



# PORTUGAL INCoDe.2030

NATIONAL DIGITAL  
COMPETENCES  
INITIATIVE e.2030



INCoDe.2030 is an acronym of "Iniciativa Nacional Competências Digitais e.2030"

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A hand is holding a tablet. The screen shows a website with a navigation menu. The menu items are: Home, About Us, Services, Projects, Partners, and Support. The background of the website is a blue sky with a city skyline. The hand is holding the tablet from the right side. The background of the entire image is a blurred city skyline.

1

**An integrated  
public policy  
initiative aimed  
at enhancing  
digital  
competences**

We live in a world that increasingly relies on digital technologies and where online electronic devices are the most common form of interaction. The economy, productivity and competitiveness are also increasingly dependent on digital factors, leading to a growing need for digital literacy in almost every profession.

Even though Portugal is not far from the European median in terms of digital skills<sup>1</sup> (Figure 1), it needs to reinforce them, especially in terms of qualification to encourage Internet usage. To this end, we need both to qualify the young population and requalify our human resources. Portugal's training infrastructures and the strong potential of its human resources make this a viable task, albeit one that requires mobilisation and a combination of efforts from different areas of governance and civil society. To this end, in 2017 the Portuguese government established the "National Digital Competences Initiative e.2030, Portugal INCoDe.2030", an integrated public policy to enhance and foster digital competences.

Digital competences are essential for both exercising full citizenship and to facilitate employability by meeting the needs of an increasing digitisation of the labour market: a more skilled working population gives rise to more new jobs, as well as innovative markets and products, leading to more competitive and robust economic activities. Digital competences are also very important for the development of a critical and multifaceted awareness and to promote social well-being and inclusion.

At the same time, the country itself must be an active agent in the global effort to produce new scientific computing knowledge and develop the capacity to manage and use large amounts of information, to ensure a better position in Europe and the world. We cannot wait to find out what the new technologies will be; we have to be part of their creation.

Therefore, the Portugal INCoDe.2030 initiative has a broad scope in this drive towards digital development, starting with the promotion of digital inclusion and literacy, educating the young generations from an early age, qualifying the active population and specialising its graduates for advanced digital jobs, and to turn the country into a net contributor for the new digital developments.

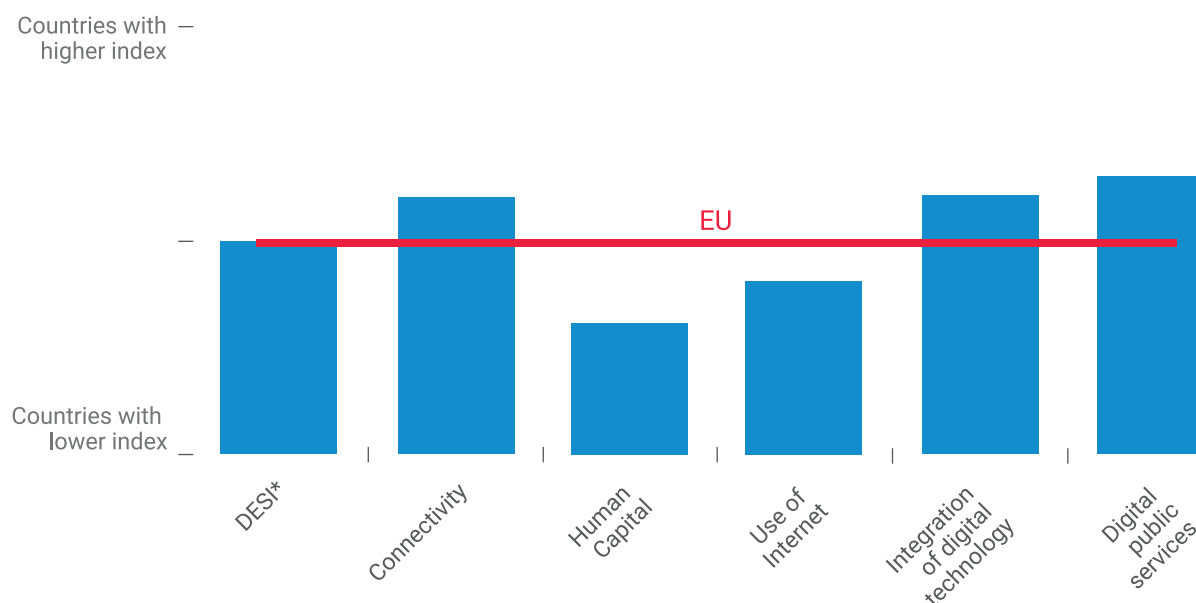


Figure 1. Portugal's relative position in the area of digital competences in the European Commission's DESI 2017 Index  
Source DESI: Digital Economy and Society Index

<sup>1</sup> 15th in the DESI 2017 Index, Digital Economy & Society Index of the European Commission

A photograph of two children in a classroom setting. One child, wearing a light blue t-shirt and dark jeans, is seated in a black office chair, facing a computer monitor. The other child, wearing a striped t-shirt and blue shorts, is standing and leaning over the desk, pointing at the screen. The image is partially covered by a blue semi-transparent overlay on the left side. A blue circle with the number '2' is positioned in the lower-left area of the overlay.

## 2

### What are digital competences?

The Portugal INCoDe.2030 initiative addresses the concept of digital competences in a broad manner. It includes the notion of digital literacy (i.e. the ability to access digital media and ICT, to understand and critically assess contents, and to communicate effectively), as well as the production of new knowledge through research.

The concept of digital competences is also linked to the use of digital technologies to design new solutions for different types of problems, the integration of interdisciplinary knowledge and data analysis, the intensive use of artificial intelligence, as well as of advanced instrumentation and communication networks and mobile systems, and the development and programming of cyber-physical systems. This involves hardware and software and extends the concept of ICT to electronics, automation and robotics.

Competences can be developed to different levels of depth and proficiency in each of these areas, depending on the level of qualification and goals set. These different levels are reflected in the type of measures that will be promoted in an inclusive and comprehensive way for the whole of society.



3

## The big challenges for Portugal, in the area of digital competences

Qualifying the Portuguese population in digital competences is a huge challenge, with several political, economic, cultural and social dimensions.

In this context, the Government has established a set of goals for its term in office covering factors such as social inclusion and digital literacy, and physical and cognitive access to digital services for the entire population, analytical capacity in the context of big data, production and dissemination of information, privacy and security, intensive use of ICT in the process of lifelong learning and R&D aimed at the production of knowledge and advanced forms of scientific computing.

The aim of INCoDe.2030 is to put Portugal among the leading European countries in digital competences, by overcoming three big challenges:



**1. Generalise digital access,** use and literacy, in order to fully exercise citizenship and to promote **inclusion** in an increasingly dematerialised society, where many social interactions happen on the internet and are increasingly mediated by electronic devices.



**2. Stimulate employability** and professional training and **specialisation** in digital technologies and applications, in order to respond to an increasing market demand and to promote qualified jobs in a **higher value added economy**.



**3. Ensure strong participation** in **international R&D networks** and the **production of knowledge** in digital areas.

A person with curly hair is seen from the side, working on a laptop. They are sitting on a balcony with a metal railing, overlooking a coastal city with a large body of water and a distant lighthouse. The scene is bathed in warm, golden light, suggesting sunset or sunrise. A blue semi-transparent overlay covers the left side of the image, containing the chapter number and title.

## 4

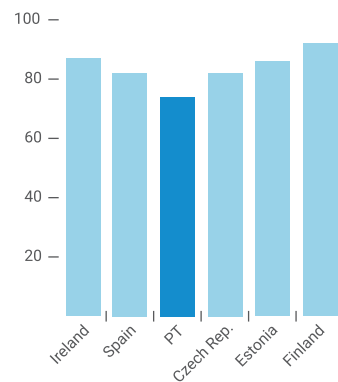
### The place of Portugal in the European context: goals

INCoDe.2030 is set in the international context and aims to improve Portugal's position and competitiveness, working towards securing a prominent place in terms of digital competences in the 2017-2030 period, through a set of actions and initiatives, namely a stronger participation in international scientific and technological networks, primarily in Europe and North America, but also with the Portuguese-speaking countries and the Mediterranean nations of North Africa. Portugal must have a strong presence in the most relevant international arenas dealing with the shift to the digital society and economy, particularly in the EU, OECD and UN, in order to achieve increased visibility, and contribute to opening new markets, attracting talents to Portugal.

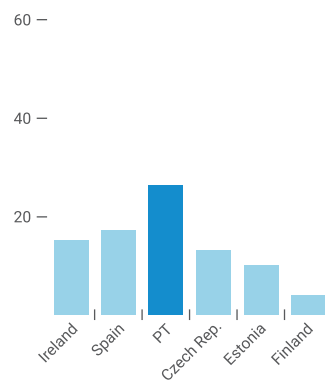
Portugal's current position in Europe, the challenges to be addressed, appraisal of the measures taken and the results achieved over time through this programme can be understood through a set of indicators divided into 5 categories: access, human potential, use, investment, and training and certification (Figure 2).

# Access

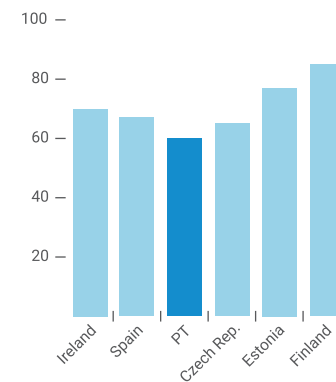
% of households with internet access



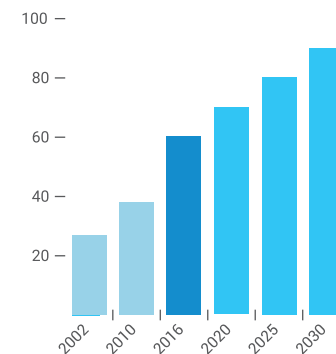
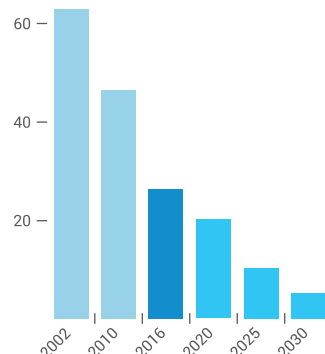
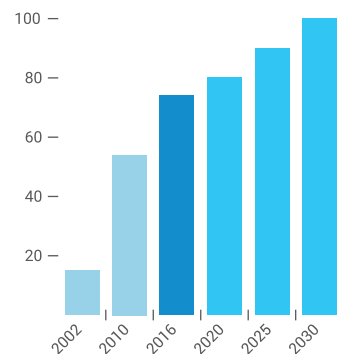
% of individuals who have never used the internet



% of individuals who frequently use the internet



European comparison

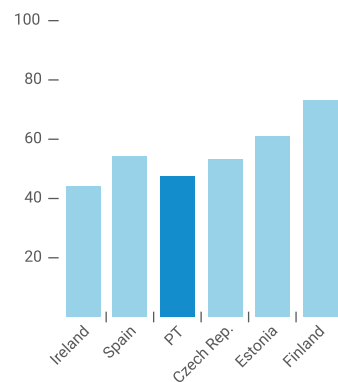


National evolution

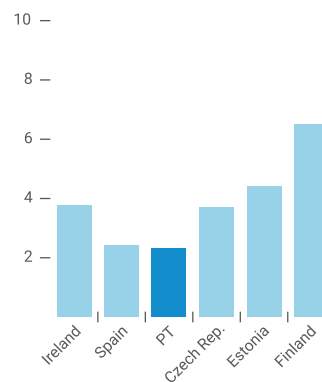
Figure 2. Comparative analysis for a selected set of indicators in digital competences, and the goals throughout the duration of INCoDe.2030  
Source: European Commission, Digital Single Market, Digital Scoreboard - 2016 and Eurostat - 2016

# Human Capital

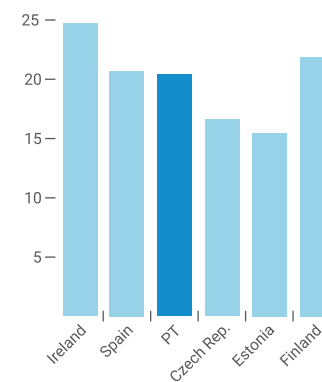
% of individuals with basic or better-than-basic digital skills



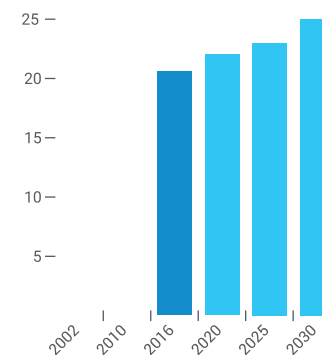
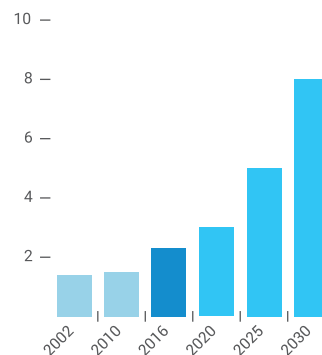
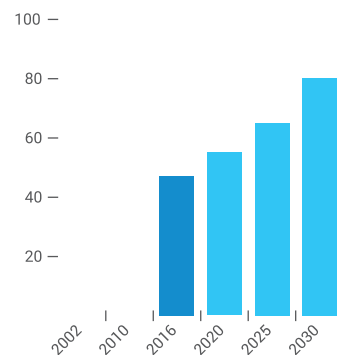
% of ICT specialists in employment



Number of higher education graduates in STEM per thousand inhabitants (20-29 years old)



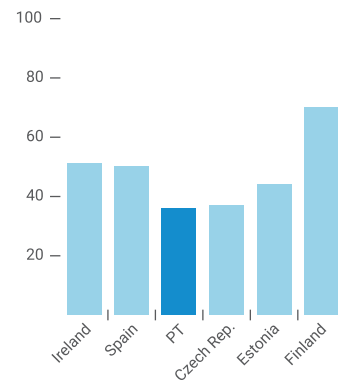
European comparison



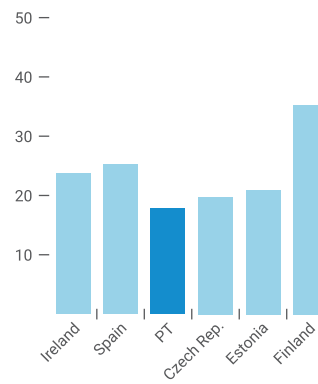
National evolution

Figure 2. Comparative analysis for a selected set of indicators in digital competences, and the goals throughout the duration of INCoDe.2030 (continuation)  
Source: European Commission, Digital Single Market, Digital Scoreboard - 2016 and Eurostat - 2016

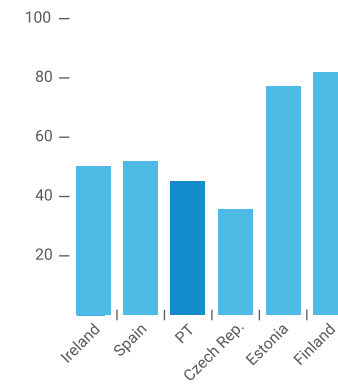
% of employees who use computers with an internet connection at work



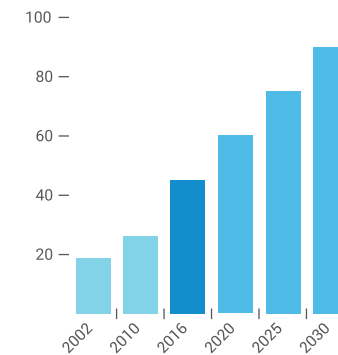
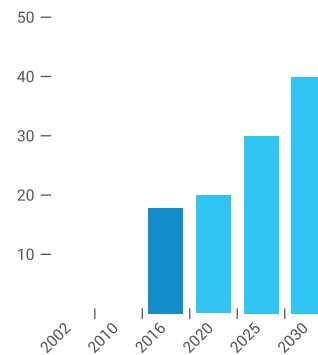
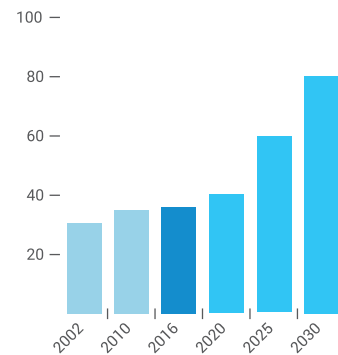
% of SMEs with a high level of digital intensity



% of individuals who have used the internet to use online public services (last 12 months)



European comparison

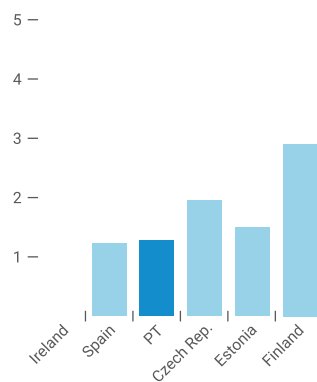


National evolution

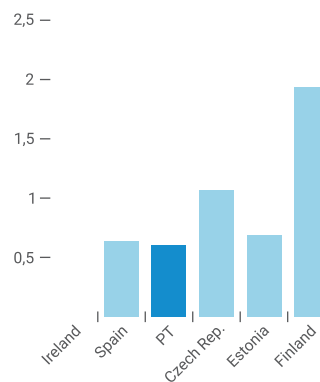
Figure 2. Comparative analysis for a selected set of indicators in digital competences, and the goals throughout the duration of INCoDe.2030 (continuation)  
Source: European Commission, Digital Single Market, Digital Scoreboard - 2016 and Eurostat - 2016

# Investment

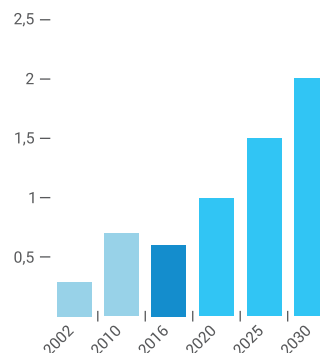
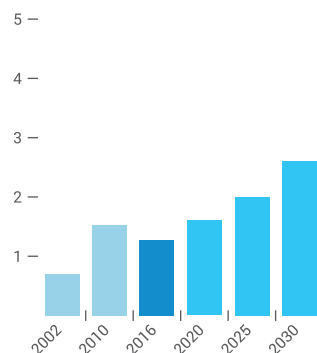
Total expenditure on R&D as a function of GDP (GERD) - %



Business expenditure on R&D as a function of GDP (BERD) - %



European comparison



National evolution

Figure 2. Comparative analysis for a selected set of indicators in digital competences, and the goals throughout the duration of INCoDe.2030 (continuation)

Source: European Commission, Digital Single Market, Digital Scoreboard - 2016 and Eurostat - 2016



A woman with long brown hair, wearing a straw hat and a red top, is seen from the side, holding a smartphone to take a photo of a cityscape. She is standing on a balcony with a green metal railing. The background shows a dense urban area with red-tiled roofs, a body of water, and a distant hill with a tower. The image is partially covered by a blue semi-transparent overlay on the left side.

## 5

### Main action lines

To address the challenges outlined above and the targets identified in Figure 2, the Portugal INCoDe.2030 initiative has proposed a wide range of measures involving the various governmental areas. These measures should be implemented alongside the private sector, academia and civil society initiatives with similar aims. The measures are structured around five main action lines.

A photograph of a person's hand holding a black smartphone. The phone's screen is dark, showing only the status bar at the top with '3G' and a battery icon. The background is a desk with a keyboard, a pair of glasses, a blue box, and some papers. A green semi-transparent overlay covers the right side of the image, containing the text.

# Action Line 1 INCLUSION

Making sure the whole population has equal access to digital technologies to obtain information, communicate, and interact with others.



1

In view of the increasing digitisation of the world today - from education to industry, from entertainment to social life, from cities to farms, from medicine to the environment - it is essential that everyone has the skills, competencies and means to use and benefit from digital technologies to participate in a networked society.

To accomplish this objective, initiatives and digital inclusion programmes must be designed and implemented that are flexible enough to address different needs and capable of overcoming several obstacles and limitations: citizens who have already left formal education and are not exposed to vocational training, the unemployed, youths at risk, migrants and minorities, the elderly, people with special needs, etc. Thus, to ensure a level of social justice and cohesion that can lead to balanced and sustainable development and properly prepare the population for the future,

it is essential to raise the people's awareness of the importance of digital competencies, and to create centres where citizens have access to resources, contents, mentoring and training aligned with the Digital Competence Framework. This shall be accomplished through networking communities and collaborative work with stakeholders, taking into account inequalities that remain, specifically, among different regions in Portugal.



## Action Line 2 EDUCATION

Educating the younger population by stimulating and reinforcing digital literacy and digital skills at all levels of schooling and as part of lifelong learning.

## 2




Digital technology is changing the way people work, interact and learn. Education must therefore support all students to learn with, through and about digital technologies, developing skills that go beyond their simple use.

This involves developing scientific reasoning, collaborative work and design capabilities, and even, in many cases, computing skills, fostering the Students' Skills Profile by the End of Compulsory Schooling.

It is therefore essential that the new generation is equipped with these skills through permanent and coordinated education and vocational training systems. This task includes reviewing programme contents and teaching processes, developing digital didactic and educational resources, promoting teachers' pre-service and in-service training, and ensuring lifelong training.

In order to achieve these objectives, it is essential to fully integrate digital skills and resources into the teaching methodologies and to make sure an adequate technological infrastructure is in place.





## Action Line 3 QUALIFICATION

Qualifying the working population by providing them with the knowledge they need to become a part of a labour market that relies heavily on digital skills.

### 3



The need for ICT skills in the labour market has been growing sharply, and despite the high unemployment levels, particularly among the young, the response to these needs has been insufficient. The disparity between the needs of the labour market and the availability of qualified professionals requires a multi-dimensional intervention to reinforce ICT training, particularly to meet the demanding challenges of the progressive digitisation of almost everything, from services to industry, agriculture, health services, the environment, etc.

Thus, in the immediate future, it is a priority to train intermediate-level technicians in well-defined areas, aimed at specific economic sectors. These sectors must be involved in the process, through networks, providing internships, participating in content definition, and creating spaces for joint/ collaborative training.

At the same time, professional re-training in digital skills should not be neglected, both for STEM graduates in areas with higher unemployment, and for teachers and educators of subjects where there is an oversupply.



## Action Line 4 SPECIALISATION

Promoting specialisation in digital technologies and applications to improve employability and create higher added value in the economy.

# 4



The demand for professionals with digital skills is, today, a reality in the EU, in every economic sector, such as health, agriculture, fishing, industry, energy, cities, mobility and transport, environment and water resource management, public security and defence, construction, tourism and creative industries, retail and distribution, banking and insurance, education and training, among others.

In this context, it is important to increase the offer of Computing and ICT in higher education at all levels, from short cycle degrees/diplomas (TeSP) to 1st and 2nd Bologna cycles as well as post-graduate programmes, fostering the cooperation between Higher Education Institutions, research units and companies in terms of the design and development of degrees, while enhancing active learning methodologies that include project-based learning, on-the-job training and internships.



# Action Line 5 RESEARCH

Providing the conditions for the production of new knowledge and an active participation in international R&D networks and programmes.

5

The resilience of our society and the competitiveness of our economy need to be strengthened not only through the production of new knowledge, but also by implementing this knowledge to bring benefits to the society and economy, particularly in areas involving advanced digital skills, such as handling and analysing big data, computational biology and bioinformatics, photonics, advanced and cognitive computing, cognitive machine learning, cybersecurity, and cyberphysical systems.

Furthermore, it is important to promote widespread access to scientific information, to enhance the cooperation between laboratories based on an advanced scientific computing network, and to foster international collaboration with leading research institutions, namely by maintaining the current programmes with US universities and extending them to other universities and other countries.



## 6

### Organisation, promotion and monitoring of the programme

The Portugal INCoDe.2030 initiative is structured as an integrated programme for Portugal, bringing together and encouraging collaboration between people with different experience and knowledge as well as multiple public and private organisations.

An Observatory for Digital Competences has been set up by the Directorate-General for Statistics in Education and Science (DGEEC), which, in collaboration with the National Institute for Statistics (INE), will monitor and report on the programme's development, taking into account the indicators listed in Figure 2.

The promotion and coordination of INCoDe.2030 will involve three permanent bodies:

- The National Forum for Digital Competences, which is responsible for gathering and coordinating a broad range of private and public companies and institutions to ensure widespread mobilisation for the initiative, as well as of organising an annual conference in which the developments in each line of action will be presented and analysed in the context of national and international success stories and good practices.
- The INCoDe.2030 Coordination Structure, which oversees the lines of action and also the initiative as a whole, promoting and coordinating the activities in each action line to guarantee a common focus and purpose, updating the general and specific goals and objectives.
- The INCoDe.2030 Technical Secretariat, which monitors, records and reports on the implementation of all the planned activities, developing the necessary platforms for their development and communication, in close articulation with the Coordination Structure and the Forum for Digital Competences.

## Annex: Some kick-off flagship projects and initiatives



Development of an Integrated Network for Public Communication Services that will ensure Internet access for everyone.



Development of a Network of Creative Communities for Digital Inclusion to impart digital competences to underprivileged groups.



Qualification and re-qualification of Teachers in ICT, to expand the teaching of Computing to students at all levels.



Qualification and Digital Specialisation of the employed or unemployed population for the private sector, in services, commerce, industry and agriculture, creating the necessary competence to leverage the digital transformation of companies.



Qualification and Digital Specialisation of workers in Public Administration.



Increase the offer of ICT studies in universities and polytechnic institutes, both for continuing education and lifelong learning.



Promote the use of Data Science in Public Administration in order to improve decision-making procedures and the effectiveness of public policies.



Development of a National Network for Advanced Computing, to enable R&D in cutting-edge disciplines in Computer Science.

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