PromethEUs

Position Paper

Digital for Growth: Strengthening the Single Market and Reviving EU Competitiveness

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In view of the upcoming European elections and the debate driven by the reports on the Future of the Single Market and on the Future of EU Competitiveness, the PromethEUs network of think tanks, consisting of Elcano Royal Institute (Spain), I-Com – the Institute for Competitiveness (Italy), IOBE – the Foundation for Economic and Industrial Research (Greece) and the Institute of Public Policy – Lisbon (Portugal), has produced a position paper analyzing the role played by digital innovation and transformation and related policies and regulation in driving EU growth.

1. Why are digital technologies so strategic for EU competitiveness?

According to the economic literature, total factor productivity is responsible for a large part of growth in output per worker across sectors. This means that growth is primarily explained by innovation rather than the mere accumulation of labor and capital. Innovation can be interpreted more or less extensively. For instance, Mokyr (2009) argued that, at the dawn of the first industrial revolution, the concept was expressed by British skilled workers who internalized key Enlightenment cultural ideas, such as that the world could be transformed for the betterment of humankind. But it was Adam Smith to describe in his magnus opus "The Wealth of Nations", published in 1776, the productivity improvement experienced by a pin factory thanks to better specialization of workers but also technical advances.

Today, a significant part of innovation is channeled through digital technologies. By classifying five successive technological revolutions since the 1770s, the innovation economist Carlota Perez (2002) named the fifth one as the Age of Information and Telecommunications. This began in 1971 with the announcement of Intel's first microprocessor, the beginnings of the computer boom epitomized by Moore's Law, originally postulating that the amount of computing power of integrated circuits would double every year (1965). Later, that rhythm was lowered to eighteen or even twenty-four months but was still powerful enough to describe the second machine age, with the reawakening of the artificial intelligence field after a long winter (Brynjolfsson and McAfee, 2014).

ICT (or at least some of its most promising applications) can be considered a general-purpose technology (GPT), positively affecting total factor productivity. According to Bresnahan and Trajtenberg (1995), GPTs are characterized by three fundamental features. First, pervasiveness - GPTs are used in most sectors of the economy. Second, their scope for improvement - over time GPTs tend to provide better performance thanks to further technical advances. Third, thanks to them, opportunities for new innovations can be created – we need only think of the use of digital tools such as AI in scientific research.

Gordon and Sayed (2020) found out that most of the 1995-2005 US productivity revival was driven by ICT-intensive industries producing market services and computer hardware while, on the other hand, in the same period, the EU experienced a slowdown in growth due to scarce ICT investments, a failure to capture the efficiency benefits of ICT, and performance shortfalls in specific industries including ICT production ().

At present and in the next years, according to one estimate, achieving the EU's Digital Decade agenda could unlock over €2.8 trillion in total economic value, equivalent to 21% of the EU's current economy (PublicFirst, 2022). A recent EPRS study (2023) concluded that boosting the digital transition could generate yearly benefits reaching up to €384 billion overall or €860 per citizen.

However, a distinction between digital innovation and digital transformation should be drawn. Both positively affect productivity, but the former refers to technological development (also encompassing strategic autonomy issues), while the latter to technology adoption.
Both objectives deserve to be actively pursued to the benefit of the EU's current and next generations.

2. The EU tech gap with the US and China

In the last two decades, EU countries have been losing ground to the US and China.
In a recent speech (2024), Isabel Schnabel, Member of the Board of the ECB, said that "at the turn of the millennium, Europe was operating at the global technological frontier, but today many euro area firms are laggards. Compared with many of their global peers, they invest less in both physical capital and research & development, and they are less productive".

Although Europe, fortunately, has many high-performing companies, in the aggregate European enterprises are growing more slowly, displaying lower returns and investing less in R&D than their US counterparts. This reflects the fact that Europe largely missed the last technology revolution, lagging behind in terms of value extracted by ICT and other technological advancements (McKinsey Global Institute, 2022).

A vast array of data confirms this bleak analysis, such as follows:

Patents – Though maintaining its edge in advanced manufacturing and Internet of Things (IoT), the EU has lost ground (mostly to China) in robotics and is visibly behind both China and the US in AI and Big Data[i].

Investments – Some US tech companies invest in R&D more than the largest Member States. A recent study commissioned by the European Commission, comparing public sector R&D allocations vs Big Tech in 2022, ranked Amazon first (€69.6 bn), followed by Germany (€43.1 bn), Alphabet (€37.6 bn), Meta (€33.6 bn), Apple (€25 bn), Microsoft (€23.3 bn), France (€17.9 bn), Italy (€12.6 bn), Spain (€7.9 bn) and the Netherlands (€7.7 bn)[ii].

Tech trade – the EU is a net exporter only as regards advanced manufacturing and robotics while it is a net importer for big data, digital mobility, IoTs, micro- and nano-electronics, digital security and AI[iii].

Large tech companies - among the 20 largest by market capitalization, only 2 companies are from the EU (ASML 10th, SAP 18th) vs 15 for the US[iv].

Venture capital and scale-ups – in 2022, venture capital in the EU was at 0.09% of GDP, double the level of 2018 (0.04%) but lower year-on-year and still a fraction of the level in the US (0.75%) and China (0.58%). The number of EU scale-ups was 38% of the US figure, though the gap has been narrowing[v].

Connectivity – in 2022, fiber coverage was 56% in the EU compared to 99.7% in Japan and South Korea and 48.8% in the US that, however, has traditionally relied on cable. As regards 5G roll-out, South Korea has deployed more than 5 times the number of 5G base stations per 100,000 inhabitants than the EU, and China almost triple[vi].

Two recent studies carried out by the PromethEUs network confirmed this gap in two important markets: **data** and **generative AI**.

The US data market value in 2022 stood at €289.5 billion, nearly four times that of the EU (€73 bn) and more than seven times that of China (€40 bn). The EU occupies second position in terms of size and strength of the data market and data economy if compared against the present international background. Despite its second position in absolute size, Europe ranks lower than China in terms of percentage change (+12.6% vs +24.1% between 2021 and 2022)[vii].

Europe is significantly underperforming in terms of AI patents. Out of the top 167 universities and public research institutions for patents, only 4 are in Europe. Among these 4 European public research organizations (that do feature on the WIPO list of top AI patent filers), the

highest-placed is the German Fraunhofer Institute, which is ranked 159th, while the French Alternative Energies and Atomic Energy Commission (CEA) is in 185th position. At the same time, European startups received just $1 billion out of the 22 billion that VCs have invested in generative AI since 2019, making up less than 5% of this sum to Europe. Asian startups received $790 million but, of course, Asia and China, in particular, can rely on large tech companies and government funds to make up (at least partially) for any funding gap[viii].

3. Still no single market in place

Unfortunately, the level of European market integration in the service area remains disappointing. Intra-UE trade in services accounts for only 15% of GDP compared with more than 50% for goods. Only 25% of large firms offer cross-border online sales in the EU. For SMEs, the share is below 10%. Regulatory and administrative burdens play a large role in explaining these low figures, and also the differences depending on relative company size. What is more surprising is that also financial markets, where size and technological innovation should be more favorable, are segmented within national borders, with little if any progress having been made since the early years of the Monetary Union (Weber, 2024).

The absence of a functioning single market in key aspects, such as in the digital and financial areas, obstructs the emergence of innovative EU players by restricting access of EU startups to funding, particularly venture capital. It increases the costs of operating outside the country of origin, does not allow for the full exploitation of economies of scale, reduces talent mobility, and does not provide R&D organizations with the opportunity to achieve the needed critical mass to succeed at global level. The speed towards achieving the single market is too slow mainly because each Member State has a different approach, priorities, resources and mapping of capabilities, due to the regional imbalances arising from structural factors, as well as the levels of adoption of targeted policies. However, under the current framework there are no effective European governance instruments in place to reconcile and coordinate differences.

The role of the EU to promote the single market from a digital perspective is mainly codified in 3 instruments - digital regulation, industrial policy and foreign policy. In the outgoing legislative cycle, a massive amount of new regulation such as the Digital Services Act, the Digital Markets Act, the Artificial Intelligence Act, the Data Act, the Data Governance Act, to name just few of the most groundbreaking, has been put in place. Besides regulation, the EU also updated its industrial policy in 2021 aiming to organize the digital and green pillars, through several initiatives and, most notably, through the Important Projects of Common European Interest (IPCEIs). So far, these projects have not had the expected impact as, although they did produce some limited effect on the communications sector, on cloud infrastructure, and created some European alliances on AI data and robotics, they were undertaken by only a few stakeholders from 5-7 Member States. As a result, the goal of 75% of firms to integrate Big Data, Artificial

Intelligence and cloud services by 2030 will most likely not be achieved, as current projections show that only 60% will manage to do so.

Besides regulation and the industrial policy, there is a need to promote international partnerships, which the EU currently aims to establish through digital partnerships (with Singapore, South Korea and Japan), trade and technology councils (with the US and India), digital alliances (with Latin America and Caribbean countries) and digital economy packages (with the African Union and other African countries).

4. EU regional imbalances and the role played by the Recovery and Resilience Facility

The growing distance to other countries and the absence of a well-functioning single market is reflected by an extreme heterogeneity among EU Member States in terms of digital outcomes.

The European Innovation Scoreboard 2023 ranks EU Member States in four different performance groups: innovation leaders (Belgium, Denmark, Finland, the Netherlands and Sweden); strong innovators (Austria, Cyprus, France, Germany, Ireland and Luxembourg); moderate innovators (Czechia, Estonia, Greece, Hungary, Italy, Lithuania, Malta, Portugal, Slovenia and Spain) and emerging innovators (Bulgaria, Croatia, Latvia, Poland, Romania and Slovakia). The gap between the best and worst performers is still very wide, although between 2016 and 2023 performance differences among the 27 Member States have become somewhat smaller. However, the group of emerging innovators is still lagging behind the next group of moderate innovators.

This heterogeneity can be observed also for the spreading of digital technologies, such as generative AI. Accounting for population size, Denmark appears to be the largest generative AI market worldwide, with a yearly market value per 100,000 inhabitants of $7.35 million, followed by Finland, Ireland and Sweden. Instead, the US - the biggest generative AI market in absolute terms - ranks fifth. Canada and the UK emerge after the seven EU Member States, but outperform Germany and France. Most countries from Eastern and Southern Europe are below average with lower values, ranging from $1.68 million per 100,000 inhabitants for Portugal to $0.68 million per 100,000 inhabitants for Greece.

Regional imbalances in digitalization seem dependent on structural factors such as different educational attainment, employment rates, or population age. However, well-designed policies can make a difference. For instance, the 2023 edition of the European Innovation Scoreboard places Spain among the top 5 best-performing Member States for digitalization (together with innovation leaders such as Denmark, Finland, the Netherlands and Sweden).

Alongside already existing EU funds, the NGEU Programme has been a timely opportunity to address via the RRPs some of the regional imbalances mentioned above, thanks to the redistributive mechanism providing more resources to poorer Member States (apart from those more overburdened by the Covid pandemic, such as Italy and Spain). Countries belonging to the PromethEUs network have been among the largest recipients of the funds (either in absolute or relative terms). As recently observed by the Financial Times[ix], grants and loans provided by the NGEU Programme explain at least in part the sound economic performance of the four Southern European countries, that have collectively overtaken Germany, EU's largest economy, by about 5 % since 2017 (with an evident acceleration in the last 2 years). Apart from its short term fiscal and macroeconomic impact, the NGEU Programme offers a great opportunity to accelerate the digital transition and scaling positions in the European Innovation Scoreboard, all being currently classified as Moderate Innovators (whose performance is only between 70% and 100% of the EU average).

The digital connectivity strategy of **Greece** is not complete, but the target of whole population coverage by 2030 should be achieved through the collaboration of the government with the mobile operators and the announced investments by the latter. The national fiber network coverage is significantly behind the EU average, though it is expected to catch up within the next 3 years. For transport networks, Greece is taking steps to provide all highways with 5G coverage but lacks connectivity in other infrastructure installations, such as logistic centers, ports and especially railways, where a radical upgrade is needed. Regarding ports connectivity, one of the first private networks is already operational in the port of Piraeus, and there are further investments in state-of-the-art infrastructure.
As far as the Public Sector is concerned, the Greek DigiGOV innoHUB aims to support the development of a new generation of public services based on open standards and open-source solutions for citizens and businesses by utilizing advanced digital technologies (AI, Blockchain, mobile Internet, 5G, HPC, IoT, Cloud, etc.). It also seeks to enrich the ecosystem of digital transformation actors, advance their skills and synergies, and strengthen the communities of practice, to foster innovation in the Public Administration and transform it into a large innovation buyer and investor, as well as to facilitate networking with intra-regional and international cooperation, and synergistic activities while endorsing open principles in governance and digital transformation. The Greek DigiGOV EDIH initiative has created the basis for a strong multi-stakeholder coalition on AI, leveraging high-end expertise, capacity, relevant infrastructures, and initiatives of its partners. Among its priorities are: a) to accelerate the use of AI for new, innovative public services and thus allow SMEs and startups to participate in public procurement; b) to provide the necessary skills on AI to public servants and organize joint actions with the National Centre of Public Administration (EKDDA) to reskill public servants in future and emerging technologies; c) to engage AI/ML practitioners and solution providers, and connect them with service design practitioners and other stakeholders; as well as d) to facilitate the development, training and deployment of AI/ML tools and platforms (e.g., Greek LLMs).

Italy's plan stands out as the largest national project within this initiative, committing a total of €191.5 billion towards transformative reforms and investments across several critical sectors. The digital transformation is a cornerstone of the NRRP, emphasizing improvements in digital infrastructure, skills, and public services.
The Italian connectivity strategy relies on €6.71 billion of investment, covering 5 projects:
1. “1 Gig Italy”, which will guarantee a download speed of 1 Gigabit and an upload speed of 200 Mbit in areas of grey and white next generation access (NGA) market failure;
2. “5G Italy”, which will provide 5G connections in areas of market failure, i.e., areas where mobile networks have not been developed or where only 3G networks are available with no 4G and/or 5G mobile networks envisaged in the near future or where there has been demonstrable market failure;
3. “Connected schools”, which will provide schools with 1 Gigabit broadband connectivity;
4. “Connected healthcare facilities”, which will provide public healthcare facilities with 1 Gigabit broadband connectivity;
5. “Connected minor islands”, which will provide select minor islands lacking fiber optic connections with the continent with ultrafast broadband connectivity;
In the field of digital services and digital citizenship, the investment goal is to develop integrated, harmonized, state-of-the-art, citizen-oriented digital services and to ensure their widespread adoption among central and local administrations and improve the user experience. The aim is therefore to improve the digital services offered to citizens as a direct consequence of transforming the "basic" elements of the Public Administration's digital architecture, including cloud infrastructure and data interoperability. The number of services that will be integrated depends on the type of administration, but the end goal of each Milestone is to have an average of 50 services for the Municipalities, 20 services for the Regions, 20 services for health authorities, and 15 services for schools and universities. Full interoperability of the main data sets and services between central and local governments would be ensured.
New skills and updated training for Public Administration personnel would be provided by 100 online courses using an innovative approach, the activation of training vouchers, the introduction of Communities of Practice and the development of managerial transformation projects for 480 administrations. Healthcare and justice are two important areas of training investment also in digital skills.

According to the European Innovation Scoreboard 2023, **Portugal** is a Moderate Innovator with performance at 85.6% of the EU average. Its performance is below the average of the Moderate Innovators and is increasing at a rate lower than that of the EU (-8.5%). The action plan "Portugal Digital" of 2020 presented a comprehensive approach that aimed to enhance digital transformation and innovation across various sectors. This action plan predates the RRP from which Portugal is set to receive €20 billion, out of which €2.7 billion concern the digital transition. As of February 2024, about 25% has been paid out.
Regarding connectivity, Portugal already has a high level of high-speed internet coverage, clearly above the EU average, and the action plan includes efforts to expand high-speed internet access

across the country, including rural and remote areas, ensuring that all citizens and businesses can participate in the digital economy.
Through initiatives such as INCoDe.2030, Portugal has focused on improving digital skills, which have been quite constant at the EU average, at all levels of education and training, aiming to reduce the digital divide and prepare the workforce for a digital economy. This initiative a) promotes lifelong learning opportunities for digital skills development, targeting not only students but also the adult workforce, including vocational training and professional development programs, b) aims to reduce the digital divide by ensuring that disadvantaged groups, including the elderly and people living in rural areas, have access to digital technologies and the skills to use them effectively, c) supports research and innovation in digital technologies by fostering collaboration between academia, industry and government, while aiming to drive advancements in fields such as AI, big data and cybersecurity, d) encourages collaboration between the public sector, private companies and educational institutions to develop and implement digital skills training programs, and e) focuses on integrating digital education across all levels of the educational system, from primary to higher education. The “Digital School”, one of the initiatives to support the latter aspect of digital skills, funded through the RRP the procurement of thousands of computers to equip schools, and has already absorbed 48% of its budget, while its reform regarding digital competences for teachers and other personnel is ongoing.
The action plan also includes the digitization of Public Administration and the implementation of comprehensive e-Government services, which currently are at the EU average, allowing citizens and businesses to access various government services online, streamlining processes and improving efficiency. In terms of the RRP, about 23% of the foreseen investments had taken place by the end of 2023, with 50% of the non-monetary reforms achieved, but only 17% of the investments regarding information systems for the public finance administration.
The digital transformation of businesses is at the EU average, and has doubled the percentage of businesses with AI, but is falling behind on Big Data. "Portugal Digital" includes: a) support for the startup ecosystem via StartUp Portugal; b) the establishment of Digital Innovation Hubs to support businesses in their digital transformation processes; c) the certification of technological and innovative companies to attract skilled IT professionals from outside the EU, addressing the skills shortage in the tech sector; d) support for smart city initiatives, leveraging IoTs, AI and other technologies to improve urban infrastructure, energy management, transportation and public services; as well as e) making provisions for increased investment in research and development, particularly in digital technologies, to boost innovation and support the development of new products and services. In terms of the RRP, 21% of the foreseen investments towards economic justice and business environment has been made, 50% of the reforms achieved, while only 10% of the Firms 4.0 program, which aims for investments in companies’ systems and innovation creation, spent.

“Digital Spain” is one of the fundamental pillars of the Recovery, Transformation and Resilience Plan of **Spain** and relies on 8 digitalization plans: i) Plan for Connectivity and Digital

Infrastructures; ii) Strategy for the Promotion of 5G Technology; iii) National Cybersecurity Plan; iv) National Artificial Intelligence Strategy; v) Public Administrations Digitalization Plan 2021-2025; vi) SME Digitalization Plan 2021-2025; vii) Plan to Boost the Audiovisual Sector; and viii) National Digital Skills Plan. In addition, Spain has developed the "Digital Kit" program which subsidizes the costs of adopting basic digital solution packages in Spanish SMEs and aims to promote a public-private partnership mechanism to accelerate the digitization of small businesses, to minimize the barriers between levels of digital maturity, as well as to boost the digitization of SMEs. In addition, this program provides for intermediator firms, the "digitalization agents", that channel funds to small firms but also, for people, the "change agents", which help SMEs to train their workforce in digital technologies. There are many Spanish universities that offer education on digital technologies, but there are few programs for vocational training. The latter helps people to access employment easier and faster than universities. This shortcoming was addressed recently through a regulatory framework, while a new law provides for credentials for any such program that one completes. A recent development, which may also help Spain to promote the single market, is the launch of the certification / program [choose] "Public company for technological transformation", that aims to channel and strategically allocate funding towards specific technologies.

Unfortunately, the **ex-post assessment** of RRPs is hindered by several factors, amplified by the urgency to envisage plans and execute them. As already noted in a previous study carried out by the PromethEUs network[x], in most cases, no Key Performance Indicators (KPIs) have been defined as concrete metrics that ensure, regardless of the justifying documents, the effective achievement of the underlying policy objectives identified in the RRPs. Nor is there any information about trade-offs between different possible initiatives. This puts at risk the optimality of initiatives from a planning and performance perspective, including the evaluation of whether this was the best way to spend the budget (opportunity-cost perspective) and how to spend it better in the future. This is even more problematic for comparative analyses. Jointly assessing different RRPs is a challenging task because of their heterogeneity in presenting data, information and goals. Indeed, when looking at the different plans, it emerges that the organization and the availability of information regarding figures, definitions, fields of intervention and existence of sub-categories greatly varies across different countries, making it also hard to compare this information. In view of similar programs in the future, a more rigid standardized approach, set by the European Commission upon consulting Member States, should be put in place.

5. A decalogue of digital policy priorities for the next EU legislative term

1. **Within the reassessment of EU budget priorities (e.g. the growing focus on defense & security), the budget of the Digital Europe program should be markedly revised upward:** the current budget (less than €10 bn over 7 years in 5 areas) does not match individual investments by the world's largest companies in one single technology.

2. **Introducing more coordination in key technology investment** (e.g., AI): the EU budget not only needs to be increased but also better coordinated with other EU programs and especially with Member States. Here, the coordinated plan for AI, started in 2018, should be resumed and strengthened, as well as its governance (with a sanctioning mechanism for non-complying MSs set in place).

3. **Using public procurement to increase demand for innovation**: public procurement should become an industrial policy tool, by rules defined at EU level. For frontier technologies to be developed, centralized or at least coordinated mechanisms could be envisaged in order to accelerate the time to market process.

4. **Reducing red tape at EU and national level, especially for startups and other entities expanding internationally:** the scaling-up process should be facilitated, with regulatory and administrative fast track mechanisms in place for startups and innovative SMEs. Startups and innovative SMEs should be explicitly encouraged to operate outside their country of origin in the EU and elsewhere.

5. **Streamlining EU digital legislation, making it simpler and increasing consistency:** a massive amount of EU regulation has been produced in the last couple of legislative mandates. As the main focus of the next should be on execution, the provision of Consolidated Texts, gathering and reconciliating the existing legislation, could be extremely helpful.

6. **Accelerating the Capital Markets Union:** the current national scale of financial investment in innovative companies is detrimental to the growth of European startups but also EU financial institutions such as venture capital and private equity funds.

7. **Targeting SMEs with specific programs to upskill and reskill current management and workforce:** current programs are not able to reach an adequate amount of companies. New forms of private-public collaborations should be put in place, supplying tools easy to use (e.g. multimedia courses, available in every language).

8. **Speeding up the creation of sectoral dataspaces:** in the European Data Strategy, presented in 2019, sectoral dataspaces available at EU level and covering most of the

economy were rightly envisaged as an essential tool. Unfortunately, the outgoing mandate has achieved too little, due to many unforeseen circumstances and national/local obstacles. The implementation process underlying sectoral dataspaces needs to be greatly accelerated, overcoming the current obstacles and speeding up the creation of skills.

9. **Facilitating interoperability and open digital ecosystems:** resistance from larger companies and technological issues have slowed down so far the establishment of digital markets fully open to competition and innovation from all the relevant actors. As already mentioned, European entities are on average smaller and, therefore, mainly interested in operating interoperable services and in open platforms in order to grow. Moreover, European consumers could benefit from more competition and innovation.

10. **Encouraging and entrusting digital diplomacy:** multilateral digital diplomacy fora and bilateral agreements should be actively promoted by EU institutions. A single Commissioner should be entrusted with this mission, in coordination with the most involved members of the Commission.

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