2.0**” and funded with a total budget of 445 million EUR. The measures support small and medium-sized enterprises, for the purchasing digital products and services that could foster their digital transformation. More specific there are three individual State Aid programs: Program I “**SME Digital Tools**” providing vouchers that will be allocated for the acquisition, through purchase or lease, of new digital products and services, Program II “**Development of Digital Products and Services**”, with a budget of 100 million EUR, in the form of a non-refundable grant for the development of infrastructure and cloud services and Program III “**Digital Transactions**”, for replacing of cash registers and old POS machines of SMEs. Another RRF measure the “**Smart Manufacturing**” launched in 2022 (with a budget of EUR 75 million) to accelerate investment projects in the industrial sector.

Apart from RRF there are programmes for digitisation of business also through new **NSRF 2021 -2027**, and the Operational Programme (OP) ‘Competitiveness’, with a budget of **EUR 300 million** focused on main three pillars: (i) Basic Digital Transformation of SMEs; (ii) Advanced Digital Transformation of SMEs; (iii) Cutting-edge Digital Transformation of SMEs.

Complementary to the other measures, seven **European Digital Innovation Hubs (EDIH)** had started operations in Greece by the beginning of 2023. They are expected to be one-stop shops supporting companies and public sector organisations to respond to digital challenges and become more competitive.

Regarding the Greek startup ecosystem, it was brought into the spotlight during the financial crisis, and it keeps growing ever since. In recent years, the Greek startup scene saw a stage of consolidation with new successes and a lot of balancing out. Greece is **home to many aspiring entrepreneurs** who are working on promising new ideas and innovative business models. As a result of this emerging startup ecosystem, there are more than 720 start-ups registered on the platform **Elevate Greece** and two additional Greek start-ups became **unicorns** in 2022, bringing the total number of unicorns to three. It’s worth to mention though, that the number of Greek registered start-ups equals to a ratio of **70 start-ups per 1 million population**, while Portugal has 130, Italy 234, Finland 525 and Estonia 865 (EU average 190).¹⁴



Digital Public Services

Greece ranks 24th in the EU in the field of digital public services for citizens according to DESI 2023, moving three places compare to 2022. . The DESI scores show a significant progress both on Digital public services for citizens (Greece scores 65, 13 points more than the previous year) and for businesses

¹⁴ dealroom.co

(Greece score is 74, 26 points more than the previous year). Despite this progress, Greece is still well beyond the EU average for almost all indicators concerning digitalisation of public services.

DIGITAL PUBLIC SERVICES TO CITIZENS



2030 target 100%

DIGITAL PUBLIC SERVICES FOR BUSINESSES



2030 target 100%

ACCESS TO e-HEALTH RECORDS



2030 target 100%



Measures and actions

The provision of digital public services to Greek citizens and Greek businesses has been significantly improving since 2021 with the introduction and evolution of **the Gov.gr portal**. The Gov.gr is now a focal point for every transaction of citizens and businesses with the State, providing around 1 500 digital services, the number of which is constantly increasing. In addition, a National Disability Portal hosting all digital procedures relating to disability was set up on Gov.gr. Apart from Gov.gr there are several other measures for the modernization of the public sector. More than 450 measures and IT projects were presented in the “**Digital Transformation Bible**” and many other projects are planned through the “Greece 2.0” programme.

The main priorities of these programmes are the digital transformation of the health sector, the Justice sector, the Local Governments along with **reforms for Independent Authority for Public Revenue (IAPR), e-EFKA and Public Employment Service**. More specifically, the **central CRM project** (73 MEUR) is meant to be the single digital infrastructure to serve citizens and businesses, constitutes the core of actions in the direction of providing integrated electronics services. The e-EFKA reforms include a set of measures for the digital transformation of the organisation and provision of digital services for the citizens and businesses. Additionally, the digital transformation of Justice includes a comprehensive plan to introduce e-justice, including the upgrade of record keeping systems of the courts, the digitisation of archives, and the expansion of IT systems.

In the health sector, the pandemic crisis accelerated the implementation of projects in the digitalisation sector. The digital transformation of the **Health Sector** is a primary investment of the “Greece 2.0” plan.

The specific measure has a great number of actions and projects focused on the digitalisation of health services including the following major projects: “**National Electronic Health Record**”, the “**Digital Transformation of National Health Service Organisation**”, the “**Improvement of digital readiness of Greek hospitals**” and the establishment of the “**National Telemedicine Network**”. In addition, with the “**myHealth app**” citizens have access to the history of their medical prescriptions and referrals.

Although many steps have to be made to achieve access to entire patient health record in National level, as the patient history from the public healthcare institutions (hospitals, primary care centers) is fragmented and stored in different databases.

Greek Strengths and assets to be leveraged

- **Available funding for and dedicated to digital transformation projects:** Greece make use of EU funding to carry out its digital transformation plan. In particular, the Greek RRF's fundamental pillar and essential component—digital transformation—will promote the growth of human capital. Greece's RRP (Recovery and Resilience Plan) funding will be allocated mostly to projects involving digital transformation. Additionally, the nation makes use of structural funds to carry out projects related to digital transformation.
- **Laws Concerning Emerging Technologies and Investment-Friendly Reforms:** Greece has already made steps to lower regulatory barriers by enacting laws pertaining to emerging technologies. Simultaneously, it is putting into practice investment-friendly reforms (including lower labor and capital taxes, labor and insolvency laws, and legal frameworks for strategic investments) that encourage private investments in digital and technological ventures.
- **A vibrant Innovation and Startups Ecosystem:** There are more and more innovative companies in Greece, as well as a greater number of private investments—including a sizable increase in foreign investments—all signs of the ecosystem's expanding pace.
- **Significant private investments in digital infrastructures:** As mentioned before the strategic geographical position of our country is critical to stimulate private investments in the area of Data centers and International Centers of Excellence.
- **High qualified workforce:** Greece's biggest strength is probably its highly skilled workforce. Greece has Europe's second highest percentage of Masters and PhD students as a share of its population, with science, technology and engineering being specialisms. The Greek state and the private sector will further strengthen education and the ‘triangle of knowledge’: the connections between entrepreneurship, education, and research and development.

4. Challenges towards Europe's Digital Decade

4.1. Protecting our democracy and fighting the digital divide.

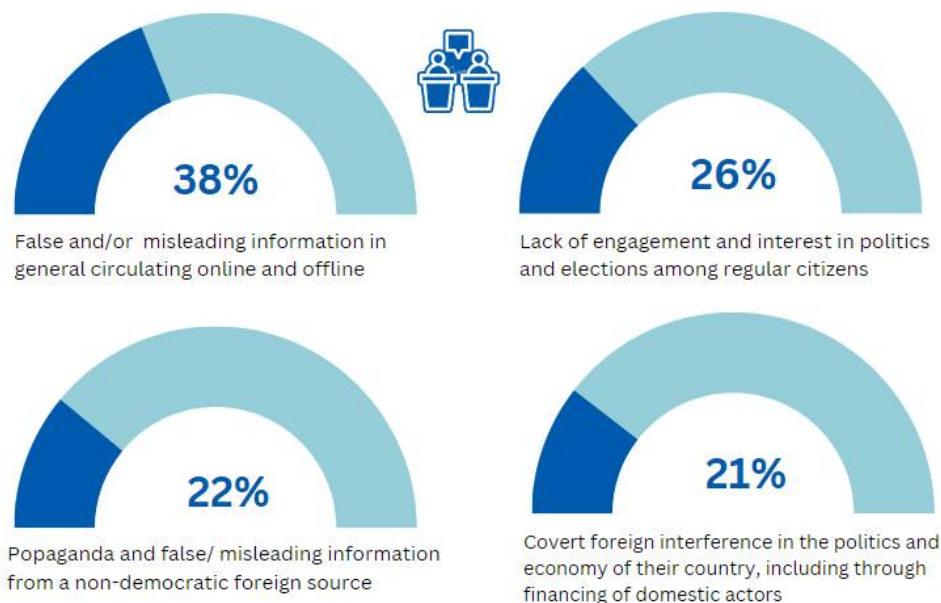
Digital technologies and services have the ability to shape how we live together and exercise our roles as citizens. They create new ways to exercise and enjoy fundamental rights and freedoms as well as to

participate in democratic life, but also new ways in which they can be infringed. This is in particular the case for AI and algorithmic systems which could pose serious risks to human dignity, equality, liberty, security, and invasion of privacy including the potential for misuse of personal data. Technologies are instrumentalised by authoritarian regimes, bringing forward new challenges to democracies, the rule of law, and growing polarisation and online hate speech, both in the EU and globally.

There is **high concern about disinformation campaigns** as for many countries and EU the 2024 is a year of elections. The perceived risk from disinformation campaigns from hostile forces has climbed higher in the global rankings from a year ago, according to the Munich Security Index 2024.

The Eurobarometer 2023 stated that the importance of protecting users from disinformation and illegal content is clearly recognized by Europeans. This ranks one of the top three priorities of Europeans for their countries from now until 2030, along with protecting users from cyber-attacks and improving the availability of high-speed internet.

Most serious threats to democracy in EU member states



Data source: Eurobarometer 2023

At the same time the **asymmetric adoption of technology** due to lack of broadband internet in rural areas or lack of skills necessary to use digital technologies effectively could create a digital divide and promote digital inequalities among certain groups of population (people with disabilities, people with low income, etc). This is why it is essential to bridge the EU's digital divide, as this will further empower citizen participation in the EU digital economy and democracy, safely and effectively.

Therefore, promoting a human-centred, fundamental-rights-based, inclusive, transparent and open digital environment where secure and interoperable digital technologies and services observe and

*“During the COVID-19 pandemic, the disparities present in the **digital divide became extremely apparent** as schools moved online. Students without reliable internet access did not have the necessary resources to connect to remote learning platforms. This made it difficult for some students to fully participate in their learning environments.”*

enhance Union principles, is one of the general objectives set out in the Digital Decade Decision. Furthermore, the **Declaration on Digital Rights and Principles** signed by the Presidents of the Commission in 2022 includes principles and commitments on access to a trustworthy, diverse and multilingual digital environment, with a view to contributing to a pluralistic public debate and effective and non-discriminatory participation in democracy.

In this context the EU put forward the **European Democracy Action Plan in 2020 and the Defense of Democracy package in December 2023** introducing a legislative proposal to set up common transparency and accountability standards and recommendations to promote the participation of citizens and civil society organisations in policy making.



Greece face a significant challenge due to digital divide that is being increasing in rural areas and in the elderly population. Population living in rural areas and elderly people may have limited access to digital devices and reliable internet connections, making it difficult for them to access digital information and digital public services. This is not only a inclusion issue affecting the democracy but also a regional development issue especially in border areas of Greece.

Security and privacy of citizens' data, became a significant challenge in Greece the last years. To address this challenge, the National Cybersecurity Authority was established in 2024, following the National Cybersecurity Strategy 2020-2025 published in 2020 which is an integrated framework to deal with cyber-attacks.



Key takeaways

- Protecting democracy from disinformation and illegal content ranks one of the top three priorities of Europeans.
- Cybersecurity is now ranked as the fourth greatest risk and disinformation as the sixth globally, according to the Munich Security Index 2024.
- Almost one third of the people believe that democracy is threaten by the lack of engagement and interest for politics and elections.
- Fostering trust in technology is essential to tackle digital inequalities and support an inclusive growth.
- Countries without stable broadband access can face challenges to economic development and educational.

- Digital divide in Europe and Greece could seriously impact economic opportunities for disconnected individuals especially in remote areas, resulting in a limited access to high-paying jobs.



Recommendations

- **Make citizens and businesses less vulnerable** to cyber-attacks and disinformation. To improve the security of the Single Market, the EU should invest in technology modernization with secure-by-default technologies and cloud services, that maximise portability of data and application between multiple cloud service providers and on-premises environments. The adoption for example of public cloud support European organisations to improve resilience and cybersecurity of the ecosystem and foster technology trust.
- **Enhance media literacy to effectively fight disinformation.** Public awareness campaigns, targeting especially vulnerable groups (kids, youth, seniors), along with educational programs inside and outside of schools could improve media literacy. In addition, utilising advanced technologies like AI, the EU could help facilitate large-scale disinformation detection and support citizens in identifying it.
- **Promote public private dialogue and collaboration** to exchange insights and best practises regarding threats to democratic values like cyber security and misinformation. The EU should foster greater collaboration with and across sectors, to uplevel shared intelligence and to jointly anticipate and mitigate threats for member states, societies, and economies. At the same time public dialogue between stakeholders (policy makers, citizens, business, etc) will increase awareness on how digital technologies could transforms citizens' lives and economy in a more secure way.
- **Adopt Privacy-Enhancing technologies:** EU member states should adopt a comprehensive and multifaceted strategy to incentivize the development and adoption of Privacy-Enhancing Technologies, notably to promote an enabling framework for innovation in the field of generative AI and online advertising. This strategy should include regulatory incentives to develop and implement practices that balance data privacy and utility, as well as guidance and regulations that are proportional, effective, and adaptable to emerging technologies.
- Greece should step up its efforts on **connectivity infrastructure**, in particular Gigabit coverage, to reduce digital divide and promote sufficient broadband internet to white areas.
- Greece should follow best practices and other successful case studies from other EU countries to improve media literacy even from primary schools. Finland offers a good example in fighting disinformation and deepfakes, as from 2016 incorporated information literacy as a core component of its national curriculum. This results the top ranked among 35 countries in the Media Literacy Index 2019.

4.2. Achieving a net zero economy

Sustainability and the protection of the environment and the planet from climate change are now quite high on the agenda of the states, businesses and citizens. For businesses in the digital technology sector, the challenge is twofold: on the one hand, because they are asked to implement the commitments they have made for their companies and, on the other hand, because they are asked to decisively support, by developing the appropriate technological solutions, the businesses of other sectors, in order to move quickly on their green transformation.

According to Eurobarometer 2023 the **twinning of the digital and green transitions** is considered a key factor in Europe's digitalisation. Two out of three people in Europe consider that digital technologies will play an important role in fighting climate change. The **ICT sector is an important source of emissions** and waste. Today, it accounts for approximately 7% to 9% of global electricity consumption, forecast to rise to 13% by 2030, for 2% to 4% of total GHG emissions and increasing amounts of eWaste. The fast-evolving nature of digital technologies and the possible sharp increase in digitally enabled services is likely to reinforce this situation.

At the same time, **digital transformation is a vital ally** in our efforts to reduce our environmental footprint. The Digital Decade Decision sets the objective of ensuring that digital infrastructure and technologies, including their supply chains, become more sustainable, resilient, and energy- and resource-efficient, with a view to minimising their negative environmental and social impact. Indeed, the Decision includes several references to the sustainability of infrastructures targets, notably edge nodes and semiconductors. The Declaration on Digital Rights and Principles promotes digital products and services with a minimum negative impact on the environment and on society, as well as digital technologies that help fight climate change.

In this context, as we should consider **Decarbonizing the Digital Sector**, under the same perspective that covers every other sector of the economy to the 2050 net-zero challenge, it is important to focus on how **Digital Decarbonization** could enable this transition.

As Digital technologies are already contributing substantially and positively to many environmental objectives, supporting the solution on two of Europe's most pressing policy problems (energy and climate crisis), it is important to understand **how they could also enable and accelerate the transition** to the required net-zero target of 2050 in an efficient and sustainable way.

This transition affecting the competitiveness of EU industries was brought to the spotlight by the «Antwerp Declaration for a European Industrial Deal». The Antwerp Declaration signed by more than 70 industries¹⁵ in Europe, proposed ten (10) axes of measurements that could support the implementation of Green Deal and increase competitiveness of EU industries at the same time. The European Industrial Deal aspires to make Europe a globally competitive provider of energy, ensuring low-cost energy for EU industry and increasing the demand of net zero, low carbon and circular products. In addition, the EU sovereignty in the energy sector will ensure that the Green Transition will be a Just Transition, providing to all member states and their citizens resilience against any future energy crisis.

Several studies indicate that digital solutions play an enabling role at **reducing global emissions (up to 20%)**¹⁶, especially by focusing on the highest emissions sectors as energy, materials, and transport.

¹⁵ Industries in the EII ecosystem which employs 7.8 million people in Europe and provides a value added of EUR 549bn (4.55% of the EU total)

¹⁶ [Accenture, WEF, 2022](#)

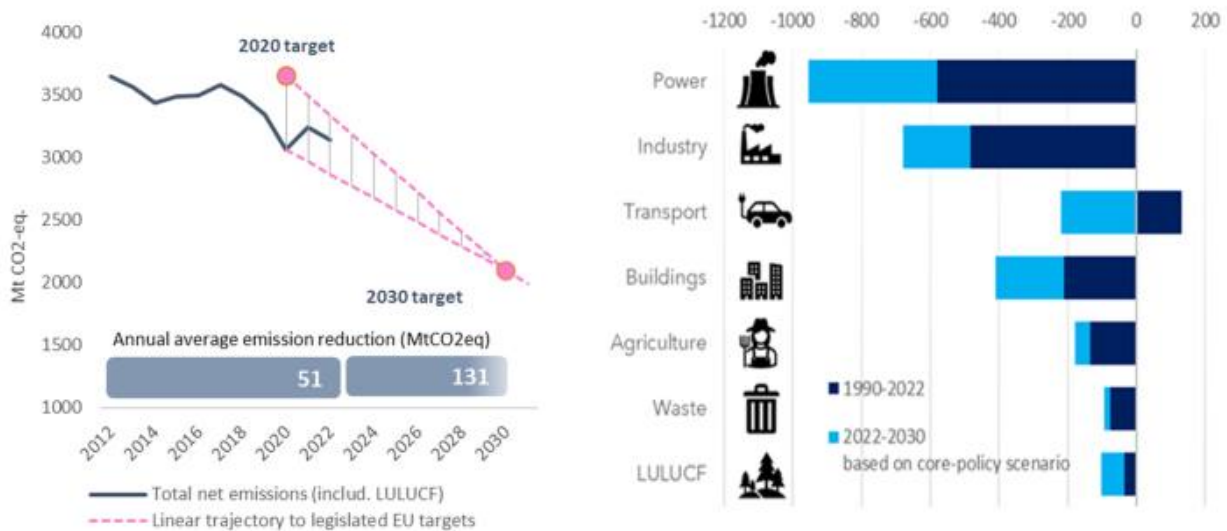
As the commitments for 2030 are projected to reduce emissions by only 7.5%, it seems we need a measurable [55% reduction by 2030](#)¹⁷ to keep the goals of the Paris Agreement on track. Filling this gap will require rewiring high-emitting sectors around efficiency, circularity, and sustainability, with digital technology standing as key to this transformation.

In order to enhance the deployment and development of digital technologies to the desires green transition **an enabling policy framework** is required that provides the necessary incentives to **facilitate investment in cost-effective digital climate solutions**. Moreover, EU and the country members should leverage existing decarbonisation tools by promoting at the same time the deployment of cutting-edge low-carbon technologies (such as Artificial Intelligence and Machine Learning) for the strategic planning of climate initiatives within various sectors of the economy (businesses, municipalities, governmental bodies, and civil society).

Additionally, the EU should enhance the promotion of these technologies by **increasing its investment in research and development**, while also facilitating the sharing of best practices and providing training to encourage and facilitate the adoption of digital solutions in key sectors like energy, construction, agriculture, and transportation.

At this point, it is quite important to understand that if we want digital decarbonization to achieve measurable results it is quite critical to identify and assess the contribution of each sector to the total GHG emissions.

Some quite interesting findings from the data produced by the European Environment Agency (EEA) and re-published by Eurostat show that GHG emissions have been declining in most sectors, except in fuel combustion in transport, including international aviation.



EU net greenhouse gas emissions, targets and required reductions (MtCO₂-eq) (source: Climate Action Progress Report 2023)

Focusing on Greece, the country's profile on the latest **Climate Action Progress Report 2023**¹⁸, published on October 2023 by the EU Commission, indicates that despite the significant reductions that have been

¹⁷ [Emissions Gap Report , UNEP ,2021](#)

¹⁸ https://climate.ec.europa.eu/news-your-voice/news/climate-action-progress-report-2023-2023-10-24_en

accomplished through the most of the economy's sectors, there are still specific sectors that increase and not reduce their emissions throughout the last decades.

Following the EU trends, transport is the sector that increases rather reduces GHG emissions, and in a quite significant rate (28% from 1990-2022¹⁹). In order to accelerate the reduction of emissions in the transport sector, the deployment of digital technologies might be the key for achieving countable results until 2030.

Except dedicated policy measures (some of them are already implemented in EU and Greece) mobility companies could leverage digital technologies such as the IoT, imaging, cloud, geo-location, and AI to (among other use cases) gather and analyse real-time data to improve decision-making and route optimization, lowering at the same time GHG emissions.



According to the last Climate Action Progress Report 2023, in 2022, the highest contribution to GHG emissions in Greece came from the energy sector (31%), followed by the transport sector (23%) and the industry sector (17%). Between 2015 and 2022, the sectors which contributed the most to the change in net GHG emissions (i.e. -22%) were energy, for which emissions fell by 40%, and industry, where emissions fell by 20%.

With the ambitious National Energy & Climate Plan (NECP) towards a climate-neutral economy by 2050, the Greek government is committed to withdraw all lignite power plants by 2028. This commitment serves priorities related to the environmental protection, to the promotion of competitive electricity generation methods and to the diversification of the lignite-mining areas, namely Western Macedonia (NUTS 2) and Megalopolis (NUTS 3 / LAU 1). The National Just Transition Development Plan (NJTDP) is seen in the wider context set by the "Energy Roadmap for 2050" and the "European Green Deal".



Key takeaways

- The twin digital and green transformation is already high on the European policy agenda and is considered a key factor in Europe's digitalization.
- Decarbonizing the Digital Sector is as important as the Digital Decarbonization (use of digital technologies to reduce GHG emissions)
- Digital Technologies could enable and accelerate the transition to the required net-zero target of 2050 in an efficient and sustainable way.
- Digital solutions can reduce global emissions by up to 20%.
- Accelerating adoption in highest emission sectors is considered a key. Eg, the transport sector is the only sector that increases and does not reduce the GHG emission throughout the last decades.

¹⁹ [EU Climate Action Progress Report 2023 - Greece factsheet.](#)

- EU needs to leverage existing decarbonization tools but also focus on enhancing cutting-edge technologies for the development of new efficient solutions.



Recommendations

- Prioritize the **implementation of legislation established under the EU Green Deal** for all EU members. Identify the emerging tools and technologies required to swiftly advance decarbonization efforts per sector for the first milestone of 2030, with a strategic focus on achieving total decarbonization by 2050.
- Enhance **common approach within the EU** member countries concerning the **twin green and digital** transition in order to avoid barriers and facilitate the achievement of targets.
- Highlight the National Energy and Climate Plans (NECPs) as key vehicles for long-term decarbonization planning and investment for EU countries and
- **Focus on investments enhance** Green and Digital transition and increase dedicated funding for Academia and Businesses. An **enabling policy framework** is required that provides the necessary incentives to **facilitate investment in cost-effective digital climate solutions**.
- **Enhance** the deployment of cutting-edge low-carbon technologies (such as Artificial Intelligence and Machine Learning) for the strategic planning of climate initiatives within various sectors of the economy.
- Establish a monitoring mechanism that could identify and assess the contribution of each sector to the total GHG emissions in order to build sector-based solutions on the aspect of **Digital Decarbonization**.
- Facilitate the development of an E-Transport strategy focused on the digitization of the sector as a key to accelerating the GHG emissions reduction by 2030.
- Promote the **Decarbonization of the Digital Sector** with measures and actions that could facilitate the sector's sustainability and 2030 efforts contribution

4.3. The digital transformation as key driver for competitiveness and growth.

Almost every day, new technologies make their way into the market. They frequently offer businesses the chance to reimagine their business strategies and greatly improve the efficiency of their operational frameworks. **Businesses can gain a major competitive edge** by utilizing these technologies and use data to improve agility and power innovation, accelerate artificial intelligence (AI) to drive growth, leverage cloud computing and unlock new opportunities through ecosystems and partnerships.

The adoption of digital technologies by European companies is still well below the Digital Decade targets, in particular those for the uptake of AI and big data. The progress toward the digitalisation of SMEs is still

insufficient and quite uneven across the EU (69%, compared to a target of 90% of SMEs by 2030). While larger enterprises are making progress on their digital transformation, only 33% of European SMEs have adopted technologies such as Cloud or AI, and only 8% of European SMEs sell to another EU member state²⁰. The projected baseline trajectory indicates that only 66% of businesses will use cloud, 34% big data and 20% AI, far from the 75% objective set for 2030²¹. In compare with the US, there are twice as many SMEs with an international portfolio of so called “4IR patents” (IoT, cloud, 5G, AI) in the US than in the EU (European investment Bank, EIB Investment Survey 2019-2022).

Apart from the utilization of advanced technologies to stimulate growth, European companies are being challenged to innovate more effectively to meet the rising expectations of customers and stakeholders. Europe is still lags behind competitors such as the United States and China in R&D investment levels and has fewer new companies that are considered world leaders, like unicorns, where only the 13% of them based in EU, while the 50% is based in United States²². Europe is facing significant difficulties to capitalise on its excellent scientific base to spur innovation, adopt new technologies and bring its ideas to the market²³.



Although the Greek digital technology industry is expanding rapidly, the country's SMEs' digital intensity and level of advanced technology adoption are still below the EU average.

Greece has to act quickly to put the RRP's measures into practice in order to improve its contribution to the Digital Decade. This includes putting a strong emphasis on the use of cutting-edge technologies like big data and artificial intelligence (AI), especially in small and medium-sized businesses.

Greece also should invest in areas that have already prove their dynamics like the startups emerging ecosystem and capitalise their growth in Greek productive sectors like agriculture, healthcare and pharmaceutical, tourism and shipping.



Key takeaways

- Only 33% of European SMEs have adopted technologies such as Cloud or AI, and only 8% of European SMEs sell to another EU member state.
- Digital transformation in SMEs is more dependent on the culture changing rather than investing in IT tools and platforms.

²⁰ EUROPE 2030: A DIGITAL POWERHOUSE, Digital Europe, 2023

²¹ C(2023) 7500 'Communication from the Commission establishing the Union-level projected trajectories for the digital targets

²² Accelerating Europe: Competitiveness for a new era, McKinsey Global Institute, 2024

²³ Innovation Overview, European Investment Bank, 2023

- European companies face difficulties to capitalize scientific results and bring innovative products and services to the market.
- EU companies have to innovate more effectively to meet the rising expectations of customers and stakeholders.
- Greece has a unique opportunity through the RRF, to support the digitalization of SMEs in a more effective and impactful way.
- The “family business model” in Greek SMEs usually hampering a clear decision-making path regarding changes in culture, processes, and investments for embracing new technologies.



Recommendations

- **Increase accessibility to EU and national funding:** Access to funding instruments must be simplified in order to be more accessible directly by the SMEs. Perhaps with the use of AI techniques, the processes for securing public funding and disclosing accomplishments should be streamlined.
- **Invest in innovation to deliver the Digital Decade 2030:** To match the ambition of a fully-fledged Digital Single Market, the EU should set a target for increasing the share of the digital economy in European GDP by 2030. By increasing its R&D spending in technology, the EU could help to accelerate tech innovation and its adoption, which will help attain the Digital Decade 2030 goals.
- **Reduce compliance burden and legal barriers:** The complex EU regulatory framework and cost of compliance in the Single Market adds a significant cost for companies wanting to digitalise their business models and reduce their operational costs. To fully operationalize the Single Market, the EU should promote net neutrality in its sector-specific regulations, identify conflicting rules, and remove unnecessary barriers that hold SMEs back from innovating and digitalising.
- **Increase trust of SME’s in digital tools:** Cyber-threats emerge as one of the top barriers to SME digitalisation, and they increase as they digitalise. Therefore, it is essential to promote Cyber-Skilling training as mandatory for businesses. Delivering on this is essential, as it would solidify SMEs’ trust in digital tools and it would boost their drive to digitalise.
- **Promote the adoption of advance technologies** into day-to-day government and businesses operations. One could example is promoting a ‘cloud-first’ policy, stimulating the adoption of cloud computing in the public sector and other regulated industries, such as healthcare and financial services. Adoption of Cloud computing by companies and government agencies could scale resources quickly, increase portability and accessibility, reduce costs, and increase security as well as productivity.
- **Introduce legislative reforms in Greece** promoting digital entrepreneurship with emphasis on:
 - formulating a comprehensive and consistent legal framework for entrepreneurship (e.g. bankruptcy law, crowdfunding framework) and establishing faster and more effective procedures for defending this framework by the judicial system,

- strengthening, on an institutional basis, of the communication channels between the academic community and enterprises, targeted use of European programs.
- Greece should develop further **regional ecosystems** across the country. The role of local stakeholders like Universities, Municipalities and Regions is critical for regional development and these entities should be encouraged to contribute their part.
- Greek state should provide incentives and technical support to SMEs to stimulate mergers and acquisitions to increase the size of Greek businesses and transform business models like the family model to a more corporate one. This transformation will increase the capacity of Greek business to perform digital transformation and become more resilient towards the Digital Decade.

4.4. Boosting digital skills and literacy

Increasing digital skills in order to promote social participation, creativity, and competitiveness among EU citizens, education and literacy are crucial. EU policy efforts to promote lifelong learning are laudable, but considering the diversification in the EU Single Market there is no one-size-fits-all solution. The need for reskilled and/or upskilled workforce is not covered by the reskilling programmes of the private sector or the educational systems of the countries. Therefore, EU institutions and member states must agree on the skills, training, and incentives required to close the skills gap between the ambitious Digital Decade goals and the severe lack of digital capacity and scarcity of IT experts in the EU workforce, particularly in light of rapidly developing new technologies like generative AI.

According to the current data the 46% of Europeans, in particular among older people, do not currently have the basic digital skills, hampering the use of digital technologies for everyday tasks and access to services offered online ²⁴. At the same time the lack of available staff with the right set of skills is hampering investments for 85% of EU firms, with SMEs struggling more often in filling ICT vacancies²⁵, when Digital Decade target the employment of at least 20 million ICT professionals by 2030.

In order to fill the significant shortage of sector specialists using advanced digital technologies and ICT specialists, it is necessary to increase the pool of pupils who would be ultimately interested to study STEM and ICT, with a special focus on girls and women who are vastly underrepresented in the digital field. Boosting the development of digital skills from an early age and in a continuous manner is essential for influencing the level of digital skills of the EU population and the number of male and female students that will consider studies and career in the ICT.

²⁴ Report on the state of the Digital Decade 2023, EC, 2023

²⁵ European Investment Bank, Investment Report 2022/2023: Resilience and renewal in Europe, 2023



The brain drain has been a long-standing challenge for Greece. After the Greek financial crisis of 2007 – 2017 the phenomenon of brain drain has been escalated and the loss of valuable human capital affected the economic growth and development. Regarding ICT specialist, Greece has a significant gap to support the digital transformation of the country the next ten years. Greece has to double the number of ICT professionals until 2030 to cover the needs of ICT projects mainly funded by RRF.

Moreover, Greece will need high skilled professionals in several advanced technologies like AI, Big Data, Blockchain etc. The lack of data scientists currently will hinder the development of AI and Big Data applications in the future. According to a Deloitte's study (The Impact of Gen AI on the Greek economy, Deloitte for SEPE Digital Economy Forum 2023) the impact of Gen AI on the ICT specialist gap is also expected to be significant, with the projected gap between supply and demand reaching ~83,000 positions cumulatively by 2030.



Key takeaways

- The free movement of high skilled professionals in EU Single Market, led to an imbalance between EU countries, regarding the available workforce to boost the engines of ICT markets.
- The 85% of EU firms hampering investments due to the lack of available staff with the right set of skills.
- The 46% of Europeans (48% in Greece), in particular among older people, do not currently have the basic digital skills.
- Advance technologies like AI require new skills for the ICT specialist to respond to the new job openings.
- Greece has a higher percentage (20%) of STEM graduates than EU (19%).
- Only 13,4% of businesses in Greece provide STEM training to their staff (Special Report: Greece in Digital Decade 2030, ΣΕΒ, 2024).



Recommendations

- **Promote stronger cooperation** between primary, secondary and VET schools and tertiary education and research to increase the number of pupils enrolling in digital studies aiming at gender convergence.
- **Investment in basic and advanced digital skills training in all education levels.** To meet the challenge in a fast-evolving context, partnering with the private sector will help ensure that

formal education, vocational training and certificates can actually meet the needs of citizens and businesses.

- EU members states should provide **guidelines on reskilling the workforce**:
 - Create an industry / sectoral toolbox with specific action recommendations.
 - Foster company, sectoral, regional and multi-stakeholder digital networks / clusters
 - Promote and support entrepreneurship as an opportunity for acquiring digital skills and career conversion.
- Promote training courses for **soft skills** along with the digital skills. Organisations could benefit from broader view of technical training with programs that focus on leadership, business management, and cross-cultural and cross-functional competencies²⁶.
- In Greece the programme “**Industrial PhDs**” should be expanded and include more upskilling opportunities especially in the technology businesses.
- The need to **expand the digital talent pool of ICT specialists** in Greece will require special attention to tackle the current gap and ensure the economy benefits from a digitally skilled population. It is also crucial that Greece can forecast the skills required to match the labour market needs and anticipate changes in skills.
- Greece should consider **making the “brain drain” a competitive advantage**. Specific government incentives that could reverse “brain drain” and gain back the high skilled ICT Greek professionals with the experience of working abroad for advanced technology corporations, could flourish the Greek ICT market workforce.
- **Embedding digital and media literacy as a formal part of civic education**: Building a strong and diverse workforce with media literacy, STEM and computer science strengths requires curricula and training upgrades starting from kindergarten, throughout primary and secondary education. It is essential to use digital technologies effectively, as well as being able to access, engage, and share online content responsibly.



4.5. The AI as the Steam Engine of the Fourth Industrial Revolution.

Artificial intelligence (AI) is evolving globally into that technology that can positively affect every part of the daily life of citizens, the state and businesses. Artificial Intelligence is still on an upward trajectory. Traditional sectors are exploring ways of embedding the technology in day-to-day activities. Bots may have been the beginning, but backend operations have been reaping great benefits from the technology, where they are beginning to make micro-decisions for businesses. From travel assistants and tag-less smart luggage handling in airports to a biology-driven genomic interpretation process, AI is set to optimize products and services, helping us humans make better and faster decisions. The global

²⁶ <https://www.weforum.org/agenda/2023/01/5-ways-develop-digital-skills-davos2023/>

generative AI market will grow robustly in the year ahead and into the early 2030s and it is estimated that the diffusion of **AI technologies will increase global GDP by 7 percent over the next decade**²⁷.

In this context, Europe's dependence on technology imports created significant scepticism about its digital autonomy and economic security. For this reason, Europe needs to **cultivate its own technology sector and support AI initiatives and investments that align with European values and needs**. At the same time, any **regulatory attempt** to control the expanding of AI applications should be in balance, as the AI now is characterised as the steam engine of the 4th Industrial Revolution and all European companies will need a seamless access to this technology resources. As governments around the world look to increase the public's trust in AI, policymakers have a critical role to play in developing AI policy frameworks showing that safety, security, innovation, and opportunity go hand-in-hand.

As regulating AI can stifle innovation and limit experimentation, another strategy could be considering **nonregulatory methods for AI industry**. Top-down regulation may not always be more successful than industry self-regulation or codes of practice. Since the private sector can usually move more quickly than legislations, "soft law" approaches are frequently preferable to "hard law". In any case regulating AI should ensure benefits outweigh costs. Costs, including both direct compliance costs and indirect innovation and competitiveness costs, impact the merits of a regulatory proposal.

In Europe the first-ever **comprehensive legal framework on AI worldwide**, the **AI Act** was approved by the EU committees in **February 2024**. The aim of the new rules is to foster trustworthy AI in Europe and beyond, by ensuring that AI systems respect fundamental rights, safety, and ethical principles and by addressing risks of very powerful and impactful AI models. The aim of the new rules is to foster trustworthy AI in Europe and beyond, by ensuring that AI systems respect fundamental rights, safety, and ethical principles and by addressing risks of very powerful and impactful AI models.

The year of 2024 is an elections year for Europe and for many other countries in the globe and AI may play a major disruptive role in influencing public opinion. The risk of AI-generated misinformation and disinformation is the ranked **2nd most identified risk after the Climate Crisis** in the Global Risk Report 2024 of the World Economic Forum. Apart from the disinformation issue there are several other issues to be handled concerning AI applications like data protection, intellectual properties and transparency, especially when GenAI systems operate as "black boxes" and it's impossible to know why and how particular content has been created.

AI will transform labour market. In the previous industrial revolutions, the machines replace the jobs of workers. This time it is expected that the AI will not affect only manufacturing workers but also middle-class professionals. A study by the McKinsey Global Institute reports that by 2030, at least 14% of employees globally could need to change their careers due to digitization, robotics, and AI advancements. Therefore, public and private sector will need to design and launch reskilling programmes for smooth transition to the new labor era.

²⁷ Generative AI could raise global GDP by 7%, Goldman Sachs, April 2023



Greece prepared a National Strategy for the development of AI in 2022, comprising a set of coordinated and interrelated actions, with the clear objective of maximising potential benefits and minimising potential costs of the economy and society.

According to the Deloitte's analysis (The Impact of Gen AI on the Greek economy, SEPE Digital Economy Forum 2023) prepared for SEPE of the impact of Gen AI on the country's GDP, its impact is predicted to be very significant, with its cumulative impact estimated at +5.5% on the country's GDP by 2030 (i.e. €10, 7 billion).

In addition, in January of 2024 the research study: Generative AI Greece 2030 "Futures of Generative AI in Greece" was published as the first empirical strategic foresight research approach on the use of Gen AI in Greece. This research presents four scenarios of possible alternative future images of Gen AI in Greece by 2030, from the "techno-social acceleration" to "techno-giant" which represents a Gen AI ecosystem that reflects the global technological boom.

In this context the Greek government launched on February 2024 the mAlgov - Beta version, which is a government AI digital assistant for helping citizens search for information and public services in the gov.gr portal.



Key takeaways

- The AI consider to be the Steam Engine of the Fourth Industrial Revolution with the estimation of increasing the global GDP by 7% over the next decade.
- The misinformation and disinformation produced by GenAI is the ranked 2nd most identified risk after the Climate Crisis in the Global Risk Report 2024 of the Word Economic Forum.
- Regulating AI efforts should focus on protecting data privacy, intellectual properties, and transparency and not to stifle innovation and limit experimentation.
- EU have a significant shortage in AI specialists, who prefer to establish and work in US regardless of where they graduate - while 60% of the world's top AI researchers work in US institutions, 29% of those individuals had received their undergraduate degree in China, 20% in the US and 18% in Europe.
- AI will transform the labor market and this time, comparing with the previous industrial revolutions, there will not be affected only manufacturing workers but also middle-class professionals in all industry domains.



Recommendations

- To protect against AI side effects, EU have to **regulate sectors, not technologies**. Meaning that we need a set rules for specific AI applications in particular sectors rather than creating broad rules for AI technologies generally. For example, an AI system to drive a vehicle is different than one to automate stock trades or diagnose illnesses, even if they use similar underlying technologies.
- EU member states and transnational corporations should **prioritize AI ethics** by including discussions of AI-related ethical issues into relevant international, intergovernmental and multi-stakeholder fora.
- EU should **scale current smaller and fragmented national and EU initiatives** and support the deployment of open AI models and applications, data spaces, open knowledge tools, privacy-preserving digital IDs, and digital payments.
- **Build an AI-empowered** workforce by investing in human capital, education, and training systems. This investment in human capital concerns both private and public sector. Industry has a critical role to play in developing new skilling programs that focus on AI preparedness. At the same time policymakers must help scale up AI training programs to support reskilling/upskilling of workforce.
- EU member States should invest in and **promote digital and media and information literacy skills** to strengthen critical thinking and competencies needed to understand the use and implication of AI systems, in order to mitigate and counter disinformation and misinformation.
- **Governments should incorporate more AI technology** to address community challenges and enhance public services. Along with industry and civil society, governments should work together to plan and implement AI programs and monitor the performance to make continuous improvements.
- Greece in particular, should benefit from the high-capacity scientific resources and **invest in AI verticals** with focus on privileged industry domains like tourism, culture, pharmaceuticals and shipping.

ANNEX A

EU Members National Roadmaps towards Digital Decade 2030

The state of play of digital transformation in the Member States

The EU stands at a pivotal moment with the Digital Decade 2030, holding the potential to unlock EUR 2.8 trillion, equivalent to 21% of the current economy. This analysis delves into the digital transformation landscape across EU Member States, underscoring the urgency for unified action in reforms, enhanced business environments, and substantial investments. The focus is on practical execution through Multiannual Digitalization Programmes and European Digital Innovation Centres. Coordinated efforts, particularly through the Digital Decade governance mechanism, are paramount for effective progress. As Member States craft their roadmaps, aligning with recommended policies and actions is crucial. Discussions involving Member States, the European Parliament, and stakeholders will shape the collaborative path toward a digitally resilient future.

Austria

Austria exhibits commendable progress in digital skills, surpassing the EU average with 63% possessing basic proficiency. To reach the 2030 target of 80%, addressing the shortage of ICT specialists, especially among women, is a priority for Austria's economy. Upskilling initiatives, particularly in advanced technologies, are crucial for sustaining digital momentum.

Despite strides in 5G, fixed Gigabit connectivity remains challenging. Austria's active involvement in microelectronics and quantum computing aligns with EU goals, positioning it as a significant player. Accelerating connectivity infrastructure, especially in rural areas, is vital, necessitating continued investment and efficient broadband rollout. Austria's digitalization of businesses is mixed, with untapped potential for increased intensity, especially in SMEs. Strategic initiatives targeting SMEs are essential for embracing big data, AI, and cloud services, requiring accelerated efforts for cohesive sector-wide strategies. In digitalizing public services, Austria excels in online availability, aligned with the EU average. Accelerating efforts in public service digitalization, monitoring effective usage, and addressing potential divides are crucial. Leveraging Austria's strong position in eID solutions can enhance overall accessibility and effectiveness. Austria's Recovery and Resilience Plan allocates a substantial 52.8% to digital transformation, emphasizing education, SME digitalization, and research infrastructure. This commitment aligns with immediate needs for digital advancement, focusing on devices for education and groundwork for SMEs.

Belgium

Belgium, performing at the EU average for basic digital skills, must intensify efforts to meet the 2030 target. Leveraging its higher-than-average ICT specialists, particularly encouraging women's participation, is vital. Progress in 5G coverage is commendable, but fiber-to-the-premises lags. Investments in semiconductors and quantum computing showcase commitment to emerging technologies. To reach Digital Decade targets, Belgium needs accelerated efforts in connectivity infrastructure, emphasizing efficient fiber rollout. The country excels in digitalizing businesses, especially SMEs, with above-average adoption of cloud computing, AI, and big data. Ongoing policy implementation is crucial for SMEs to benefit from advanced cloud solutions.

Belgium's progress in digital public services, including e-health, is notable. Accelerating efforts to enhance data accessibility and collaboration among administrative governments will improve interoperability. Strengthening collaboration and alignment of administrative bodies is crucial for advancing digital public services. In Belgium's Recovery and Resilience Plan, 27% is allocated to digital initiatives, emphasizing skills, infrastructure, and cybersecurity. The focus on upgrading ICT infrastructure in education and 5G rollout aligns with immediate needs. Continuous monitoring and adjustment will ensure effective contributions to Digital Decade targets.

Bulgaria

Bulgaria faces a significant challenge in digital skills, with only one-third possessing basic proficiency. Intensified efforts are crucial, focusing on upskilling the workforce, particularly women in ICT. Coordination of digital education policies is necessary for a comprehensive approach. Utilizing EU funds for adult learning programs can expedite skill enhancement. In digital infrastructure, Bulgaria excels in fixed broadband, but gigabit connectivity uptake is low. Incentives are needed for adoption, with ongoing efforts in 5G rollout and commitment to semiconductors and quantum computing aligning with EU goals. Accelerated measures, including gigabit connectivity and 5G, are vital for effective Digital Decade contributions. Digital transformation of businesses lags, especially in cloud computing adoption. Strategic programs indicate goals for innovation and digital transition, requiring intensified efforts in SMEs for overall alignment with Digital Decade targets. Challenges persist in public service digitalization, below the EU average. Targeted measures to reduce administrative burdens and increase awareness are essential. Despite achievements in Bulgaria's Recovery and Resilience Plan, continuous monitoring and flexibility in adaptation are crucial for substantial contributions to the Digital Decade, aligning with the EU's digital goals.

Croatia

Croatia demonstrates notable progress in digital skills, surpassing the EU average with 63% possessing basic proficiency. However, increasing ICT specialists, especially women, remains a priority. Targeted actions should enhance the education system's capacity, retaining professionals, and attracting new talent, with a focus on cybersecurity. In digital infrastructure, despite strides in fixed-line deployment, broadband services and 5G adoption need acceleration. Croatia's slightly above-average digitalization of businesses can be improved, especially in SMEs. Raising awareness, public support, and funding schemes will contribute to achieving Digital Decade targets. While lagging in digital public services, Croatia's Recovery and Resilience Plan allocates significant funds for digital transformation, showcasing achievements in agriculture, energy, and online platforms. Continuous monitoring and fulfillment of milestones will ensure effective Digital Decade contributions.

Cyprus

Cyprus has made strides in digital skills, but challenges persist, with only 50% possessing basic proficiency, slightly below the EU average. The National Digital Skills Action Plan 2021-2025, supported by the RRF, aims to enhance skills across age groups. Focused actions for awareness and training, particularly for those over 55, are essential to meet Digital Decade objectives. In digital infrastructure, Cyprus excels with a 60% coverage of fixed very high-capacity networks and 100% 5G coverage in populated areas, exceeding the EU average. Engagement in semiconductors and quantum computing aligns with EU goals, but acceleration is needed. Regular assessments of spectrum demand and continued efforts in these technologies are crucial. Cyprus outperforms the EU average with 70% of SMEs having basic digital intensity. However, advanced technology adoption falls below targets, requiring accelerated efforts through funding programs. Digital public services show consistent efforts, slightly below EU average for citizens but surpassing it for businesses. Accelerating measures in interoperability and availability will contribute to Digital Decade targets. Cyprus allocates 23% of its RRP to the digital

transition, contributing to Digital Decade targets. Positive assessments include digital milestones, with future plans for expanding networks and implementing a new cloud policy. Continuous monitoring and fulfillment of milestones are essential for Cyprus' effective contribution to the Digital Decade.

Czechia

Czechia has achieved progress in basic digital skills, with 60% of the population surpassing the EU average. Challenges include a shortage of ICT specialists (4.5% of employment) and a low share of women in the sector (10.9%). Initiatives by the Ministry of Education support digital education in schools, but acceleration in digital skills, especially for ICT specialists and cybersecurity, is crucial. RRF funding, particularly for STEM education, can aid in achieving ICT specialist targets.

In digital infrastructure, Czechia faces limitations in fixed connectivity (53% coverage), hindering progress, especially in rural areas. While 5G coverage surpasses the EU average, efforts are needed in fiber rollout and 5G allocation. Active participation in microelectronics, communication technologies, and quantum computing positions Czechia well. Continuous efforts in semiconductors and quantum computing will support the EU's competitiveness. Czechia lags in business digitalization, with 68% of SMEs having basic digital intensity. Adoption of advanced technologies falls below EU averages. Funding programs for start-ups aim to enhance innovation. Accelerating efforts to facilitate access to advanced technologies, especially among SMEs, is essential. Raising awareness and training can contribute to realizing the benefits of digital transformation. In public services, Czechia excels in citizens accessing services online (86%), but scores for transparency and mobile friendliness are below the EU average. Efforts to expand eID usage are commendable, but e-health records accessibility lags. Accelerating efforts to improve user-friendliness and citizen feedback will contribute to Digital Decade targets. Czechia allocates 22% of its RRP (EUR 1.56 billion) to digital priorities, focusing on skills and enterprise digitization. Implementation of new curricula, IT classes, and healthcare system interoperability is underway. A Digital Media Observatory combats disinformation, with 2023 milestones including digitizing the justice system and a state administration communication platform.

Denmark

Denmark excels in basic digital skills at 69%, surpassing the EU average but falling short of the 80% Digital Decade target. With ICT specialist employment slightly above the EU average at 5.7%, upskilling and reskilling initiatives are crucial, focusing on advanced and emerging technologies. Denmark's robust digital infrastructure, with 96% very high-capacity network coverage and 98% 5G coverage in populated areas, needs sustained improvement and private investment exploration in less commercially viable regions. Active participation in quantum computing initiatives and hosting the NATO center for quantum technologies establishes Denmark as a digital frontrunner, requiring continued investment in European digital infrastructures. Leading in business digitization, Denmark surpasses EU averages in AI, cloud, big data, and basic digital intensity. Support for start-ups and fostering a vibrant ecosystem contributes to ongoing innovation. In digital public services, Denmark excels, with scores above the EU average. High e-Government usage and digital eID adoption showcase its initiatives' effectiveness. Continuous support for data sharing, open data, and big data solutions is recommended. Denmark allocates a notable 25% of its Recovery and Resilience Plan (EUR 380 million) to digital transformation, actively contributing to Digital Decade targets. Achievements include new curricula, IT classes, and healthcare interoperability standards. The plan supports a comprehensive digital strategy, aiming to improve health sector resilience and digitize all society sectors. Future milestones involve the justice system's digitization and a common platform for state administration communication, demonstrating Denmark's commitment to advancing its digital landscape.

Estonia

Estonia excels in digital skills, slightly surpassing the EU average, with 56% possessing basic proficiency. Notably, the country strides towards the Digital Decade target for ICT specialists, boasting a significant 6.6% in total employment, exceeding the EU average. Estonia demonstrates gender diversity, with 24.5% women among ICT specialists, surpassing the EU average. Continuous efforts in digital skills, particularly in employer-driven upskilling, will sustain Estonia's positive trajectory.

In digital infrastructure, Estonia excels in fixed very high-capacity networks and fiber connections, participating actively in EU initiatives. However, improving 5G coverage and fixed broadband speeds remains crucial for sustained success. Estonia displays a mixed picture in business digitalization, with cloud computing surpassing the EU average, while AI and big data adoption lag. The vibrant ecosystem of innovative start-ups and scale-ups highlights growth potential. Accelerating efforts to adopt advanced technologies, especially among SMEs, is imperative for competitiveness. As a global leader in digital public services, Estonia boasts 97% of internet users accessing e-Government services. The country actively shares its expertise internationally, emphasizing innovation procurement and addressing accessibility challenges for all citizens. In Estonia's Recovery and Resilience Plan (RRP), EUR 208 million (24%) is allocated to digital transformation, aligning with Digital Decade targets. Investments include upgrading digital government services, supporting SMEs, and deploying very high-capacity networks in rural areas, reflecting Estonia's commitment to enhancing its digital capabilities and fostering innovation.

Finland

Finland excels in digital skills, with 79% possessing basic proficiency, closely approaching the 80% Digital Decade target. The country surpasses EU Digital Decade targets with 7.6% of ICT specialists in total employment. Finland's commitment to digital education, seen in programs like the New Literacies Programme, contributes significantly to its skilled workforce.

In digital infrastructure, Finland boasts impressive 5G coverage (95%) and a commitment to full fiber roll-out by 2025. Active participation in EuroHPC, quantum computing, and semiconductors positions Finland to support the EU's competitiveness. Finland's businesses showcase strong digitalization, with 89.5% of SMEs reaching basic digital intensity. Adoption of advanced technologies exceeds the EU average, reflecting a commitment to innovation. Finland excels in the digitalization of public services, with 97% of internet users utilizing e-Government services. Initiatives in e-health and AI for administrative decisions showcase Finland's commitment to enhancing public services. In Finland's Recovery and Resilience Plan (RRP), EUR 525.7 million (28.9%) is allocated to digital transformation, significantly contributing to Digital Decade targets. The plan includes investments in broadband infrastructure, automatic train protection, digital innovation in social welfare and healthcare, continuous learning, and key technologies like microelectronics, 6G, AI, and quantum computing. Finland's RRP emphasizes a holistic approach to digital development, ensuring comprehensive progress.

France

France emphasizes enhancing digital skills with just over three out of five possessing basic proficiency, underlining the need for improved scientific, digital, and media literacy. While the share of ICT specialists in employment (4.3%) slightly trails the EU average, initiatives like Pix and Skills and Jobs of the Future are positive. France excels in digital infrastructure, prioritizing full fiber rollout by 2025. Challenges lie in improving 5G spectrum readiness, sustainability, and advancing quantum computing and semiconductors. France's participation in EuroHPC and IPCEI positions it strategically. Business digitalization is a challenge, with 64% of SMEs using digital technologies, below the EU average. France's RRP allocates EUR 8.1 billion (22%) to digital transformation, emphasizing key technologies, public health, education, digital services, and high-speed broadband, showcasing commitment to the EU's Digital Decade targets.

Germany

Germany shows progress in narrowing the digital skills gap to the EU average at 49%, below the EU's 54%. The share of ICT specialists (5.0%) is above the EU average, but high drop-out rates in ICT subjects hinder potential growth. Initiatives like 'Digital Pact School' and the National Skills Strategy emphasize upskilling and reskilling. In digital infrastructure, Germany advances in 5G and gigabit connectivity, yet fixed very high-capacity network coverage for fiber at 19% needs improvement. Quantum and semiconductor participation positions Germany as a key contributor. Recommendations include accelerating 5G roll-out and supporting very high-capacity networks. Germany excels in business digitalization, with 77% of SMEs having basic digital intensity. Initiatives like 'SME digital' and Digital Now contribute to Germany's expected substantial Digital Decade contribution. Challenges in public service digitalization include limited services and nationwide availability issues. Recommendations include collaboration, interoperability improvements, and swift implementation of RRP measures. Germany's RRP allocates over 50% to digitalization, focusing on microelectronics, communication technologies, and cloud infrastructure. Ongoing revisions will address increased financial allocation and green transition support.

Hungary

Hungary grapples with digital skills, as only 50% of the population possesses basic digital skills. A low proportion of ICT specialists in total employment (4.1%) and women among ICT specialists (13.6%) indicate the need for improved efforts, aligning with the National Digitalisation Strategy's goals.

In digital infrastructure, Hungary excels in broadband and 5G coverage (58% in 2022), with fixed very high-capacity network coverage (80%) surpassing the EU average. Involvement in quantum computing and semiconductors is notable. Recommendations include increasing 5G rollout, sustaining semiconductor and quantum computing efforts, and refining connectivity goals.

Challenges persist in digitalizing businesses, with 52% of SMEs having basic digital intensity. Hungary's participation in IPCEI on Next Generation Cloud Infrastructure and Services is positive, emphasizing the need for swift RRP measures to support digital transformation. While Hungary shows progress in digitalizing public services, performance lags below the EU average. Accelerating adoption of advanced digital solutions, especially in innovation procurement, is crucial. The RRP, focusing on education, digitalization of public administration, and sector-specific initiatives, significantly contributes to Digital Decade targets with a 30% allocation.

Ireland

Ireland distinguishes itself in digital skills, with 70% of adults possessing basic digital skills, exceeding the EU average. The 6.2% share of ICT specialists in total employment surpasses the EU average, but addressing gender imbalances is crucial. Initiatives like the Adult Literacy for Life strategy contribute to success, with recommendations for sustained gender-focused policies.

In digital infrastructure, Ireland achieves 84% fixed very high-capacity network coverage and 5G coverage, exceeding the EU average. Active participation in IPCEI and the Disruptive Technologies Innovation Fund positions Ireland strategically. Recommendations include increased 5G efforts, public consultations, and enhanced gigabit connectivity. Ireland excels in business digitalization, with 85% of SMEs demonstrating basic digital intensity, surpassing the EU average. Despite strong performance, boosting advanced technology adoption is essential. Initiatives like the Digital Transition Fund contribute to progress, with recommendations for continuous policy implementation. In public services, Ireland achieves high scores, yet challenges exist, such as limited access to electronic health records. The Connecting Government 2030 strategy addresses this, with recommendations for swift implementation and expanded digital services. Ireland allocates 32% (EUR 312 million) of its RRP to digital transformation, focusing on shared data centers, digital calls for proposals, and ICT devices for students.

Continuous revisions will enhance financial allocation and digital initiative support, aligning with Digital Decade targets.

Italy

Italy encounters digital skills challenges, with 46% possessing basic skills, below the EU average. Efforts to increase ICT graduates (1.5%) and low female representation among ICT specialists (16%) need enhancement. Recommendations include intensified upskilling, industry collaboration, and increased ICT specialist training capacity. In digital infrastructure, Italy progresses with 84% fixed VHCN coverage, 93% 5G coverage, and notable advancements in semiconductors and cloud computing. Recommendations include accelerated gigabit coverage efforts and sustained initiatives in semiconductors, edge nodes, and quantum computing. Italy excels in business digitalization (85% of SMEs), but advanced technology adoption lags (big data 23%, cloud 47%, AI 8%). Initiatives like an AI ambassador contribute, with recommendations for strengthened AI and big data adoption, entrepreneurship, and innovation ecosystems. Italy lags in public service digitalization (citizens 68, businesses 75). Measures, including the Digital Health Strategy, are underway. Recommendations include accelerated implementation, improved health record accessibility, and enhanced digital services. Italy allocates 25% (EUR 48 billion) of its RRP to digital transformation, focusing on cloud-first reforms, ICT procurement, and digital skills. Investments in 5G, semiconductors, and quantum computing support Italy's prominence in these areas.

Latvia

Latvia faces digital skills challenges, with 51% possessing basic proficiency, slightly below the EU average. The share of ICT specialists in employment (4.4%) and ICT training providers (15%) falls short. Latvia exceeds EU averages in ICT graduates (5%), Internet use (90%), and gender balance in ICT specialists (22.8%). Recommendations include boosting digital skills, integrating digital into education, and addressing training gaps. In infrastructure, Latvia excels with 92% of households on gigabit networks. While fixed VHCN coverage (92%) and Fibre-to-the-Premises (91%) surpass EU averages, 5G coverage (42%) lags. Recommendations include enhancing 5G and sustaining quantum and semiconductor initiatives. Business digitalization is limited, with 52% of SMEs showing basic intensity. Latvia's RRP allocates EUR 138 million to digital transformation, emphasizing increased efforts for technology promotion and innovation. In public services, Latvia scores well (87/86), with measures like eID. Accelerating e-health records and enhancing services are recommended. Latvia allocates 21% (EUR 1.8 billion) of its RRP to digital transformation, focusing on skills, transformation, and innovation. Continuous revisions ensure sustained support for digital initiatives.

Malta

Malta has made remarkable progress in digital skills, with 61% possessing basic proficiency, surpassing the EU average. Challenges persist among certain demographics, prompting Malta's strategic response in the 2022-2025 eSkills strategy. To bridge gaps, awareness campaigns, accessibility measures, and industry collaboration are crucial. In digital infrastructure, Malta excels in connectivity but lags in 5G coverage at 20%. Allocating spectrum, incentivizing adoption, and sustaining efforts in semiconductors showcase Malta's commitment to emerging markets. With 78% of SMEs displaying digital intensity, Malta exceeds the EU average. Despite this, talent attraction remains a challenge. Government support for startups and awareness programs can bolster Malta's digital position. Achieving commendable scores in public services, Malta allocates EUR 67.6 million (26% of the RRP) to digital transformation, emphasizing smart specialization and legislative amendments. Effective implementation is vital for optimal impact.

Luxembourg

Luxembourg emerges as a digital frontrunner, with 64% possessing basic digital proficiency, surpassing the EU average. The proactive approach extends to a notable 7.7% of the workforce being ICT specialists. Robust digital infrastructure includes widespread high-speed internet and an impressive 65% 5G coverage, positioning Luxembourg at the forefront of connectivity. Businesses showcase high digitalization, with 60% of SMEs having basic intensity, excelling in cloud (38%) and AI (11%). Public services digitization is exemplary, with citizen and business scores of 97 and 98, nearing Digital Decade targets. Luxembourg's eID system and ongoing digital health efforts contribute to high scores. The Recovery and Resilience Plan (RRP) allocates funds to sustain these initiatives, emphasizing innovation and transparency. Ongoing monitoring, adaptation to evolving priorities, and collaboration with stakeholders will be key for ensuring the long-term success of Luxembourg's digital advancements.

The Netherlands

The Netherlands stands out in Europe with 79% possessing basic digital skills, exceeding the EU average. Despite this, addressing a lower percentage of ICT graduates (3.7%) remains crucial. A robust digital infrastructure includes 98% fixed very high-capacity network coverage. While 5G coverage reaches 100%, challenges in assigning the 3.6 GHz band require attention. The business sector embraces digitalization, with SMEs surpassing the EU average in basic digital intensity at 80%. Dutch public services lead, scoring 85 for citizens and 89 for businesses. Despite advancements, limited access to e-health records prompts encouragement for decentralized development. The Dutch Recovery and Resilience Plan allocates EUR 1.2 billion (25.6%) to digital transformation, emphasizing AI, quantum, education, and mobility. Ongoing qualitative assessments ensure a comprehensive approach to digital resilience and recovery.

Poland

Poland confronts digital challenges with 43% of the population lacking basic digital skills, falling below the EU average. While the education system integrates ICT into curricula and the Digital Competence Development Programme is underway, addressing a 16.7% gender imbalance in ICT specialists and increasing their share in employment to 3.6% remains pivotal. Despite steady progress in fixed very high-capacity network coverage at 71%, household 5G coverage lags behind the EU average at 63%, impacted by regulatory hurdles. Poland's digitalisation of businesses is below the EU average, emphasizing the need for incentives and training. Digitalising public services requires improvements, notably in e-health records and online service accessibility. Poland allocates EUR 7.5 billion (21.3%) to digital transformation in its Recovery and Resilience Plan, focusing on connectivity, public services, and cybersecurity, in alignment with Digital Decade targets. Continuous efforts in upskilling, connectivity infrastructure, and regulatory alignment are vital for Poland's digital advancement.

Portugal

Portugal showcases strides in digital skills, with 55% possessing basic proficiency, though targeted efforts are crucial for Digital Decade objectives. Recommendations include boosting ICT enrollments, especially among women (20.4%), and fostering lifelong learning. In digital infrastructure, Portugal excels in fixed very high-capacity networks (93%) and fiber-to-the-premises coverage (91%). Despite commendable commitment to semiconductors and gigabit connectivity, 5G coverage at 70% requires enhancement for increased competitiveness. Business digitalization is robust, with 70% of SMEs showing basic digital intensity, surpassing the EU average. While cloud and big data adoption lag, notable AI usage (17%) reflects progress. Simplifying processes, reinforcing cloud computing, and supporting digital innovation hubs are recommended. In public services, Portugal scores 78 for citizens and 82 for businesses, prioritizing digitalization. Noteworthy initiatives like eID and digital identification warrant improvements for e-health records and user-friendliness. Portugal allocates EUR 3.6 billion (22%) to digital

transformation in its Recovery and Resilience Plan, emphasizing connectivity, skills, and public services, aligning with Digital Decade targets.

Slovakia

Slovakia faces challenges in digital skills, with 55% possessing basic proficiency, slightly above the EU average. The proportion of ICT specialists in total employment (4.3%) is below the EU average. Focusing on inclusivity in digital training and attracting and retaining ICT specialists is crucial. Slovakia has made progress in household coverage by very high-capacity networks (71%), and 5G coverage is at 55%. However, gigabit and 5G rollout, especially in rural areas, requires expedited efforts. Challenges in business digitalization include 60% of SMEs with basic digital intensity, and efforts to enhance access to training and knowledge-sharing platforms are crucial. Slovakia's improving scores in digitalizing public services need continued efforts, emphasizing effective use and addressing specific challenges. The EUR 1.3 billion (21%) allocated in Slovakia's RRP to the digital transformation focuses on cybersecurity, digital skills, and European Digital Innovation Hubs, contributing significantly to Digital Decade targets. Monitoring fund utilization and implementing outlined measures are essential for successful digital transformation.

Slovenia

Slovenia excels in digital skills, with 63% possessing basic proficiency, slightly below the EU average. The share of ICT specialists in total employment (4.8%) surpasses the EU average, and the higher representation of women among ICT specialists (22.2%) is commendable. To enhance digital skills further, Slovenia should focus on inclusive training and upskilling initiatives. While connectivity infrastructure is robust (90% household access to high-capacity networks), 5G coverage lags at 37%, below the EU average. Accelerating 5G rollout and sustaining efforts in semiconductors are crucial. Challenges in business digitalization (62% SMEs with basic digital intensity) require intensified support, while public service digitalization (68 for citizens, 79 for businesses) needs effective implementation of planned measures. Slovenia's EUR 1.26 billion (15.7%) RRP allocation to digital transformation is vital for achieving Digital Decade targets, emphasizing connectivity, skills, and public service digitization. Monitoring fund utilization and necessary adjustments ensure optimal impact.

Spain

Spain boasts solid digital skills, with 64% possessing basic proficiency, surpassing the EU average. Efforts to address ICT specialist shortages involve modernizing vocational education. While excelling in fixed VHCN (93%) and fiber-to-the-premises (91%), Spain faces a minor 5G coverage lag (82%), emphasizing rural acceleration needs. Active participation in semiconductor and quantum projects showcases commitment to tech advancements. Business digitalization challenges (68% SMEs with basic intensity) require ongoing support, especially for advanced technologies. Leading in digital public services, Spain scores high in e-Government and e-health, but additional healthcare providers' connectivity to electronic records is crucial. The EUR 19.6 billion (28.2%) RRP allocation to digital transformation prioritizes broadband expansion, education, and public administration upgrades, significantly contributing to Digital Decade targets. Ensuring effective fund utilization and addressing challenges are vital for successful digital transformation.

Sweden

Sweden stands as a digital frontrunner, with 67% possessing basic digital skills, surpassing the EU average. Notably, 8.6% of the workforce consists of ICT specialists, and the share of women in this domain reaches 22.9%, showcasing strides in gender diversity. While Sweden boasts robust digital infrastructure, including widespread access to very high-capacity networks (85%), challenges in fiber rollout and gigabit accessibility in rural areas necessitate attention. Accelerating 5G deployment,

allocating remaining spectrum, and continued emphasis on semiconductors are crucial for sustained growth. Sweden excels in business digitalization, with 87% of SMEs achieving basic digital intensity. However, fostering advanced technology adoption, especially in AI and big data, remains essential. Public services score high (88/100), but addressing challenges in universal eID access and increasing investment in advanced technologies will fortify these services. The EUR 650 million RRP, focusing on broadband expansion, education, and public administration upgrades, positions Sweden strongly for Digital Decade targets, demanding vigilant monitoring and effective fund utilization.