PromethEUs

PromethEUs Joint Paper

DRIVING DIGITALISATION IN SOUTHERN EUROPE
The role of National Recovery and Resilience Plans and the current EU Policy Agenda.

Executive summary

The PromethEUs network of think tanks, made up of the Elcano Royal Institute (Spain), the Institute for Competitiveness (Italy), IOBE - the Foundation for Economic and Industrial Research (Greece) and the Institute of Public Policy - Lisbon (Portugal), is presenting a joint paper on the role of the Digital Transition in their countries' Recovery and Resilience Plans (RRPs).

In this report, we focus on the **digital dimension of the Resilience and Recovery Programme (RRP)**. The aims, defined when it was designed and approved (before Russia's invasion of Ukraine), were to mitigate the economic and social impact of the pandemic and to make economies and societies more sustainable and better prepared for the green and digital transitions.
The funds potentially allocated to the RRP (including loans) amount to almost 90% of NGEU funds. According to the rules of the RRP, each Member State should allocate a minimum of 20% of their Resilience and Recovery Facility (RRF) to the digital pillar.

Contrary to the traditional funds from the EU Budget (both MFF 2014-17 and MFF 2021-27) which are earmarked but usually unconditional transfers to Member States, the **RRF funds are transferred with a more performance-based orientation**. This is the reason why each Member State must provide information on KPIs (Key Performance Indicators) and the Commission will monitor whether targets are being achieved or not. This means that information about these KPIs should be publicly available, comprehensive and clear, and also that there should be a clarification of each Member State's priorities in the digital pillar in terms of the reforms and investments in the structural changes of their economies and societies.

Chapter 1 – The Greek RRP

The Greek Recovery and Resilience Plan (RRP) "Greece 2.0" **includes a total financing envelope of €30.5 billion (bn) or 17% of the country's annual GDP, the largest percentage in the EU**. The authorities expect a significant economic impact during 2021-2026 stemming from the RRP. **Indicatively, related investments are expected to exceed €60 bn over six years, up to 180,000 new jobs could be created, GDP could increase by 7% by 2026 and exports will grow.** In a country with a significant accumulated investment gap following three consecutive crises (sovereign debt, pandemic, energy crisis), the RRP is expected to offer an opportunity to increase private investments financed by the loan portfolio by 20%, combined with an increase in public investments through the grants.

The Greek RRP is divided into **18 components**, which revolve around **four main pillars: (1) green transition, (2) digital transformation, (3) employment-skills-social cohesion, and (4) private investment and economic transformation. The second pillar and three out of the 18 components focus entirely on digitisation reforms and investments. As well, there are 11 additional components that partially or indirectly affect digitisation, such as through the third pillar and digital skill policies.** Across all components, overall, the RRP comprises 175 measures. Of the measures, 38% relate to reforms and 62% to investments. Given the binding target of at least 20% of the plan's total resource allocation to contribute to the digital transition, this corresponds to at least €6.1 bn of Greek RRP funding for digital investments.

According to the Digital Economy and Society Index (DESI) 2021, Greece's digital performance lags significantly behind its EU peers, despite improving during the last years, primarily as a catalyst effect of the need to adjust to the pandemic crisis. In particular, **Greece was ranked 25th out of the 27 EU Member States in overall digitalisation, 21st in the human capital dimension, 27th in connectivity, 22nd in business integration, and 26th in public services.** Thus, the RRP provides a key opportunity to contribute to the economy's digitalisation convergence with the rest of the EU.

To monitor the implementation of the operational agreements, 331 milestones and targets have been defined using quantitative and qualitative criteria. In terms of implementation, Greece received the first disbursement in April 2022 (€3.6 bn), in addition to the pre-financing instalment received in August 2021 (€4.0 bn). The budget of forty digital investment projects that have been already activated for implementation until May 2022 corresponds to 18.2% of the total budget of approved investments, which is slightly below the 20% target for digital.

The main challenges for the uptake of the Greek RRP are to strike an appropriate balance between the degree of ambition and realism of targets set and their degree of granularity. Investments must be balanced to improve infrastructure and measures to enhance digital skills. So far, the Greek RRP seems to focus more on infrastructure. As well, it is crucial to set up and implement a

systematic impact assessment mechanism for the grant branch of the RRP and take into account both the short-term and long-term effects. The smooth coordination between local and central administrations has to be pursued through accountability and transparency principles so as not to impede grant absorption rates.

Chapter 2 – The Italian RRP

With a total amount of about €191.5 bn, the Italian Recovery and Resilience Plan is the largest in the EU and revolves around three main areas (also shared at EU level) - digitisation and innovation, ecological transition and social inclusion. The government decided to access the maximum amount of RRF resources available for the country, divided into €68.9 bn in grants and €122.6 bn in loans (although Italy has the second largest ratio of debt to GDP in the EU). This package **is expected to result in a significant increase in growth and employment rates**. By 2026, according to the government projections, the positive impact on GDP will be approximately 3% in cumulative terms. The Italian RRP is divided into sixteen "Components", which are then grouped into six main "Missions" (digitisation & innovation, green transition, mobility, education, social inclusion, and health).

As the green and digital transitions are the key elements of the Italian Plan, they cut across several Missions. However, the first Mission (M1), entitled "Digitisation, Innovation, Competitiveness and Culture", is that more specifically focused on digitalisation. Its aim is to support the country's digital transition, through the modernisation of three different areas - public administrations (Comp. 1), private enterprises (Comp. 2), and tourism and culture (Comp. 3).

As already noted, reforms and investments related to the digital transition are not limited to M1 but can also be found in the NRRP's remaining five missions. To estimate the total amount of resources allocated to the digital field, the digital tag of each mission must be considered. Given the findings of our research, we can affirm that the digital tag of the Italian RRP is approximately €51.08 bn. Given this amount, it can then be said that the relative weight of the digital transition goal makes up 26.67% of the NRRP's total budget.

According to DESI 2021, Italy was ranked 20th out of the 27 EU Member States for digitalisation. More specifically, Italy ranks 25th in the section human capital, 23rd in the section connectivity, 10th in the section "Integration of digital technology", and 18th in the section "Digital public services".
In the Italian RRP, the area of human capital was allocated an overall budget of approximately € 7 bn. As far as connectivity is concerned, the plan has five projects (for a total of €6.7 bn): (a) "Italia a 1 Giga"; (b) "Italia 5G"; (c) "Connected schools"; (d) "Connected health care facilities"; and (e) "Connected smaller islands". With regards to the integration of digital technology, the NRRP allocates resources to the digitalisation of businesses (€12.8 bn), the development and deployment

of advanced technologies (€5.1 bn) and ICT-related R&D (€1 bn). Finally, the Italian RRP proposes important measures in the field of "Digital public services", such as the creation of a national cloud-based hybrid infrastructure (Polo Strategico Nazionale).

Along with the resources **assigned explicitly by the RRF**, additional funds have been provided **to Italy** from the Next Generation EU, and more specifically, €13.5 bn granted by React-EU and €0.5 bn from the Just Transition Fund. Moreover, the reforms and investments outlined in the RRP will be partially financed also by the cohesion policies and other European funds of the 2021-2027 MFF, as well as the national budget funds.

Concerning the KPIs of the Italian RRP, it can be observed that the KPIs found at national level vary according to the specific objective they are connected to and, sometimes, **they can appear slightly generic compared to those found at the EU level.** At the same time, many other indicators are more detailed and comply with those in the EU regulation (see Reform 1.9 - Public Administration Reform). As far as last year is concerned, Italy had achieved all 51 objectives in December 2021 and, therefore, secured the first instalment of € 24.1 bn (in June 2021, Italy had already received an advance for an equal amount). In 2021, Mission 1, "Digitisation, innovation, competitiveness", accounted for almost half of the objectives set and achieved (25 out of a total of 51) in the Italian RRP.

Finally, some more general conclusions can be drawn from the Italian NRRP. On the one hand, it has to be noted that, while the number of measures outlined makes for an impressive plan, some of them may appear to be quite generic. Other elements that could hinder a swift and successful outcome of the Italian RRP involve the excessive fragmentation in the plan's enforcement, the scarcity of digital skills (an issue that was already outlined while referring specifically to SMEs), and the so-called procedural "bottlenecks".

Chapter 3 – The Portuguese RRP

The Portuguese RRP is designed to address persistent bottlenecks such as low productivity and low levels of education, an inefficient public administration and judicial system, towards lasting and sustainable growth, preparing the Portuguese economy for the challenges of the coming years. The aim of the Digital Transition is to improve the digital skills of the workforce and in education, enhance the efficiency of the public administration and improve the business environment, incentivising research, innovation and the digitalisation of firms.

Portugal's RRP consists of a total endowment of €16,644 m (€13.9 bn in subsidies, €2.7 bn in loans), of which €3,678 m are dedicated to investments in the digital transition (22.1%), divided into €2,460 m (14.8%) for five Digital Components and €1,215 m (7.3%) included in other (non-

digital) components. The Digital Components are Enterprises 4.0, Quality and Sustainability of Public Finances, Economic Justice System and Business Environment, Digital Public Administration, and Digital School, though three quarters of the digital transition investment is allocated to the public sector, including schools.

The progress of the RRP is measured by qualitative "milestones" and quantitative "targets". In order to assess their quality more precisely, scores have been attributed, from 1 (lowest) to 3 (highest) in terms of how (C) concrete, (M) methodological, (E) effectiveness- and (4) vision-focused, for each KPI. Overall, it is thought that the methodology is not well-described and that there is indeed a lack of measures that account for effectiveness and not merely execution.

Different public websites provide information on progress, each catering to a different audience: European Commission, "*Recuperar Portugal*" (strategic aggregates), "*Portugal Digital*" (action plan for digital transition), IAPMEI (funds to be provided to firms), and "*Mais Transparência*" (data on individual measures and beneficiaries). Using these, one could in principle follow the entire path from strategic vision to individual concrete action, and see how each amount is spent. It has been found that information available is at times inconsistent between these sources. This may be due to different publication dates, diverging definitions, and different institutional focus.

Furthermore, it is unclear on what basis many target values were defined or how exactly certain sums of money are being spent in practice. "*Mais Transparência*", the source describing in detail how funds have been allocated to different investments, only covers 70% of the digital transition budget.

As of June 2022, Portugal has already reported the successful completion of the first set of targets and milestones - five in the digital area - to the European Commission, which then paid out the first semestral tranche of funds. Equally, according to "*Recuperar Portugal*", 100% of funds for digital transition have been contracted with their direct recipients and intermediaries, all public institutions. Apart from the former, nothing has as of yet been disbursed to the final recipients, since the intermediaries have just started to open the respective competitive procedures. The next payment request will be made in autumn 2022.

Chapter 4 – The Spanish RRP

Spain's Recovery and Resilience Plan is acknowledged to aim at a "modernisation comparable to that of Spain's accession to the EU". The RPP contains 212 measures (110 investments and 102 reforms) which amount to up to €69.5 bn. **The Spanish RRP is the second largest in the EU**, only after Italy. Concretely, Spain has requested €69.5 bn in grants. No loans have been requested up to now. Its basic architecture consists of four pillars, 10 lever policies, 20 programmes, and 30

components. Green transition amounts up to the 40% of the total of funds and digital transition makes up 28% of the overall funding package. It is remarkable that Spain's digital transition workstream is far larger than the EU target of 20% and goes beyond that of most EU Member States.

Spain has ranked well ahead of most EU countries in recent years, according to the Digital Economy and Society Index (DESI). Based on the latest results from 2021, Spain ranks 9th out of 27 countries and is six positions ahead of the EU average. **However, a breakdown of the results highlights several shortcomings which are strategic for the long-term transformation of Spain's industrial, economic, social and digital policies**. While basic ICT skills are well established, Spain still lags behind in advanced skills. Only 20% of companies provide ICT training for their staff. Roughly 85% use digital technologies at a 'low' or 'very low' rate.
Three out of ten lever policies are largely devoted to the digital realm - IV (public administration), V (companies and SMEs) and VI (science, innovation, health). However, **digitalisation also spreads across most of the other levers**, mainly in Lever VII (education, skills, reskilling and upskilling) and Levers I and II, both touching on the green transition.

However, **although the contribution of the digital transformation in all 30 components exists, there are significant differences in the amount of resources devoted to each of them, including the levers which allegedly fully address the digital transition.** Only 8 out of 30 components are given 40% or more resources for their digital transformation. Another 7 components out of 30 receive between 10% and 40% of resources for digital transformation. This is especially important, because the components "Industrial Policy Spain 2030" and the "Plan for the modernisation and competitiveness of the tourism sector", which are a part of those levers supposed to be strongly used for the digital transformation, receive less than 40%.

Spain has been the **first country to receive a regular transfer from the European Commission** under the Recovery and Resilience Mechanism. In 2021, the Commission disbursed € 9 bn in pre-financing and gave the green light for a first payment of €10 bn.

The RRP addresses **specific policy measures**, such as targeted programmes for the digitalisation of SMEs, the improvement of interoperability among state and regional public administrations, and the strengthening of digital systems in educational centres (although there are no other advanced reforms, such as the digitalisation of centres' internal management systems which may lead to long-term positive effects).

The Spanish NRRP largely touches on the digitalisation of industry. However, it does envisage "strengthening a digital industry on its own", called "industrialisation of digitalisation", for intangible and tangible goods, although still insufficiently.

Spain has set out several **PERTEs**, which are strategic projects with a great capacity to boost economic growth, employment and the competitiveness of the Spanish economy, with a high

degree of public-private collaboration and transversal to the different administrations. So far, 11 PERTEs have already been decided on or are underway. Four of them are digital-related - electric and connected vehicles, the new economy of language, the aerospace industry, and digitalisation for water use. A new PERTE was recently announced on semiconductors.

Main conclusions and challenges are as follows:

1. adding the "industrialisation of digitalisation" to the "digitalisation of industry", including a Deep Tech section, would be extremely important;
2. reforms should have been prioritised over investments, as, while investments have a greater short-term impact as a temporary economic stimulus, reforms lead to long-term changes in the structural economic model;
3. it is paramount to guarantee transparency in the decentralised implementation of funding across different authorities, territorial levels and public agencies;
4. It is recommended to create a mechanism for *ex post* impact assessment.

Chapter 5 – The Four Plans in a European Perspective

The Recovery and Resilience Facility is the biggest component of Next Generation EU (NGEU) and will provide grants amounting to at most €312.5 bn at 2018 prices, or €338 bn at current prices, and loans amounting to at most €360 bn at 2018 prices or €390 bn at current prices. As already mentioned, all the RRPs must allocate at least 20% of the plan's total funds to measures contributing to the digital transition or to addressing its resulting challenges.

The European Commission has created an online portal where all the RRPs and their digital tag can be compared (at least partially). Through this portal, the achieved milestones and targets for each state can be seen. These measures have been reported as completed by the Member States and, subsequently, assessed as satisfactorily fulfilled by the Commission. To date, the portal shows: 6 measures fulfilled by France, 4 measures by Greece, 16 measures by Italy, 7 measures by Spain, and 7 measures by Portugal.

In absolute terms, the RRP resources allocated by Member States to the digital transition are in total €131.5 bn. However, **looking specifically at the four countries studied in the previous chapters, all being Prometheus members (Greece, Italy, Portugal and Spain), and the funds allocated to the digital transition for each of them, we see that they alone reach an impressive amount of €81 bn, 61.6% of the total amount of RRP funds allocated in total to the digital transition**.

These €81 bn are not only an impressive figure per se (depending of course also on economic conditions and Covid impact), but they can also be interpreted as proof of the effort by the Southern

EU countries to finally embrace the digital transition and commit to innovating both their public and private sectors. Through this impressive investment, and as mentioned taking up more than half of the EU's total RRF budget in the digital field, these countries are trying to bring Southern Europe to the same level of digitisation as other Member States.

While previous chapters of this paper presented the RRPs of the four countries involved - Spain, Portugal, Greece and Italy - and the digital transition related to their four plans, Chapter 5 adopts a broader perspective and a comparative approach. After briefly pointing out how some areas of intervention appear to be common across all four plans and identifying some of the regulatory proposals at EU level mostly interwoven with these fields, the focus will shift towards how the four RRPs relate to the other plans of the RRF facility, as well as other funds in the digital field at EU level. The areas of intervention considered in the chapter are **connectivity, digital skills, digital transformation of public administrations (also relating it to data strategy and cloud migration), cybersecurity and Artificial Intelligence (AI).**

For all areas, the chapter first considers what is the EU policy context related to the specific area, and then moves on to analysing how each RRP would contribute to the merit of the respective countries.

As a methodological conclusion, it is worth noting that comparing the numerous RRPs is a challenging task because of the different ways of presenting data, information and goals. Indeed, when looking at the different national plans, it emerges that the organisation and the availability of information regarding figures, definitions, fields of intervention and existence of sub-categories greatly varies across different countries, making it hard to compare also this information.

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Introduction

Digital Transition in the Recovery and Resilience Plans

The European Union will mobilize a large amount of funds over the next few years for member states, mainly from three sources: **The conclusion of the execution of the Multiannual Financial Framework MFF 2014-20, still available until 2023; the new MFF 2021-27; and also, the package of programmes under the label "Next Generation EU" which will be more concentrated in the next few years.**

The table below shows the relative importance of funds from the last two sources. Next generation EU (NGEU) concentrates the support in "Cohesion, Resilience and Values", since its main objective is to support European countries recovering from the pandemic crisis, and now also from the war in Ukraine. Although grants are established in an agreement, the request of loans is a discretionary policy of each member state. As we see in this report, the options chosen so far concerning loans by the four Southern EU member states (Portugal, Greece, Italy, and Spain) are different, even though the former three have the highest ratio of debt to GDP among European Union member states.

Table 1. Multiannual Financial Framework 2021-2027 and Next Generation EU (in commitments)

MULTIANNUAL FINANCIAL FRAMEWORK 2021-2027 and NEXT GENERATION EU (in commitments) - *Current prices*

€ Million	2021	2022	2023	2024	2025	2026	2027
1. SINGLE MARKET, INNOVATION AND DIGITAL	**20,919**	**21,288**	**21,125**	**20,984**	**21,272**	**21,847**	**22,077**
From which:							
Connecting Europe Facility - Digital	277	283	289	295	301	306	314
Digital Europe Programme	1,104	1,248	1,269	963	982	1,001	1,021
InvestEU Fund	1,029	1,049	190	194	198	202	206
In addition, allocation under NGEU	*3,587*	*3,604*	*4,295*				
2. COHESION, RESILIENCE AND VALUES	**52,786**	**55,314**	**57,627**	**60,761**	**63,387**	**66,536**	**70,283**
*In addition grant allocation under NGEU**	*156,551*	*129,894*	*104,200*				
*In addition loan allocation under NGEU**	*191,017*	*194,838*					
3. NATURAL RESOURCES AND ENVIRONMENT	**58,624**	**56,519**	**56,849**	**57,003**	**57,112**	**57,332**	**57,557**
Additional grant allocation under NGEU	*4,510*	*10,013*	*4,416*				
4. MIGRATION AND BORDER MANAGEMENT	**2,467**	**3,043**	**3,494**	**3,697**	**4,218**	**4,315**	**4,465**
5. SECURITY AND DEFENCE	**1,805**	**1,868**	**1,918**	**1,976**	**2,215**	**2,435**	**2,705**
6. NEIGHBOURHOOD AND THE WORLD	**16,247**	**16,802**	**16,329**	**15,830**	**15,304**	**14,754**	**15,331**
7. EUROPEAN PUBLIC ADMINISTRATION	**10,635**	**11,058**	**11,419**	**11,773**	**12,124**	**12,506**	**12,959**

Source: European Commission

In this report we focus on the Digital dimension of the Resilience and Recovery Programme (RRP). The aims, defined when it was designed and approved (before Russia's invasion of Ukraine), were to mitigate the economic and social impact of the pandemic and to make economies and societies more sustainable and better prepared for the green and digital transitions.
The funds potentially allocated to RRP (including loans) amount to almost 90% of NGEU funds. According to the rules of RRP, each member state should allocate a minimum of 20% of the Resilience and Recovery Facility (RRF) to the Digital pillar.

An important issue which will not be discussed in this report, but should be highlighted, is the much-needed coordination between the management of funds coming from two different sources, namely MFF21-27 and RRP. This issue is explicitly stated as an objective in Article 28 of the RRF Regulation (2021/241) which states that "The Commission and the Member States concerned shall (…) foster synergies and ensure effective coordination between the Facility and other Union programmes and instruments". This, however, is more easily stated than done and will much depend on the governance structure put in place in each member state to manage EU funds and programmes.

As shown in the Table above, there are at least three important programmes – "Connecting Europe Facility-Digital", "Digital Europe Programme" and to a lesser extent the "InvestEU Fund" – that have also a focus on digital. In particular, CEF Digital is meant to boost investments devoted to "safe, secure, and sustainable high-performance infrastructure" while the Digital Europe Programme is to leverage investments in "supercomputing, artificial intelligence, cybersecurity, advanced digital skills, and ensuring a wide use of digital technologies across the economy and society".

Apart from the open issue of coordination among different financial instruments, another important topic is the effectiveness of these funds to reach their objectives. Contrary to the traditional funds from the EU Budget (both MFF 2014-17 and MFF 2021-27) which are earmarked but usually unconditional transfers to member states, RRF funds are transferred with a more performance-based orientation. This is the reason why each member state must provide information on KPIs (Key performance indicators) and the Commission will monitor whether targets are being achieved or not. This means that information about these KPIs should be publicly available, comprehensive, and clear, and also that there should be a clarification of each member state's priorities in the digital pillar in terms of the reforms and investments towards structural changes of their economies and societies.

A Quick Overview of the Recovery and Resilience Plans

The RRPs of Greece, Italy, Portugal, and Spain include a large number of reforms and investments, organized into different components. The following tables provides an overview of the numbers of reforms and investments, plus the funds involved, in the four countries, including of those attributed directly to the Green and Digital transitions.

Table 2. An overview of the number of reforms and investments in the respective RRPs

	Greece	Italy	Portugal	Spain
Reforms	68	58	32	102
Investments	106	132	83	110
Components	18	16	20	30
of which				
Green transition	11	4+	8	10
Digital transition	14	3+	5	8

Source: Institute of Public Policy – Lisbon

The attribution of measures to the Green and Digital Transitions is not uniform, though, and reforms may include either one or multiple initiatives, making direct comparisons difficult. All four countries will receive significant funds for investment under the RRF:

Table 3. An overview of the funds allocated to RRPs

	Greece	Italy	Portugal	Spain
Total	€30.5 bn	€191.5 bn	€16.6 bn	€69.5 bn
Grants	€17.8 bn	€68.9 bn	€13.9 bn	€69.5 bn
Loans	€12.7 bn	€122.6 bn	€2.7 bn	---
Total as % of GDP	17%	10.8%	7.9%	5.8%
as % of total:				
Green transition	38%	37%	38%	40%
Digital transition	**23%**	**27%**	**14.8% direct, 22% in total**	**28%**

Source: Institute of Public Policy – Lisbon

While the relative sizes of the funds for investment are very different between these four countries, all respect the minimum of 20% for the Digital Transition. The funds are in part attributed to initiatives that are directly related to the digital transition, while other have multiple aims.

1. The Greek RRP

1.1. Main weaknesses addressed by the Greek RRP

Following three consecutive economic crises and high uncertainty during the last decade, the sovereign debt crisis (2010-2018), the pandemic shock (2020-), and the global energy crisis (2021-), Greece has accumulated a significant investment gap, which has hampered productivity and potential growth. In this context, **the Recovery and Resilience Plan (RRP) "Greece 2.0" is expected to offer a crucial opportunity to increase private investments financed by the RRP loan portfolio by 20%, combined with an increase of the previously systematically under-executed public investment budget through the RRP grants.** Furthermore, and not less importantly, the RRP contains a large number of reforms, aiming to align Greece with good European practices in a wide range of policy areas, including digital transformation.

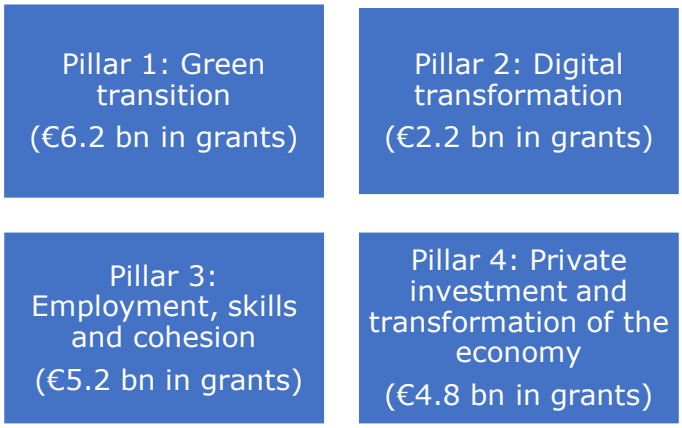
Beyond supporting the country's economic recovery following consecutive crises, the RRP aspires to accelerate the country's economic, institutional and social transformation towards a smarter, greener and more resilient growth model. The main objectives are described as "a paradigm shift towards a more extroverted, competitive and green economic model, matched with a more efficient, less bureaucratic, digitalised state, a more growth-friendly tax system, a dramatically reduced informal economy, and a strong, resilient and inclusive social safety net". The Central Bank of Greece estimates that the aggregate positive impact on GDP may reach up to 7% by 2026, with permanent gains in GDP and employment due to reforms and productivity growth.1 Moreover, the authorities expect RRP-related investments to exceed €60 billion (bn) over six years, up to 180,000 new jobs can be created, and exports will be enhanced in the context of a traditionally relatively closed economy.

The Greek RRP is **divided into 18 components, which revolve around four main pillars[2]: (1) green transition, (2) digital transformation, (3) employment-skills-social cohesion, and (4) private investment and economic transformation.** The second pillar contains three out of the 18 components and focuses entirely on digitisation reforms and investments. These three components, described in subsection 1.2, are *connectivity infrastructure, public sector transformation and private sector transformation*. Each corresponds respectively to circa 20%, 55% and 25% of the RRP digital pillar investments' budget. Besides, there are 11 additional components that partially or indirectly affect digitisation, such as through the third pillar and digital skill policies. Information about the

[1] https://greece20.gov.gr/en/objectives-strategy-benefits/
[2] https://greece20.gov.gr/en/pillars-and-components/

implementation progress of all 14 components directly or indirectly related to digital transformation is presented in subsection 1.5.
Furthermore, all three components focusing on digital transformation often directly impact several other of the EU "6 pillars".[3] Indicatively, connectivity infrastructure investments contribute to "Smart, sustainable and inclusive growth". Reforms touching upon the digital transformation of the public sector also enhance the "Green transition", as well as "Social and territorial cohesion". Likewise, actions supporting the digital transformation of businesses pave the way for "Smart, sustainable and inclusive growth" while overlapping with "Policies for the Next Generation".

Figure 1. The four pillars of Greek RRP



Source: Greek Recovery and Resilience Plan "Greece 2.0", 2021

Across all components, overall, the RRP comprises 175 measures. Among the measures, 38% relate to reforms, and 62% relate to investments. Given the binding target of at least 20% of the Plan's total resource allocation to contribute to the digital transition, this corresponds to at least €6.1 bn of Greek RRP funding for digital investments. The current digital targets set corresponds to 23.3% of total Greek RRP targets.

The RRP can significantly contribute to the further development of digital infrastructure and the digitalization of the economy. Not only it consists of a pillar dedicated to digital transformation, but also the other three pillars include a digital dimension. More specifically, the plan includes measures aimed at:

[3] https://ec.europa.eu/info/sites/default/files/el_rrp_summary.pdf

I. Improving connectivity by accelerating and facilitating the deployment of very high-capacity networks.
II. Enhancing the digitalisation of government and key sectors of the economy, notably through wider adoption of digital capacities and advanced digital technologies.
III. Fostering the digital transformation of Greek businesses.
IV. Developing digital skills to reduce the digital gap.
V. Implementing several multi-country projects to reach scale and interoperability.

1.2. Priorities, objectives and initiatives of the Greek RRP digital pillar

The "digital transformation" pillar of the Greek RRP consists of three components. These were already presented in the previous section. The priorities, objectives and initiatives (reforms and investments) under each component aim at its achievement.

Specifically, the key objectives of component 2.1 (Enhancing connectivity for citizens, businesses and the State) include: (a) the facilitation of fiber optic infrastructure installation, (b) the development of 5G networks, combined with other technologies such as Artificial Intelligence, covering major Greek highways, (c) the switch to fast broadband connections and transition to 5G technology, and (d) the utilization of space technologies and applications. Indicative planned reforms for achieving these priorities are the transition to 5G technology, transition to 100/200 Mbps (UltraFast) broadband connections and strengthening the Superfast Broadband demand. Furthermore, the investments that will be supported in this context comprise: (i) installation of fiber optic infrastructure in buildings, (ii) installation of submarine fiber cables and (ii) 5G networks – 5G corridors, which will provide coverage of all Greek motorways that are part of the Trans-European Transport Networks. The investment budget under component 2.1 is €582 million (m), of which €522 m (90%) are covered by the Recovery and Resilience Facility.

Component 2.2 promotes the digitalization of the public sector. Through this component, Greece aims to modernize the functioning of its State, through the incorporation of new technologies, with a view to: (a) increase its efficiency and effectiveness, (b) provide more qualitative services to citizens and businesses, as well as (c) improve the performance and productivity of civil servants. The relevant planned reforms for promoting these priorities aim at: (i) interconnection and interoperability of registries, systems and services for data exchange between public organizations, (ii) strengthening of "customer"-oriented services, through simplification of processes, as well as related digital systems' enhancements, (iii) incorporation of new technologies, in order to increase the efficiency of the services provided by the public administration and reduce the systems' maintenance and upgrade costs. These include the use of artificial intelligence (iv) adoption of a cybersecurity strategy and policies by the public sector, as well as (v) a new governance strategy for public administration.

Numerous investments in the context of this component can contribute to achieving its priorities and objectives. These mainly concern: (i) strengthening of interoperability and development of web services, (ii) establishment of more e-Registries, (iii) development of customer relationship management systems (CRM), (iv) a new system for public procurements, (v) a central document management system, (vi) the modernization of public administration's One-Stop Shops, (vii) digital skills upgrade programs for conscripts, (viii) acquisition of Central Cloud Computing Infrastructure and services, and (ix) upgrade of cloud-computing infrastructure and services for the National Infrastructures for Research and Technology. The investment budget under component 2.2 is €1,281 m and is fully covered by the Recovery and Resilience Facility.

At the epicentre of the last component of the "digital transformation" pillar is the digital upgrade of the private sector ("Supporting the digital transformation of businesses"). The main objective is to increase the take up of digital technologies by businesses, such as artificial intelligence, Internet of Things, cybersecurity systems, cloud infrastructures and services, to reduce the digital gap between the Greek small and medium-sized enterprises (SMEs) and the European SMEs average. The digital upgrade can contribute to streamlining business processes and utilization of digital capabilities to expand market presence, domestically and globally. Indicative reforms for achieving these priorities include introducing tax incentives to facilitate the SMEs' digital transformation and the establishment of a digital business ecosystem. On the investments side, the targeted digital transformation of SMEs will focus on (i) implementation of digital tools and processes by businesses, (ii) upgrading the cash registers and POS ecosystem to enhance transparency and competition and (iii) increasing the digital awareness of business executives. The investment budget under component 2.3 is €475 m, of which €375 m (79%) are covered by the Recovery and Resilience Facility.

From the above presentation of the components of the "digital transformation" pillar of the Greek RRP, it emerges that two of the three aim towards certain sectors of the economy (2.2 towards the public sector, 2.3 towards SMEs). In contrast, the targeting of the first one can be considered as rather "horizontal" (citizens, businesses, State). It is already evident from the above presentation of the planned reforms and investments that most of them, mainly the investments, concern the public sector (Table 4). This fact probably reflects the need of the public sector in Greece to catch up with the global technological developments, as well as the policy recommendations of the EU, as regards the operational model of the State and the provision of more qualitative services to citizens and businesses. Accordingly, most of the budget of the "digital transformation" pillar mainly concerns investments for the digital upgrade of the public administration (Table 5). However, the difference in the budget allocation among the business sector and the public sector, is less pronounced than that in the number of reforms and investments.

The reason for this is that some investments that will be carried out in the context of the "horizontal" component 2.1 mainly -but not solely- concern businesses (fiber optic infrastructure in

buildings, installation of 5G wireless network infrastructure in six Greek highways (2011 km), micro-satellites to support telecommunications, spatial planning, shipping, agriculture as well as other sectors of the economy).

*Table 4. Distribution of reforms/investments under the "Digital Transformation" pillar, per type of sector of the economy concerned**

	Reforms	Investments
Business sector	5	12
Public sector	7	22
Citizens	4	7

**In case a reform/investment concerns more than one sector, it is counted for all the sectors concerned*

Source: IOBE

*Table 5. Distribution of investment budget under the "Digital Transformation" pillar, per type of sector of the economy mainly concerned**

	Investment Budget (million €)
Business sector	864
Public sector	1,035
Citizens	237

**Although some investment projects concern more than one sector, to avoid an overrun of the budget of the "Digital Transformation" pillar, their budget is counted once, under the sector these mainly concern*

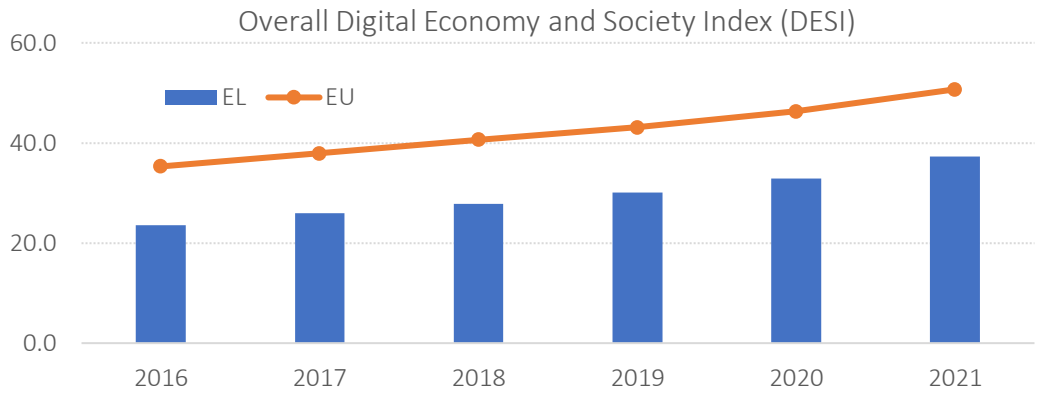
Source: IOBE

1.3. Weaknesses identified by the DESI report

Greece's digital transformation performance accelerated substantially during the pandemic but remained well below the EU average, according to the latest Digital Economy and Society Index (DESI) report from 2021.

Greece ranked third-last in the EU with respect to the overall index, above Bulgaria and below Poland. The score increased from 32.9 in 2020 to 37.3 the following year, while the average performance of the EU was 50.7. However, there is potential for significant steps towards advancing digital transformation in Greece.

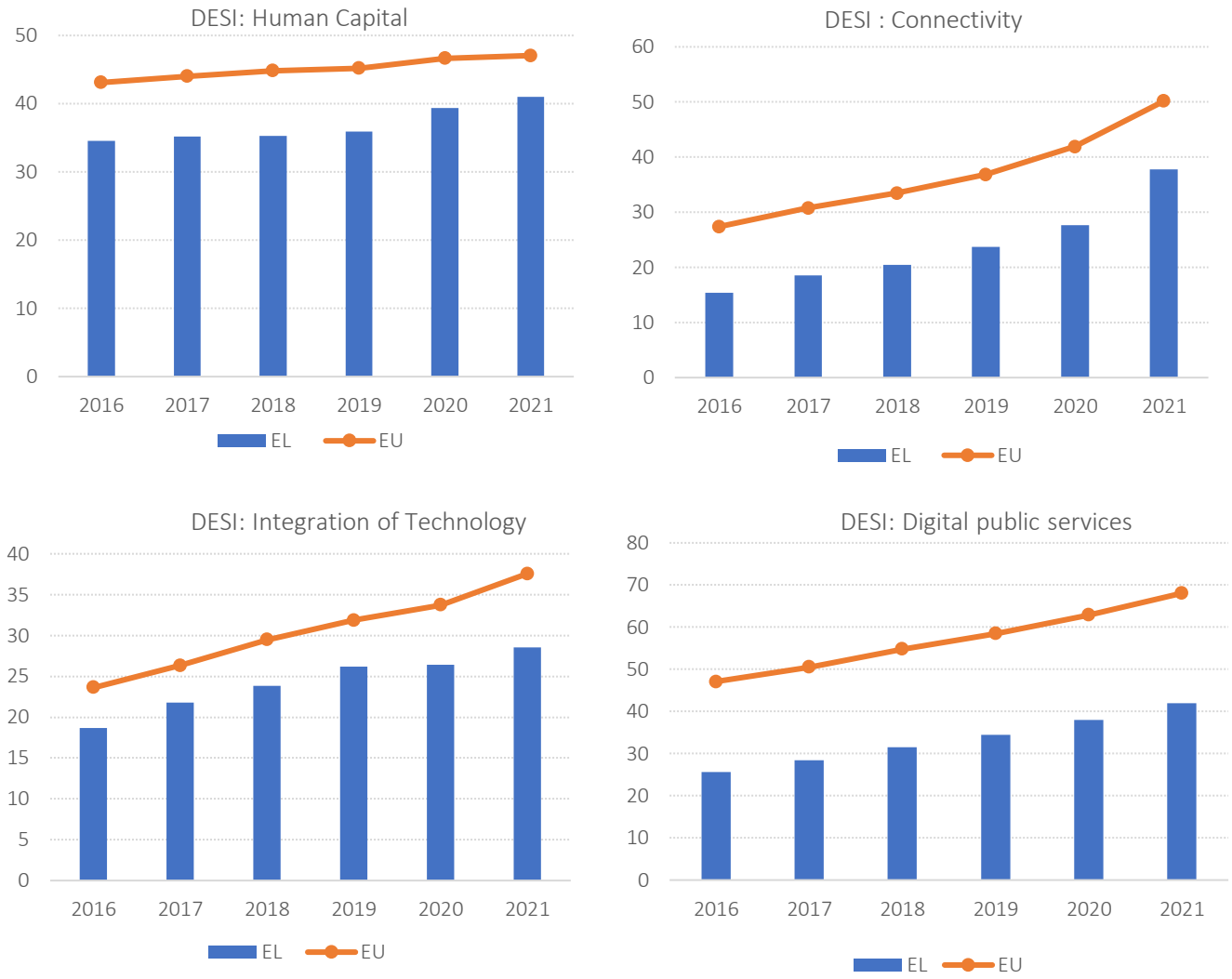
Figure 2. Digital performance of Greece compared to the EU, 2016-2021



Source: DESI 2021

In the Human Capital dimension of DESI, Greece ranks 21st, below the EU average. Slight progress in the achieved score is evident compared to the performance in 2020 (41 from 39.4). The proportion of people with at least basic digital skills is low (51%). Furthermore, the percentage of employed ICT specialists is still low (2.0% in 2020 while in 2018 was 2.3%, EU average was equal to 4.3% in 2020). In 2020, just 12% of businesses provided ICT training to their staff, while the EU average was 20%. It turns out to be imperative for Greece to invest heavily in upskilling and reskilling its workforce. Specialized education and training programmes in areas such as Artificial Intelligence (AI), quantum technologies, and cybersecurity lack capacity. The provision of digital experts could result from collaborations between the Higher Education Institutes and the private sector (DESI, 2021).

Figure 3. Digital performance of Greece in the four dimensions of DESI, compared to the EU, 2016-2021



Source: DESI 2021

Digital skills upgrade is foreseen in Greece's RRP. **Integrating digital skills in all educational levels' curricula is planned. Furthermore, upskilling and reskilling programmes for the labour force, aiming at the digital and green transition, expected to increase long-term employment and productivity, have been arranged.** Moreover, the RRP includes reforms and investments that digitalize processes and infrastructures. Especially, the modernisation of Vocational Education Training (VET) curricula to match current labour market needs, focusing on digital skills (€690 m) is being planned. In addition, the plan foresees upgrading digital skills for conscripts/military (€32 m) for judges and judicial employees (€32 m).

Continuing to the connectivity dimension, Greece ranks last (27th) in the EU, scoring 37.7, while the EU average is 50.2. Progress is rapid regarding the fast broadband (NGA) coverage - a 6% increase in 2020, reaching 87% (EU average). Still, the country lags behind EU peers regarding very high-capacity networks (VHCN). The fixed VHCN coverage was equal to 10%, up from 7% in 2019, while the takeup of at least 100 Mbps fixed broadband is very low (3% from 1% one year earlier). Both figures are well below the EU average of 59% and 34%, correspondingly. Overall, fixed broadband takeup is still advancing at a moderate pace (77% in 2020, up from 76% in 2019 – similar to the EU average). Regarding the broadband price index, progress has been achieved with a score of 53 in 2020 compared to 49 in 2019. On the other hand, the mobile broadband takeup (60% in 2019) is still below the EU average (71% in 2019).

Connectivity is also included in the Greek RRP. **The plan involves connectivity investments of €321.6 m financed by the grant component of the RRP and a further €912 m for investments in Very High-Capacity Networks funded based on the € 12.7 bn Loan Facility. The total is equal to €1.2 bn (18% of the RRP's total digital budget).**

The adoption of digital technologies by Greek enterprises has been slow; the country's ranking is 22 in the EU. Only 19% use social media compared to the EU average of 23%, while 4% sell online cross-border, half of the EU average (8%). Moreover, 13% of businesses use big data analytics, slightly below the EU average of 14% and 65% use ICT for environmental sustainability, close to the EU average (66%). The businesses' percentage is 38%, above the EU average (36%) regarding electronic information sharing. Greek businesses are in the leading positions in the use of AI (34%), significantly above the EU average (25%).

The National RRP contains substantial measures to boost the digitalization of Greek firms, especially investments in the form of grants for the digital transformation of SMEs (€375 m). Through the planned reforms and investments, SMEs are expected to digitalize their processes and services with innovative interventions tailored to the specific needs of their industries, increase participation in e-commerce platforms and other forms of digital sales and utilize efficient data procedures. A budget of €330 m in Loan Facility funding for the digitalization of SMEs and allocation of €770 m for large enterprises is planned. Also, accelerating Smart Manufacturing aims to support SMEs in the manufacturing sector to adopt state-of-the-art smart technologies and accelerate the industry's transition to Industry 4.0 (DESI, 2021).

Last but not least, Greece ranks second last (26th) in Digital public services. The availability of digital public services for both citizens and businesses is low (score equal to 54) for both citizens and businesses compared to the EU average (75 for citizens and 84 for businesses). On the other hand, the country performs relatively well in the open data maturity indicator, scoring 85% in 2020, higher than the EU average of 78%. Similarly, on active users of e-government services, the country is above the EU average of (67% and 64% correspondingly). Greece exceeds the EU average in the dimension of open data (85% in Greece while the EU average is 78%).

E-government and the digitalization of public services hold a large proportion of the digital budget of Greece's RRP (more than €2.7 bn). Critical investments and reforms, among others, include the digitization of key services archives, measures on cloud infrastructures and cybersecurity, investments in cloud computing and big data, and the development of a cybersecurity strategy to increase the reliability and security of public sector systems and data (DESI, 2021).

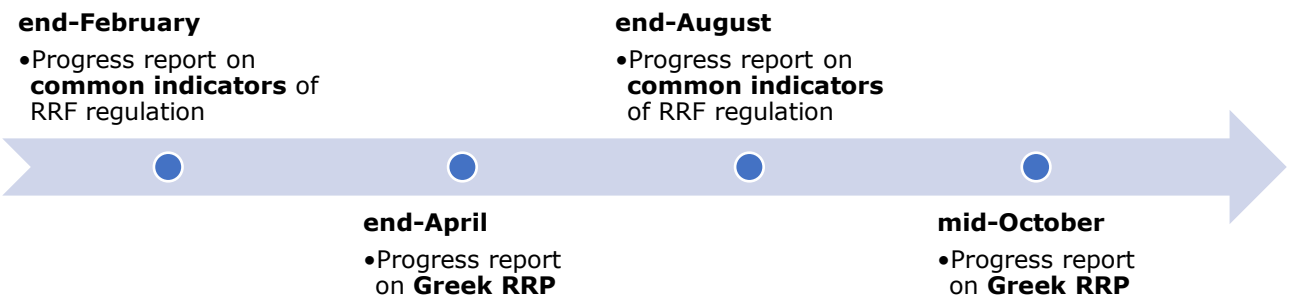
1.4. Key Performance Targets and Transparency

1.4.1. Descriptive overview

The disbursement of RRF funds is performance-based, hence expected to reflect each country's progress on reforms and investments set out in the RRP. An indicative timeline for both grants and the loan portfolio has been agreed upon for each country through the Operational Arrangements. A European Scoreboard is set up to provide an overview of implementation progress across EU states. There is a set of 14 common performance indicators, of which four are directly related to digital policies: (1) Additional dwellings with internet access provided via very high-capacity networks, (2) Enterprises supported in developing or adopting digital products, services and application processes, (3) Users of new and upgraded public digital services, products and processes, (4) Number of participants in education or training. Besides these common indicators, each Member State has specified additional national specific KPIs, in agreement with the European Commission.

The annual reporting cycle entails four key months: two progress reports with respect to the common KPIs are expected in February and August, while two additional progress reports on the national KPIs are foreseen in April and October.

Figure 4. Annual RRP reporting cycle key dates



Source: Operational Arrangements between the EC and Greece, December 2021

To monitor the implementation of the Greek operational arrangements[4], 331 milestones and targets have been defined using both quantitative and qualitative criteria. More than 60% of the total number of milestones and targets relate to either green or digital projects, of which about 40% refer to primarily digital-related actions (23.3% of total). A horizontal condition governing implementation is that none of the RRP funded actions should significantly harm the environment ("Do not significant harm" principle).
National coordination of the Greek RRP execution is undertaken by a special Public Agency supervised by the Ministry of Finance, while a public website (https://greece20.gov.gr/) provides systematic updates on implementation progress.

1.4.2. Assessment

Across all components, overall, the Greek RRP comprises 175 measures, reflecting a rather comprehensive and ambitious monitoring instrument. Among the measures, 38% relate to reforms, and 62% relate to investments, which slightly emphasises investments compared to reforms.

Among the 331 milestones and targets set for Greece, they contain around 70 qualitative indicators, 38 quantitative indicators, an extensive number of report submissions, and a significant number of actions related to entry into force of primary or secondary legislation. The information published systematically on both portals of the European Commission RRF and the National implementation coordination Greece 2.0 has so far proved to be highly useful in promoting transparency. This can be further improved by providing more granular information on a quarterly basis, for instance with respect to the types of investment projects for which a call has been published, or those for which the loan co-financing instrument has been activated, including the modalities of the selected co-financing scheme in each case.

Even though the implementation is still in its early phase, there are areas where improvements can be contemplated and pursued. For example, the links and spillover effects between the RRP expected outcomes with other national strategic objectives, such as the "Digital Bible", can be strengthened. Moreover, it may be useful to complement the implementation framework with systematic analysis in relation to ex-post impact assessment studies and synchronous monitoring of bottlenecks, with the aim to timely highlight areas and directions for corrective action.

The Key Performance Indicators suggested in the Operational Agreements exhibit wide variation with respect to their degree of granularity, specificity or data requirements. One element that could be strengthened with an aim to safeguard and communicate publicly that the impact of each reform or investment is durable, would be the requirement for systematic monitoring of quantitative KPIs

[4] https://ec.europa.eu/info/files/operational-arrangements-between-commission-and-greece-02en_en

across time, not just one-off, at one particular point in time. Such a framework would enhance public institution building, social and political ownership of the reforms, while would facilitate digital transformation to gain roots and develop further in the medium-term.

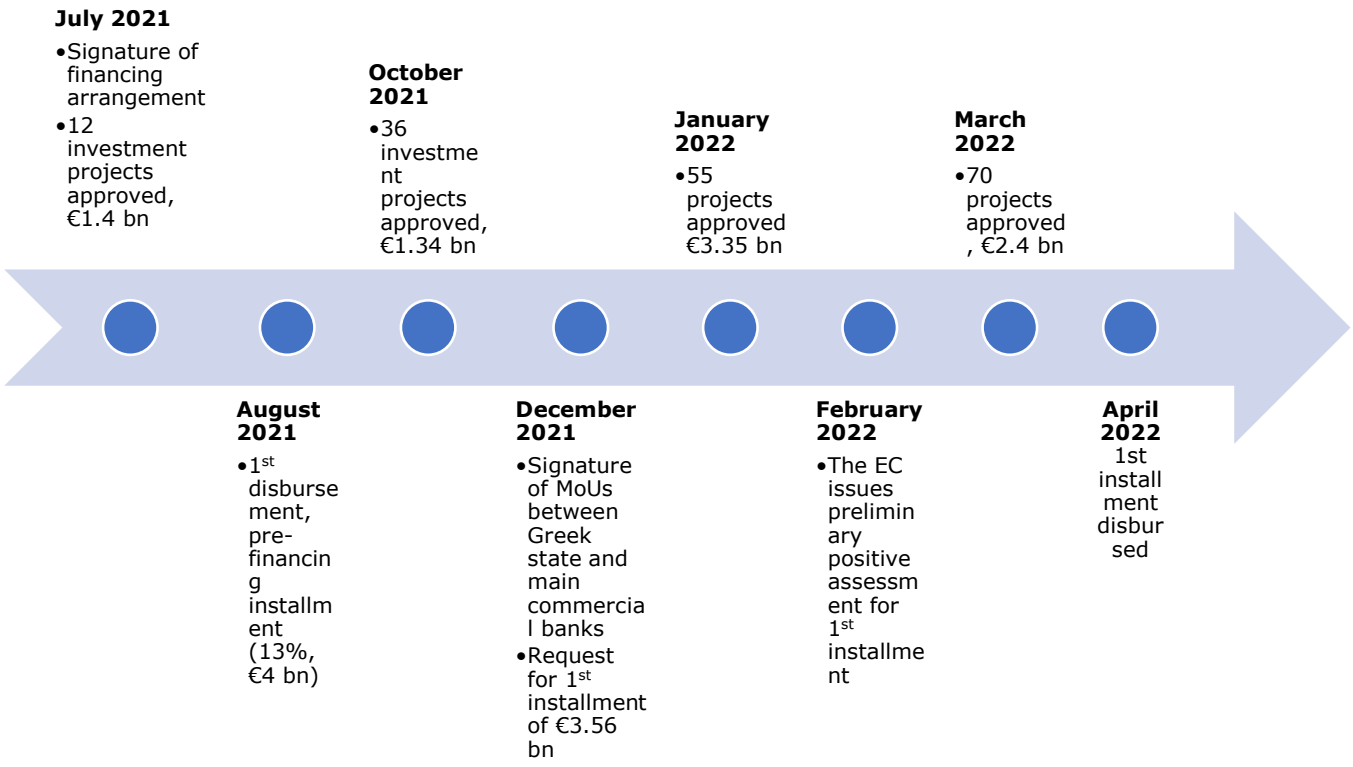
1.5. Progress of execution

The financing agreement with the European Commission concerning the grants requested by Greece under the National Recovery and Resilience Plan (RRP – Greece 2.0) was signed in Athens and Brussels on July 23rd 2021. The agreement concerns an amount **of €13.5 bn, as the rest of the grants (€4.3 bn), according to the Regulation, can be made available after the foreseen revision of the plan in 2023.** On the same day, the loan agreement was also signed, consisting of very low-interest loans of €12.7 bn. Also, in July, the first twelve investment projects of the Greek RRP were activated, with a financing budget (RRF + national resources) of €1.42 bn. This implies

that the technical sheet for each project has been approved by the Deputy Minister of Finance, who manages the RRF in Greece, following a relevant suggestion of the Special Coordination Service of the Fund. No calls for interest were made public at that time. In mid-August, the EC made the advance payment of the RRP, amounting to €4 bn (13% of the overall financial envelope).
In October 2021, another 36 projects were approved, with a financing budget of €1.34 bn. In end-November 2021, the Ministry of Finance signed an MoU with the European Bank for Reconstruction and Development (EBRD) for mobilizing €500 ml from the loan arm of the RRF. This financing aims to support private investments of more than €1 bn. Furthermore, in December 2021, the Ministry of Finance submitted to the European Commission, with a delay of approximately two months, the request for the first instalment of the RRF resources, amounting to €3.56 bn, €1.72 bn of which in grants and €1.84 bn in loans. During the same period, MoUs were signed between the Ministry of Finance and six domestic banks for the use of part of the loan resources of the Recovery and Resilience Fund, amounting to €970 m.

More investment projects of the RRP (Greece 2.0) were activated in the first months of 2022. Specifically, another 55 projects, with a financing budget of €3.55 bn in January and 70 more projects, with a budget of €2.4 bn in March. Meanwhile, in February 2022, the European Commission announced its positive preliminary assessment of Greece's request for the first tranche of the RRF resources. During the same period, the use of loan resources of €500 m started, in the context of an agreement between the Ministry of Finance and the European Investment Bank (EIB), to manage €5 bn out of the €12.7 bn of the loan-arm of the RRF financing to Greece. In early April, the European Commission disbursed the first instalment. This development made Greece the third among the EU Member States that has received the first instalment from the RRF. Considering the activation of another 57 RRP investment projects in early May, their total number up to this period was 230, with their budget exceeding €10 bn (€10.2 bn). The implementation progress of the Greek RRP described above is depicted in Figure 5.

Figure 5. Key dates of Greek RRP progress during the first year



Source: Greek Recovery and Resilience Plan website (https://greece20.gov.gr/)

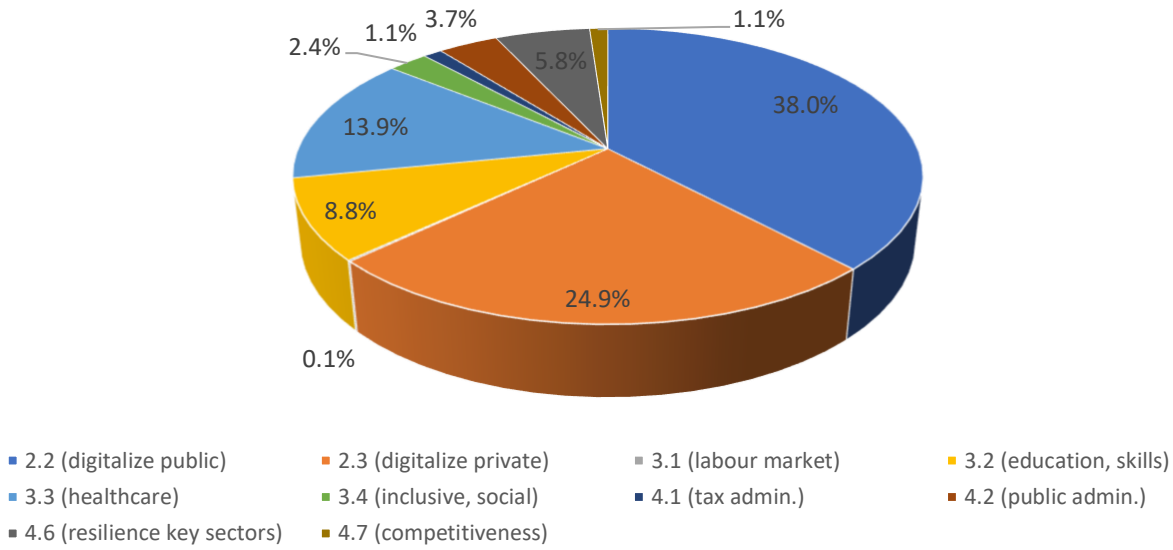
Although many projects of the Greek RRP have been activated from July 2021 to May 2022, the number of currently open calls for tenders (May 2022) is very small. Specifically, only eight such calls are open. The overall budget of the related investments (RRF funding+national resources) is €801.5 m.

Regarding the 40 activated projects up to May that concern the digital transition, the overall budget is €1,855.2 m. This amount corresponds to 18.2% of the total budget of activated investment projects falling under the RRP. This percentage is slightly lower than the binding target of at least 20% of each NRRP's budget to contribute to the digital transition or to its challenges, set by Regulation COM (2020) 408. This target concerns both the grants and the loans that the RRF will provide.

There are investment projects directly or indirectly related to digital transformation in 14 components of the Greek RRP. Up to May 2022, projects were activated in 10 of these components. Component 2.2 (digitalization of the public sector) holds the highest share of the budget of activated digital projects (38.0%), followed by component 2.3 (digitalization of the private sector, 24.9%) and component 3.3 (improve resilience, accessibility and sustainability of healthcare, 13.9%, Figure 6).

On the contrary, the improvement of tax administration (component 4.1) and the improvement of competitiveness and promote private investments (component 4.7) hold the smallest shares (1.1% in both cases).

*Figure 6. Distribution of the budget of activated digital projects per component of the Greek RRP**



**Projects activated up to May 2022*

Source: Greek Recovery and Resilience Plan website (https://greece20.gov.gr/), Data processing: IOBE

Finally, among the eight investment projects for which calls have been made, two concern the digital transition pillar: Digital Transformation of the Justice Sector (budget €85.2 m) and subsidies to pupils, students and primary and secondary school teachers for the purchase of technological equipment (tablets, laptops, desktops. budget: €39.5 m).

To sum up, some very significant steps have already been made to absorb resources from the RRF for the implementation of the Greek RRP, bringing Greece to one of the first positions among the EU Member States on this issue. Regarding implementing the investment projects, the preparatory actions for their activation have already been completed for 230 of them, with an overall budget of €10.2 bn. Forty of these projects are related to digital transition, with a budget of €1,855,2 m. This amount corresponds to 18.2% of the total budget of activated investment projects falling under the RRP. It is somewhat lower than the relevant target set by the EC (20% of each RRP's budget). Although many projects of the Greek RRP are currently (May 2022) at the phase described above, the number of open calls is very small, with only two of them concerning digital transition.

1.6. A first evaluation

Greece's digital performance lags significantly EU peers, despite improving during the last years, primarily as a catalyst effect of the need to adjust to the pandemic crisis. Thus, the RRP brings an essential opportunity to contribute to the economy's digitalization convergence with the rest of the EU.

From the Greek perspective, the RRP is a precious opportunity to narrow the economy's substantial investment gap and accelerate productivity enhancing reforms. It includes numerous reforms and investments for boosting the digitalization of Greece, which mainly concern the public sector and SMEs. Thus, **its effective implementation can significantly contribute to the further development of digital infrastructure and the digitalization of the economy. During the first year of the Greek RRP implementation, digital investments represent 18.2% of total approved investments, a portion slightly below the 20% target. Almost 40% of the budget of activated digital investments concern the public sector, 25% the digitalization of the private sector and 14% the improvement of healthcare services.** Although many projects of the Greek RRP have been activated, the number of open calls is very small. Given Greece's lag in the area of digital performance, policy makers and stakeholders should accelerate and facilitate the implementation of the RRP digital components, across both dimensions of infrastructure and skills, in both the public and private sectors. To that effect, it is essential to speed up the approval of the digital initiatives in the broadband spectrum to create momentum.

The main challenges for the Greek RRP enforcement are to strike an appropriate balance between the degree of ambition and realism of targets set and their degree of granularity. It is necessary to balance investments to improve infrastructure and measures to enhance digital skills. So far, the Greek RRP seems to focus more on infrastructure. Also, it is crucial to set up and implement a systematic impact assessment mechanism for the grants branch of the RRP and consider both short-term and long-term effects. Smooth coordination between local and central administrations has to be pursued through accountability and transparency principles so as not to impede grants' absorption rates.

Implementing the loans branch of the Greek RRP, to the extent that it requires to be complemented with co-funding by private sources, remains challenging given the poor quality of Greek commercial banks' assets side and the demand for loans. Hence, SMEs financing through the banks contains uncertainty because the banking system may face credit supply constraints, not least of which stemming from the high-yet decreasing- stock of Non-Performing Loans, a legacy of the sovereign debt crisis. The RRP could offer a vital opportunity to enhance investment financing for SMEs. However, the amount of funding allocated to SMEs in Greece is relatively small and likely insufficient to put SMEs on the cloud and IoT platforms.

2. The Italian RRP

2.1. Introduction

2.1.1. Problems & weaknesses addressed by the RRP

Italy's Recovery and Resilience Plan consists of a broad package of reforms and investments "to unleash [the] Italian growth potential, to generate a strong upturn in employment, to improve the quality of work and services for citizens and territorial cohesion and to promote the ecological transition".[5] With a total amount of about €191.5 billion (bn), the Italian Recovery and Resilience Plan is the largest in the EU, and is developed around three areas (also shared at EU level) - digitisation and innovation, ecological transition and social inclusion.

The Government decided to request the maximum amount of RRF resources, amounting to €191.5 bn, divided into €68.9 bn in grants and €122.6 bn in loans (although Italy's debt-to-GDP ratio is the second highest among Member States, exceeding 150%).

During the last decades, Italy has accrued a substantial delay in the areas of digitisation and innovation. This not only concerns the adoption of digital technologies in both production systems and public services, but also the digital skills of the Italian citizens, which appear to be lower than the EU average. As promptly outlined in the RRP, bridging this gap at national level, and promoting more investments in technologies, infrastructures, and digital processes, is crucial in order to increase the competitiveness of both Italy and the EU alike. This is why the digitisation and innovation of processes, products, and services are embodied in almost every policy of the RRP.

Following the digitisation and green transition, the Italian RRP focuses on three overarching priorities of a more social nature - gender equality, youth, and the South of Italy. The RRP addresses these issues through investments and reforms that should foster women's empowerment and gender equality, broaden young people's employment prospects, and promote the development of Southern Italy (as well as the north-south regional balance).

This vast package of investments and reforms **is expected to lead to a concrete and significant increase in growth and employment rates**. By 2026, the final year of the Recovery Plan, the positive impact on GDP is expected to be equal to, approximately, 3 percentage points, in cumulative terms.[6]

[5] https://www.mef.gov.it/en/focus/The-Recovery-and-Resilience-Plan-Next-Generation-Italia/
[6] https://www.mef.gov.it/en/focus/The-Recovery-and-Resilience-Plan-Next-Generation-Italia/

These results will be accentuated by the leverage effect that will characterise many of the Plan's projects, as well as by structural reforms.

2.1.2. How important is digital in the Plan?

The Italian Recovery and Resilience Plan is divided into sixteen "Components", which are then grouped into six main "Missions". The latter are divided according to the six Pillars outlined in the RRF Regulation. As previously mentioned, the Green and Digital transitions will be the key elements of the plan.

To understand how the digital transition plays a key role in the RRP, we can look at the RRP's first Mission (M1) entitled "Digitisation, Innovation, Competitiveness and Culture". Its aim is to support the country's digital transition, through the modernisation of the public administration, the communication infrastructure, and the production system. The main objectives of this section include: broadening the coverage of ultra-broadband networks for the whole country, increasing the competitiveness of industrial supply chains, and enhancing the internationalisation of companies. Furthermore, this mission focuses on the relaunch of two very important sectors for the Italian economy - tourism and culture.

The budget allocated to M1 amounts to €40.29 bn. Only 73% of this budget is earmarked for reforms and investments specifically related to the digital transition, which means that in M1 digital tagging amounts to €29.41 bn. Italy's RRP supports digital transition with investments in: (i) connectivity (€6.7 bn); (ii) the digital transition and innovation of the Italian production system (€13.4 bn); (iii) the digitalisation of the Italian public administration (€6.1 bn).

2.1.3. The digital transition in relation to the 6 pillars

The Recovery and Resilience Facility is structured around six pillars: the green transition; the digital transformation; economic cohesion, productivity, and competitiveness; social and territorial cohesion; health, economic, social and institutional resilience; and policies for the next generations.

Table 6: An overview of the Italian RRP & the Digital Tag of each Mission

MISSIONS	Title & Area of interest	Budget (Total)	Digital Tag (in %)	Digital tag (in €)
Mission 1	Digitisation, Innovation, Competitiveness & Culture	€ 40.29 bn	73%	€ 29.41 bn
Mission 2	Green Revolution & Ecological Transition	€ 59.46 bn	3%	€ 1.89 bn
Mission 3	Infrastructure for Sustainable Mobility	€ 25.40 bn	13%	€ 3.30 bn
Mission 4	Education & Research	€ 30.88 bn	20%	€ 6.17 bn
Mission 5	Inclusion & Cohesion	€ 19.86 bn	15%	€ 2.97 bn
Mission 6	Health	€ 15.63 bn	47%	€ 7.34 bn
Total		€ 191.51 bn	27%	€ 51.08 bn

*** Official amounts per Mission according to the updated RRP. **As specified in the Plan, totals may not match due to official rounding** (see: https://italiadomani.gov.it/it/home.html)*

Source: The Institute for Competitiveness – I-Com

As far as the Italian plan is concerned, while central to Mission 1, **digital tagging is not only limited to the RRP's first mission**, being identified as a transversal necessity with digital-related goals to be found in all the other missions. Moreover, the funds allocated to Mission 1 do not completely fulfil the digital tagging purpose, and the same reasoning also applies to all the other missions which at a first glance may not seem related to the digitisation of the country's public and private sectors. The above will be further explained in the following Section, where each Mission of the Italian RRP will be analysed in detail in order to identify which measures are connected to the digital transition goal.

2.2. Digital transition

2.2.1. Priorities and Objectives

As previously mentioned, Italy has decided to focus its actions under the RRP on the green and digital fields. The country has seen a decline in productivity over the last two decades, compared to growth in the rest of Europe. One of the factors that limits productivity growth is the low level of investments in digitalisation and innovation, especially by small and medium-sized enterprises that make up most of its productive fabric (EC Country Report Italy).
Amongst the factors that are to be held responsible for this low position is the **inadequate level of digital skills**, as well as the still **limited adoption of advanced technologies** by the public and private sectors. Mission 1 (M1) aims to reduce disparities in competitiveness, productivity, and digitisation. The goal is to increase private investment and the attractiveness of the country, through a set of interventions aimed at public administrations, private enterprises, tourism and culture.

2.2.2. Proposed initiatives (reforms & investments)

As mentioned above, the digital tagging of the Italian RRP finds its core in the plan's first Mission, consisting of three components, each focusing on the digitisation and reform of three different areas – public administrations (C1), private enterprises (C2) and investments in tourism and culture (C3). With its €40.29 bn budget, this Mission is the second largest item of expenditure, accounting for more than 20% of total resources, and is aimed at achieving the country's modernisation.

A budget of €9.72 bn has been allocated for the Digitisation, Innovation and Security of the Public Administration (Component 1, hereby referred to as M1.C1). The innovation and modernisation of the Italian PA is a long-awaited reform, as well as a key priority of the RRP. M1.C1 is made up of a total of 18 initiatives and is divided into three sub-components: (a) PA digitisation (10 initiatives - 7 investments and 3 reforms); (b) PA innovation (6 initiatives - 3 investments and 3 reforms); and (c) innovation of the judicial system (2 investments).

More than 60% of M1.C1 resources is earmarked for the numerous interventions regarding the PA digitisation. The main interventions involve: the improvement of the digital infrastructure and the purchasing procedure for ICT (Reform 1.1); the creation of a national cloud; the interoperability of public administration databases; the digitisation of major administrative offices (e.g. Ministry of Internal Affairs, Ministry of Justice, Ministry of Defence, Council of State, etc.); the upgrade and development of digital services for citizens and related platforms; the enhancement and strengthening of human capital and digital skills of citizens (to be achieved also through the programme "digital civil service"). Finally, another key area of intervention is cybersecurity (with an allocated budget of € 0.62 bn). The RRP's goal here is to: strengthen the front-line controls for the management of alerts and risk-events towards the PA and companies of national interest; build (or strengthen) the evaluation and auditing systems on the safety of the electronic equipment and applications used by said authorities; and create a new National Agency for Cybersecurity.

The sub-component "**PA Innovation**" (M1.C1.b), while not exclusively focused on the digital field, is still closely linked to the latter. The effort to modernise the Italian PA moves **along four dimensions**: (i) reforming the selection mechanisms for PA **personnel** and creating a new digital portal to serve this purpose; (ii) simplifying and reforming some **procedures** (the ultimate goal being to also speed up the RRP's implementation); (iii) developing a **human capital of "excellence**" in the PA; (iv) allowing for the **full digitisation** of the PA's internal processes.
Finally, the third component of Mission 1 focuses on the **innovation of the Italian judicial system**. This section involves 2 investments - in human capital to strengthen the Judicial Bureau, and overcome the inequality between courts in different areas, and in specifically strengthening the administrative justice sector.

As previously pointed out, Mission 1 does not only focus on the reform of the Italian PA, but also on the innovation of the national production system. The second component of Mission 1, entitled **Digitisation, innovation, and competitiveness in the production system (M1.C2**), is divided into 7 measures (6 investments and one reform) with a budget of **€23.89 bn**. This component's main investment regards the so-called "4.0 transition" (Investment 2.1) - a multi-year plan to promote **investments in capital goods and the updating of machinery through a tax return system for companies.** This project was allocated a budget of **€13.38 bn**, making it one of the major investments in the field of digitisation and innovation. Other interventions include the **development of a Very High-Capacity Network**, such as **ultra-fast fibre optic networks** and **5G** (Investment 2.3) and investments in satellite technology (Investment 2.4). Additional measures are aimed at encouraging small and medium enterprises in the shift, promoting the internationalisation of Italian companies (investment 2.5), and improving the regulatory framework of industrial property (Investment 2.6 and Reform 2.1).

The third and **last component of Mission 1** (M1.C3) focuses on tourism and culture, two key sectors for the Italian economy that were also deeply affected by the pandemic. The budget allocated to M1.C3 is **€6.68 bn, and these resources are to be used to increase the country's appeal through a modernisation of its tourist attractions and the promotion of the Italian cultural heritage.** This component consists of **14 interventions** (12 investments and 2 reforms) divided into four main areas - the cultural heritage for future generations, religious and rural landmarks, "culture industry 4.0" and "tourism 4.0". It should be noted that even though M1.C3 is part of Mission 1, aimed at the country's innovation and digitisation, only 16% of the budget allocated to this component implements the digital tagging goal. Among the several interventions of M1.C3, those closely linked to the digital field are investment 1.1 ("Digital strategy and cultural heritage platforms") and investments 3.1 and 3.2 on the "cultural and creative industry 4.0"

2.2.3. Digital tag in the RRP's remaining missions

As previously mentioned, the reforms and investments for the Italian digital transition are not limited to the first Mission but can also be found in the RRP's remaining five missions.

Mission 2 - "Green revolution and ecological transition" - has been allocated a budget of €59.46 bn. Almost 3.19% of these resources (€1.89 bn) will be used to implement measures connected to the digital field.
More specifically, the biggest investment connected to the digital transition can be found in the second component of Mission 2 (M2.C2) which focuses on "Energy transition and sustainable mobility". The most important measure in M2.C2 is "Investment 2.1" which aims at strengthening the smart grid, with a budget of €1.44 bn. Other measures with an important digital tag include the investments in battery production (Investment 5.1.3) and, in M2.C3, the digitisation of national parks (Investment 3.2).

Mission 3 – "Infrastructure for Sustainable Mobility" - is also connected to the green transition and focuses on the modernisation of the national railway network. The latter carries a considerable **digital tag of 13%** (**€3.3 bn** out of the Mission's €25.40 bn total budget). For the digital field, the most important investment in this mission is the upgrading of the Italian railway network (Investment 1.4).

Mission 4 of the Italian RRP - "**Education and Research**" - is the most closely linked to the digital transition goal, as 20% of this Mission's budget has been allocated to measures connected to digital areas. The most important investments can be found in Component 1 of Mission 4 (M4.C1) - "**Strengthening education: from kindergartens to universities**" - with 19% of the budget specifically earmarked for digital measures. This component is divided into four areas: (1) improvement and expansion of education and training services (only 1% digital tagging); (2) improvement of recruitment and teacher training (96% of the budget for digital measures); (3) capacity building and infrastructure development (where 36% of resources, €2.6 bn, are for digital reforms); and (4) reform and strengthening of doctorates (40% of the budget falls under the digital agenda). Other investments can be found in the Component 2 - "From research to companies" -, where **22% of the budget (€2.46 bn) is to be used for connecting academic research and businesses related to digital measures**, such as the creation of common platforms or funding new PhD positions in relevant fields.

Projects connected to the digital field continue in Mission **5**, which focuses on the relaunch of the labour market in Italy. This Mission carries an overall **digital tagging of 15% (€2.97 bn**), with the most important measures being: (a) Reform 1.1. focusing on labour market regulation reform and training; and (b) Investment 2.1 on the "universal civil service" to create a link between younger and older citizens to **increase digital skills** through a voluntary base, but also Investment 3.1 related to sport and social inclusion.

Finally, Mission 6 directs a significant number of resources to the digital transition of the Italian health system (47% of its budget, more than €7.30 bn). For the digital transition, the key measures can be found in Component 2 and, more specifically, in Investment 1.1 (renovating and modernising hospitals under digital and technological aspects), and Investment 1.3 (strengthening the technological infrastructure for data collection, processing, analysis, and simulation).

2.2.4. The relative weight of the digital transition

After having identified all the investments and reforms connected to the digital transition, some conclusions can now be drawn regarding the importance of this goal in the overall structure of the RRP.

Even though most of the important measures can be found in the RRP's Mission 1, the previous paragraph has revealed how all the other Missions are also closely intertwined, allocating part of their budgets to the digital transition. When trying to define the weight (budget-wise) of the digital goal in Italy's RRP, all the Missions of the plan must be analysed, and not just Mission 1. Therefore, to estimate the **total amount of resources allocated to the digital field,** the digital tag of each mission must be considered - €29.41 bn for Mission 1; €1.89 bn for Mission 2; €3.30 bn for Mission 3; €6.17 bn for Mission 4; €2.97 bn for Mission 5; and €7.34 bn for Mission 6, resulting in a total amount of **€51.08 bn, that is 26.67% of the RRP's total budget.**

2.3. The link between DESI and RRP reforms & investments

2.3.1. Italy's digital weaknesses according to DESI 2021

As previously reported, according to the 2021 edition of the Digital Economy and Society Index (DESI), Italy was ranked 20th out of the 27 EU Member States for digitalisation (DESI 2021)[7]. The new indicators are based on the four main areas in the Digital Compass (replacing the previous five-area model). According to the index's new structure, the four areas are: (a) **human capital; (b) connectivity; (c) integration of digital technology; (d) digital public services.**
With regards to **human capital, Italy ranks 25th out of the 27 EU countries**. Italy displays consistent shortcomings in both basic and advanced digital skills, consequently reducing the chances of innovation for enterprises, as well as increasing the risk of digital exclusion for a great part of the population. One cause for concern is the fact that only 42% of Italians aged 16-74 years have basic digital skills (compared to an EU average of 56%), and only 22% have advanced digital skills (lower

[7] While at a first glance this might seem an improvement from the previous year, the truth is that, due to the new structure and model adopted by the DESI index for this last edition, an exact comparison is not possible. Or, at least, does not reveal such promising results. See: https://digital-strategy.ec.europa.eu/en/policies/desi-italy

than the EU 31%). Moreover, the percentage of ICT specialists out of total employment in Italy is only 3.6% (below the EU average of 4.3%), and 1.3% of Italian graduates study ICT, well below the EU average. Italy's performance is closer to the EU average for female ICT specialists representing 16% (the EU average is 19%). Only 15% of Italian enterprises provide ICT training for their employees, five percentage points below the EU average.
As far as the second area of **connectivity** is concerned, **Italy ranks 23rd among EU countries** with an overall score of 42.4. Two aspects were found to be above the EU average: (a) 3.6% of households had a take-up of at least 1 Gbps in 2020, and (b) the number of households included in fast broadband next generation access (NGA) coverage is 93%, higher than the EU average of 87%. While the Covid-19 outbreak has caused an acceleration in ultra-broadband coverage in white areas, more long-term solutions are needed to address delays in the Italian ultra-broadband plan.

More positive results can be found under the section **"Integration of digital technology", where Italy ranks 10th.** The majority of Italian SMEs shows a basic level of digital intensity (69%, higher than the EU average of 60%) and Italian businesses perform positively in the use of e-invoices. Moreover, Italy is one of the most active EU players in the field of supercomputing/HPC. Yet, Italy's results remain weak in other areas, such as the use of big data (only 9% of companies), the use of artificial intelligence (18% compared to the EU 14%), and the uptake of e-commerce and ICT for environmental sustainability (both below the EU average).

Finally**, Italy ranks 18th** in the last category analysed by the DESI 2021 - **"Digital public services".** While there has been some development compared to previous years, the use of digital public services appears to be still relatively low. The share of Italians who used e-government services grew from 30% in 2019 to 36% in 2020, but this is still significantly lower than the EU average of 64%. Moreover, the number of digital identities issued (SPID) reached 20 million in April 2021. It is to be noted that Italy outperforms the EU average with regards to digital public services for businesses and open data, but, on the other hand, ranks below the EU average for digital public services for citizens.

2.3.2. How does the RRP address each weakness?

The RRP lays out a vast and detailed roadmap touching on all four aspects of the DESI. First, according to the RRP, **the area of human capital was allocated an overall budget of approximately €7 bn.** The plan covers the issue with several measures that will strengthen the existing network of digital facilitation centres (€135 m), and reinforce the 'digital civil service', a programme where young volunteers will train people in digital skills (€60 m). Moreover, the RRP will invest in the modernisation of the education system, by updating university curricula; strengthening public employment services; expand the academic offer in the field of digital technologies (€500 m) and fund new PhD positions in new technologies (€240 m). Further investments related to digital skills

target public sector employees (through Massive Open Online Courses), teachers (National Digital School Plan), and doctors (through measures connected to the electronic health record).

For **connectivity**, the plan presents five projects (for a total of €6.7 bn): (a) "**Italia a 1 Giga**" to provide at least 1 Gbit/s in download and 200 Mbit/s in upload connectivity in grey and black next-generation access (NGA) market failure areas; (b) "**Italia 5G"**, focusing on investments to boost the deployment of 5G mobile infrastructure in 'market failure areas', 5G corridors and 5G-ready extra-urban roads; (c) "Connected schools", focusing on the digitisation of the school system; (d) "Connected health care facilities" to increase the connectivity of hospitals and healthcare facilities; and (e) "Connected smaller islands" to boost connectivity in these areas. Additional measures are related to satellite constellations and services and, in particular, the SatCom initiative will develop a secure (with quantum key distribution) system of telecommunication satellites in emergencies.

As far as the integration of digital technology is concerned, the RRP allocates resources to the digitalisation of businesses (€12.8 bn), the development and deployment of advanced technologies (€5.1 bn) and ICT-related R&D (€1 bn). The measures connected to the digitalisation of businesses focus on stimulating the uptake of Industry 4.0 technologies, and relevant investments to support tax credits under Transition 4.0. Additional measures focus on innovative production chains, and the strengthening of support services and collaboration between businesses, universities, and research centres (e.g., reinforcing competence centres and the network of European Digital Innovation Hubs). Other investments regard the deployment of advanced technologies, including the development of the strategic value chain of microelectronics (€340 m), and the promotion of R&D in the field of advanced digital technologies (e.g. AI, HPC and Quantum, and the support for R&I partnerships, including those on Key Digital Technologies and HPC).

The RRP involves significant measures connected to the area of "**Digital public services".** The plan aims at developing a **national cloud-based hybrid infrastructure (Polo Strategico Nazionale),** migrating local and central public administration IT systems to a cloud-based system; increase the accessibility to online public services and complete key digital platforms like SPID and ANPR. Through an investment of €556 m the **National Digital Data Platform** (Piattaforma Digitale Nazionale Dati) will be created. At the same time, three investments (a total of €783 m) will improve accessibility and compliance with Single Digital Gateway procedures of citizen-facing digital services. Among other things, the RRP also aims at reinforcing cybersecurity by investing in technology tools and operating structures (€623 m), such as a '**national hyper Security Operations Centre (SOC)'** and the creation of a **new national cybersecurity agency**.

Finally, part of the resources will be used to strengthen the digital back and front-office of main central public administrations (€611 m), allow full interoperability across regional systems of the electronic health record (EHR) and data usage for health risk monitoring (€1.7 bn), boost the use of telemedicine (approx. €1.3 bn) and digitally upgrade hospitals and diagnostic equipment (approx. €1.5 bn).

2.4. Key Performance Indicators

The Recovery and Resilience Facility is closely connected to a performance monitoring framework. According to the RRF Regulation, the information received through this performance monitoring framework will be made available through the establishment of a Recovery and Resilience "Scoreboard" that will be open to the EU Parliament, the other institutions and EU citizens. This scoreboard will provide concise information on the progress regarding the implementation of the Recovery and Resilience Plans of each country. It will be publicly available online and will be updated twice a year, following the biannual reporting by the Member States.[8]

With regards to the KPIs that can be found in the Italian RRP, it can be seen that some of the latter appear quite generic. Several measures connected to Mission 1 and the digital field only present a reference to "Publication in the Official Gazette" as an indicator, for instance. This, however, is not true for all measures, as several reforms or investments present more detailed requirements such as ongoing monitoring, and to be more precise a "year-end monitoring of uptake in 2023 compared to 2019 baseline (referenced to target in 2Q2025) and signing of service contracts" (Reform 1.9 - Public Administration Reform). Some other indicators, on the other hand, are significantly more detailed, appearing to better comply with those set in the EU regulation. In some cases, a reference, for instance, to the publication of "an implementation report to measure the impact of measures meant to provide technical assistance and capacity building" (see: Reform 1.9 - Public Administration Reform), the release of a "PSN Cloud distribution report" or the publication of quarterly migration progress reports by the Ministry of Sustainable Infrastructure and Mobility (Investment 1.1: Digital Infrastructure) can be found.

As mentioned, the KPIs used at the EU level appear to be rather specific, compared to those of the Italian plan (or at least to some of them). Overall, it can be observed that the KPIs found at national level vary according to the specific objective they are connected to. Nevertheless, it must be noted that achieving the level of detail required by the most elaborate KPIs at EU level could be a difficult task in some circumstances. This issue could be especially problematic if we consider that several measures of the RRP measures involve (at least in the case of Italy) small local administrations where only a handful of people are employed, many of whom lacking in specific digital training. In such scenarios, these tiny administrations would likely be unable to meet the requirements as it would

[8] Source: COMMISSION DELEGATED REGULATION (EU) of 28.9.2021 on supplementing Regulation (EU) 2021/241 of the European Parliament and of the Council establishing the Recovery and Resilience Facility by setting out the common indicators and the detailed elements of the recovery and resilience scoreboard, available at: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13071-Recovery-and-resilience-scoreboard-common-indicators-and-detailed-elements_en

be too challenging and/or not cost-effective when balancing the additional administrative burdens (particularly for small municipalities) against the benefits.

Therefore, in a nutshell, while the KPIs outlined in the Italian plan might be too simplistic, those provided at EU level are perhaps too technically complex in some cases. Finally, it should be noted that the measures foreseen by the RRP are, for the most part, interventions meant to activate the digital transition, rather than a full revolution. Referring to an "activation" effect rather than to a complete digital transformation seems even more appropriate when considering that by 2026 Italy will be trying to achieve many of the digital goals outlined in the Digital Compass strategy for the year 2030.[9]

2.5. Early Results (2021)

Italy's plan devotes approximately 27% of its allocation to supporting the digital transformation which, as said, exceeds the RRF requirement (20%). Following the Council's approval of the plan in July 2021, Italy received €24.9 bn pre-financing in August 2021. Further payments, in 10 instalments each for grants and loans, will depend on the progress in implementing the plan. In December 2021, Italy submitted a first payment request worth €21 bn and on 28 February 2022, the EC endorsed a positive preliminary assessment of this request. For 10 of the 11 assessment criteria set in the RRF Regulation (Annex V), the Commission attributed the highest possible rating (A) to the plan.

As far as 2021 is concerned, Italy had achieved all 51 objectives set by December and, therefore, secured the expected instalment of €24.1 bn. Mission 1 "Digitisation, innovation, competitiveness" accounted for almost half of the objectives (25), mostly related to the entry into force of the relevant legislation. New measures touched on several areas, including: the laws enacting Reform 1.1 entitled "ICT purchasing process" and reform 1.3 "Cloud first and interoperability"; acts implementing the reform of the civil and criminal justice (respectively, Reform 1.4 and Reform 1.5), and the regulatory framework on insolvency (Reform 1.6). In addition, several laws and measures (including secondary legislation) that were passed focused on the public procurement system and the reform of the public administration (Reforms 1.9 and 1.10); laws enhancing the effectiveness of the spending review and the strengthening of the Ministry of Finance (Reforms 1.12 and 1.13).

Other measures specifically concerned the special recruitment of experts for the enactments of the RRP. In August 2021, a call for the recruitment of 500 new staff members to be assigned to the Ministry of the Economy and Finance and to other central administrations that hold RRP projects

[9] See: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52021DC0118

was published.[10] The plan is to increase the number of professionals assigned to RRP projects in order to support the programming, monitoring, and reporting activity connected to the Plan. November 2021 saw the start of the selection procedure of 1,000 experts who will be employed to support territorial administrations in the activities indicated in the RRP, and especially in the digital area. These experts will assist the Regions and Autonomous Provinces for the following three years and may be assigned to different administrations in the country, such as in regional offices, municipal, and provincial administrations.

Finally, other legislative acts passed during last year concerned the initial steps of the Digital Tourism Hub (Investment 4.1), the 4.0 transition and the connected tax credits (Investment 1), and several other resources connected to the competitivity of the tourist sector and businesses operating in the area.

2.6. The potential impact on SMEs

It goes without saying that the number of reforms and the impressive amount of resources that are connected to the RRP are not only a great opportunity for the country, but also a key element for the modernisation of its economy. Italy's economic sector mainly involves small and medium-sized enterprises, which make up the core of the economic system. With regards to the digitisation process of these companies, Covid-19 was certainly a strong driving force behind the adoption of digital tools by SMEs, especially as a response to the shrinking demand related to the global pandemic. Reduced consumer mobility and the shutdown of most retailers pushed many SMEs toward e-commerce and, in particular, towards third-party marketplaces.

In 2021, 60.3% of Italian SMEs had reached at least a basic level of digital intensity (compared to the EU average of 56%, and a European target of 90% by 2030). Overall, 80% of Italian companies with at least 10 employees are still at a 'low' or 'very low' level of ICT uptake. On the other hand, the remaining 20% present have 'high' or 'very high' levels of digitisation. In companies with at least 10 employees, 41.9% have purchased cloud computing services at medium-high level, and 51.9% at intermediate and sophisticated level (compared to the EU average of 35%, and a European target of 75% by 2030).[11]

Yet, despite these encouraging signs, the digitisation of Italian SMEs is still struggling to take off and SMEs in Italy are still lagging far behind their larger European counterparts. The increased use of cloud services, for instance, often involves only the use of basic hosting services, even though the

[10] Recruitment is provided for by Art. 7 of Decree Law no. 80 of June 9, 2021.
[11] ISTAT (Istituto Nazionale di Statistica) - Imprese e ICT (Anno 2021), available at: https://www.istat.it/it/files//2022/01/REPORT-ICT-NELLE-IMPRESE_2021.pdf

use of advanced services such as computing power, CRM, and software applications in the fields of finance and accounting, are actually on the rise.

Despite a 2% increase compared to the previous year, in 2020, the percentage of companies (with at least 10 employees) that carried out online sales was still low (18.4%), and it remains below the European average of 23%.[12] The Italian RRP provides important opportunities in this regard. In overall terms, the investments envisaged for the basic digitisation of SMEs could provide a positive boost for the competitiveness of these businesses. Amongst the Plan's missions, for instance, some funds are allocated to the support of Italian "Made in Italy"- products, and to the internationalisation of Italian SMEs. More specific actions include measures that could indirectly help the digital transition of these business are the following: innovation of the public administration, boost of the broadband and connectivity and easier access to credit for businesses, especially SMEs. These three areas represent key enabling conditions for the digitisation of SMEs.

From the point of view of incentives for the digitisation, the above-mentioned "Transition 4.0" plays a key role. Part of the resources is allocated to the purchase of services such as cloud computing and data analysis tools. However, to achieve these objectives investments in the training of employees and their digital skills are needed. Employees need to be trained and new hires need to be targeted, placing a huge weight on digital skills. These investments, however, should not be perceived only as a short-term tool. Every SME needs to undertake a serious and structured digitalisation, rethink products in a digital key, as well as redesign processes and business models, and ensure that investments and projects are aimed at long-term sustainable growth. **To ensure that the digital transformation of SMEs takes place, it is essential to invest in the skills at decision making level (as in the case of managers), on how to implement them internally (with the help of technical and specialist figures) and how to ensure that they generate added value (through extensive involvement of the workforce).**

Following this, the government must work on a simplification of regulations that will facilitate access to public calls for tenders, which is often extremely hard, and difficult to understand for most entrepreneurs. This especially applies to SMEs which sometimes lack the human capital to fully research all the necessary, yet complex documents and regulations. This simplification should concern not only access to tenders but also their finalisation - bureaucratic procedures should also be simplified when it comes to the achievement of the required objectives. Moreover, to meet the needs of these companies, standardised procedures would be useful for questioning the Ministry of Economic Development or the Internal Revenue Service.

[12] ISTAT (Istituto Nazionale di Statistica) - Imprese e ICT (Anno 2021), available at: https://www.istat.it/it/files//2022/01/REPORT-ICT-NELLE-IMPRESE_2021.pdf

Finally, alongside legislative simplification, there is also work to be done on communication regarding calls for tenders and existing facilities. This should increase the number of SMEs that are aware of the available RRP incentives.

2.7. Concluding remarks

On the one hand, it has to be noted that, while the number of measures outlined makes for an impressive plan, **some of these measures (reforms and investments alike) appear to be quite generic**. More specifically, while some targets are well detailed, both in their objectives and how they will be carried out, others do not present the same level of precision or information.

Another element that could hinder a swift and successful outcome of the Italian RRP is the **excessive fragmentation** in the plan's enforcement. As previously mentioned, Italy's plan consists of an impressive number of measures, yet **the responsibility for executing these measures is spread across different levels, authorities, and parts of the Italian Public Administration.** Most of the reforms and investments fall under the authority of the relevant ministry (such as the Ministry of Economics and Finance, the Ministry of Justice, and the Ministry of Technology Innovation and Digital Transition), as well as other major central institutions. However, the enforcement of the Italian plan will take place at different levels and will not exclusively involve central offices of the Italian public administration, but also regional and local offices. If not taken into consideration and dealt with, **such a diversified and fragmented scenario could cause frictions with regards to responsibilities, tasks and the hierarchy amongst the different offices and bureaus.**

A third critical aspect that should be considered, when assessing the implementation of the Italian RRP, is **the shortage of digital skills, an issue that has already been outlined while referring to SMEs**. The lack of digital skills has been highlighted as one of the key-issues to be addressed by the RRP with regards to the digital field as the **shortage of digital skills among Italians has broader effects, possibly even stalling the execution of the RRP altogether.** This concern applies specifically to all the measures connected to the digital field as the scarcity of digital skills regarding citizens, workers and, most importantly, the public administration, could **be a huge obstacle for the effective execution of all the measures that are expected to be carried out**.

The RRP is an extraordinary opportunity for the modernisation and economic recovery of Italy. Nevertheless**, for the plan to succeed, it is crucial to prevent the so-called procedural "bottlenecks"** that could delay investments, affect the performance of the reforms, and ultimately put at risk the success of the entire plan. The risk of bottlenecks in the digital area is especially high concerning the investments in **upgrading the country's telecommunication networks**. Excessive administrative and procedural burdens could **block the resources for modernising the network**, making it complicated to invest these resources and achieve the expected results due to excessively complex procedures. Moreover, when comparing the 2021 and 2022 timelines, it can be observed

that **the objectives reached last year were relatively easier than those that are awaiting the country in 2022**. As mentioned, the targets achieved in 2021 were mainly related to bureaucratic or regulatory obligations and mostly focused on the entry into force of basic legislation. On the other hand, the current year foresees the achievement of more challenging objectives, with approximately **100 goals that include the approval of complex reforms and the implementation of multiple investments**.

In the months and years to come, authorities in charge of the digital transition will be facing some difficult challenges in order to achieve all the goals in time. In the short term, this is especially true for major reforms and investments such as the **creation of a Cybersecurity Agency**, or those related to **ultrabroadband networks**, but also all the reforms and investments which will involve a large part of the public administration. Within the cybersecurity field, we previously mentioned the launch of the network of cybersecurity screening and certification laboratories, and the expected activation of at least one laboratory within the year. Here, it is worth mentioning that there are more than 300 organisations and companies involved in the Italian National Cybersecurity Perimeter. Assuming that each of them will have to certify more than one piece of equipment, it can be estimated that the total number of devices to be certified exceeds 1,000 units. Given this amount of work, it would be necessary to have a much higher number of laboratories and to shorten the procedures that are currently foreseen (which are based on the Common Criteria and require several months to certify each piece of equipment).

The RRP is a plan of reforms meant to take place and be implemented across several years. Therefore, a complete and thorough assessment of its quality at this stage is still premature. It can be said that most (if not all) of the weaknesses of Italy in the digital field (such as: digital skills of the population, broadband networks, digital transition of the public administration and of SMEs) have been identified and specifically addressed by the RRP.

Nevertheless, the real challenge for the months and years to come will be the execution of the plan and the coordination of the different bodies involved. A viable and useful precaution will involve a continual careful scrutiny of all those measures that appear to be more generic and **assess how the authorities in charge of each of them will decide to implement these reforms or investments**.
Given the importance of this plan and the opportunity for growth it provides for the country, the hope is that the actors responsible for its enforcement will strike the right balance between the urgency to achieve the established goals in time and the quality of each measure.

3. The Portuguese RRP

3.1. Main Weaknesses Addressed in Portugal's RRP

Portugal's RRP consists of 83 investments and 37 reforms. Of these, 40% of total investment value will go towards addressing economic and social resilience, 38% to climate transition, and 22% to the digital transition. As the other EU countries, Portugal respects the requirement of dedicating at least 20% of total investment to digital objectives. Still, these are not central to the Portuguese RRP, as only seven out of 37 reforms are linked to the digital transition.

The European Commission (EC) provides a succinct summary of the specific challenges faced by Portugal and addressed by its RRP.[13]

"The reforms [of the Portuguese RRP] address bottlenecks to lasting and sustainable growth, while investments are targeted to address barriers to productivity and potential growth, such as **those addressing restrictions of regulated professions** and gaps in human capital, **including in digital skills and education**, as well as, **enhancing public financial management** and the **efficiency of the public administration and of the judicial system**. Other important reforms and investments supporting income convergence and the catching-up of productivity and competitiveness of the Portuguese economy include those aimed at supporting the capitalisation of firms, business research, innovation, and **digitalisation**, as well as the green transition, including by supporting the renovation and improvement of energy efficiency in buildings. Finally, the Portuguese plan includes initiatives aimed at boosting the response capacity and the efficiency of health and long-term care services and initiatives addressing housing affordability." [our highlighting[14]]

In other words, the EC correctly identifies Portugal's lacklustre performance in terms of productivity and growth as its main challenge, followed by social concerns. Considering Economic and Social Resilience, the EC states:

> "Key macroeconomic challenges for the Portuguese economy include high public and private debt levels, and sluggish productivity growth which is held back by, inter alia, relatively low levels of investment (particularly in intangibles), low R&D intensity, overall low skill levels of the population and a business environment hampered by inefficiencies in the justice system and regulatory restrictions."

[13] https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility/portugals-recovery-and-resilience-plan_pt

[14] We will come back to these barriers to productivity and potential growth in the conclusions.

Clearly, the main obstacles to growth and recovery in Portugal lie with factors that have held back the country over the last twenty years: a mix of low qualifications both of workers and business owners, and an economy based on low wages and low value-added. Concerning the digital transition, the EC states:

> **"Digital challenges** for Portugal include the need to invest in the digital transition, particularly in the **development of digital skills**, both basic and advanced, in the **use of digital technologies** to ensure equal access to quality **education and training**, and to **boost firms' competitiveness**. This is especially relevant in Portugal, where the economy is characterised by micro-enterprises concentrated in traditional sectors."

From these descriptions of the three areas of the RRP it becomes clear that the focus of the Portuguese plan is to help a backward economy catch up with its faster-moving European peers. In this context, the digital transition has principally a supporting role, as follows:

1. Low levels of education hamper productivity: Parts of the plan address both the use of digital tools to improve education, and education in digital skills themselves.
2. Complicated legal rules and an inefficient public administration and justice system block innovation and growth: As we will see below, most of the investment in the digital area (three quarters, more precisely) are dedicated to public institutions directly dependent on the State, including administrations, courts, and schools.
3. Portuguese firms tend to be small and concentrated in low-productivity sectors: The digital transition here relates to workforce training, digitisation of processes, and only marginally to innovative business models.

What seems to be absent, at least based on this summary, is a vision of how Portugal's economy itself might adopt a new digital paradigm.

3.2. Digital Transition in the Portuguese RRP

Portugal's digital transition strategy is promoted and communicated at an international level by "Portugal Digital". **The Portuguese action plan for Digital Transition is based on three main action pillars and catalysts. These include:**

- **Pillar I - Training and digital inclusion of people**
- **Pillar II - Digital transformation of the business fabric**
- **Pillar III - Digitization of the State**

The RRP contains the following **seven reforms in the digital transition area**:

1. Digital transition of businesses
2. Modernization and Simplification of Public Financial Administration
3. Economic legal system and the business environment
4. Digital, simple, inclusive, and safe Public Services for citizens and businesses
5. Functional and organic reform of Public Administration
6. Public Administration empowered to create public value
7. Reform for a digital education

One reform is directly related to businesses, and six out of seven reforms concern the public administration plus the public school system. These reforms are formulated in rather vague terms and their connections to the concrete initiatives they imply are not always clearly and explicitly identified, nor is the path from policy objective to concrete action steps laid out in one single document.

As concerns investments, Portugal will receive a total endowment of €16,644 m (€13.9 bn subsidies, €2.7 bn loans), of which €3,678 m are dedicated to investments in the digital transition (22.1%), divided into €2,460 m (14.8%) for five digital components and €1,215 m (7.3%) included in other (non-digital) components.
The five digital components consist of the following investments and objectives:

Component 16: Enterprises 4.0 (€650 m, 26.42% of digital transition funds)
The Portuguese business sector, particularly SMEs (small and medium-sized enterprises) and their employees, is characterised by a low level of digitalization. Investing in the digital transition intends to increase the knowledge and usage of digital skills of both business leadership and workforce. There is one reform and three investments with the aim of digitising processes, production, commercialization, strategy, innovation, and value creation.

The reform *"Digital Transition of the business community"* refers to digital competences being included in the National Catalogue of Qualifications, including new training programs in cybersecurity, privacy, sustainability, and usability (until March 2022). This seems to fall quite short of what would be needed for a structural change on this matter.

The investments foreseen under this component are as follows. All are coordinated by IAPMEI, an existing public agency that supports businesses:

- *Digital Empowerment of Enterprises (€100 m)*. Designed with a clear vision of two digital skills training programmes, planning and defined metrics.

- *Digital Transition of Enterprises (€450 m)*. Four concrete programs to transform Portuguese SME business models, with a clear vision and combination of meaningful metrics. However, the bridge between the vision and how the action is planned is unclear.
- *Catalysing the Digital Transition of Enterprises (€100 m)*. This investment includes concrete steps and three programs (Digital Innovation Hubs that support digital transition, digital invoicing, certifications).

Component 17: Quality and Sustainability of Public Finances (€406 m, 16.5% of digital transition funds)

The increase in the public debt-to-GDP ratio, aggravated by the COVID-19 crisis, has constrained the available fiscal space. This component aims at better conditions for fiscal policy through improving public financial management and bridging gaps in fiscal-structural reforms with more transparent public resource management, promoting integrated public asset management and improving the performance of the social security and tax authorities. One reform and three investments address this objective.

The reform *"Modernisation and Simplification of Public Financial Administration"* covers four different areas related to the budget, procurement, public enterprises, and tax and social security.

The monetary investments allocated to this component are:

- *Public Finance Management Information Systems (€163 m)*. Includes 12 initiatives, some concrete and others vague. A clear vision and planning are missing, however.
- *Modernisation of the Tax Authority's asset information system infrastructure (€43 m)*. This investment includes 12 specific tasks, although vision and metrics are unclear.
- *Digital Transition of Social Security (€200 m)*. Includes 4/5 concrete initiatives. While the vision is clear, concrete metrics do not exist.

Component 18: Economic Justice System and Business Environment (€267 m, 10.85% of digital transition funds)

The aims are to simplify the interaction between citizens and businesses with the State, to reduce costs, complexity and eliminate barriers to economic activity; to target inefficiencies in the justice system by adopting a "digital by definition" paradigm, as well as remaining bottlenecks in business licensing. With the duration of judicial procedures among the highest in the EU, the business environment is also affected by ineffective collateral and bankruptcy laws as well as heavy licensing procedures in some sectors.

This component includes one reform (equal to its title) and one monetary investment which includes 5 concrete outcomes concerning various digital platforms: (1) new interfaces for attorneys and digital service platforms and information systems to streamline the judicial ecosystem; (2) Digital platforms for the Citizen and Business Life Cycles; (3) Digital Platforms for Criminal Investigation and Forensics; (4) Knowledge management platforms; and (5) Enhancement of Technological Infrastructure and Equipment.

Component 19: Digital Public Administration (€578.1 m, 23.5% of digital transition funds)

This component includes three reforms and seven investments, and focuses on the need to provide better, simpler, and more digital public services, using technology and enhancing proximity, enhancing the contribution of State and public administration to economic growth and social development.

The three reforms included in this component are:

- *"Simple, inclusive and secure digital public services for citizens and businesses"*. While it is clear this reform aims at making public services more digital and less burdensome, it is not clear how it was planned to be executed until its deadline of September 30th, 2021, or how it will evolve thereafter.
- *"Functional and organic reform of Public Administration"*. This reform aims to restructure and simplify public services, exploiting synergies using a centralised joint platform, though it is not clear how this will be done. Expected to be concluded by 2023.
- *"Public Administration Empowered to Create Public Value"*. This reform aims to improve the competence of public employees, particularly digital, applying new working models such as teleworking. This reform is reflected in the Strategy for Innovation and Modernisation of the State and Public Administration of July 2020, with the aim of improving worker management and training. This reform is linked to the investment in skills training and was due on June 30th, 2021.

The monetary investments allocated to this component are:

- *Redesigning public and consular services (€188 m).* Three initiatives are outlined in this investment. While specific entities and mechanisms are referred to, the tools being used and the tactical/practical vision to implement them is unclear.
- *Building Public Administration Skills – training workers and managing the future (€88 m)*. This investment is dedicated and measured with respect to three specified targets: training public employees in management, data science and technology.
- *Sustainable e-services (€70 m).* This investment has three main initiatives concerned with the organisation, communication, and safety of data in the Public Administration. The

purpose is clear as well as some of the services used. The details are unclear but there is an intuitive vision.
- *Enhancing the overall cybersecurity framework (€47 m)*. This investment has four initiatives, but their design is unclear.
- *Efficient, secure and shared critical digital infrastructures (€83 m)*. Four initiatives concerning government digital infrastructure are presented. Specific entities are referred to but no clear structure is explained.
- *Digital Transition of the Public Administration of the Madeira Autonomous Region (€78 m)*. Nine ambitious one-sentence bullet points are presented, without clear indication of the planned initiatives or their vision.
- *Modernisation and Digitisation of the Regional Public Administration (Autonomous Region of the Azores) (€25 m)*. Five investments are indicated, but it is unclear what they mean.

Component 20: Digital School (€559 m, 22.72% of purely digital transition funds)

This component aims at creating the conditions for educational, pedagogical, and managerial innovation of the Portuguese primary and secondary education system. Digital skills are to be developed for teachers, students, and school staff, integrating technologies in different curricular areas and providing appropriate support for an inclusive and sustainable growth of the economy. This component includes one reform and three investments.

The objective of the "*Reform for Digital Education"* is to redesign digital education, improving curricular autonomy and flexibility and the way how digital technologies will be used in the knowledge acquisition process. The vast majority of teachers are to be trained in the integration of digital tools in the curricular programs. This reform is due by the end of 2025.

The monetary investments allocated to this component are:

- *Digital Transition in Education (€500 m)*. This investment is aimed at four clear objectives, with six numerical targets. However, the relation between some targets and the underlying objectives (why 600,000 computers, what is the follow-up?) is unclear.
- *Digital education (Azores Autonomous Region) (€38 m).* The goal of the investment is clear, contrary to the vision and the specific metrics to be applied.
- *Programme for accelerating the digitisation of education in the Madeira Autonomous Region (€21 m).* The goal of this investment is clear, but some of the planned interventions and the respective metrics are unclear.

3.3. A brief overview of monitoring and assessing the RRP

As mentioned above, components C17 to C20 all relate to public administrations of some kind, where C20 is specific to the public-school sector. Overall, the main objectives of these investments are to develop digital skills, both basic and advanced; use of digital technologies; ensure equal access to quality education and training; boost firms' competitiveness and create a safe digital environment for the digital transition of society and business. Digital-related initiatives from other components include:

- Qualification and skills (vocational and life-long learning): €666 m for the modernisation of vocational education and training institutions
- Digital health: €300 m to modernise the computer systems of the National Health Service and increase the digitalisation of medical records

In February 2022, the *Comissão Nacional de Acompanhamento* (CNA), a commission created in 2021 specifically to evaluate the implementation of Portugal's RRP, wrote its first report. This report has not been made public[15], but excerpts have been quoted in the press:

> "While [...] the vast majority [73.58%] of the RRF funds dedicated to Digital Transition [the 5 components] are destined to investments by Public Administration Institutions in direct dependence from coordinating Ministries, **the guidelines of these respective investments and reforms [...] although extensive, are vague, imprecise, at times, incomplete concerning the exact context of these initiatives**".

This comes without surprise, as the European Commission's assessment of the Portuguese RRP of June 2021 already related its single lowest assessment rating to the fact that "some [information] gaps remain" associated with "cost estimates, supporting documents and cost justifications".[16]

The CNA also highlights the insufficient information published about programmes and funding opportunities. Simultaneously, it states that the digitalization of the Public Administration is "an enormous challenge" in both "planning and good execution". Going forward, "the survey of the existing situation in the Public Administration, the mapping of the processes and work models, which must be digitised, the change of culture and the focus on the objectives are important steps to carry out a profound reform".

[15] At the time of writing (June 2022). In May 2022, the first president of the *Comissão Nacional de Acompanhamento*, António Costa Silva, was nominated Economy Minister, and a new President of CNA was appointed. The digital area was transferred from the Ministry of Economy and Digital Transition to a Secretary of State in the Prime Minister's office.
[16] https://ec.europa.eu/info/sites/default/files/pt_rrp_summary.pdf.

Some of the initiatives in the RRP appear designed with the proposal requirements themselves in mind and not for the specific needs of the different areas. Some of these areas have proposals containing buzzwords and technical terms but without a clear connection to how and why they are relevant to address the challenges at hand. Only a few cases have key specific terms associated with more detailed procedures.

As an example, consider Digital Public Administration (C19). One of Portugal's main weaknesses is its inability to implement program budgeting – foreseen in the Budget Framework Law for decades – with comprehensiveness, transparency, and clear objectives and indicators. This has been pointed out in successive reports and evaluations by the Institute of Public Policy – Lisbon, and the International Budget Partnership. Therefore, Portugal needs to improve budget transparency and implement budgeting with consideration of public sector outputs and outcomes. Addressing this, among other weaknesses, should be a priority, in order to improve the efficient allocation of public sector funds and promote economic growth.

3.4. Does the RRP Address Portugal's Specific Digital Weaknesses?

When established in 2020, the Digital Transition action plan "Portugal Digital" was the result of consulting more than 200 indicators, including DESI, INCoDe.2030, Global Competitiveness Report and Networked Readiness Index.[17] The Digital Transition in the RRP is based on this.

DESI, the Digital Economic and Society Index, indicates the relative strengths and weaknesses of the 27 countries of the European Union.[18] An aggregate index is derived from indicators in four main dimensions: Connectivity, Human Capital, Integration of Digital Technology, and Digital Public Services.

In this aggregate index, Portugal is just below average and practically identical to France in the four dimensions. Portugal scores at or *better* than average in:

- Broadband take-up, speeds, and coverage; 4G coverage
- Consumption of digital entertainment and news, social networks, health information
- Online presence of businesses and number of trained IT specialists

[17] https://dre.pt/dre/detalhe/resolucao-conselho-ministros/30-2020-132133788.
[18] https://digital-strategy.ec.europa.eu/en/policies/desi

Portugal scores *below* average in:

- Affordability of broadband, take-up of mobile broadband
- Internet usage: below-average number of households with internet and various measures of internet usage. High number of individuals who never used internet
- Slightly below average use of eGovernment services
- Low number of online purchases and sales by citizens, due to lack of trust and security concerns
- Usage of digital tools by firms
- Digital skills: while internet users have an average level of basic skills, in the workforce in general the share with even basic digital skills and those that use computers at work is low
- Low use of work-related internet services

Among the above four dimensions, Portugal is weakest in Digital Integration and Human Capital. The DESI measures indicate that Portugal's main issue in the digital area is a relatively large share of the population and workforce (including owners of firms) with no or only basic digital skills. This shows up as distrust and low usage of digital tools in private life and at work, while businesses struggle to incorporate these tools in their internal processes and business plans.

On the other hand, DESI does not consider:

- Digitalization of the public administration and the justice system
- Digital tools in primary, secondary, and higher education
- Digital skills of the young generation

The initiatives laid out in the previous section are mostly aimed at improving different aspects of the public administration, with the general objective of removing roadblocks to the functioning of the economy and society. Even though this dimension is mostly absent from the DESI, it is clearly consistent with the overall aim of the RRP. The same applies to digital tools and content in primary and secondary education, but higher education seems to have been completely left out.

The RRP's initiatives for acquisition of digital skills of the workforce in the private and public sectors, i.e., digital education for adults, address a clear need identified in DESI. The same applies to the organised support for digitisation of businesses, especially of SMEs, as there seems to be a lack of digital experience that translates into the quick and effective adoption of digital tools, processes, and business models.

On the other hand, the RRP does not address the issue of digital skills, trust, and use of digital tools in the general population, though it must be said that these are also linked to social characteristics such as income level and general level of schooling (which is still very low particularly in the age group above 50) that other initiatives in the RRP attempt to address – but this will take time.

3.5. Measuring the Implementation of the RRP

(a) Milestones & Targets

The Operational Arrangements list the Key Performance Indicators (KPIs) that formalise the milestones and targets to be met before payment requests can be made. Portugal shall report on the progress made each semester in the achievement of the RRP and the Operational Arrangements (by April 30th and October 15th) as well as on common indicators set out in Article 29(4) of the RRF Regulation (by February 28th and August 31st). Payment requests will be made on a semi-annual basis.

The task force "*Recuperar Portugal*" has the responsibility of regularly providing information about the implementation of reforms and investment projects and is coordinating and monitoring how the initiatives envisaged are implemented and achieve the objectives set out in the RRP. There will be exchanges with the Commission "to take stock of progress on the implementation of the RRP" and to inform the latter of any significant "risks to the timeline for the completion of any milestone or targets".

Table 7: Verification criteria

Verification Mechanism	Number of Measures
Certification(s)	2
Decision from MoF	1
List	26
List and complement	3
Numeric	4
Numeric, list	1
Official Journal	9
Proof of availability	1
Proof of completeness implementation	1
Proof of completion	2
Proof of completion and operability	6
Proof of completion operability and availability	1
Proof of completion, list	3
Proof of implementation	3
Proof of operability	12
Proof of operability and availability	2
proof of purchase	1
Specific	6
specific numeric	1
Specific proof of completion	1
Grand Total	**86**

Source: Institute of Public Policy - Lisbon

There are 39 qualitative milestones and 47 quantitative targets in the digital area. Of these, 5 were to be achieved already in 2021, 15 in 2022, 13 in 2023, 8 in 2024, 34 in 2025, and 11 in 2026. The milestones refer to the completion of activities such as entry into force of laws, contracts signed, purchase and delivery of items. The quantitative targets present goals in terms of numbers of items to be achieved, in part starting from a specific base value. The achievement of all targets and milestones is subject to verification, usually through documentary proof such as reports or official documents. The targets, being numerical values, are precisely specified. On the other hand, it cannot be deduced from the Operational Arrangements on what basis these targets were chosen and which trade-offs (with other actions not taken) they involved.

(b) A closer look at the KPIs

We analysed each KPI in the Operational Arrangements individually and investigated evidence for their completion across different public sources, including those of the Responsible Entities.

In Table 7, we classify the KPIs by type. Across the 86 initiatives available in the Operational Arrangements, lists are the most common form of proof of completion, accounting for 37% of the total number of KPIs. Only 9% of all KPIs are identified as "specific", which is applied when a more exhaustive concrete set of requirements is defined. Proof of implementation, operability, completeness, or availability account for 36% of the total number of KPIs.

These KPIs also tend to include the requirement to justify how the target or milestone was met. In cases where the initiatives' main purpose is to elaborate laws, a publication in the *Diário da República* can be a concrete proof of achievement, which might allow for an *a posteriori* assessment of the law's impact. In other scenarios, however, such as training programs or software development, the mere proof of operability may not be a concrete enough metric in itself for assessing the effectiveness in achieving the policy objectives.

The lack of further output- or outcome-focused metrics linked to policy objectives calls into question the goal of putting Portugal at "the forefront of countries which are better prepared for facing the inherent changes and challenges of global transition", the original purpose behind the Digital Transition Action Plan as published in the Resolution of the Council of Ministers No. 30/2020, of 21 April in the *Diário da República*.

Table 8 shows how different types of KPI are used for each digital component. While in "Enterprises 4.0" *lists* account for the majority of the assessment criteria, in "Quality and Sustainability of Public Finances" and "Digital Public Administration" it is mainly proofing of completeness, implementation, operability, or availability.

Table 8: KPIs other than "Document justifying how targets were met"

Verification Mechanism	Number of Measures	Verification Mechanism	Number of Measures
16 - Enterprises 4.0	**15**	**19 - Digital Public Administration**	**24**
Certifications	1	List	5
List	9	Numeric	2
List and complement	3	Official Journal	3
Official Journal	1	Proof of availability	1
Specific	1	Proof of completion	1
17 - Quality and Sustainability of Public Finances	**20**	Proof of completion and Operability	4
Certificate	1	Proof of completion operability and availability	1
Decision from MoF	1	Proof of completion, list	2
List	3	Proof of Operability	3
Official Journal	2	Proof of Operability and availability	1
Proof of Completeness Implementation	1	Specific	1
Proof of completion	1	**20 - Digital School**	**18**
Proof of Implementation	3	List	9
Proof of Operability	3	Numeric	2
Proof of Operability and availability	1	Numeric, list	1
Specific	4	Proof of completion and Operability	2
18 - Economic Justice System and Business Environment	**9**	Proof of completion, list	1
Official Journal	3	proof of purchase	1
Proof of Operability	6	specific numeric	1
		Specific proof of completion	1

Source: Institute of Public Policy – Lisbon.

With the aim of assessing the sophistication of each individual KPI in the Operational Arrangements more accurately, while keeping in mind the main digital objectives, we rated each individual investment and reform based on a specific set of criteria. These criteria are:

- 1. How concrete are the verification criteria for ensuring that the best policy choices are being made? Do they include specific technical terms or procedures? (C - Concreteness)
- 2. Are the structure and methodology to achieve these targets clearly outlined? (M - Methodology)
- 3. How concrete are the publicly available accountability/effectiveness metrics to make sure that the targets achieved are the most adequate to address the weaknesses outlined in DESI and other sources? (E - Effectiveness)
- 4. How clear is the expected impact, in alignment with the policy objectives? (V - Vision)

Table 9: Average KPI sophistication per digital component and criteria

	C	M	E	V	Average
C16: Enterprises 4.0	2.1	1.2	1.1	2.7	1.8
C17: Public Finances	1.7	1.7	1.6	2.5	1.9
C18: Just. & Bus. Env.	1.6	1.0	1.1	2.7	1.6
C19: Public Adm.	1.5	1.1	1.5	2.5	1.6
C20: Digital School	2.2	1.2	1.3	1.7	1.6
Average	1.8	1.3	1.3	2.4	

Average Assessment of each of the 86 KPIs, grouped by Digital Component and Concreteness (C), Methodology (M), Effectiveness (E) and vision-focused (V).

Source: Institute of Public Policy – Lisbon.

We assessed each of these four questions qualitatively for each individual initiative with ranks 1-2-3 (low-medium-high, respectively), based on the types of KPI outlined above, and then summarised the information by question, RRP component, and implementing institution.

Averaging the 86 initiatives for each of the four criteria - as presented in Table 9 - we find that Vision scores highest, Methodological clarity and Effectiveness lowest. Values are low when considering the average for each of the 5 digital components, with C17 (Public enterprises) scoring highest. When comparing different institutions, the Ministry of Finance, including ESPAP, UniLEO, DGO, and DGTF, were among the entities with the highest overall concreteness, methodology, effectiveness, and defined vision.

Table 10: Assessment of KPIs by Responsible Entity

Entity	Concrete	Method	Effectiveness	Vision
Minstry of Economy and Digital Transition in collaboriation with the Minister of Labour, Solidarity and Social Security	2,00	3,00	1,00	2,00
EMPD - Portugal Digital Mission Structure	2,07	1,07	1,07	2,73
IEFP - Institute of Employment and Training	2,33	1,33	1,33	3,00
IAPMEI - Agency for Competitiveness and Innovation	2,07	1,07	1,07	2,79
DGAE - Directorate-General for Economic Activities	2,00	1,00	1,00	2,80
AICEP - Agency for Investment and Foreign Trade of Portugal	2,00	1,00	1,00	2,00
Startup Portugal	2,00	1,00	1,00	2,50
DIH Working Group	2,00	1,00	1,00	3,00
ANI - National Innovation Agency	2,00	1,00	1,00	3,00
INCM - National Mint Press	2,00	1,00	1,00	3,00
CNCS - National Cybersecurity Center	2,00	1,00	1,25	3,00
AMA - Agency for Administrative Modernization	1,33	1,00	1,00	2,83
CNPD - National Data Protection Commission	2,00	1,00	1,00	3,00
ESPAP - Public Administration Shared Services Entity	1,82	1,91	1,91	2,36
Ministry of Finance	1,69	1,77	1,69	2,31
UniLEO - Implementation Unit of the Budget Framework Law	1,86	2,00	2,00	2,14
DGO - Directorate-General for Budget	1,86	2,00	2,00	2,14
DGTF - Directorate-General for Treasury and Finance	2,00	2,00	2,00	3,00
UTAM - Technical Unit for Follow-up and Monitoring of the Public Business Sector	2,00	2,00	1,00	3,00
AT - Tributary and Customs Authority	1,00	1,00	1,00	2,33
IL, IP, ISS, IP	1,33	1,00	1,00	3,00
IGFS, IP - Social Security Financial Management Institute	1,00	1,00	1,00	3,00
IGFEJ - Institute of Financial Management and Justice Equipment	1,50	1,00	1,25	2,75
Ministry of Justice	2,00	1,00	1,00	3,00
DGPJ - Directorate-General for Justice Policy	2,00	1,00	1,00	3,00
MMEAP - Ministry of Modernization of the State and Public Administration	2,00	1,00	1,00	1,67
PJ - Judiciary Police	1,00	1,00	1,00	3,00
IRN - Institute of Registries and Notaries	1,00	1,00	1,00	2,00
DGACCP/SG (DGA/DSCI)	2,00	2,00	2,00	3,00
INE - National Institute of Statistics	2,00	1,00	2,00	3,00
GNS - National Security Office	2,00	1,00	1,00	2,67
CEGER - Government IT Network Management Center	1,50	1,50	2,00	2,00
Ministry of Internal Administration, General Secretariat of the MAI	2,00	1,00	3,00	3,00
SEF / Ministry of Home Affairs: General Secretariat of the MAI	1,00	1,00	2,00	3,00
VP_DRI	1,00	1,00	1,50	2,50
Regional Secretariat for Finance, Planning and Public Administration	2,00	1,00	1,00	2,00
DGAEP – Directorate-General for Administration and Public Employment	1,50	1,00	1,50	1,50
INA - National Institute of Administration	1,00	1,00	1,00	2,00
SGEC - General Secretary of Education and Science	2,22	1,00	1,44	1,44
Regional Secretariat for Education	2,11	1,44	1,11	1,89

Source:Institute of Public Policy – Lisbon.

3.6. General Wrap-Up and Latest Developments

Apart from the initial information available in the Operational Arrangements, up-to-date public information specific to each reform and investment is often presented in an aggregated manner or, when concrete, in a scattered form, dispersed over different websites and resources. This requires a special effort to discover how each policy objective comes to fruition from strategy to concrete implementation. Some institutions, especially IAPMEI, state explicitly that these actions are part of the RRP. Unfortunately, this is not the case for all.

There is a range of sources that - although not always explicitly referencing each other - allows us to trace and compare how some of the different digital strategies are implemented. It is not explicit, however, how exactly each investment is allocated apart from indicating the institutions or projects that receive them. These sources are:

- 1. The European Commission's Recovery and Resilience Scoreboard provides the per country fulfilment ratio of the milestones and targets.[19]
- 2. "*Recuperar Portugal*" Monitoring Overview includes an updated overview of the different stages of implementation of the RRP (last updated on 04/05/2022).[20]
- 3. Portugal's Operational Arrangements with the European Commission contain each individually defined milestone and target over time (signed on 18/01/2022).[21]
- 4. The European Commission's Implementing Decision on the authorisation of the disbursement of the first instalment of the non-repayable support and the first instalment of the loan support for Portugal (signed on 02/05/2022) includes an assessment of the milestones and targets defined and achieved in 2021.[22] A more comprehensive analysis is found in the annex to the European Commission's analysis.[23]
- 5. The "*Mais Transparência*" portal includes the rate of fulfilment per component with detail down to the level of each action step, identified beneficiaries, and affected projects.[24]
  It is a government initiative for public transparency and not dedicated exclusively to the RRP (last updated on 13/04/2022).

[19] https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/digital.html.
[20] https://recuperarportugal.gov.pt/wp-content/uploads/2022/05/Relatorio-de-Monitorizacao-PRR-Sumario-20220504.pdf.
[21] https://ec.europa.eu/info/sites/default/files/countersigned-portugal-rrf-oa1.pdf.
[22] https://recuperarportugal.gov.pt/wp-content/uploads/2022/05/C_2022_2927_1_EN_ACT_part1_v6.pdf.
[23] https://ec.europa.eu/info/system/files/c_2022_1999_1_en_annexe_acte_autonome_nlw_part1_v2.pdf.
[24] https://transparencia.gov.pt/fundos-europeus/prr/dimensao/transicao-digital#dimension_by_type_prr_id.

- 6. "*Portugal Digital*" presents the execution level per milestone of each initiative. This comes with little surprise, as "*Recuperar Portugal*" picks up on the Action Plan for the Digital Transition which includes many of the structural proposals planned in 2020 for the "*Portugal Digital*" agenda (last updated on 29/03/2022).[25]

While the EU Scoreboard and *Recuperar Portugal* include a general overview of the digital transition strategy and implementation measurement, it is in the Operational Arrangements and EC Implementing Decisions that we can find the exact KPIs and metrics to be achieved and their expected date of conclusion. In *Mais Transparência* and *Portugal Digital* we can see how each of the investments and reforms have progressed individually and which are their specific outcomes and agents. Together, these references provide a more comprehensive overview from strategic conception to implementation on how different components of the RRP are implemented. Still, some relevant information is missing and at times financial measures are not aligned between sources, so that it is not always possible to infer how funds from a given component have exactly been allocated.

On January 25th, 2022, Portugal submitted a payment request of €1.16 bn (€553.44 m in grants and €609 m in loans) which the European Commission endorsed on March 25th and delivered on May 9th, based on the achievement of the 38 milestones and targets of 2021 - 5 of which specific to the digital transition - required for the first instalment.

From component to each specific program and reimbursement, this process is managed and fulfilled by intermediate, direct, and final beneficiaries. Intermediate beneficiaries are agencies and public organisms subcontracted by the Mission "*Recuperar Portugal*" and responsible for the implementation of investments made by third parties. Direct beneficiaries are public entities directly investing these funds. Final beneficiaries include the people, enterprises and institutions affected by the funds. Once the mission "*Recuperar Portugal*" subcontracts the responsible entities for fulfilling the RRP investments, defining its direct and intermediate beneficiaries, these investments then move to an approval stage, followed by payment to beneficiaries. 43% of all digital transition investments are still awaiting approval.

[25] http://portugaldigital.gov.pt/indicadores/os-resultados-ja-alcancados.

Table 11: Achievement status in different sources

Code	Description	Date	Achievement Status					Responsible Entity includes clear public information
			EC Recovery and Resilience Scoreboard	Recuperar Portugal	EC Implementing Decision	Mais Transparência	Portugal Digital Dashboard	
C17-r32	*(Milestone): New management contract for public enterprises*	2021Q4	No information	Fulfilled	Fulfilled	Fulfilled targets for 2021	100% complete	Ministry of Finance, clear communication present
C19-r34	*(Milestone): Judicial framework for the digital transition of public administration*	2021Q3	No information	Fulfilled	Fulfilled	Fulfilled targets for 2021	Unclear information	Unclear in AMA, contracts available in DRE
C19-r36	*(Milestone): Creation of "National Institute of Public Admin."*	2021Q2	No information	Fulfilled	Fulfilled	Fulfilled targets for 2021	Unclear information	INA Website available
C16-i03	*(Target): Selection of 17 Digital Innovation Hubs*	2021Q4	No information	Fulfilled	Fulfilled	0% fulfilled	85 % completed	IAPMEI, clear reference of developments
C20-i01	*(Milestone): Contracts for 600,000 computers for high schools*	2021Q4	No information	Fulfilled	Fulfilled	Fulfilled targets for 2021	90 % completed	SGEC, unclear action steps taken

Source: Institute of Public Policy - Lisbon

The above six sources of information are not always consistent – this even true within the same institution. While the European Commission's Recovery and Resilience Scoreboard presented no information at the time of the April 2022 assessment, the Implementing Decision document already indicated the successful fulfilment of these same components.

Some entities are more explicit than others in presenting the actions and outcomes resulting from the RRP initiatives and investments. *Portugal Digital*[26], IAPMEI[27], DGAE[28] and ANI[29] are some of the few sources with explicit information about the Digital Transition, including one of the targets for 2021, the implementation of at least 16 Digital Innovation Hubs (C16-i03). Others, such as the Secretary General of Education and Science, published only the Technical Guidance[30] containing the obligations for final beneficiaries (C20-i01).

The three reforms implemented in 2021 can be followed via the legal framework for the digital transformation of the Public Administration and publications in the *Diário da República*. Copies of

[26] https://portugaldigital.gov.pt/acelerar-a-transicao-digital-em-portugal/testar-e-incorporar-nova-tecnologia/polos-de-inovacao-digital-dih/

[27] https://www.iapmei.pt/PRODUTOS-E-SERVICOS/Incentivos-Financiamento/Sistemas-de-Incentivos/Plano-de-Recuperacao-e-Resiliencia/Empresas-4-0.aspx

[28] https://www.dgae.gov.pt/servicos/politica-empresarial/competitividade/polos-de-inovacao-digital-dih.aspx

[29] https://www.ani.pt/pt/noticias/not%C3%ADcias-ani/digital-innovation-hubs/

[30] https://www.sec-geral.mec.pt/pt-pt/pagina/beneficiario-intermediario

new management contracts were also delivered for EC assessment. Overall, only the allocation of about €1.7 bn is disclosed in "*Mais Transparência*", some with an uncertain spending purpose. The destiny of the remaining €0.7 bn (30%) is not registered on "*Mais Transparência*", though it is the most granular of the available sources.

3.7. Concluding remarks and recommendations

Portugal's RRP - particularly as related to the Digital Transition - is designed to address some of the country's most relevant structural issues. Overall, these structural factors are well-identified, and the program initiatives are strongly aligned with the policy vision.

However, the Key Performance Indicators in the Operational Arrangements have not been defined in all cases as concrete metrics that ensure, regardless of the justifying documents, the effective achievement of the underlying policy objectives identified in the Digital Action Plan; 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). While there are multiple publicly available resources related to the Digital Transition in Portugal's RRP, even with extensive research and crossing of information, some important questions regarding budget allocation and impact measurement remain unclear.

With these observations in mind, **we propose that, during the next few years, public institutions and transparency initiatives should develop clear effectiveness metrics, focused on technological and socio-economic development. These should include concrete metrics demonstrating how each action step is contributing (or not) to each digital transition objective. A "return on investment" metric** would allow estimating why and how each specific investment will achieve the target at hand and could also be used to justify the choice between alternative actions**.** We also propose that Responsible Entities clearly identify investments and outcomes as being part of the RRP, **standardising as much as possible the presentation of the information that is publicly available at different entities.**

4. The Spanish RRP

4.1. General

4.1.1. Problems & weaknesses addressed by the RRP

Spain's Recovery and Resilience Plan (RRP) is acknowledged to aim at a "modernisation comparable to that of Spain's accession to the EU", with a threefold objective: (1) to act as a counter-cyclical lever to help boost the economy in the short term, (2) to address the major structural changes in the country in the medium term, and (3) to transform the growth model towards a more digital, sustainable and resilient model.

The Recovery and Resilience Plan contains 212 measures (110 investments and 102 reforms) which amount up to €69.5 billion (bn). **The Spanish RRP is the second largest in the EU**, only after Italy. Concretely, Spain has requested €69.5 bn in grants. No loans have been requested up to now. Its basic architecture consists of four pillars, spread out across 10 lever policies, which contain in turn 20 programmes, the latter being made up of 30 components (or specific policies).

The Spanish RRP revolves around the four axes of green transition, digital transformation, social and territorial cohesion, and gender equality. Green transition amounts up to the 40% of the total of funds and digital transition makes up the 28% of the overall funding package. It is remarkable that Spain's digital transition workstream is far larger than the EU target of 20% and larger than most EU member states.

Spain has ranked well ahead of most EU countries in recent years, according to the Digital Economy and Society Index (DESI). Based on latest results from 2021, Spain ranks ninth out of 27 countries and is six positions ahead of the EU average. **However, a breakdown of results sheds light on several shortcomings which are strategic for the long-term transformation of Spain's industrial, economic, social and digital policies overall**.

With the exception of the categories "Connectivity" and, partially, "Digital public services", the rest of categories show some flaws. In the "Human capital" category, Spain is an advanced digital economy in what refers to Internet user skills (basic skills, 1a), but the country lags behind in advanced skills and development (1b) when compared to the rest of EU countries. Also, only 20% of enterprises are providing ICT training to their staff (a ratio which is similar to the EU average, but still remains limited). In the "Integration of digital technologies", Spain also has limitations when it comes down to the use of different digital technologies at enterprise level ('Digital Intensity'). 15% of Spanish enterprises use digital technologies "highly" or "very highly". The remaining 85% acknowledge to use them in a "low" or "very low" rate. While it is true that SMEs are increasingly

integrating basic digital technologies (in 2021, 62% of SMEs did so) and Spanish SMEs are in the top ten of EU countries selling online through e-commerce, the intensity of using digital technologies in companies is still restrained and advanced skills have not been implemented so far. Finally, the category of "Digital public services" has two faces: Spain is a leading country in the EU for open data and for e-government services for businesses. However, in the areas of user centricity in public digital services and the ratio of transparency for users to manage their own personal data, Spain has an average mark.

This patchwork of strengths and weaknesses explains why Spain's RRP is devoting a large share of its efforts and funding to digitalisation. Main areas of concern are the shortage of advanced skills for both enterprises and workforce at a time where basic skills should genuinely be taken for granted across sectors and firms, the low level of integration of digital technologies into businesses, the digitalisation of critical sectors to make them competitive -SMEs, public administration, industrial policy-, and the revamping of science and innovation, research, and development.

4.1.2. How important is digital in the Plan?

The digital transition accounts for the 28% of the total of the RRP. It is important to point out that this share is larger than the EU target of 20% for the digital pillar.

Based on the RRP, which is divided into 10 lever policies, 20 programmes, and 30 components, **digital transformation is fully addressed in three levers**: 4 (public administration), 5 (companies and SMEs) and 6 (science, innovation, health). However, **digitalisation also spreads out across most of the rest of levers**, mainly in lever 7 (education, skills, reskilling and upskilling) and levers 1 and 2, both touching on the green transition.

Table 12. Budget allocation by programmes in each lever policy related to digital transition goals

Lever policies and programmes touching on the digital transition, with budget allocation
1. Urban and rural agenda, territorial cohesion and modernisation of agriculture
○ Strategy on Sustainable, Secure and Connected Mobility (€13.2 bn) ○ In the first lever policy, the Component on the green and digital transformation of agri-food and fisheries system is part of the Plan on preservation of the coastline and water resources (*€2 bn*), but budget figures are not broken down.
2. Resilient infrastructures and ecosystems
○ Strategy on Sustainable, Secure and Connected Mobility (€13.2 bn): Please note that this strategy is expected to have an impact on both urban and rural agenda (lever policy 1) and resilient infrastructures and ecosystems (lever policy 2). The budget amount is the same for both lever policies.

3. A fair and inclusive green transition	
	○ Electric infrastructures, smart networks, flexibility and storage capacity (project amounts up to €1.4 bn – not fully devoted to smart networks).
4. An Administration for the 21st century	
	○ "Digital transformation of the public administration" section amounts up to €3.2 bn, contained within the Plan for the Modernisation of the Public Administration (€4.3 bn). Special focus on justice, healthcare, employment, education and social service systems.
5. Modernisation and digitalisation of industry and SMEs, entrepreneurship and business environment, recovery and transformation of tourism and other strategic sectors	
	○ Industrial Policy Spain 2030 (€3.8 bn) ○ Plan on the Digitalisation of SMEs (€4.06 bn) ○ Plan on Modernisation and Competitiveness of the Tourism Sector (€3.4 bn) ○ 5G Roadmap (€3.99 bn)
6. Promotion of science and innovation and strengthening of the capabilities of the National Health System	
	○ National Strategy on Artificial Intelligence (€500 m) ○ Institutional reform and strengthening of the science, technology and innovation system capabilities (€3.4 bn)
7. Education and knowledge, lifelong learning and capacity building	
	○ National Plan on Digital Skills (€3.6 bn) ○ Modernisation and digitalisation of the education system, including 0-3 aged pre-school stage (€1.6 bn)

Source: Own elaboration based on Spanish Recovery and Resilience Plan's official website (2022) and Observatorio NextGeneration EU EsadEcPol-EY Insights (2021).

These seven lever policies touch on the digital transition. All of these include both investments and reforms packages. In some cases, these are already in progress or developed by means of other mechanisms: Digital Spain Agenda 2025, and itemised State budget for the national strategy on AI. The other remaining three lever policies do not have either programmes or components explicitly related to the digital. These are: the new care economy and employment policies; promotion of culture and sports industry; and modernisation of the tax system for inclusive and sustainable growth. Based on the list, some top-tier priorities are: Digitalisation of SMEs; Mobility; 5G roadmap; Digital skills; Industrial policy; and the public administration.

Although the contribution of digital transformation into all 30 components exists, there are significant differences in the amount of resources devoted to each of them, including the levers which are allegedly fully addressed to the digital transition (*Table 13*). Components are part of a specific lever, as components are specific policies to be developed and implemented. The four pillars – digital and green transition, territorial cohesion, gender equality – refer to the principles that must

guide the development and fulfilment of these components. 8 out of 30 components are given 40% or more resources for their digital transformation. This is the case of electricity infrastructures, promotion of smart grids and deployment of flexibility and storage, the modernisation of the public administration, the boost of SMEs, the National Plan for Digital Skills, and culture and audio-visual hubs. Other 7 components out of 30 receive between 10% and 40% of resources to transform themselves digitally. This is especially important, because the components "Industrial Policy Spain 2030" and the "Plan for the modernisation and competitiveness of the tourism sector", which are part of those levers supposed to be strongly devoted to digital transformation, receive less than 40% of resources on it. This is also the case of the component 17 (Institutional reform and capacity building of the national science and innovation system), component 18 (Renewal and expansion of the capacities of the National Health System) and component 21 (Modernisation and digitalisation of the education system, including early education from 0 to 3 years of age), which receive less than 10% of resources for their digital transformation.

These differences in the contribution of resources on digital transformation devoted to sectors, acknowledged as strategic by the Spain's RRF, will be analysed in subsequent sections.

Table 13. Contribution of digital transformation in each of the 30 components in Spain's Recovery and Resilience Plan

Component	Contribution
Component 1. Shock plan for sustainable, safe and connected mobility in urban and metropolitan environments.	Less than 10%
Component 2. Housing rehabilitation and urban regeneration plan.	Less than 10%
Component 3. Environmental and digital transformation of the agri-food and fisheries system	Less than 10%
Component 4. Conservation and restoration of ecosystems and their biodiversity	Less than 10%
Component 5. Preservation of coastal space and water resources	Between 40% and 10%
Component 6. Sustainable, safe and connected mobility	Less than 10%
Component 7. Deployment and integration of renewable energies	Less than 10%
Component 8. Electricity infrastructures, promotion of smart grids and deployment of flexibility and storage	40% or more
Component 9. Renewable hydrogen roadmap and its sectoral integration	Less than 10%
Component 10. Just Transition Strategy	Between 40% and 10%
Component 11. Modernisation of Public Administrations	40% or more
Component 12. Industrial Policy Spain 2030	Between 40% and 10%
Component 13. Boosting SMEs	40% or more
Component 14. Plan for the modernisation and competitiveness of the tourism sector	Between 40% and 10%

Component 15. Digital connectivity, boosting cybersecurity and 5G deployment	40% or more
Component 16. National Artificial Intelligence Strategy	40% or more
Component 17. Institutional reform and capacity building of the national science and innovation system	Less than 10%
Component 18. Renewal and expansion of the capacities of the National Health System	Less than 10%
Component 19. National Plan for Digital Competences (digital skills)	40% or more
Component 20. Strategic plan for the promotion of vocational training	Between 40% and 10%
Component 21. Modernisation and digitalisation of the education system, including early education from 0 to 3 years of age.	Less than 10%
Component 22. Shock plan for the care economy and reinforcement of inclusion policies	Between 40% and 10%
Component 23. New public policies for a dynamic, resilient and inclusive labour market	Less than 10%
Component 24. Revalorisation of the cultural industry	40% or more
Component 25. Spain audiovisual hub of Europe (Spain AVS Hub)	40% or more
Component 26. Plan for the promotion of the sport sector	Between 40% and 10%
Component 27. Measures and actions to prevent and fight against tax fraud	Less than 10%
Component 28. Adaptation of the tax system to the reality of the 21st century	Less than 10%
Component 29. Improving the efficiency of public expenditure	Less than 10%
Component 30. Long-term sustainability of the public pension system in the framework of the Toledo Pact	Less than 10%

Source: Own elaboration based on Spanish Recovery and Resilience Plan's official website (2022) and Observatorio NextGeneration EU EsadEcPol-EY Insights (2021).

This structure shows that digitalisation is not only acknowledged to be a "trusted technology" for the public administration, SMEs and other companies, and science and innovation R&D. It is also seen as an "enabling technology" for other sectors which are in need to revamp.

4.2. Digital transition

4.2.1. Priorities and Objectives

As previously mentioned, Spain has focused its RRP on the twin transitions, both green and digital. Priorities and objectives by mean of digitalisation are to overcome the main shortcomings from an economic, social and territorial point of view. Main goals are guaranteeing the accessibility of digitalisation for society as a whole, boosting the digitalisation of companies -especially SMEs and start-ups- and traditional industries, R&D&I, and the increase of digital skills among the population and also the workforce across sectors.

Digitalisation is also foreseen as a driver to overcome other societal challenges. The modernisation of businesses will also lead to their internationalisation, the renewal of technological capital, the revamping of technology transfer, and the adaptation to the ecological transition of the very digitalisation of processes and products.

The RRP is also expected to make digitalisation lead to greater social and territorial cohesion. While in Spain 92% of the population and 65% of rural areas are already covered by broadband, still there is a connectivity gap across regions within the country which is addressed by the RRP. Also, gender equality (both increasing the number of women specialized in ICT as well as adapting digitalisation processes to women's realities) remains a paramount goal, what explains why it is also one of the four axes in the RRP. Additionally, Spain is devoting efforts to the shaping of digital rights.

4.2.2. Proposed initiatives (reforms & investments)

The Recovery and Resilience Plan (RRP) contains 212 measures (110 investments and 102 reforms) which amount up to €69.5 bn, through grants (no loans). Budget figures on investments are defined in the RRP. No budget figures on reforms are provided.

Investments

The Recovery Plan envisages the mobilisation of public investment in the Spanish territory of € 140 bn by 2026 to boost private investment by up to €500 bn in private investment. This means doubling public investment in the coming years, bringing it closer to 4% of GDP, in line with the period after joining the euro.

Concretely, the lever policy which receives the greatest percentage of investment is the fifth on modernisation and digitalisation of industries, SMEs, tourism and the building-up of an entrepreneur nation (€16.1 bn, amounting for 23.1% out of the total of investments). Within this

lever V, the boosting of SMEs receives the largest share of budget (€4.9 bn, 7% out of the overall total of investments). Digital connectivity, cybersecurity and 5G deployment receives €4 bn, 5.8%). Industrial Policy Spain 2030 gets allocated €3.8 bn (5.4%), although it is important to remember that it receives a low contribution for digital capabilities (only between 10% and 40%) for the total of projects contained within this component.

The second lever which receives greater investments is the first one on ecological transition. However, its component which is more related to the digital transition (Component 3 on the digital and environment transformation of the agri-food and fisheries system) receives only a total of €1 bn (a low share of the total of investments, accounting for 1.5%).

The lever with the third largest amount of investments in Lever II on resilient infrastructure and ecosystems. In this case, the Component 6 which addresses a "connected, sustainable and secure mobility" is given a greater budget than in the previous case. Concretely, this component receives €6.6 bn, or the 9.6% of the total of investments which are foreseen by the Spanish RRP.

Another component which receives great attention and which is strategic for Spain is the digitalisation of the public administration. This Component 11 in lever 4 has been allocated €4.3 bn, accounting for 6.2% of the total of investments.

Additionally, a specific case which needs to be specifically analysed is the low investment for the National Strategy on Artificial Intelligence (€500 m, or 0.7% of the total). This does not mean that the national strategy is receiving little attention. On the contrary, the budget for this strategy had already been allocated prior to Spain's RRP and in a completely separate budget package at the domestic level.

Reforms

The RRP foresees 102 reforms. No budget figures on reforms are provided. It is important to remark that some of these digital-related reforms signalled by the RRP were already ongoing through other funding packages. Others are new and created under the context of the RRP.

Some reforms are: The Strategy for a Connected and Sustainable Mobility, the modernisation and digitalisation of the public administration, the modernisation and strengthening of the education, professional training and higher education system, and new public policies for the labour market (towards a workers' statute in the 21st century).

Most remarkable reforms are part of the Spain Digital Agenda 2025, which is the roadmap driving the country's digital transformation.
It started in 2019 (with an amount budgeted for 2019-2020). However, with the release of Spain's Recovery and Resilience Plan, Spain Digital Agenda 2025 has received an investment of €8.8 bn over

the 2021-2022 period, and the reforms have received greater budget allocations due to the itemised funding in the RRP.

With the aim of making progress in the eight areas of the Digital Spain Agenda, the Government published eleven Expressions of Interest throughout 2021 and launched six calls for proposals with an overall budget of almost €6 bn. In addition, three key initiatives for Spain's digital transformation have been approved: the Draft General Audio-visual Communication Law, the Draft General Telecommunications Law, and the Charter of Digital Rights.

4.2.3. Implementation

Spain has been the first country to receive a regular transfer from the European Commission under the Recovery and Resilience Mechanism.

In 2021, the Commission disbursed €9 bn in pre-financing and gave the green light for a first payment of €10 bn, after verifying that Spain had met the 52 milestones associated with the first tranche in the *Council Implementing Decision*. The milestones included important measures such as the Climate Change and Energy Transition Law (enshrining climate neutrality by 2050), the reform of minimum income support, **measures to support the digitisation of SMEs and boost digital skills, or the modernisation plan for vocational training**.

Throughout 2022, Spain has committed to achieving several digital-related reforms: concretely, the law on start-ups or emerging companies (which was already approved in 2021), the general law on audio-visual communication, and the law on cybersecurity and 5G.

In 2022, two more disbursements are planned for a total value of €18 bn. The first payment (€12 bn) is related to the fulfilment of 42 milestones and targets that should have been carried out until December 2021. This payment is also **associated with significant reforms**, namely the 2021-2024 Employment Activation Strategy (which includes actions for digital upskilling and reskilling), **the Safe, Sustainable and Connected Mobility Strategy, and the High-Technology Equipment Investment Plan**, among others. By the end of 2022, Spain could request the disbursement of the remaining €6 bn, subject to the achievement of 29 milestones and targets that Spain has planned to reach by the end of June 2022.

Management issues arise in the execution of this pre-committed budget. According to official sources[31], Spain has only executed 27.2% of European funds committed to be implemented by 2021 (€6.5 bn out of €2.7 bn budgeted). This instrument is encountering difficulties in its management.

However, this does not necessarily mean that this budget has already reached the companies as final recipients. In reality, this amount includes what has so far been transferred to the state or regional bodies which will eventually distribute the budget to the final recipients. The money already appears as paid, but it does not mean it has been paid to final recipients, only to intermediate partners -for example, public agencies, state companies or regional public administrations. Nor is it specified[32] which specific public administration -regional, state level- has executed each part of what has been paid. Official sources provide a breakdown of the total amount transferred to the regions up to 21 April (€13.345 bn), but not which stage this amount is at -authorised, committed, or executed.

4.3. The adequacy of the RRP

4.3.1. How does the RRP address weaknesses?

Spain's Recovery and Resilience Plan prioritizes investments over to reforms. This also applies to the digital realm. **While investments are precisely defined in terms of timings, expected spending and often stakeholders involved (when possible), there is no information on specific budget, roadmaps, and reform procedures**.

The Recovery and Resilience Plan can be analysed through several lenses. First, a bottom-up approach, specific to a concrete number of policy measures: how the RRP aims to address each digital-related weakness through a number of policy actions (Box 1). Second, this section also analyses to what extent the RRP does not comprehensively address an important issue within industrial policy: how to industrialize digitalization (Box 2). Third, a top-down approach on collaborative projects for targeted technology development: how identified weaknesses in certain technologies are being addressed either by the RRP -through national PERTEs- or by other EU-wide mechanisms -with European IPCEIs (see 3.1.3).

[31] IGAE (2022b), December 2021 (provisional), Mecanismo de Recuperación y Resiliencia, by chapter (p.162) and Budget for coss, execution chapters 4 and 7, pp. 124-34 and 140-48. Link: https://www.igae.pap.hacienda.gob.es/sitios/igae/es-ES/Contabilidad/ContabilidadPublica/CPE/EjecucionPresupuestaria/Documents/MENSUAL%2012-21.pdf

[32] Gutiérrez, H. (2022), España solo ha gastado el 23% de los fondos europeos previstos para 2021 y 2022 (El País). May 4, 2022. Link: https://elpais.com/economia/2022-05-04/espana-solo-ha-gastado-el-23-de-los-fondos-europeos-previstos-para-2021-y-2022.html

4.3.1.1. Specific policy measures in the RRP

A breakdown of specific actions within each component sheds light on how the RRP addresses each digital-related action:

- In the lever IV on public administration, there is the goal of digitalising the public sector so that all administrative regions (the so-called *Comunidades Autónomas*) achieve a greater level of cohesion and interoperability amongst them, jointly with the central government. It also addresses the strengthening of digital skills and modernisation in public management and across public servants.
- In the lever V on digitalising SMEs, an area of work is the integration of digital technologies into existing infrastructures. A grounded example is the *Kit Digital*, which provides roughly €3,000 to each small- and medium-sized company which requests it. However, less resources are devoted to the creation of new digital infrastructures, more adapted to current and emerging demands.
- In the lever VI on science and innovation, there are several areas of action:
    - Spain Digital Agenda 2025
    - National Strategy on Artificial Intelligence: the RRP allocates only €500 m, but this is a complement to the budget which had already been allocated at the domestic level in Spain (a total of €4.5 bn). This national strategy also foresees a public-private joint venture (*NextTech*) which looks forward to increasing financial resources.
- In the lever VII on education and skills, the skills gap is strongly addressed by the RRP. To give an example, Spain is 7.6 percentage points below the European average in teleworking, reflecting a gap between the capacity of an infrastructure and its use. Also, as it has been analysed in the first chapter, a few enterprises provide ICT training to its workforce and these skills tend to be basic rather than advanced. To this end, the Component 19 on a National Plan for Digital Competences devotes €3.6 bn:
    - In the field of education, the focus is mainly put onto portable devices and the installation and maintenance of interactive digital systems (classrooms, blackboards) in educational centres. No references are made for highly advanced reforms, such as the digitalisation of centres' internal management systems, the renewal of data architecture, or the strengthening of data interoperability among schools and public administrations (both at the national and regional level).
    - In the field of Professional Training or vocational training, the RRP itemises €2.1 bn to create 200,000 new vocational training offers, upskilling of workforce, the setting-up of excellence vocational training centres and the creation of entrepreneurship ecosystems in vocational training, among others.

4.3.1.2. How to strengthen the RRP: from digitalization of the industry to the industrialization of digitalization

The Spanish RRP largely touches on the digitalization of the industry. However, this report points out the need to add an additional layer to the issue: the industrialization of digitalization[33], i.e., opportunities to manufacture software and devices to respond to this new demand. The RRP does envisage "strengthening a digital industry on its own", although still insufficiently. This box aims to provide lessons on how to improve the transformation of the Spanish economy through a different lens. This may be useful for the Spanish RRP implementation plan and any other policy actions that can complement it over time.

The aim of the industrialization of digitalization is to achieve added value and quality employment in quantity through the digital transition by manufacturing tangibles and developing intangibles for domestic use and for export. This approach is part of the industrial policy, addressed in Component 12. However, the industrialization of assets such as advanced devices and deep technology require longer timeframes -often from five to 20 years- than the period of time the RRP devotes to industrial policy generally speaking. This mismatch is not enough addressed.

Fostering intangible products

Particularly, there are several priority areas to pay attention to: intangible products, the software industry, artificial intelligence, quantum computing and communication, cybersecurity and the Spanish language industry.

To illustrate this last point: In the language industry, Spain has much to gain, especially in terms of translation - text and voice - computerised and increasingly automatic, interpretation, and in the natural language of machines or programs. The government has launched a Plan for the Promotion of Language Technologies[34] and a PERTE (Strategic project for the economic recovery and transformation) for the new economy of Spanish language. The RRP envisages a boost to the so-called "natural language tools" that are the key to Artificial Intelligence and Big Data, with excellent research in this respect in Catalonia and the Basque Country. In this field, Spain is leveraging on the rest of the Spanish-speaking world. But if it does not act quickly, others, including companies from the US and China, as well as Mexico and Chile, for example, could beat it, as still there is no solid approach to how to “industrialize” digitalization processes at a large scale. The same situation is

[33] Andrés Ortega. *Industrializar la Digitalización*. Elcano Policy Paper, february 2022. https://www.realinstitutoelcano.org/policy-paper/industrializar-la-digitalizacion/

[34] Plan de Impulso de las Tecnologías del Lenguaje (2021): https://plantl.mineco.gob.es/Paginas/index.aspx

applicable to the audiovisual industry. One of the government's objectives is to turn Spain into a hub for the audiovisual industry in Spanish for the world.

Fostering tangible products

The RRP contemplates the fields of sensors, microprocessors and microelectronics, submarine cables, cross-border communication infrastructures, cloud, 5G and communication satellites.

Spain has strengths in this field, such as 3D printing or advanced/intelligent manufacturing, the circular economy and fashion, in which Spain is a leader with Inditex.[35] It is necessary to invest in these fields by industrializing them. A clear example is the lack of solid nexus between industries on the Internet of Things (IoT) and quality tourism.[36] There are potentially solid opportunities in this nexus, and both industries still do not know how to talk to each other with a common language. The need to make different developers convene altogether through a common line of industrial policy is paramount also for the case of multi-country projects which have been proposed in the RRP. Concretely, in the areas of cloud, satellite and quantum communications, and microprocessors.

The RRP has addressed this to certain extent. It advocates for the reform of the current Industry Act, which dates back to 1992 and predates the digitalization process of the Fourth Industrial Revolution currently underway. But to do so, it will be necessary to build partnerships with Spanish accelerators, including Wayra (Telefónica) and others based in Spain, such as BBVA. Google, for example, has one with SeedRocker, and Amazon with bBooster. Also, Spain will need to seize its position in GAIA-X, the Franco-German initiative for the next generation of European data infrastructure: a secure and federated system that meets the highest standards of digital sovereignty while promoting innovation. This project is the cradle of an open and transparent digital ecosystem. It is initiated by Europe, for Europe and beyond. It aims to develop common requirements for a European data infrastructure.[37] Spain's government has decided to create a national Gaia-X hub with the aim of generating a Spanish data sharing ecosystem, especially in the tourism sector.

Regarding 5G, Spain envisages €770 m of public funding[38] for the deployment of 5G access network infrastructure and transmission network reinforcements, including €150 m to create passive mobile

[35]DESI report, Bank of Spain: Informe Anual 2020, https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesAnuales/InformesAnuales/20/Fich/InfAnual_2020.pdf

[36]See Alicia Macías (2021), Andalucía Lab: "Beneficios del Internet of Things aplicado al Turismo", https://www.andalucialab.org/blog/beneficios-del-internet-of-things-aplicado-al-turismo/

[37]Raquel Jorge (2020): "GAIA-X: ¿oportunidad para la soberanía digital europea?" https://blog.realinstitutoelcano.org/gaia-x-oportunidad-para-la-soberania-digital-europea/

[38] RRP's Component 15.6

infrastructure in rural areas without 4G coverage. Designing digitalization products in road infrastructure, logistics, 5G connections, as well as collaborating in Europe in the semiconductor industry (whose shortcomings, as mentioned above, have paralyzed several manufacturing chains, and are not expected to be solved for another year or more) is essential for the industrialization of digitalization. The connected car, even more than being electric, will be essential.

In terms of submarine cables, Spain is at the centre of attention, with various initiatives.[39] It could be an opportune alternative to the saturation of cable links in the United Kingdom. The government will remove obstacles to these investments, in order to strategically seize the country's geographical location.

4.3.1.3. PERTEs and IPCEIs: top-down, collaborative projects on targeted technologies

Another weakness of the Spanish economy is its excessive weight (80% of the employment) of SMEs. especially the small. The Spanish government has launched new mechanisms for cooperation between large companies and SMEs: the PERTE (*Proyectos estratégicos para la recuperación y transformación económica* or Strategic projects for the economic recovery and transformation), public-private, which are an integral part of the RRP. The PERTEs are strategic projects with a great capacity to boost economic growth, employment and the competitiveness of the Spanish economy, with a high degree of public-private collaboration and transversal to the different administrations. So far there are 12 PERTEs already decided or under way[40]. Although all of them are connected to the digital transition, four of them are directly linked to the digital issue: on electric and connected vehicle, on the new economy of language, on the aerospace industry, and on digitalization for the use of water. A new PERTE was recently announced on microelectronics and semiconductors, which amounts to €12.25 bn of public investment until 2027.

IPCEIs are EU Important Projects of Common European interest. They involve more than one EU Member State, are designed to be disruptive and have and a broad R&D&I ambition. They promote projects with an impact for the EU and for the member countries. They are a key strategic instrument for the implementation of the European Union's Industrial Strategy. Moreover, they are a tool to circumvent the limitations on public (Sate) aid in the EU, as they can involve up to 50% of public funding. Spain participates in the one on Next Generation Cloud Infrastructures and Services (IPCEII-CIS) (with France, Italy, Germany, Belgium, Hungary, Latvia, Luxembourg, the Netherlands, Poland and Slovenia), and is studying its participation in the one on microelectronics, and possibly on semiconductors.

[39] The most recent has been the arrival in Sopelana (Bilbao) of Google's Grace Hopper cable to link Bilbao and New York, and then England. https://espana.googleblog.com/2021/09/el-cable-submarino-grace-hopper-de.html
[40] https://planderecuperacion.gob.es/como-acceder-a-los-fondos/pertes

However, while the German approach to IPCEIs is the result of an interactive process within its science, technology and industry system, Spain lacks such a system, due to a lack of priorities and comprehensive mechanisms to define them. PERTEs and participation in IPCEIs can serve to alleviate this shortcoming.

Compared to Germany, France, United Kingdom and even Israel, Spain lacks a national plan or strategy for what is called deep tech, which needs large public and private investments and brings together several technologies.

4.4. Conclusions and Comments

Spain's Recovery and Resilience Plan is a forward-looking opportunity to make the country accelerate its goals of economic competitiveness and ensuring a cohesive and common integration from an economic, social and territorial perspective. The digital transition is present across all levers, programmes and components, especially in levers V, VI and VII. Some investments and reforms are newly created under the Recovery and Resilience Mechanism, while others which were previously existing have benefitted from the RRP. Main goals on digitalising the public administration, boosting SMEs and start-ups, and ensuring a highly advanced skilled workforce (either reskilled, upskilled or newly skilled) are overall positively addressed, with some funding packages which are some of the largest budget allocations in Spain's RRP. Also, the fact that Spain has been the first country to receive a regular transfer from the European Commission under the Recovery and Resilience Mechanism is good news, because this shows Spain's commitment to timely fulfil milestones and targets it has committed to.

However, several challenges exist:

- The RRP devotes more resources and mechanisms to investments and fewer to reforms. However, the nature of digital transformation is the reformation and updating of sectors, processes and people. From an analytical perspective, **all levers, programmes and components touching on the digital transition should prioritize reforms over investments or, at least, to find a balance between both**.

  While investments may be more impactful in the short term as a temporary economic stimulus and reduce transaction costs in the transformation of existing processes, products or people's skills, investments will not lead to changes in the incentives of economic agents through major structural reforms in the long run. Also, reforms tend to produce greater positive changes in the fight against inequalities and imbalances, as reforms touch on the core of the economic structure.

- The RRP aims to address all measures through a **decentralized implementation across different authorities, territorial levels and agencies of the public administration**. This is positive insofar as measures, once implemented, may be greatly impactful on the ground. It also allows policy makers to distribute efforts. To this end, it will be important to ensure that digital transformation programmes are well coordinated amongst regional administrations, especially in those cases where no data interoperability or no data architecture has existed so far for certain sectors, such as in education or the social security regime.

- The RRP should **provide mechanisms for *ex post* impact assessment**. This would help Spain avoid duplications in efforts and overlaps, and guarantee an efficient and effective use of budgetary resources across the actors involved in the public administration to make the recovery and resilience funds actionable and impactful. Also, the Recovery and Resilience Plan is a great opportunity to build confidence in the design, implementation, and evaluation -and experimentation, if possible- of public policies which are atomised and provide specific solutions for specific challenges.

- Reforms and investments should put the focus not only on the integration of digital technologies into existing infrastructures, but more on the creation of new ones. This is essential for the adaptation of a workforce which will be required to have advanced ICT skills -even if not working on digital topics- and will face demands from these innovative infrastructures. Also, the shortage of digital skills has broader negative effects in the modernisation of critical sectors, from the public administration to education and healthcare.

- There is no independent body to oversee the distribution and use of the funds, although the European Commission will always have an eye on them. They depend mostly on the Ministry for the Economy, in which the State Secretariat for Digitalisation and Artificial Intelligence is located. The Ministry of Industry, which deals with Telecommunications, participates actively.

Spain has the *momentum* to benefit from the Recovery and Resilience Mechanism. It will improve the economic competitiveness of the country, the societal cohesion and result in greater indirect "snowball" effects. However, to do so, Spain needs to adapt its public administration towards greater flexibility in administrative procedures, ensure *ex post* impact assessments, guarantee that there is transparency, and build confidence amongst the stakeholders who will be the final implementing actors of the Recovery and Resilience Plan.

5. Evaluating the Four plans in a European perspective

The Recovery and Resilience Facility promotes reforms in several areas of the digital field such as digital skills, super high-capacity networks, digitalisation of public services and businesses (particularly SMEs), and many others.

The previous chapters of this paper presented the RRPs of four countries - Spain, Portugal, Greece and Italy -, and the digital transition related to these four Plans. In the following pages, the study will move towards a broader perspective, and will adopt a comparative approach.

5.1. How the four plans compare at EU level

The Recovery and Resilience Facility (RRF) is the biggest component of Next Generation EU (NGEU) and will provide grants amounting to at most €312.5 bn at 2018 prices, or €338 bn at current prices, and loans amounting to at most €360 bn at 2018 prices or €390 bn at current prices.
As already mentioned, all the RRPs must allocate at least 20% of the plan's total funds to measures contributing to the digital transition or to addressing its resulting challenges.

The European Commission has created an ***online portal***[41] where it is possible to compare (at least partially) all the RRPs and their digital tag. By going through this portal, the achieved milestones and targets for each state can be seen[42]. These measures have been reported as completed by the Member States and subsequently assessed as satisfactorily fulfilled by the Commission.
To date (15 June 2022), the portal shows: 6 measures fulfilled by France, 4 measures by Greece, 16 measures by Italy, 7 measures by Spain, and 7 measures by Portugal[43].

Similarly, there are also some other interesting studies attempting to compare the different areas of national RRPs.[44] At the same time, it is worth noting that comparing the numerous RRPs is a challenging task because of their different ways of presenting data, information, and goals. Indeed, when looking at the different national Plans, it emerges that the organisation and the availability of information regarding figures, definitions, fields of intervention, and existence of sub-categories greatly varies across different countries, making it hard to compare also this information.

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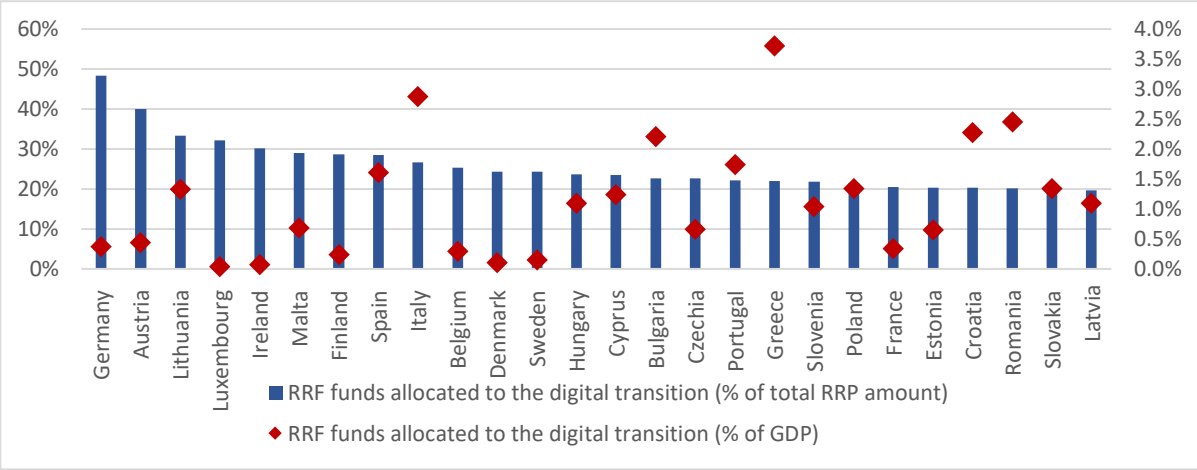
[41] https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/digital.html
[42] Up to 20 June 2022, the Netherlands has not yet presented a Recovery and Resilience Plan. With regards to more recent developments, in March 2022 the Dutch Minister of Finance sent a first draft of the Dutch RRP to Dutch Parliament. According to the latter, the draft plan includes 39 plans for reforms and investments worth €7.7 bn. See also: https://www.euractiv.com/section/politics/short_news/dutch-finally-present-eu-recovery-fund-plans/
[43] To be noted that as explicitly clarified on the portal itself "The fact that a milestone/target does not yet show as fulfilled does not mean that it is not being implemented or already completed."
[44] https://www.bruegel.org/publications/datasets/european-union-countries-recovery-and-resilience-plans/

However, keeping several caveats in mind, when looking at the different RRPs, some general and common elements can be highlighted. One, for instance, is the fact that all plans, except for Sweden and Latvia, have requested the full amount of grants (or more). As well, seven countries have also requested loans - Greece, Italy, Romania, Cyprus, Poland, Portugal, and Slovenia. While the first three have requested the full amount of loans available, the others have requested between 16% and 37% of the loans available. Moreover, not all MSs specify the exact green and digital tag for each sub-component, while all of them present the general weight of the green and digital areas (which as mentioned have to be at least 37% and 20%, respectively).

What also emerges from this research is that countries receiving relatively **smaller amounts from the RRF (compared to their GDP) concentrate investments on green and digital spending**. This is the case for instance of countries such as Germany, Luxembourg, and Denmark. On the other hand, in the Plans of those states receiving higher funding, we see on average more diverse measures, with more funding for non-green and non-digital shares of spending.

Figure 7. Funds allocated to the digital transition per Member State[45]



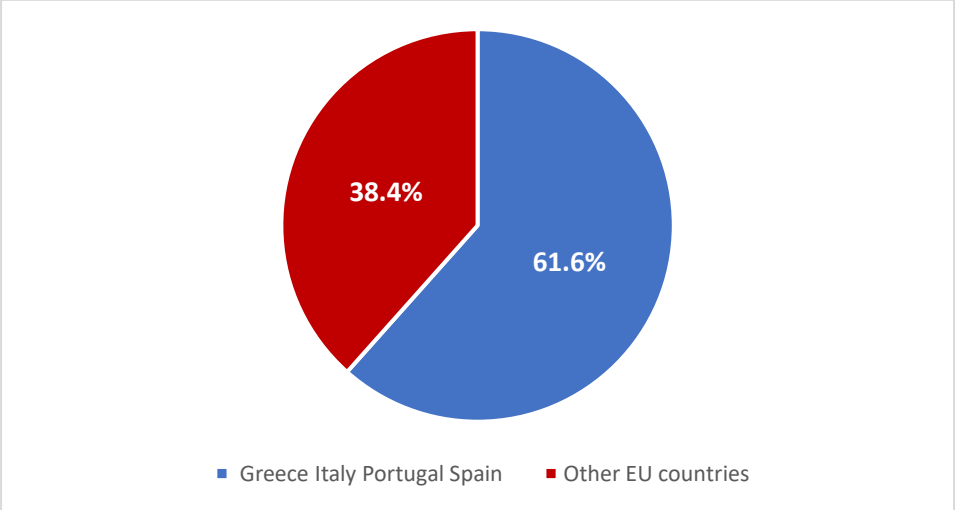
Source: the calculations for Italy, Portugal, and Spain are based on the data presented respectively by I-Com, IPP and Elcano Royal Institute in the previous chapters of this paper. For the other Member States calculations are based on Bruegel's dataset.[46] *For this reason, data for Greece provided at page 17 are different from the ones provided in this chart because the first do not include data relative to loans and grants beyond the Greek RRP pillar primarily concerning the digital transformation.*

[45] Up to the current date, the Netherlands has not yet presented a Recovery and Resilience Plan. With regards to more recent developments, in March 2022 the Dutch Minister of Finance sent a first draft of the Dutch RRP to Dutch Parliament. According to the latter, the draft plan includes 39 plans for reforms and investments worth €7.7 bn. See also: https://www.euractiv.com/section/politics/short_news/dutch-finally-present-eu-recovery-fund-plans/

[46] https://www.bruegel.org/publications/datasets/european-union-countries-recovery-and-resilience-plans/

Figure 8 shows the amount of funds allocated to the digital transition, expressed for each Member State as a percentage of the total RRP amount (left axis) and as a percentage of GDP (right axis).
In absolute terms, the RRP resources (grants and loans) allocated by Member States to the digital transition are in total €131.5 bn. However, looking specifically at the four countries studied in the previous chapters, the Prometheus members (Spain, Portugal, Greece, and Italy), and the funds allocated to the digital transition for each of them, we see that they alone reach an impressive amount of € 81 bn.
While this sum alone is quite remarkable, it becomes even more interesting when we realize it is equal to 61.6% of the total amount of RRP funds allocated in total to the digital transition (Fig. 8).

Figure 8. RRF funds allocated to the digital transition



Source: the calculations for Italy, Portugal and Spain are based on the data presented respectively by I-Com, IPP and Elcano Royal Institute in the previous chapters of this paper. For the other Member States calculations are based on Bruegel's dataset.

5.2. Comparing the four RRPs over EU digital priorities

5.2.1. Connectivity

The EU policy context

One of the main goals of the EU in the Digital Decade is for Europe to become the most connected continent by 2030.[47] This goal implies that every household in the EU should have access to high-speed internet coverage by 2025 and gigabit connectivity by 2030.[48] Consequently, the EU has taken actions in several ways with the intent to improve connectivity.
The actions adopted at EU level include (a) introducing the European electronic communications code, which sets rules applicable across the EU; (b) supporting wireless networks such as 5G through the radio spectrum policy programme; (c) ending of roaming charges in the EU, [49] and "roam-like-at-home" rule; (d) leading global discussions on Internet development and governance.[50]

Most importantly, the EU has committed to supporting the improvement of network coverage and the introduction of 5G networks across Europe, through funding, supporting experts and creating guidance and guidelines, such as the Connectivity Toolbox, a set of best practices for the timely rolling out of 5G and fast broadband. Furthermore, with its line of action, the EU aims to set a higher standard of service, bring broader and more diversified choices to consumers and reduce costs. To achieve these objectives, the focus has shifted towards creating a harmonised set of rules for connectivity services, so that everyone will have access to the same connection EU wide.

How the Four plans would contribute

This said about connectivity, it is interesting to recall how several measures regarding this field can also be found in the Resilience and Recovery Plans. To begin with, **the Greek RRP** contains investments in the field of connectivity for a total amount of €1.2 bn (18% of the RRP's total digital budget). Out of this considerable amount, €321.6 m were financed by the grant component of the RRP and a further €912 m for investments in Very High-Capacity Networks was based on the € 12.7 bn Loan Facility.

More specifically, the key objectives of the devoted to connectivity related reforms and investment Component 2.1 of the Greek RRP, entitled "Enhancing connectivity for citizens, businesses and the state", include: (a) the facilitation of fibre optic infrastructure installation, (b) the development of

[47] https://digital-strategy.ec.europa.eu/en/policies/connectivity
[48] https://digital-strategy.ec.europa.eu/en/policies/connectivity
[49] https://europa.eu/youreurope/citizens/consumers/internet-telecoms/mobile-roaming-costs/index_en.htm
[50] https://digital-strategy.ec.europa.eu/en/policies/connectivity

5G networks covering major Greek highways, (c) the switch to fast broadband connections and transition to 5G technology, and (d) the utilisation of space technologies and applications. Indicative planned reforms for achieving these priorities are the transition to 5G technology, transition to 100/200 Mbps (UltraFast) broadband connections and strengthening the Superfast Broadband demand.

Further investments that will be supported in this context include: (i) installation of fibre optic infrastructure in buildings, (ii) installation of submarine fibre cables and (ii) 5G networks – 5G corridors, which will provide coverage of all Greek motorways that are part of the Trans-European Transport Networks. The investment budget under Component 2.1 is €582 m, of which €522 m (90%) are covered by the Recovery and Resilience Facility.

While these measures are particularly important within the framework of the RRF facility, on the other hand, they can also be analysed from a broader perspective and in connection with other financial measures. More specifically, it is worth recalling how Component 2.1 of the Greek RRP not only supports the European Flagship "Connect" (its goal being to improve access to very high-capacity networks and contribute to achieving by 2025 a high 5G signal coverage), but it is also in line with the Digital Transformation Bible (DTB). This component addresses the country-specific recommendation 3 (CSR) of the 2020 Council Recommendations, which calls on Greece to focus on investment concerning digital transition, particularly those regarding very high-capacity digital infrastructure.
However, Greece is not the only country that has allocated consistent resources to the field of connectivity. Several measures are also included in the **Italian RRP**, and especially in Mission 1 of the Plan. One of the main goals within this Mission is to broaden the coverage of ultra-broadband networks for the whole country, with investments in connectivity equal to € 6.7 bn.

Particularly interesting here is the second component of Mission 1 (M1.C2) that focuses on the modernisation and digitisation of the Italian production system and was allocated a total budget of €23.89 bn. Among the several measures in this component, there are interventions which focus on the development of a Very High-Capacity Network, such as ultra-fast fibre optic networks and 5G (Investment 2.3) and investments in satellite technology (Investment 2.4).

As already introduced in the Italian chapter of this paper, Italy's plan presents five projects in the field of connectivity: (a) "Italia a 1 Giga" to provide at least 1 Gbit/s in download and 200 Mbit/s in upload connectivity in next-generation access (NGA) market failure areas; (b) "Italia 5G", focusing on investments to boost the deployment of 5G mobile infrastructure in 'market failure areas', 5G corridors and 5G-ready extra-urban roads; (c) "Connected schools", focusing on linking the school system with high capacity networks; (d) "Connected health care facilities" to increase the connectivity of hospitals and healthcare facilities; and (e) "Connected smaller islands" to bring submarine cables to these areas.

Moving on to connectivity-related measures in the **Spanish RRP**, we must recall Lever Policy 5 on "Modernisation and digitalisation of industries, SMEs, tourism and the building-up of an entrepreneur nation". The latter is not only deeply intertwined with the field of connectivity but is also the lever policy receiving the highest percentage of investment, with a budget of € 16.1 bn, (amounting for 23.1% out of the total of investments). Within this policy we can find specific funds allocated to the digital connectivity, cybersecurity and 5G deployment, which will receive €4 bn, so 5.8% of the total EU funds.

With regards to 5G, Spain envisages €770 m of public funding for the deployment of 5G access network infrastructure and transmission network reinforcements, including €150 m to create passive mobile infrastructure in rural areas without 4G coverage. Finally, as Spain plays a crucial role in the field of submarine cables, the country has planned various initiatives for this sector. The main goal in this area is for the government to remove all those obstacles that hinder these investments, and thus allow the country to strategically seize its geographical location.

On the other hand, the **Portuguese RRP** does not specifically foresee investments in connectivity. This may be both because Portugal already scores well for high-speed coverage, and because other national initivatives are already addressing remaining coverage issues.

Table 14: Recap of Prometheus countries' measures in the field of "Connectivity"

COUNTRY	BUDGET	MOST SIGNIFICANT MEASURES
GREECE	**€1.2 bn**	• Component 2.1 – Measures concerning: (a) the facilitation of fibre optic infrastructure installation, (b) the development of 5G networks covering major Greek highways, (c) the switch to fast broadband connections and transition to 5G technology, and (d) the utilisation of space technologies and applications. Indicative planned reforms for achieving these priorities are the transition to 5G technology, transition to 100/200 Mbps (UltraFast) broadband connections and strengthening the Superfast Broadband demand. • Further investments that will be supported in this context include: (i) installation of fibre optic infrastructure in buildings, (ii) installation of submarine fibre cables and (ii) 5G networks – 5G corridors, which will provide coverage of all Greek motorways that are part of the Trans-European Transport Networks. The investment budget under component 2.1 is €582 m, of which €522 m (90%) are covered by the Recovery and Resilience Facility.

ITALY	**€6.7 bn**	• Component M1.C2 - Investment 2.3 on the development of a Very High-Capacity Network, such as ultra-fast fibre optic networks and 5G; and Investment 2.4 on satellite technology (). • Italy's plan presents five projects in the field of connectivity: (a) "Italia a 1 Giga"; (b) "Italia 5G"; (c) "Connected schools", (d) Connected health care facilities and (e) "Connected smaller islands"
SPAIN	**€4 bn (partially)**	• Lever Policy 5 - where part of the funds is allocated to digital connectivity, cybersecurity and 5G deployment; deployment of 5G access network infrastructure and transmission network reinforcements (€770 m); and creation of passive mobile infrastructure in rural areas without 4G coverage. • Various initiatives in the field of submarine cables
PORTUGAL	-	• No initiatives foreseen on this topic

Source: Elcano Royal Institute, I-Com, IOBE and IPP-Lisbon.

5.2.2. Digital skills

The EU policy context

While it is true that nowadays digitals skills are necessary for all citizens, many Europeans still do not have adequate digital skills. According to the Digital Economy and Society Index (DESI), 4 out of 10 adults in Europe lack basic digital skills. Because of these alarming figures, the EU has developed a range of policies and initiatives to increase the digital skills of people in the EU (both the workforce and consumers). More specifically, the European Commission aims to reduce the level of 13-14 year-olds who underperform in computing and digital literacy from 30% (2019) to 15% in 2030 and it has set targets in the European skills agenda and the digital education action plan to ensure that 70% of adults have basic digital skills by 2025.[51]

To achieve these goals in the field of digital skills, the EU has been investing in several programmes related to the digital skills of EU citizens. The first of these programmes is the + European Skills Agenda,[52] a five-year plan to help people and businesses develop better digital skills and to put them to use. This programme includes 12 actions organised around four building blocks, namely: (a) a call to join forces in a collective action (A Pact for Skills, Action 1); (b) actions to ensure that people have

[51] https://digital-strategy.ec.europa.eu/en/policies/digital-skills-and-jobs
[52] https://ec.europa.eu/social/main.jsp?catId=1223&langId=en

the right skills for jobs (Actions from 2 to 8); (c) tools and initiatives to support people in their lifelong learning pathways (Actions from 9 to 11); (d) a framework to unlock investments in skills (A Pact for Skills, Action 12 - Improving the enabling framework to unlock Member States' and private investments in skills. The funding of this programme will be supported by several EU resources such as: (a) the European Social Fund Plus (€ 61.5 bn); (b) Erasmus (€ 16.2 bn); (c) InvestEU (€ 4.9 bn); (d) European Globalisation Adjustment Fund (€ 1.1 bn); (e) European Solidarity Corps (€ 0.8 bn); and, of course, (f) Digital Europe (€ 0.5 bn). [53]

The second important measure in this field is the Digital Education Action Plan (2021-2027), a renewed EU policy initiative whose goal is to support the sustainable and effective adaptation of the education and training systems of EU Member States to the digital age. The Digital Education Plan presents two priorities and puts forward the following actions for the period 2021-2027. Under the first priority, "Fostering the development of a high-performing digital education ecosystem", the plan presents six actions, such as "Strategic Dialogue with Member States on the enabling factors for successful digital education" (Action 1) and European Digital Education Content Framework (Action 3). Under the second priority, "Enhancing digital skills and competences for the digital transformation", the plan presents six more actions such as a European Digital Skills Certificate (EDSC) (Action 9) or women's participation in STEM (Action 9).[54] Overall, the Digital Education Plan contributes to the priorities expressed by the EC's 'A Europe fit for the Digital Age' and also to those of the Next Generation EU. Moreover, it also supports the Recovery and Resilience Facility, which aims to create a more digital and resilient European Union.

Thirdly, it is important to recall the Skills and Jobs Coalition, that deals with the digital skills gap across citizens by bringing together Member States, companies and organisations.[55] The Coalition's work covers four pillars : (a) "Digital skills for all" which enables all citizens to actively participate in European digital society; (b) Digital skills for the labour force, which promotes digital skills and upskilling and reskilling the workforce as well as job seekers; (c) "Digital skills for ICT professionals" which focuses on developing advanced digital skills for ICT professionals in all industry sectors; and (d) Digital skills in education, focusing on the innovation of education under this point of view.

How the four plans would contribute

Given the importance of digital skills and how broadly this issue is tackled at EU level, we can now focus on how this topic is addressed by national RRPs.

[53] According to the official portal of the European Skills Agenda: "*Resources from the Recovery and Resilience Facility specifically for skills investment cannot yet be estimated*" *See:* https://ec.europa.eu/social/main.jsp?catId=1223&langId=en
[54] https://education.ec.europa.eu/focus-topics/digital-education/about/digital-education-action-plan
[55] https://digital-strategy.ec.europa.eu/en/policies/digital-skills-coalition

The **Greek RRP** presents several measures closely linked to the field of digital skills. Greece intends to integrate digital skills in all educational curricula and, at the same time, upskilling and reskilling programmes for the labour force have been planned. Moreover, the RRP includes reforms and investments that digitalise processes and infrastructures, such as the modernisation of Vocational Education Training (VET) curricula with a focus on digital skills (€690 m). Finally, Greece intends to allocate part of the resources to the upgrading of digital skills for conscripts and the military (€32 m), as well as judges and judicial employees (€32 m).

As far as digital skills in the **Italian RRP** are concerned, it is clear the country lags well behind in the areas of the digital skills, which appear to be lower than the EU average. As outlined in the RRP, bridging this gap and promoting more investments at national level, is crucial in order to increase the competitiveness of the country.

Some interesting references to the field of digital skills can be found in Mission 1 and, more specifically, in Component 1 (M1C1) related to **the PA digitisation. In this component, several measures deal with the** enhancement and strengthening of human capital and digital skills of Italian citizens.

However, Mission 1 is not the only one dealing with this field, measures and plans connected to the upgrade of digital skills continue in Mission 5, which focuses on the relaunch of the labour market in Italy. The two most important measures of this mission are Reform 1.1. focusing on labour market regulation reform and training, and Investment 2.1 on the "digital civil service" to create a link between younger and older citizens to increase digital skills through a voluntary base, as well as Investment 3.1 related to sport and social inclusion.

Out of the four RRPs analysed in this paper, the **Portuguese** is probably one of the most interesting when it comes to human capital and digital skills. The Portuguese plan addresses barriers to productivity and potential growth, such as gaps in human capital, through several measures focusing on digital skills and education. Portugal intends to invest in the development of its citizens' digital skills (both at basic and advanced level), and the use of digital technologies in education and training. Moreover, Portugal means to improve not only the use of digital tools to improve education, but also increase the teaching of digital skills to all citizens.

In this area, it is interesting to recall Component 16 entitled "Enterprises 4.0" and the Reform "Digital Transition of the business community". The latter will include digital competences in the National Catalogue of Qualifications. Another interesting component is n. 19, "Digital Public Administration", and its Reform, "Public Administration Empowered to Create Public Value". This reform aims to improve the competence of public employees, particularly in the digital area, and apply new working models such as teleworking. This reform is linked to the investment in skills training and was due on 30 June 2021.

The second monetary investments allocated to this component focus on "Building Public Administration Skills" – training workers and managing the future (€88 m). Further measures can be found in Component 20 on Digital School (€559 m). This component aims at improving the digital skills of teachers, students and school staff and integrating technologies in different curricular areas. In particular, the Reform for "Digital Education" looks at redesigning digital education, improving curricular autonomy and flexibility and how digital technologies will be used in the knowledge acquisition process. Finally, related measures from other components include "Qualification and skills" (vocational and life-long learning) with a budget of €666 m to modernise vocational education and training institutions.

Last but not least, the **Spanish RRP** also devotes a large share of its funds to increasing the level of advanced skills for both enterprises and the workforce. According to DESI 2020, on the one hand, Spain has a satisfactory level of Internet and basic user skills, but, on the other, it is one of the countries lagging behind in advanced skills and this applies especially to Spanish SME's.

With regards to measures dealing with digital skills, it is important to recall Lever Policy 7, entitled "Education and knowledge, lifelong learning and capacity building", which has a specific measure focusing on this area. The National Plan on Digital Skills, which was allocated a budget of €3.6 bn and is one of the 8 (out of 30 components) that are given 40% or more resources for their digital transformation. The goal of the National Plan for Digital Skills is to create a roadmap that will serve to identify the measures needed (on a national, regional and local level) to ensure that all citizens have access to relevant resources so they can acquire and develop digital skills.

Overall, is worth pointing out that developing and encouraging more digitally skilled workers and citizens is crucial for the European Union, not only to regain and maintain its competitiveness in the global arena, but also to establish an inclusive digital society for all EU citizens. The Recovery and Resilience Facility and the National plans could, therefore, contribute to this goal and push the path towards a digitally prepared EU population.

Table 15: Recap of Prometheus countries' measures in the field of "Digital Skills"

COUNTRY	MOST SIGNIFICANT MEASURES
GREECE	• Integrate digital skills in all educational curricula and, at the same time, upskilling and reskilling programmes for the labour force, see: Modernisation of Vocational Education Training (VET) curricula with a focus on digital skills (€690 m). • Upgrade digital skills for conscripts and the military (€32 m), • Upgrade of digital skills for judges and judicial employees (€32 m).

ITALY	• Mission 1 – Investment 1.7 on Basic Digital Skills (€ 0.2 bn); Investment 1.4 "Digital Services & Digital Citizenship" (€2.01 bn); Reform 2.3 "Skills and career" (€0.2 bn); and several measures of M1C1 related to **the digitisation of the public administration.** • Mission 5 – Reform 1.1. focusing on labour market regulation reform and training; Investment 2.1 on the "digital civil service"; Investment 3.1 related to sport and social inclusion.
SPAIN	• Lever Policy 7 – National Plan on Digital Skills (budget of €3.6 bn)
PORTUGAL	• Component 16 – Include digital competences in the National Catalogue of Qualifications. • Component 19 – Reform "Public Administration Empowered to Create Public Value" focusing on the digital competence of public employees, and apply new working models such as teleworking.; investment in skills training; Investment in Building Public Administration Skills – training workers and managing the future (€88 m). • Component 20 on the Digital School (€559 m) - Improving digital skills of teachers, students and school staff and integrating technologies in different curricular areas; Reform for "Digital Education" aims to redesign digital education, improving curricular autonomy and flexibility and how digital technologies will be used in the knowledge acquisition process. • Other components – "Qualification and skills" (vocational and life-long learning) with a budget of €666 m modernise vocational education and training institutions.

Source: Elcano Royal Institute, I-Com, IOBE and IPP-Lisbon.

5.2.3. Digital Transformation of Public Administrations between data strategy and cloud migration

The EU policy context

In the last decade, digitising public services has increasingly become a key priority for governments intending to make administrative procedures faster and more accessible to citizens across the EU. Yet digital transformation of public administrations can have larger consequences than a mere simplification of administrative procedure. Digitising public services and increasing the use of cloud implies a broader modernization of the state and governance models.

Here, it is important to recall that as announced in its Work Programme for 2020, the European Commission adopted the European Strategy for Data in February of the same year. The goal of this

strategy is to create a "single market for data" that will boost EU's role in the field of data sovereignty. On November 2020, the EC adopted the Data Governance Regulation,[56] the aim being to give companies better access to data in order to develop new products and services. It must be noted that access to big data is a key element also for the development of AI technology.
As far as more recent developments are concerned, it's worth recalling that the Data Governance Act was adopted by the European Parliament in April 2022.

This first proposal in the field of data was followed in February 2022 by another proposal on harmonised rules on fair access to and use of data (the Data Act).[57] Before the Data Act was published, the EC ran an open public consultation on the proposal in the period from 3 June to 3 September 2021 in order to help shape the proposal. The Data Act plays a crucial role in the above-mentioned European Strategy for Data. This proposal intends to make Europe a leader in the data economy "by harnessing the potential of the ever-increasing amount of industrial data". While the Data Governance Act regulates the processes and structures to facilitate collection and use of data, the Data Act specifies which subjects can produce value from data and under which conditions.

The goal of the Data Act is to make more data available for citizens, companies and public administrations through measures that: increase legal certainty for subjects generating data; prevent contractual abuses that prevent fair data sharing; create ways for the public bodies to access and use data held by the private sector that is necessary for specific public interest purposes; and develop an efficient framework that will allow customers to switch between different providers of data-processing services to unlock the EU cloud market. The Data Act has been open for feedback from stakeholders from 14 March to 13 May 2022.

How the four plans would contribute

Looking at the four Plans which were presented and discussed in the previous chapters, we can observe how several measures connected to the field of digital transformation of public administration and cloud are to be found in all of them.

To begin with, several references on this topic can be found in **the Greek RRP.** First of all, it is possible to recall component 2.2 of the Plan which promotes the digitalisation of the public sector and modernisation of the state, through the incorporation of new technologies. Among the several reforms of this component, one that appears to be particularly interesting is that dealing with the interconnection and interoperability of registries, systems and services for data exchange between public organisations.

[56] https://digital-strategy.ec.europa.eu/en/policies/data-governance-act
[57] https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1113

Moreover, some other investments in the context of this component concern the acquisition of Central Cloud Computing Infrastructure and Services, and the upgrade of cloud-computing infrastructure and services for the National Infrastructures for Research and Technology. Other resources were allocated to the strengthening of interoperability and development of web services, the establishment of more e-Registries, the development of customer relationship management systems (CRM), a new system for public procurements, a central document management system, and the modernisation of public administration One-Stop Shops.

Finally, when it comes to the digital transformation of public administration and cloud in the Greek RRP, some important measures can also be found in component 2.3 of the Plan. This component promotes - European strategies, initiatives and plans to increase the share of companies using advanced cloud services and big data by 2025.

Thus, said about the Greek Plan, other measures connected to the field of data and cloud can also be found in the **Italian RRP**. Here, Mission 1 and its first component (M1.C1) may be recalled, which focuses on the "**Digitisation, Innovation and Security of the Public Administration".** In this component, the Italian NRRP devolves significant resources to the field of "Digital public services" and includes several measures connected to the cloud and data field, such as the development of a national cloud-based hybrid infrastructure (*Polo Strategico Nazionale*) and the migration of local and central public administration IT systems to a cloud-based system.

In addition, the Plan includes a reform on "Cloud first and interoperability" that will ease cloud adoption, streamline the data-exchange between public administrations, and enhance the adoption of digital services. Other investments will increase the accessibility to online public services and complete key digital platforms like SPID and ANPR, while an investment of €556 m will be devolved for the creation of a National Digital Data Platform (*Piattaforma Digitale Nazionale Dati*).

Apart from Mission 1, we can find several measures connected to the area of cloud and data in Mission.6, which focuses on the Italian Health System. More specifically, Investment 1.3 of M6 focuses on strengthening the technological infrastructure of hospitals and health facilities specifically for the collection, processing, analysis and simulation of data.

Moving on to digital transformation and cloud in the **Portuguese RRP**, some references can be found to this field in Component 19 of the Plan entitled "Digital Public Administration". This component consists of three reforms and seven investments, and focuses on the need to provide better, simpler and more digital public services. In this component, it is particularly interesting to recall Investment 3 entitled "Sustainable e-services" with an allocated budget of €70 m. As was previously mentioned in the Portuguese chapter of this paper, this investment combines three main measures which focus on the use of data in the public Administration, and specifically in their organisation, communication, and safety.

Yet, this investment is not the only important measure in component 19 of the Portuguese plan. In fact, two reforms of this component also appear to be closely linked to the field of data and cloud. The first, "Simple, inclusive and secure digital public services for citizens and businesses", aims at making public services more digital and less burdensome for Portuguese citizens, while the second, "Functional and organic reform of Public Administration", by exploiting synergies using a centralised joint platform, aims at reorganising and simplifying public services.

Turning to the **Spanish RRP,** we can observe that among the several lever policies that make up this Plan**,** Lever Policy 4 entitled "An Administration for the 21st Century" is probably the most interesting. In the latter we can find the Plan for the Modernisation of the Public Administration (with an allocated budget of €4.3 bn), and its section "Digital transformation of the public administration" with a budget of €3.2 bn. This section focuses on the digitisation of justice, healthcare, employment, education and social service systems, which indirectly also regards the field of data and a partial shift towards cloud for public administrations.

Where the field of data is concerned, Spain intends to secure its position in GAIA-X, the Franco-German initiative for the next generation of European data infrastructure. As previously mentioned, this project aims to develop common requirements for a European data infrastructure.[58] More specifically, Spain's government has decided to create a national Gaia-X hub[59] that will create a Spanish data sharing ecosystem, especially in the tourism sector. Moreover, Spain participates in the project on Next Generation Cloud Infrastructures and Services (IPCEII-CIS) together with France, Italy, Germany, Belgium, Hungary, Latvia, Luxembourg, the Netherlands, Poland and Slovenia.
It goes without saying that digital public services and, therefore, an increased use of cloud technologies bring many opportunities to both citizens and businesses, students, workers, and all types of citizens can complete an impressive number of tasks with just a "click".

As seen, the EU is working to help public administrations across Europe to become more digitalised and, therefore, allow all citizens to enjoy the benefits of smart public services during the Digital Decade.[60] In this evolving scenario, the resources that have been allocated through the Recovery and Resilience Facility are certainly a step in the right direction.

[58] https://blog.realinstitutoelcano.org/gaia-x-oportunidad-para-la-soberania-digital-europea/
[59] https://gaia-x.eu/who-we-are/hubs/
[60] https://digital-strategy.ec.europa.eu/en/policies/digital-public-services#:~:text=The%20EU%20is%20working%20to,they%20are%20accessible%20across%20borders.

Table 16: Recap of Prometheus countries' measures in the "Digital Transformation of Public Administration and Cloud"

COUNTRY	MOST SIGNIFICANT MEASURES
GREECE	• Component 2.2 - Reform on the interconnection and interoperability of registries, systems and services for data exchange between public organisations. • Component 2.3 – Investments in the acquisition of Central Cloud Computing Infrastructure and Services, and the upgrade of cloud-computing infrastructure and services for the National Infrastructures for Research and Technology; strengthening of interoperability and development of web services; the establishment of more e-Registries; development of customer relationship management systems (CRM), new system for public procurements, a central document management system, and the modernisation of public administration One-Stop Shops.
ITALY	• Component M1C1 - The development of a national cloud-based hybrid infrastructure (*Polo Strategico Nazionale*); the migration of local and central public administration IT systems to a cloud-based system; reform on "Cloud first and interoperability"; National Digital Data Platform (*Piattaforma Digitale Nazionale Dati*). • Component M6.C1 – Investment 1.3 on strengthening the technological infrastructure of hospitals and health facilities specifically for the collection of data.
PORTUGAL	• Component 19 – Investment 3 on sustainable e-services (budget of €70 m) and the use of data in the public administration; reform "Simple, inclusive and secure digital public services for citizens and businesses"; and reform "Functional and organic reform of Public Administrations".
SPAIN	• Lever Policy 4 entitled "Plan for the Modernisation of the Public Administration" (with an allocated budget of €4.3 bn), and its section "Digital transformation of the public administration" with a budget of €3.2 bn.

Source: Elcano Royal Institute, I-Com, IOBE and IPP-Lisbon.

5.2.4. Cybersecurity

The EU policy context

Given the current "connected" era we are currently living in, the risks and threats from cyberspace have dramatically increased. In the last years, the European Union's work in this field has expanded exponentially on various fronts, from promoting cyber resilience and safeguarding our communication and data, to keeping online society and economy as safe as possible.

In December 2020, the Commission and the High Representative of the Union for Foreign Affairs and Security Policy presented the new EU Cybersecurity Strategy.[61] The latter intends to create a global and open Internet which will limit risks to security and fundamental rights. The strategy encompassed concrete proposals for deploying three types of instruments - regulatory, investment and policy initiatives. The strategy deal with the security of essential services such as the railway network, the health system, energy grids of Member States, and the booming number of connected objects in our lives. The strategy aims to build collective capabilities to respond to major cyberattacks.

More specifically, the strategy addresses three fields of action at EU level: (a) resilience, technological sovereignty and leadership; (b) operational capacity to prevent, deter and respond; (c) cooperation to advance a global and open cyberspace. Under the first line of action, the Commission proposes to reform the rules on the security of network and information systems, and this through a Directive on measures for high common level of cybersecurity across the Union (revised NIS Directive or 'NIS 2'),[62] in order to increase the level of cyber resilience of critical public and private sectors. There is also the proposal to launch a network of Security Operations Centres across the EU, which will be powered by artificial intelligence and will create a 'cybersecurity shield' for EU space.

Other measures will focus on support for SMEs and upskilling their workforce. Under the second line of action, a new Joint Cyber Unit will be launched to strengthen cooperation between EU bodies and Member State authorities. The EU will also enhance cyber defence cooperation, develop cyber defence capabilities, build on the European Defence Agency's work, and encourage Member States to use the Permanent Structured Cooperation and the European Defence Fund.

Finally, the third line of actions intends to increase cooperation with international partners to strengthen the rules-based global order. The EU will further strengthen its EU Cyber Diplomacy

[61] https://ec.europa.eu/commission/presscorner/detail/en/IP_20_2391
[62] https://eucyberdirect.eu/news/council-and-eu-parliament-reach-an-agreement-on-the-nis-2-directive

Toolbox and increase cyber capacity-building efforts to third countries by developing an EU External Cyber Capacity Building Agenda.

It should be noted that the EU intends to support this strategy through an unprecedented level of investment, proof of the EU's commitment to the new technological and industrial policy and its recovery agenda.
This support will be carried out through the next long-term EU budget, notably the Digital Europe Programme and Horizon Europe, as well as the Recovery Plan for Europe. Moreover, the EU's new Cybersecurity Strategy is a key element of Shaping Europe's Digital Future, the Commission's Recovery Plan for Europe and of the Security Union Strategy 2020-2025.[63]
The most interesting aspect for the purpose of this paper is the fact that Member States are encouraged to make full use of the EU Recovery and Resilience Facility to boost cybersecurity and match EU-level investment. The objective is to reach up to €4.5 bn of combined investment from the EU, the Member States and the industry, notably under the Cybersecurity Competence Centre and Network of Coordination Centres, and to ensure that a major portion gets to SMEs.

How the four plans would contribute

First of all, it should be pointed out that the four Member States focus on policies strengthening cybersecurity domestic resilience (especially targeting SMEs and skills), but leave out measures related to cyber-diplomacy, that are an important focus of the EU Strategy.

Moving towards a more specific analysis, we can start by recalling the **Greek RRP.**

When it comes to cybersecurity, we can once again recall Component 2.2 of the Greek Plan which is entitled "Enhancing connectivity for citizens, businesses and the state" and promotes the digitalisation of the public sector and, indirectly, also refers to cybersecurity measures.

The most relevant to cybersecurity priority of the Greek plan under Component 2.2, is the adoption of a cybersecurity strategy and policies by the public sector. With the development of a cybersecurity strategy, Greece aims to increase the reliability and security of public sector systems and its data, ultimately leading to a faster digitalisation of public services. The take up of advanced technologies by businesses, such as cybersecurity systems, is the main objective of Component 2.3 of the Greek RRP which focuses on the digital upgrade of the private business sector.

Where the **Italian RRP** is concerned**,** we can observe that cybersecurity plays an important role in the digital transition of the latter. Among other things, the Italian RRP aims at reinforcing

[63] https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1379

cybersecurity with an allocated budget of €623 m, and intends to do so by investing in technology tools and operating structures such as a 'national hyper Security Operations Centre (SOC)' and the creation of a new national cybersecurity agency.

More specifically, we can look at Investment 1.5, quite clearly entitled "Cybersecurity", and was allocated a budget of €0.62 bn. The Italian RRP's goal here is to strengthen the cybersecurity protection of public administration bodies and companies of national interest, enforce the evaluation system of electronic equipment and applications used by those bodies, as well as operationalise the new National Agency for Cybersecurity.

As far as **Portugal** is concerned, cybersecurity is mentioned in the previously introduced Component 19, "Digital Public Administration", of the Portuguese Plan. This component includes three reforms and seven investments, one of which includes four measures that will focus on "Enhancing the overall cybersecurity framework". It is also included the investment in a Cybersecurity DIH according to component 16. The investment focusing on cybersecurity was allocated a budget of €47 m to C19 and less than €100 m to stimulate the business sector in multiple layers, including cybersecurity.

Moving on to the remaining RRP, the **Spanish one,** with regards to the field of cybersecurity it is interesting to recall Component 15. The latter explicitly refers to Digital connectivity, boosting cybersecurity and 5G deployment. This component receives €4 bln, 5.8% of the overall investments. Moreover, it is important to recall that throughout 2022, Spain has committed to achieving several digital-related reforms including some legislative ones, such as the new law on cybersecurity and 5G.

To conclude this analysis, with more recent developments in the field of cybersecurity, it is worth mentioning that on 11 May 2022, EU Member States, with the support of the European Commission and the EU Agency for Cybersecurity (ENISA), published a report on the cybersecurity of Open RAN. According to this report, Open RAN could bring significant security opportunities, however, some challenges to its use cannot be ignored. This applies especially in the short term to the field of cybersecurity- as by increasing the complexity of networks, Open RAN could intensify a number of security risks. To address these heightened risks, the EC's report recommends a number of actions based on the EU 5G Toolbox.

Table 17: Recap of Prometheus countries' measures in the field of "Cybersecurity"

COUNTRY	BUDGET	MOST SIGNIFICANT MEASURES
GREECE	**Figure not available***	• Component 2.2 - Adoption of a cybersecurity strategy and policies by the public sector. • Component 2.3 - take up of digital technologies by businesses, such as artificial intelligence, Internet of Things, cybersecurity systems, cloud services etc.
ITALY	**€ 0.62 bn**	• Component M1C1 - Investment 1.5 entitled "Cybersecurity" (allocated budget of €0.62 bn) aims at reinforcing cybersecurity by investing in technology tools and operating structures such as a 'national hyper Security Operations Centre (SOC)' and the creation of a new national cybersecurity agency.
SPAIN	**€3.6 bn**	• Lever Policy 7 – National Plan on Digital Skills (€3.6 bn)
PORTUGAL	**€47 m + (unavailable sum for the DIH)**	• Component 19 – Investments (4 measures) on "Enhancing the overall cybersecurity framework" (€47 m). • Component 16-i03 – Cybersecurity DIH (portion from € 100 m)

* There is no specific RRP budget allocation concerning the adoption of cybersecurity systems, either from the public or the private sector.

Source: Elcano Royal Institute, I-Com, IOBE and IPP-Lisbon.

5.2.5. Artificial Intelligence

The EU policy context

The current historical period has been described as "the verge of the fourth industrial revolution", with the abundance of data combined with powerful algorithms and artificial intelligence (AI) being its key element. Despite the fact that the EU's interest and actions in the field of AI have a longer interest, the start of the EU's pro-active approach towards AI can be set on 25 April 2018, when the European Commission presented the Communication "AI for Europe". This can be considered as the starting point of the pro-active approach towards AI within the EU. February 2020 marks the beginning of the Von der Leyen Commission's digital proposals, among which a white paper on AI entitled "Artificial Intelligence: a European Approach to excellence and trust"). In June 2020, the

European Parliament established AIDA – a special committee on Artificial Intelligence in a Digital Age - with the objective of analysing AI's impact on the EU economy.

In April 2021, the European Commission published its AI package, which consists of a Communication on Fostering a European Approach to Artificial Intelligence; the Coordinated Plan with Member States: 2021 update; a proposal for an AI Regulation laying down harmonised rules for the EU (AI Act).

As far as the Coordinated Plan is concerned, three key messages can be identified aiming at both EU institutions (here, the Commission) and Member States, that should: (a) increase and speed up investments in AI technologies "to drive resilient economic and social recovery aided by the uptake of new digital solutions"; (b) act on AI strategies and programmes by implementing them in time, so that the EU can benefit from the "first-mover adopter" advantage; (c) align AI policies across the EU, remove fragmentation and address global challenges.

In order to achieve this, the plan sets four central policy goals: (i) set enabling conditions for AI development and uptake in the EU; (ii) make the EU the place where excellence thrives from the lab to market; (iii) ensure that AI works for people and is a force for good in society; (iv) build strategic leadership in high-impact sectors.

With the AI Act and the new Coordinated Plan with Member States, the EU Commission intend to guarantee the safety and fundamental rights of people and businesses, while strengthening AI uptake, investment, and innovation across the EU. In detail, the AI ACT establishes a list of prohibited certain practices for all AI systems as violating EU values and fundamental rights. The regulation follows a risk-based approach, differentiating between uses of AI that create (i) an unacceptable risk, (ii) a high risk, and (iii) low or minimal risk. Moreover, the AI Act also imposes obligations on users of high-risk AI systems, and contains various measures intended to support innovation in this area. The proposal establishes at Union level a European Artificial Intelligence Board (the 'Board'), composed of representatives from the Member States and the Commission. It will also collect and share best practices among the Member States. At national level, Member States will have to designate one or more national competent authorities.
Since its publication in April 2021, the European Commission's Proposal for a Regulation on Artificial Intelligence (AI) has been the source of an increasingly intense debate among stakeholders, both on European and international level. On the one hand, stakeholders and experts have praised the Commission for its efforts to lay down a harmonised framework in the field of AI, while, at the same time, several have recognised the proposal as a first step in defining a new regulatory approach in the field of AI. Moreover, some critics focus on the compliance costs, paperwork and administrative burdens that will fall on companies if the new regulatory framework is enforced, several voices argue that high compliance costs will have a negative impact on businesses, that would be particularly true for SMEs and start-ups, and this will eventually hinder innovation and competition in the field.

With regards to financial and budgetary aspects, it's interesting to point out that the proposal of the Commission is to invests at least €1 bn per year in Artificial Intelligence technologies. This impressive amount of resources will be granted through two key programmes for digital transformation at EU level: the Horizon Europe and Digital Europe. In addition to these two programmes, further resources should be destined to the field of AI from national Resilience and Recovery Plans.
Considering this explicit connection between RRPs and the field of AI, an interesting case is provided by **the Greek RRP.**

One of the key objectives of component 2.1 of the Greek RRP (Enhancing connectivity for citizens, businesses and the State) is the development of 5G networks, in order to cover all Greek motorways part of the Trans-European Transport Networks. To achieve this goal 5G technologies will be combined with other technologies, among which also Artificial Intelligence. Moreover, under component 2.2 of the Greek Plan, one objective is to increase the efficiency of the services provided by the public administration and reduce the systems' maintenance and upgrade costs. This target will be pursued with the aim of technologies such as Artificial Intelligence. Thirdly, it's worth recalling component 2.3 of the RRP of the Plan which focuses on the digital upgrade of the private sector. The main objective of this component is to increase the take up of digital technologies by businesses, such as Artificial Intelligence, Internet of Things, cybersecurity systems, cloud infrastructures and services, to reduce the digital gap between the Greek small and medium-sized enterprises (SMEs) and the European SMEs average.

As far as **the Italian RRP** is concerned, we can start by recalling that, according to DESI, 2020 Italy places itself at a pleasing position when it comes to integration of digital technology (10th in the EU), yet on the other hand the country remains weak in some areas, such as the use of big data and the use of artificial intelligence (18% compared to the EU average of 14%). Given this complex scenario depicted by the DESI 2022, it should not come as a surprise that Italy allocated part of its RRF resources to this field.

More specifically, the Italian RRP allocates resources to the digitalisation of businesses (€12.8 bn), the development and deployment of advanced technologies (€5.1 bn), including AI and ICT-related R&D (€1 bn). Other investments concentrate on advanced technologies (€340 m) with the goal to establish national leaders on key emerging technologies, such as AI.

However, there is one more RRP that deserves to be recalled when analysing the field of AI - **the Spanish one.** As far as the field of AI is concerned, the most relevant part of the Spanish RRP is Lever Policy.6, which focuses on science and innovation and includes several areas of action. Among the several fields of interest of this broad and varied lever policy, AI was allocated a budget of € 500 m through the National Strategy on Artificial Intelligence.

Yet, despite an explicit mention in the Plan and its crucial role at EU level, at first glance, it could seem as if AI in Spain had actually been allocated relatively low resources from the RRF facility. Indeed, the total investment for the National Strategy on Artificial Intelligence according to the Spanish RRP covers 0.7% of the total RRP resources.

However, this does not mean the national Artificial Intelligence strategy is receiving little attention in Spain. On the contrary, the budget for this strategy had already been allocated prior to Spain's RRP and in a budget which had already been allocated at the domestic level in Spain (for a total of € 4.5 bn). Moreover, this national strategy also foresees a public-private joint venture (*NextTech*) which aims at an increase in the available funding for this field.

Another field of particular interest for Spain concerns intangible products. In this area, the government has launched a Plan for the Promotion of Language Technologies and a PERTE (Strategic project for the economic recovery and transformation) for the new economy of Spanish language. The RRP envisages a boost to the so-called "natural language tools" that are the key to Artificial Intelligence and Big Data, with excellent research in this respect in Catalonia and the Basque region.

The Portuguese National AI strategy was first published in 2019, being today promulged by iNCoDe.2030. Very few components within the RRP refer explicitly AI investment with some exceptions included in the health system and social security. The clearest investment in AI included in the **Portuguese RRP** is in component 16-i03 where at least 14 Digital Innovation Hubs are expected to have an impact with Artificial Intelligence. These reach from a Smart Islands Hub (SIH); a Smart Sustainable Farms Foods and Trade European Digital Innovation Hub (SFT-EDIH); a Blue Digital Hub; an Artificial Intelligence & Data Science for Public Administration Portugal Innovation Hub; a Digital Innovation Hub for Artificial Intelligence and High-Performance Computing and others.

To conclude, the Recovery and Resilience Facility provides an "unprecedented opportunity to modernise and invest in AI" and through this opportunity the EU could become "a leader in the development and uptake of human-centric, trustworthy, secure and sustainable AI technologies" as outlined in the official portal of AI Coordinated Plan.[64]

[64] https://digital-strategy.ec.europa.eu/en/policies/plan-ai#:~:text=The%20key%20aims%20of%20the,AI%20policy%20to%20avoid%20fragmentation.&text=The%20Coordinated%20Plan%20on%20Artificial%20Intelligence%202021%20Review%20is%20the,global%20leadership%20in%20trustworthy%20AI.

Table 18: Recap of Prometheus countries' measures in the field of "Artificial Intelligence"

COUNTRY	MOST SIGNIFICANT MEASURES
GREECE	• Component 2.1 - Development of 5G networks, in order to cover all Greek motorways part of the Trans-European Transport Networks with the help of AI • Component 2.2 - Increase the efficiency of Public Administration services through the use of AI • Component 2.3 - Increase the take up of digital technologies by businesses, such as Artificial Intelligence, IoT and other
ITALY	• the Italian RRP allocates resources to the development and deployment of advanced technologies, including AI and ICT-related R&D (€1 bn). • Other investments focus on advanced technologies such as AI (€340 m)
SPAIN	• Lever policy n.6 – National Strategy on Artificial Intelligence (€500 m)
PORTUGAL	• Mainly component 16.i03 - 17 Digital Innovation Hubs (at least 14 including AI)

Source: Elcano Royal Institute, I-Com, IOBE and IPP-Lisbon.

5.3. Conclusions

To conclude, the RRF funds allocated to the digital transition by the four Southern EU countries (€81 bn) are not only an impressive figure per se (related of course to dire economic conditions and Covid impact) but can also be interpreted as a proof of the effort as well as the resources available to Southern EU countries to finally embrace the digital transition and commit to innovating both their public and private sector. Through this impressive investment, which as mentioned took up more than half of the EU's total RRF budget in the digital field, these countries finally have the opportunity to fill the gap with more digitally advanced Member States. This is a goal that cannot be missed.

As a methodological conclusion, it is worth noting that comparing the numerous RRPs is a challenging task because of their different ways of presenting data, information and goals. Indeed, when looking at the different national Plans, it emerges that the organisation and the availability of information regarding figures, definitions, fields of intervention and existence of sub-categories greatly varies across different countries, making it hard to compare also this information.

This could not only be a problem for an effective ex post assessment but reminds also the lack of a concrete coordination between different plans and between the single RRPs and the EU policy strategy in each of the relevant areas.

Conclusions and policy recommendations

The RRP funds (grants and loans) allocated to the digital transition by Prometheus Member States (Spain, Portugal, Greece and Italy) amount to €81 bn, out of a total of €131.5 bn for all Member States. Therefore, the four Southern European countries can rely on most of available resources (61.6%) to close the digital divide with the most advanced Member States and improve the life and productivity of their citizens. This is an unprecedented, as well as unique, opportunity that cannot be missed.

In order to achieve the final outcomes consistent with the envisaged ambitions, several challenges and potential flaws need to be addressed. In its different chapters, the paper has mentioned in particular the following:

1. Generally speaking, **RRPs devote more resources and mechanisms to investments and fewer to reforms**. However, digital transformation can be successful only if it radically changes processes and organisations. All levers, programmes and components touching on the digital transition should prioritise reforms over investments or, at least, find a better balance between both.

2. A **smooth vertical coordination between central and local administrations**, through transparency, accountability and good governance principles, is indispensable. More in general, a decentralised implementation could be positive insofar as measures, once implemented, may greatly and directly impact territories. However, in the digital realm, this means ensuring data interoperability and proper data architecture, for instance.

3. The **horizontal coordination with other EU funds**, stated in Article 28 of the RRF Regulation (2021/241), is not easily achievable without proper tools. It will very much depend on the governance structure put in place in each Member State to manage the different EU funds and programmes.

4. The inadequacy of **digital skills, both basic and specialised,** could represent an important bottleneck to the achievement of the RRPs goals. This problem is generally present, but it appears more urgent to address for **SMEs and the public administrations** in charge of the

plan execution. Training facilities and courses should be scaled up rapidly, thanks also to public-private partnerships.

5. **Key Performance Indicators (KPIs)** have not been defined in all cases 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). Therefore, the RRPs should provide **mechanisms for ex post impact assessment.** A **"return on investment" metric** would allow for estimating why and how each specific investment will achieve the target at hand and could also be used to justify the choice between alternative actions. We also propose that Responsible Entities clearly identify investments and outcomes as being part of the RRP, standardising as much as possible the presentation of the information that is publicly available at different entities.

6. Comparing RRPs is a challenging task because of their **different ways of presenting data, information and goals**. Indeed, when looking at the different plans, it emerges that the organisation and the availability of information regarding figures, definitions, fields of intervention and existence of sub-categories greatly varies across different countries, making it hard to compare also this information. This could be a problem for an effective ex post assessment, relying on a set of information as complete as possible and meaningful benchmarking. For this reason, the European Commission should work with Member States on a **standardised approach**.