PORTUGAL INCoDe.2030





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title>Portugal INCoDe.2030</title>
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<body style="margin: 20; padding: 30;">
<hgroup>
<h1>Axis 1. INCLUSION</h1>
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PORTUGAL INCoDe.2030

NATIONAL DIGITAL COMPETENCES INITIATIVE e.2030

PORTUGAL INCoDe.2030

An integrated digital competences programme for Portugal, 2017-2030

A set of actions based on 5 axes:

1. Inclusion
2. Education
3. Qualification
4. Specialisation
5. Research

To overcome 3 big challenges:

1. Ensure digital literacy and inclusion for full citizenship
2. Encourage specialisation in digital technologies and applications to improve employability skills
3. Produce new knowledge in the context of international cooperation

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1. An integrated public policy initiative to enhance digital competences

The world we live increasingly relies on digital technologies, so it is important that everyone has the competences to deal with this new reality. The new practices tend to be based online, and users normally interact with them through electronic devices. In the case of the active population, learning, productivity and competitiveness are also increasingly dependent on digital factors, meaning that there is a growing need for digital competences in many different professions.

Even though Portugal is close to the European median in terms of digital competences (15th in the DESI 2017 Index, Digital Economy and Society Index of the European Commission; Figure 1), it needs to reinforce basic Information and Communication Technologies (ICT) competences, especially in terms of human capital and internet usage levels, preventing them to stay at a worrying threshold. This is also true for specialists, who need to be able to make the most of the growing availability of jobs in the digital market.

To this end, we have a training infrastructure as well as the human potential capable of being (re)qualified to meet the demands of employment opportunities

typical of modern societies, such as Portugal. However, this (re)qualification is a demanding task that requires mobilisation and a combination of efforts from different areas of governance and civil society. This is the 21st Government's purpose with the "National Digital Competences Initiative e.2030, Portugal INCoDe.2030".

Portugal needs to promote a new set of digital competences with a view to making the most of the opportunities the future will bring, and generating renewed confidence in the new generations.

These competences, which have been planned up to 2030, are part of exercising full citizenship. A country with digitally proficient citizens is also a country where more people are included, involved, and able to deal with the society they are part of.

Digital competences are also intrinsically linked to employability - increasing digitalisation in the labour market requires new competences. A more skilled active population generates more new jobs, as well as innovative markets and products, generating more competitive and robust economic activities.

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. This will help 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 create them and work with them.

Creating a more resilient society involves developing new competences, particularly digital ones, which are constantly changing and evolving; at the same time, it involves preparing people for growing uncertainty, recognising that there are differences that will require unique preparation models.

It is in this context that the Portugal INCoDe.2030 initiative includes a public policy integrated action that aims to stimulate and guarantee the development of competences as tools to help prepare the new generations for the "unknown", investing increasingly in new knowledge and in the capacity to create new jobs - more qualified and better paid - encouraging entrepreneurship in young people.

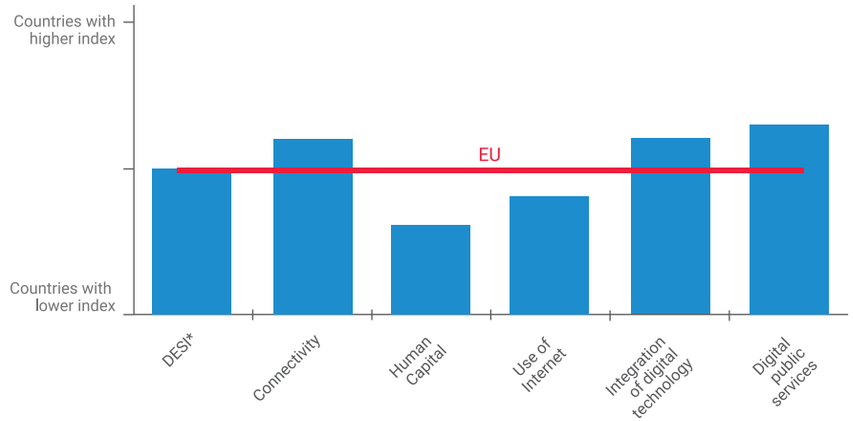


Figure 1. Portugal's relative position in the area of digital competences in the European Commission's DESI 2017 Index
Source DESI: Digital Economy and Society Index

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 ICTs, understand and critically assess contents, and communicate effectively), as well as the production of new knowledge through research, which involves **processing information**, and **communicating**, **interacting with** and **producing** digital **content**.

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, intensive use of artificial intelligence, the use 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[1].

Competences can be developed to different levels of depth and proficiency in each of these areas, depending on the level of qualification and set goals. 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.

[1]This broader concept of ICT is often referred to as TICE, which is the Portuguese acronym to Information, Communication and Electronics Technology. However, the established English term is “ICT”, which we will use.

3. The big challenges for Portugal, regarding digital competences

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

It is in this context that the Government Programme, through the National Reform Programme, has established a set of goals, namely inclusion and digital literacy, guaranteed physical and cognitive access to digital public services for the entire population, promotion of analytical capacity for society and economy in the context of big data, production and dissemination of information, privacy and security, the use of information, communication and electronic technologies in the process of life-long learning and, finally, research and development activities (R&D) aimed at the production of new knowledge, and advanced forms of scientific computing.

The aim of the National Digital Competences Initiative, Portugal INCoDe.2030, is to position Portugal at the top of European digital competences ranking by overcoming three big challenges:

01 generalise **digital literacy**, with a view to the full exercise of citizenship and **inclusion** in a society with increasingly more digital practices, where many social interactions happen on the internet and are increasingly mediated by electronic devices.

02 stimulate **employability** and professional training and **specialisation** in digital technologies and applications, in order to respond to the increasing demand of the market and to promote the qualifications needed for employment in a **higher value-added economy**.

03 ensure strong participation in **international R&D networks** and the production of **new knowledge** in digital areas.

4. Portugal's position in the international and European context: goals

Digital competences characterisation

The Portugal INCoDe.2030 Initiative is framed 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 period 2017-2030.

This movement, which the Portugal INCoDe.2030 Initiative aims to materialise, should be accompanied by stronger participation in international scientific and technological collaboration networks, primarily in Europe and North America (to safeguard Portugal's Atlantic specificities within the EU), in the Portuguese-speaking countries and in the Mediterranean countries of North Africa, and in the most relevant international fora dealing with transformation 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 and attracting talents to Portugal in these areas.

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

ACCESS

% of households with internet access

National evolution			Expected evolution		
2002	2010	2016	2020	2025	2030
15	54	74	80	90	100

European comparison

PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
74	85	82	87	82	86	92

% of individuals who have never used the internet

National evolution			Expected evolution		
2002	2010	2016	2020	2025	2030
63	46	26	20	10	5

European comparison

PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
26	14	17	15	13	10	4

% of individuals who frequently use the internet

National evolution			Expected evolution		
2002	2010	2016	2020	2025	2030
27	38	60	70	80	90

European comparison

PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
60	71	67	70	65	77	85

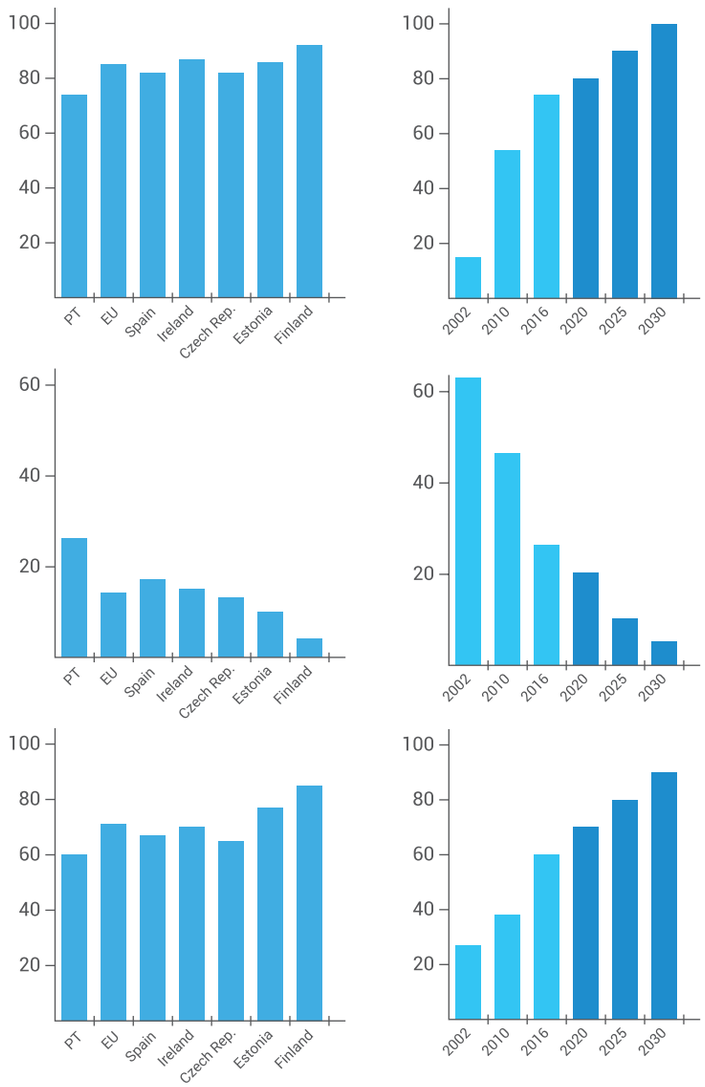


Figure 2. Comparative analysis of a selected set of digital competences indicators
Source: European Commission, Digital Single Market, Digital Scoreboard - 2015/2016

HUMAN CAPITAL

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

National evolution			Expected evolution		
2002	2010	2016	2020	2025	2030
-	-	47	55	65	80

European comparison						
PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
47	56	54	44	53	61	73

% of ICT specialists in employment

National evolution			Expected evolution		
2002	2010	2015	2020	2025	2030
1,4	1,5	2,3	3	5	8

European comparison						
PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
2,3	3,5	2,4	3,7	3,7	4,4	6,5

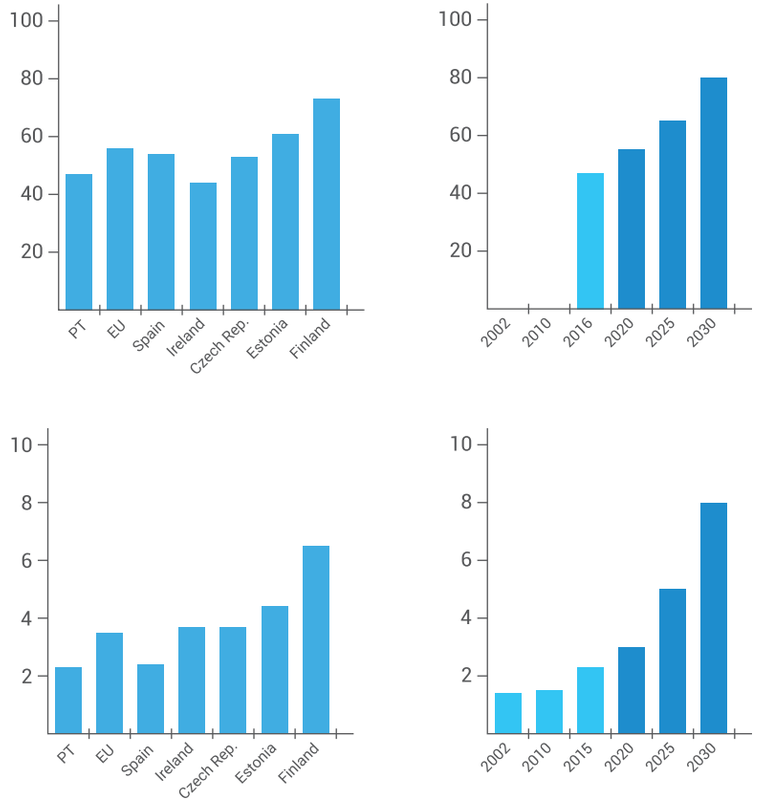


Figure 2. Comparative analysis of a selected set of digital competences indicators (continuation)
Source: European Commission, Digital Single Market, Digital Scoreboard - 2015/2016

No. of higher education graduates in Science, Mathematics, Technology and Engineering per thousand inhabitants (20-29 years old)

National evolution			Expected evolution		
2002	2010	2016	2020	2025	2030
21	20,4	nd	22	23	25

European comparison

PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
20,4	18,7	20,7	24,7	16,6	15,5	21,9

No. of doctorates per thousand inhabitants (25-34 years old)

National evolution			Expected evolution		
2002	2010	2014	2020	2025	2030
4,7	4,8	4,5	5	6	7

European comparison

PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
4,5	-	4,9	-	-	-	7,4

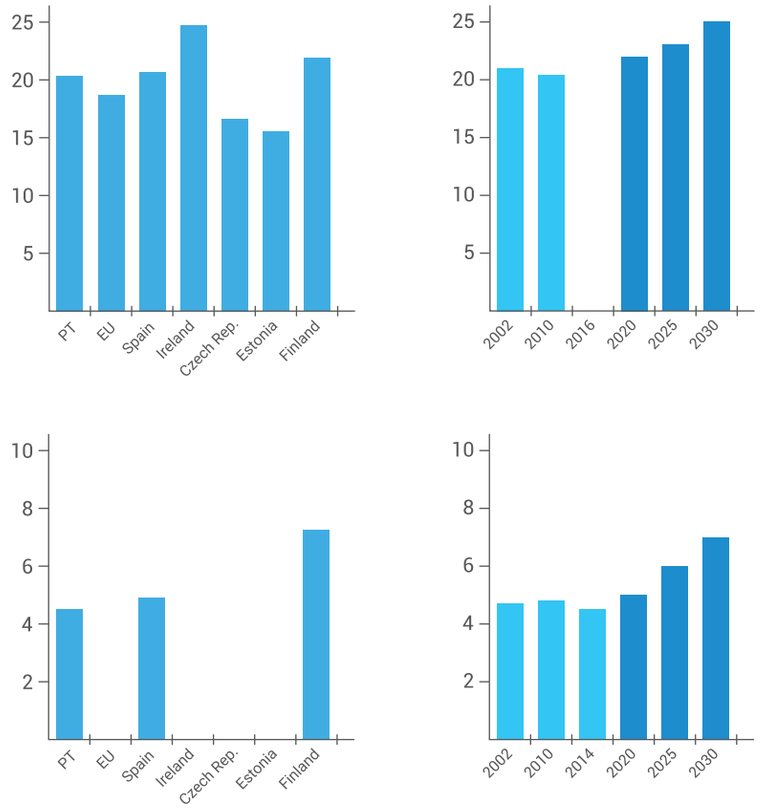


Figure 2. Comparative analysis of a selected set of digital competences indicators (continuation)
Source: European Commission, Digital Single Market, Digital Scoreboard - 2015/2016

USE

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

National evolution			Expected evolution		
2002	2010	2016	2020	2025	2030
32	35	36	40	60	80

European comparison

PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
36	50	50	52	37	44	70

% of SMEs with a high level of digital intensity

National evolution			Expected evolution		
2002	2010	2015	2020	2025	2030
-	-	17,7	20	30	40

European comparison

PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
17,7	20,3	25,3	23,4	19,7	20,8	35,5

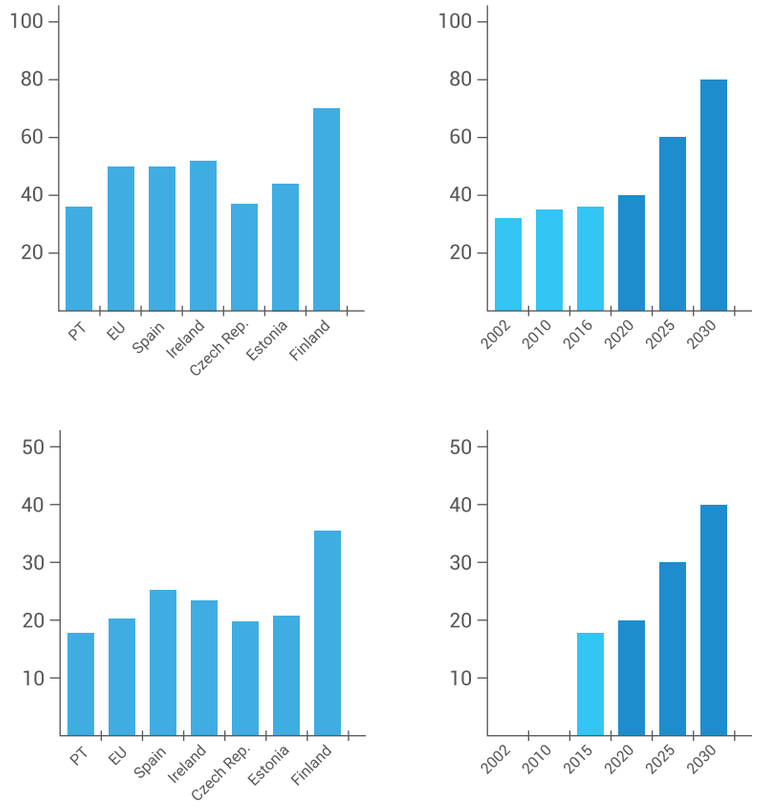


Figure 2. Comparative analysis of a selected set of digital competences indicators (continuation)
Source: European Commission, Digital Single Market, Digital Scoreboard - 2015/2016

% of individuals who have used the internet for online banking (last 3 months)

National evolution			Expected evolution		
2002	2010	2016	2020	2025	2030
8	19	29	40	60	90

European comparison

PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
29	49	43	52	51	79	86

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

National evolution			Expected evolution		
2002	2010	2016	2020	2025	2030
19	26	45	60	75	90

European comparison

PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
45	48	50	52	36	77	82

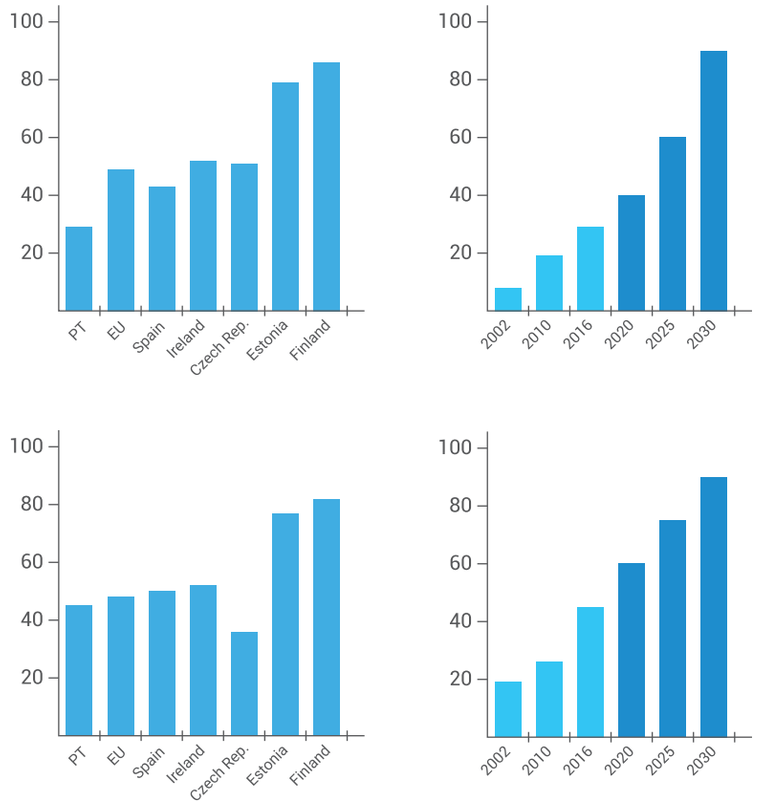


Figure 2. Comparative analysis of a selected set of digital competences indicators (continuation)
Source: European Commission, Digital Single Market, Digital Scoreboard - 2015/2016

INVESTMENT

Total gross domestic expenditure on R&D (GERD) in percentage of GDP

National evolution			Expected evolution		
2002	2010	2015	2020	2025	2030
0,7	1,53	1,28	1,6	2	2,6

European comparison

PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
1,28	2,03	1,22	nd	1,95	1,5	2,9

Business enterprise sector expenditure on R&D (BERD) in percentage of GDP

National evolution			Expected evolution		
2002	2010	2015	2020	2025	2030
0,29	0,7	0,6	1	1,5	2

European comparison

PT	EU	Spain	Ireland	Czech Rep.	Estonia	Finland
0,6	1,3	0,64	nd	1,06	0,69	1,94

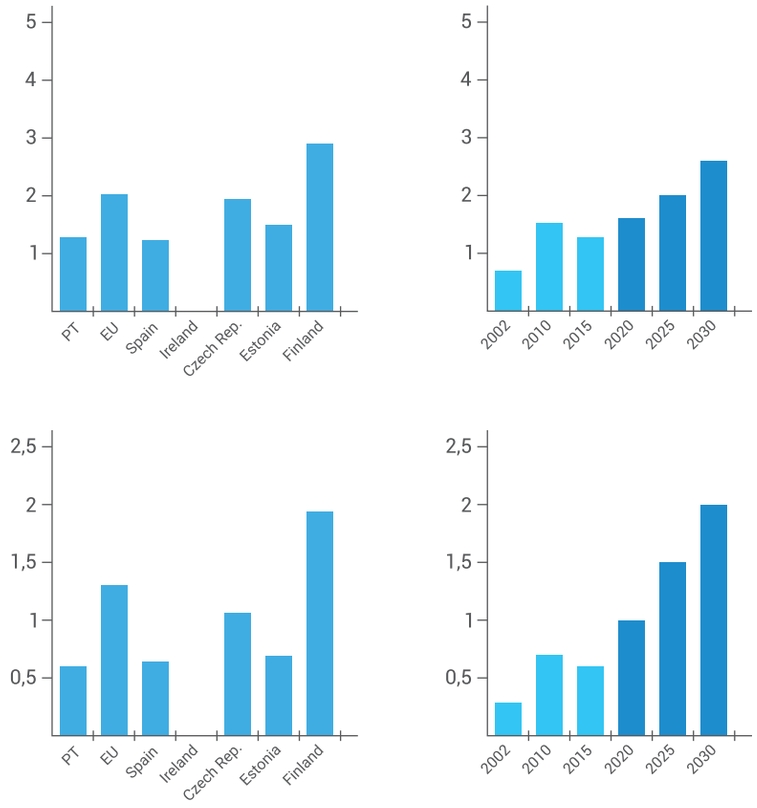


Figure 2. Comparative analysis of a selected set of digital competences indicators (continuation)
Source: European Commission, Digital Single Market, Digital Scoreboard - 2015/2016

Digital competences goals for Portugal

In terms of **access**, the goal is to evaluate the situation of the infrastructure in place for accessing the internet. Even though the existence of access conditions does not mean they are being used effectively, this programme is geared towards stimulating the development of digital competences.

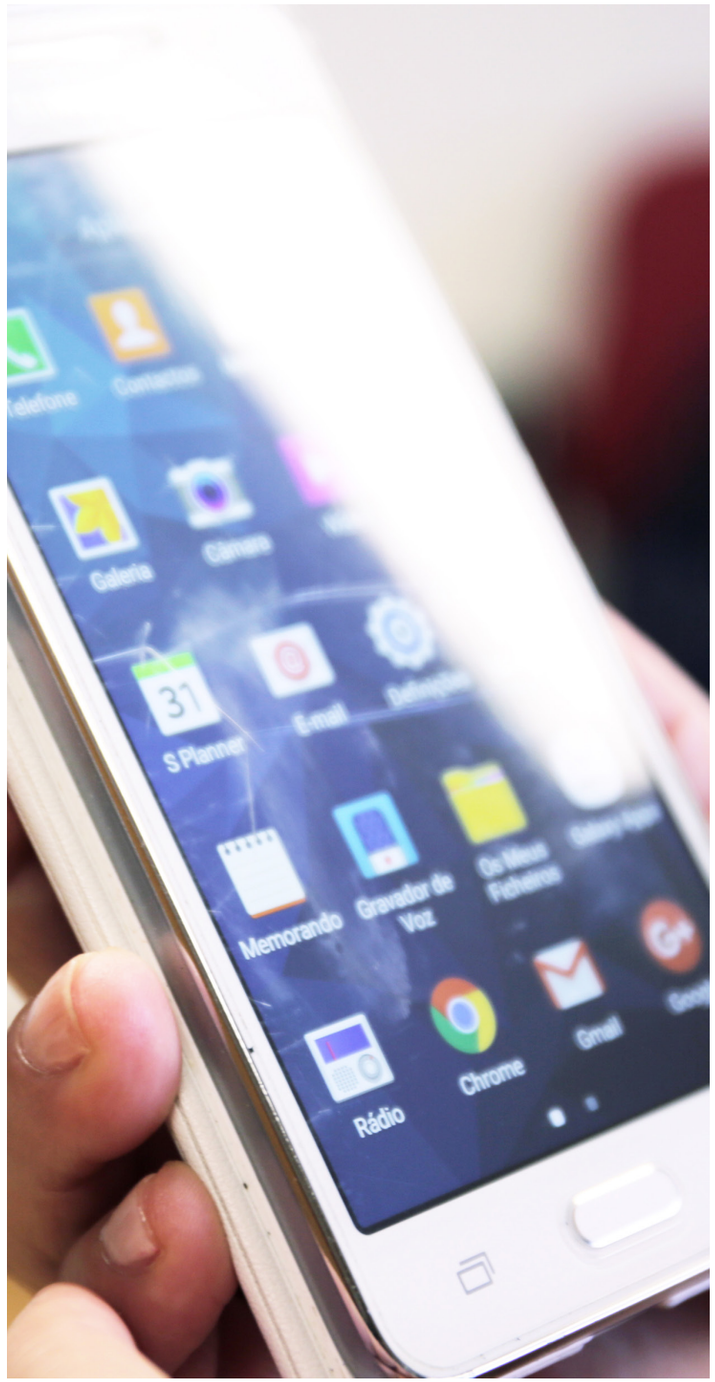
In the area of **human capital**, the population's digital competences are assessed both globally and in terms of the impact on employability. Here, indirect indicators that are relevant to the programme are also taken into account, such as the number of STEM (Science, Technology, Engineering and Mathematics) graduates, and the number of PhDs.

The **use** category describes how the Portuguese population uses digital tools in their personal life and at work.

The **investment** category analyses the total expenditure of companies on R&D, which is so relevant to Axes 4 and 5 of the programme. Although they are context indicators, they are key to describing the overall picture of qualification.

Finally, regarding **training and certification**, a set of five indicators of a slightly different nature are considered. This is because, even though they are linked to human capital, they do not measure the present state of qualifications, but rather the effectiveness of the measures taken to improve them in several areas of digital competences.

The selected indicators are defined internationally. As a result, it is possible to compare Portugal's performance against a set of countries in Europe and the OECD and set goals to achieve (Table 1).




INSTITUTO

Digital competences goals for Portugal

ACCESS

% of households with internet access

Relatively low compared to other countries. However, developments have been significant.

GOALS		
2020	2025	2030
80%	90%	≈100%

% of individuals who have never used the internet

This indicator is particularly negative for Portugal, even though considerable progress has been made. This is one of the indicators that deserve more attention and effort.

GOALS		
2020	2025	2030
20%	10%	5%

% of individuals who frequently use the internet

Portugal already has reasonable values, but still way lower than more developed countries.

GOALS		
2020	2025	2030
70%	80%	90%

HUMAN CAPITAL

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

Portugal currently sits above Ireland, but the comparison may be affected by difficulties in confronting levels of education. Spain is much better, but the difference with Finland is still significant.

GOALS		
2020	2025	2030
55%	65%	80%

% of ICT specialists in employment

Only the comparison with Spain is not very unfavourable.

GOALS		
2020	2025	2030
3%	5%	8%

People with Higher Education STEM Diplomas per thousand inhabitants (20-29 years old)

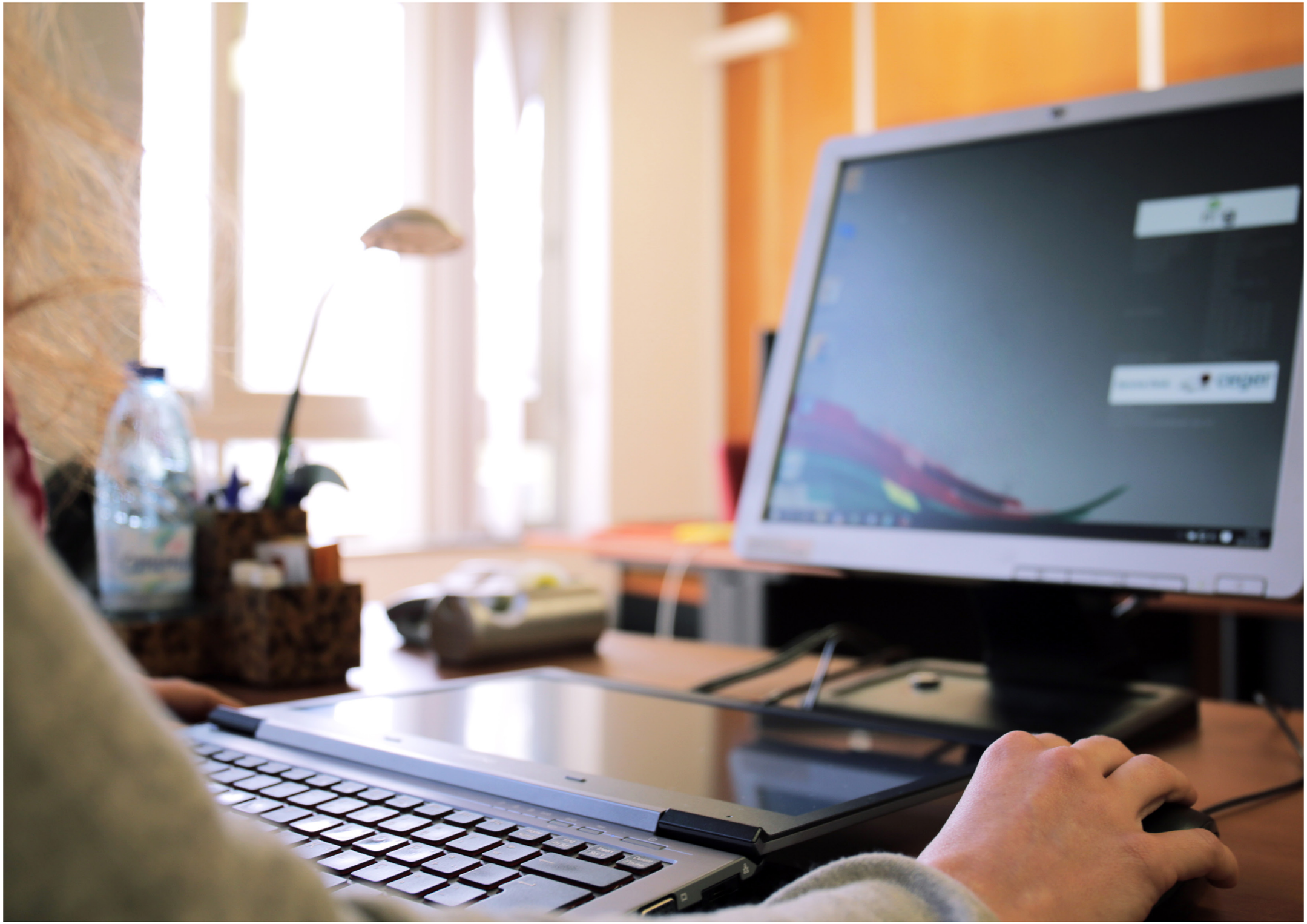
Portugal compares favourably to more developed countries. However, this indicator could be improved.

GOALS		
2020	2025	2030
22	23	25

New PhDs per thousand inhabitants (25-34 years old)

This indicator compares favourably to other countries. However, disinvestment in recent years has lowered the indicator, which is why it is important to recover the previous effort.

GOALS		
2020	2025	2030
5	6	7



Digital competences goals for Portugal

USE

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

The situation in Portugal is significantly worse than that of the countries it is compared to, and progress has been very slow.

GOALS		
2020	2025	2030
40%	60%	80%

% of SMEs with a high level of digital intensity

Portugal is significantly below most other countries.

GOALS		
2020	2025	2030
20%	30%	40%

% of individuals who have used the internet for online banking (last 3 months)

Despite some progress, Portugal is still poorly positioned, with almost three times fewer people in this category than Finland, and far below countries like Ireland or the Czech Republic.

GOALS		
2020	2025	2030
40%	60%	90%

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

Only Estonia and Finland are significantly better than Portugal. However, it makes sense to further strengthen Portugal's lead in Europe.

METAS		
2020	2025	2030
60%	75%	90%

INVESTMENT

Total gross domestic expenditure on R&D (GERD) in percentage of GDP

The recent drop in this indicator is worrying and it is essential to resume the earlier pace of growth.

GOALS		
2020	2025	2030
1,6%	2%	2,6%

Business enterprise sector expenditure on R&D (BERD) in percentage of GDP

This indicator also shows a setback in recent years that needs to be recovered.

GOALS		
2020	2025	2030
1%	1,5%	2%

Digital competences goals for Portugal

TRAINING AND CERTIFICATION

Qualifying training for unemployed young people and adults

This indicator is measured by the number of people receiving accredited, validated, and certified ICT training in Qualification Centres

GOALS		
2020	2025	2030
a definir	-	-

Professional retraining of staff with a higher education in low employability and high unemployment areas

This indicator measures the number of unemployed trainees with a higher education, who are receiving Modular Training, Vida Ativa or other type of training in the area of ICT

GOALS		
2020	2025	2030
18.000	-	-

Available digital literacy training, associated to fighting info-exclusion, aimed to both employed and unemployed people

This indicator measures the number of people receiving train under the Basic Competences, Vida Ativa Qualifica+ and Modular Training modalities as part of the effort against info-exclusion

GOALS		
2020	2025	2030
50.000	-	-

Pedagogical competences of ICT teachers, with a view to strengthening their digital competences and mobilising digital teaching resources

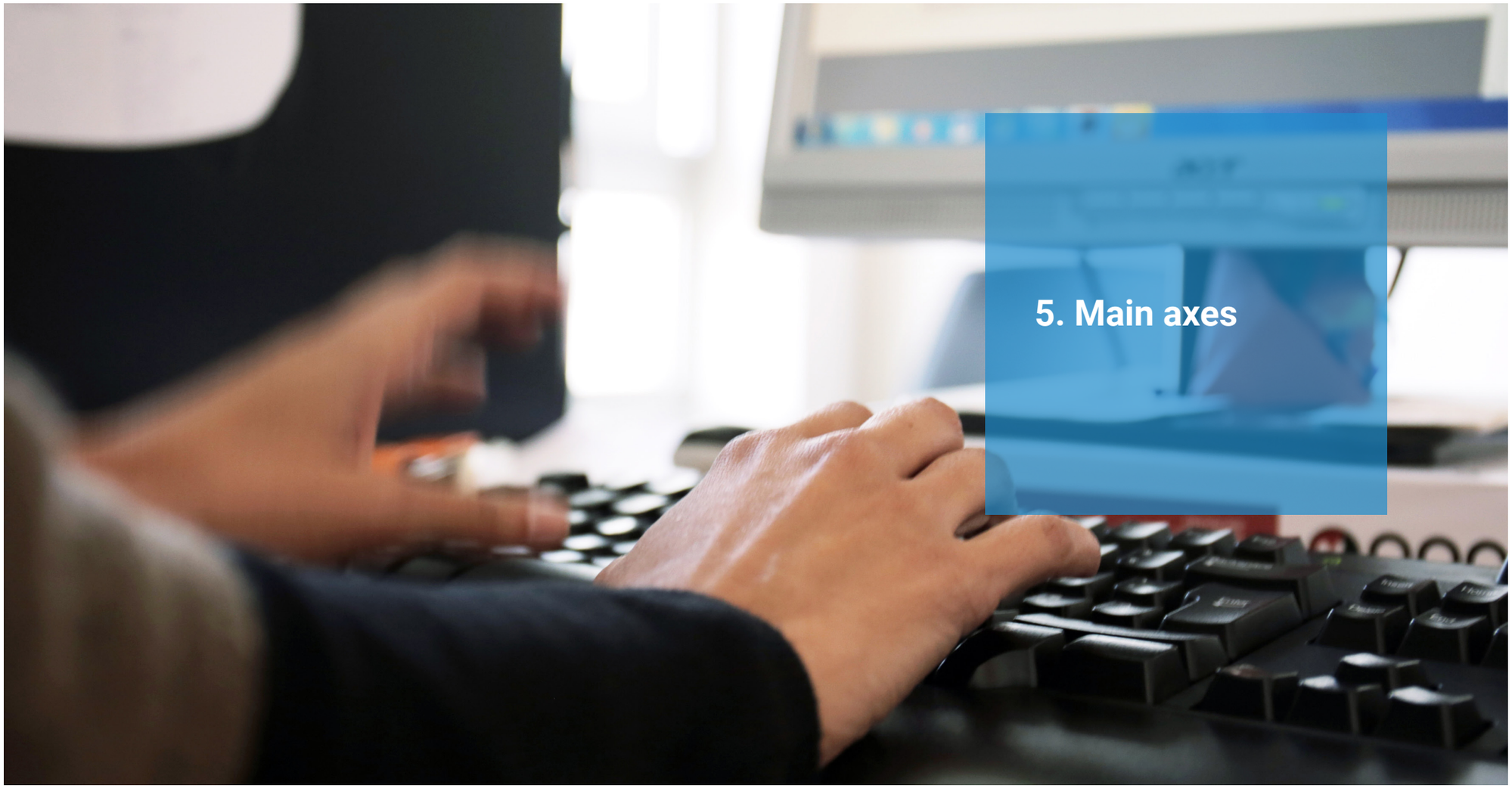
This indicator measures the number of ICT teachers and trainers, including distance learning

GOALS		
2020	2025	2030
2.000	-	-

Industry-recognised certification of senior and intermediate staff in the field of ICT competences

This indicator measures the number of certifications obtained, in particular, from Microsoft, CISCO, SAMSUNG and others

GOALS		
2020	2025	2030
10.000	-	-

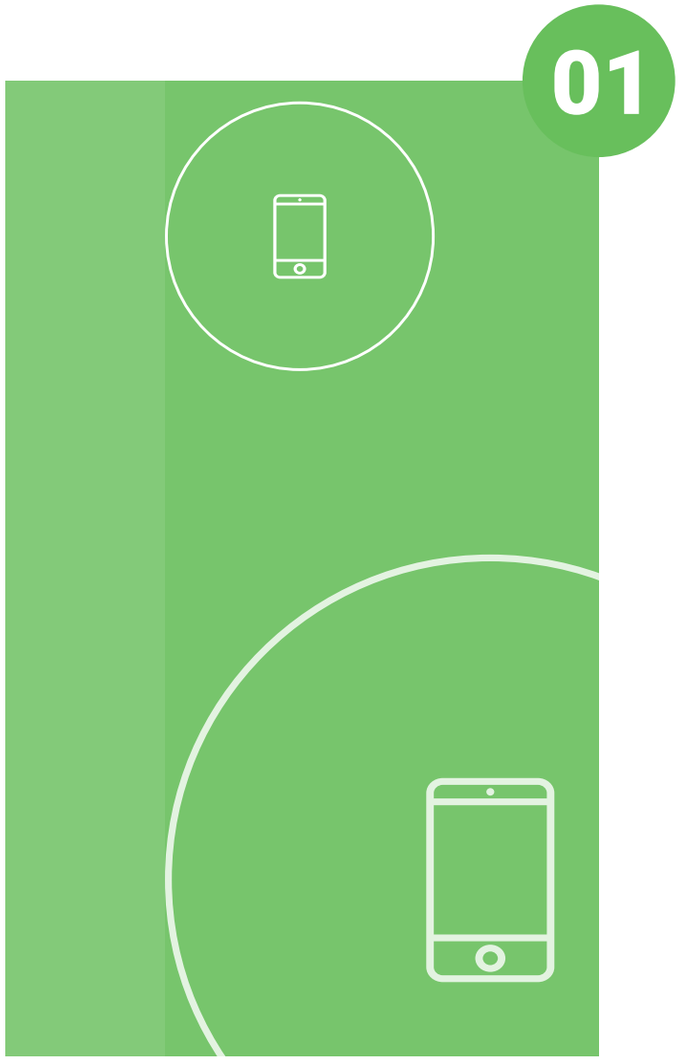


5. Main axes

To address the challenges outlined above and the targets identified in Table 1, the Portugal INCoDe.2030 initiative has proposed a wide range of measures that will mobilise the various governmental bodies. These measures should work alongside the civil society initiatives which have similar aims. These measures are structured around five main axes or courses of action.

Axis 01
INCLUSION

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



01

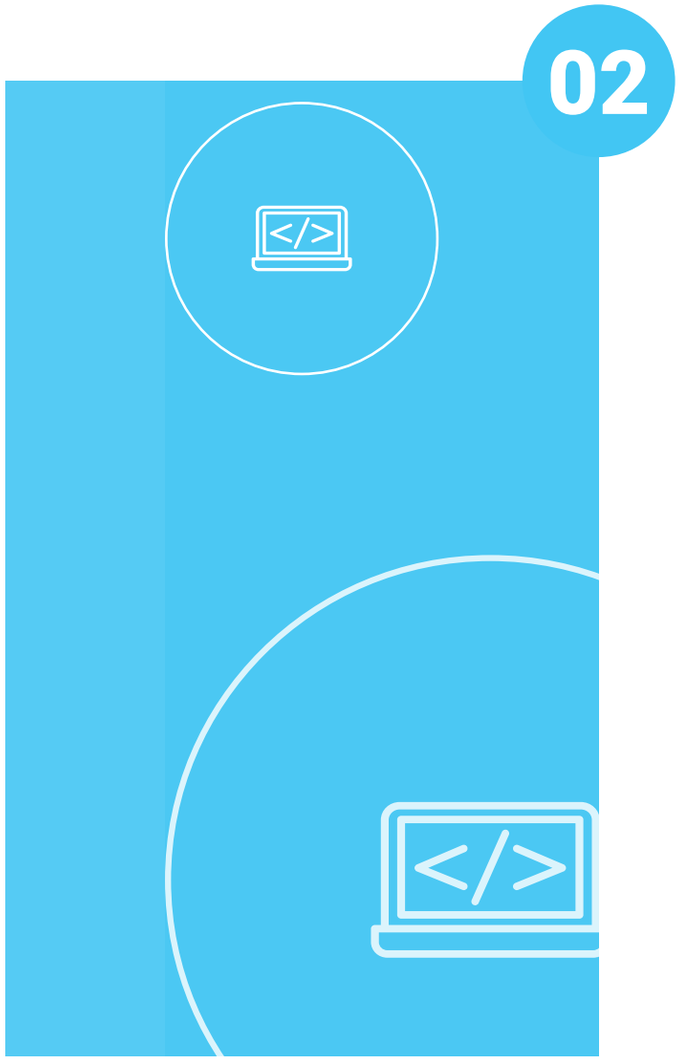
In view of the increasing digitalisation of the world today - from education to industry, from entertainment to social life, from cities to farms, from medicine to the environment - it is essential that the people of Portugal have the competences and the means to use digital technologies.

However, in order to achieve this, there are numerous obstacles and limitations to overcome for many citizens, namely those who have already left formal education and are not exposed to vocational training.

Thus, to ensure a level of fairness and social cohesion that will lead to balanced and sustainable development, it is essential to raise the population's awareness about the importance of digital competences, specifically by creating **resources and content centres** and **user training campaigns**. This must be done while ensuring territorial cohesion, taking into account the need to reinforce the use of broadband services. In order to achieve these objectives, it is critical to strengthen gender equality in terms of access to and development of digital competences; as well as promote regional approaches, bridging the inequality that still exists in Portugal.

Axis 02
EDUCATION

Ensure the education of the younger population by stimulating and reinforcing digital literacy and digital competences at all levels of schooling and as part of lifelong learning.



02

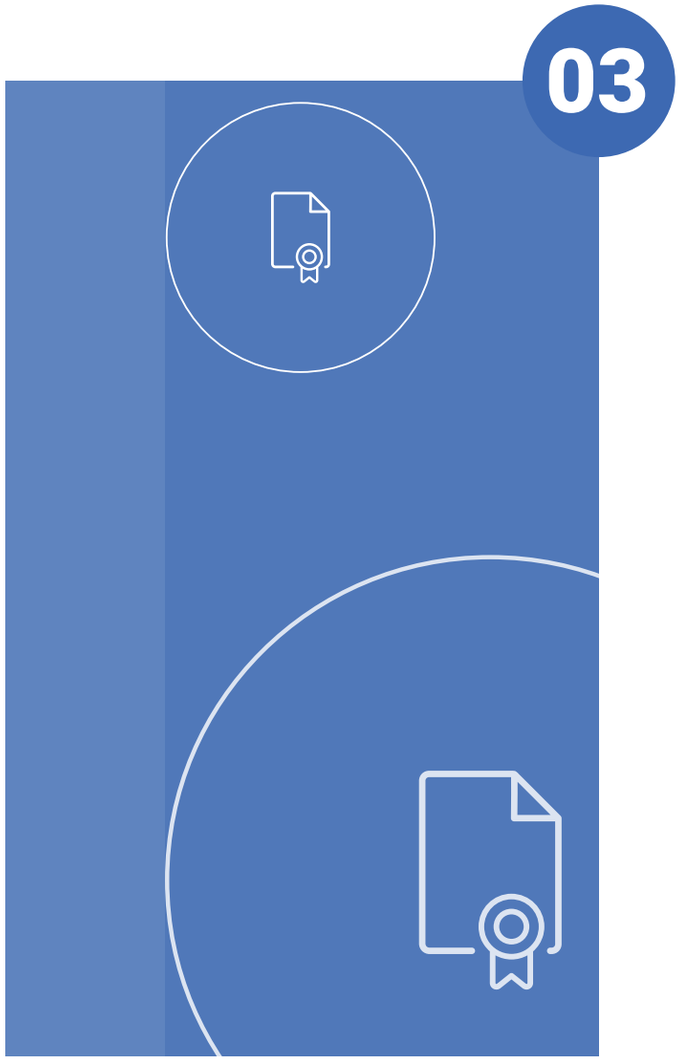
Preparing citizens, now and for the future, involves developing competences that go beyond simply coexisting with digital technologies; it is also about helping people to improve their understanding through the early acquisition of knowledge at the level of a frequent user.

This involves developing logical reasoning competences, collaborative work and project and even, in many cases, development (programming) competences.

It is therefore essential that the new generation is equipped with these competences through permanent and coordinated education and vocational training systems. This task includes reviewing program contents and teaching processes, developing digital didactic and educational resources, ensuring adequate technological infrastructure, promoting the training of teachers and trainers, and ensuring lifelong training. In order to achieve these objectives, it is essential to fully integrate digital competences and resources into the teaching processes.

Axis 03
QUALIFICATION

Capacitate the active population by providing them with the knowledge they need to become a part of a labour market that relies heavily on digital competences.



03

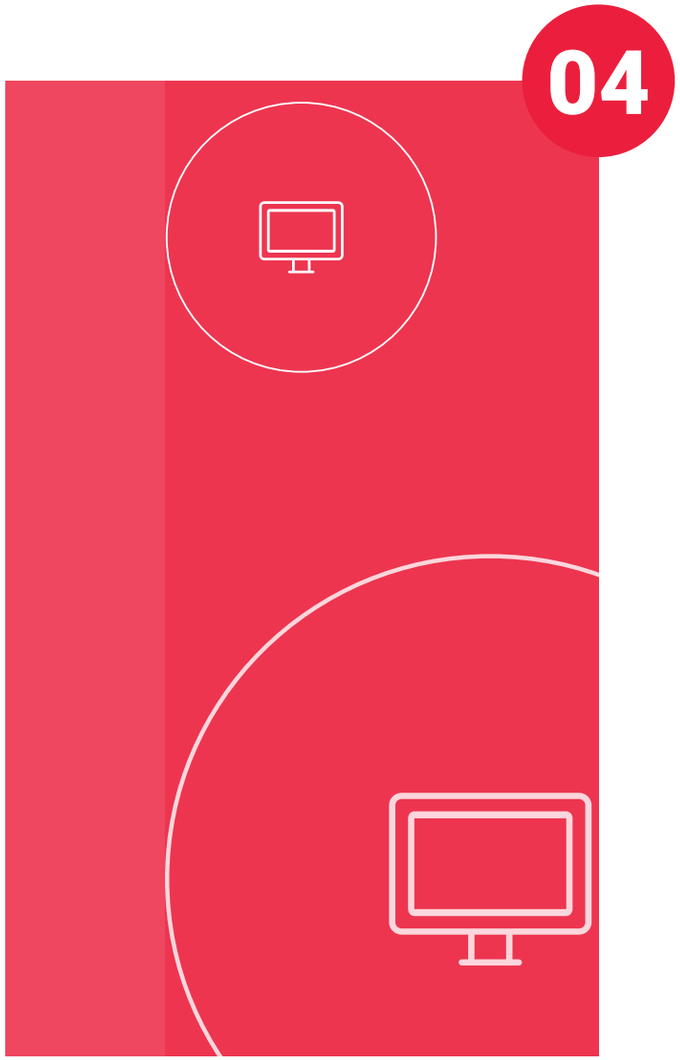
The need for ICT competences in the labour market has been growing very significantly; and, despite the still-high unemployment rates, particularly youth unemployment, the response to these needs has not been enough. The disparity between the needs of the labour market and the availability of qualified professionals requires a multi-faceted intervention to reinforce ICT training, particularly to meet the demanding challenges of the progressive digitisation of business activities and industry (i.e. “Industry 4.0”).

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 have to be involved in the process, by creating a network of academies and digital labs, providing internships, and creating spaces for joint/ collaborative training.

At the same time, professional re-training in digital competences should not be neglected. There is a need for intensive ICT and advanced training preparation for teachers and educators, whether the education leads to a degree or not, both for the economic sectors, and for the cultural sectors and Public Administration in general.

Axis 04
SPECIALISATION

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



04

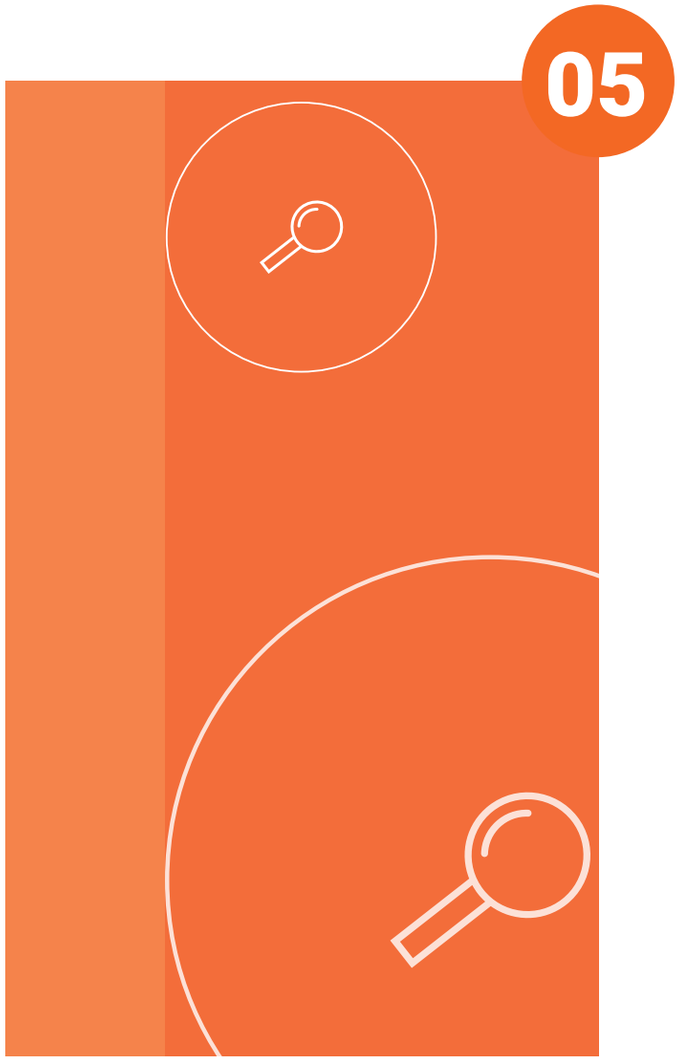
Although the demand for professionals with digital competences is a reality in every activity sector today, in the European Union, more than half of professionals with digital competences are already working in ICT-intensive sectors. In addition, new markets and products are emerging in areas which, until recently, appeared not to have any need for such competences. This is true in health, agriculture, fishing, industry, energy, cities, mobility and transport, environment and water resources management, public security and defence, construction, tourism and creative industries, retail and distribution, banking and insurance, education and training, etc.

In this context, it is important to improve the range of higher education at all levels, from short technical courses (TeSP) to 1st and 2nd Bologna cycles as well as post-graduate programmes in the priority areas of this initiative, focusing on cooperation between Higher Education Institutions, research units and companies in their development and training, while enhancing active educational procedures that include training at work.

It is also important to launch a network of digital innovation laboratories and ensure that specialised training is a national priority, reinforcing the current training on offer through TeSP, undergraduate and masters' programmes, and post-graduate degrees; intensifying advanced training programmes throughout working life, and encouraging specialisation in key sectors for Portugal.

Axis 05
RESEARCH

Ensure conditions are in place for the production of new knowledge and active participation in international R&D networks and programmes.



The initiative to plan the development of digital competences up to 2030 aims to contribute to the advancement of science and digital technologies. The resilience of our society and the competitiveness of our economy need to be strengthened through a virtuous cycle, which not only requires a strong involvement from society in the production of new knowledge but also the translation of this knowledge into societal and economic benefits.

Thus, Portugal must strengthen its participation in scientific production in all areas of knowledge, but especially in areas involving advanced digital competences; such as handling and analysing big data, computational biology and bioinformatics, photonics, advanced computing in general, cognitive computing and automatic learning, cybersecurity, and cyber-physical systems. In this context, it is important to promote scientific activity in four major key areas:

- Advanced Cyberinfrastructure (ACI) - including all advanced scientific computing fields.
- Computing and Communication Foundations (CCF) - including quantum computing, among other areas of R&D.
- Computer and Network Systems (CNS) - including big data, cloud computing, and IoT, among others.
- Information and Intelligent Systems (IIS) - including artificial intelligence, as well as human-centred computing in relation to digital media.

In this context, it should be clear that promoting new competences in these areas can and should facilitate knowledge of social and cultural phenomena, among others, by mobilising data processing in an effective way in all areas of knowledge, health, culture, and the study of social processes.

It is important to work towards widespread access to scientific information and create conditions for cooperation between laboratories based on an advanced scientific computing network; as well as promote international collaboration, especially by maintaining programmes that are carried out with US universities and extending these programmes to other universities and to other countries.

6. Programme's organisation, promotion, and monitoring

The Portugal INCoDe.2030 Initiative is structured as an integrated programme for Portugal, and will be promoted by bringing together and encouraging collaboration between different public and private organisations.

An **"Observatory for Digital Competences"** has been set up by the Directorate-General for Statistics on Education and Science (DGEEC), which, in collaboration with National Institute for Statistics (INE), monitors and reports on the programme's development, taking into account the indicators listed in Figure 2 and Table 1. The promotion and coordination of the actions of the programme includes the following levels:

- The **Permanent Forum for Digital Competences**, which aims to promote and articulate a broad range of social actors and ensure widespread mobilisation for the initiative, including a public annual conference in which the developments in each line of action will be presented and analysed. There will also be presentations on national and international success stories and good practices. Throughout the year, there will also be a number of specialised seminars and workshops, and training and promotion of thematic networks will be encouraged. The activities of the forum will be promoted by the Technical Secretariat (referred to below) and its first president will be **Rogério Carapuça**, president of the Portuguese Association for the Development of Communications (APDC).

- **Technical Coordination**, which will be the responsibility of the **lines-of-action coordinators**, whose role is to monitor the development of the activities, based on the information provided by the Technical Secretariat (referred to below) and to present a critical report at the annual conference of the Forum. The coordination during the launch phase of the initiative will be done by:

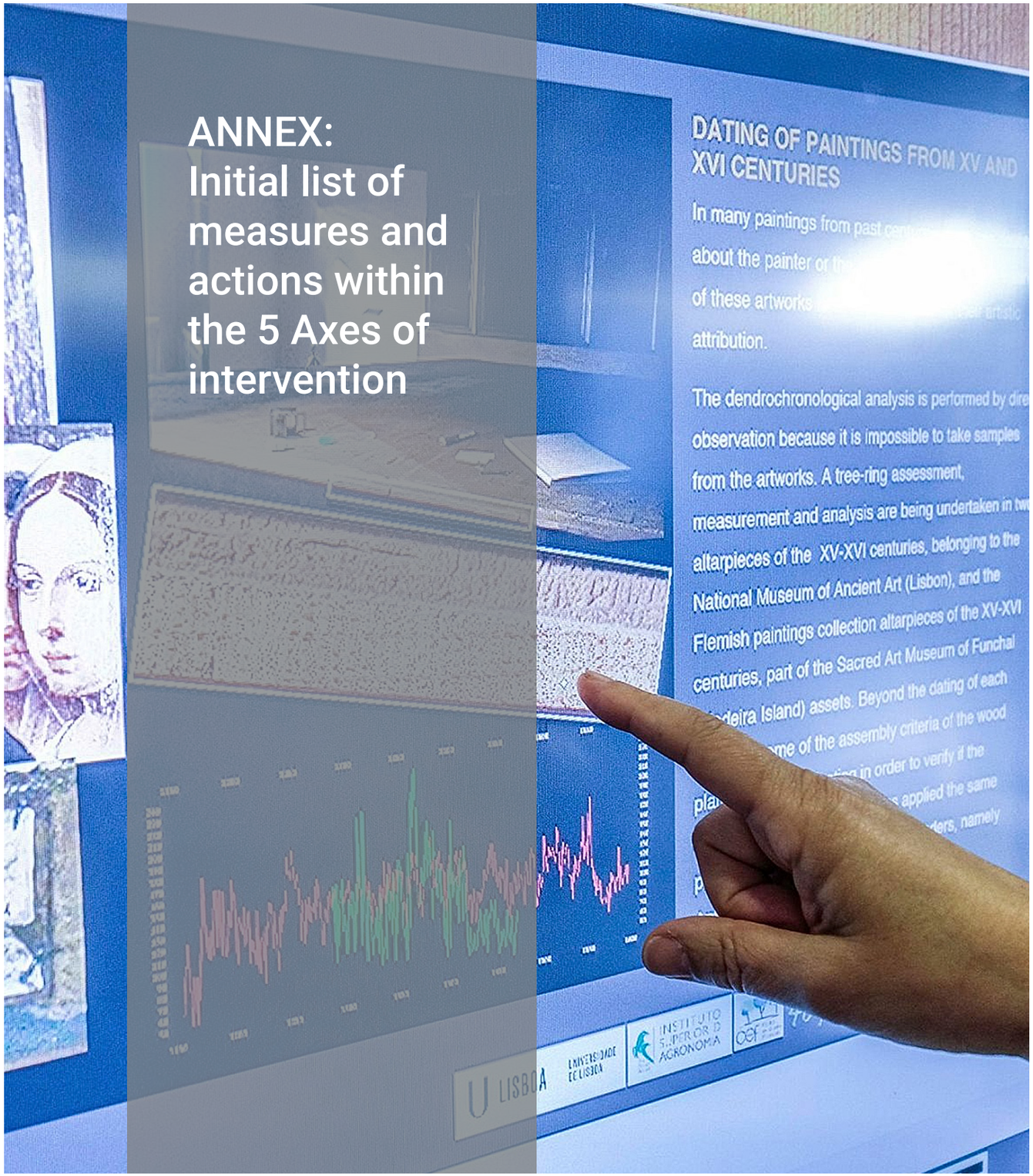
  - Global Coordination - **Pedro Guedes de Oliveira** (INESC TEC; University of Porto)
  - Axis 1: Inclusion - **Sofia Marques da Silva** (University of Porto)
    José Luís Ramos (University of Évora)
  - Axis 2: Education - **José Vítor Pedroso** (Directorate General for Education)
  - Axis 3: Qualification - **Cristina Barros** (Polytechnic Institute of Leiria)
    Paulo Feliciano (Institute for Employment and Vocational Training)
  - Axis 4: Specialisation - **Eva Oliveira** (Polytechnic Institute of Cávado and Ave)
    Pedro Dominguinhos (Polytechnic Institute of Setúbal)
  - Axis 5: Research - **Susana Sargento** (University of Aveiro; Telecommunications Institute)
    Rodrigo Rodrigues (INESC ID; IST, University of Lisbon)

- **Technical Secretariat for Digital Competences,** which aims to monitor the implementation of all planned activities, based on the guidance and supervision of the lines-of-action coordinators, who should be provided with all relevant information, as well as the recommendations of the *Permanent Forum for Digital Competences*:

  - **Ana Cristina Neves** (FCT, Foundation for Science and Technology), coordination
  - **Maria João Horta** (DGE, Directorate General for Education)
  - **Helena Duarte** (IAPMEI, Agency for Competitiveness and Innovation)
  - **Maria da Luz Pessoa e Costa** (IEFP, Institute of Employment and Vocational Training)
  - **Ana Sofia Figueiredo** (AMA, Agency for Administrative Modernization)
  - **Marina Pereira** (INA, National Institute of Administration, DSOI/INA)

  The logistical support for the operation of the technical secretariat shall be guaranteed by the Foundation for Science and Technology (DSI/FCT).

- **Political coordination,** at the level of the Government and the Committee of Education and Science of the Assembly of the Republic.



ANNEX: Initial list of measures and actions within the 5 Axes of intervention

The measures foreseen in the initial launch phase of the Portugal INCoDe.2030 Initiative are listed below, grouped according to each of the 5 axes. These measures will be progressively updated, deepened and expanded in the course of implementing the initiative.

Axis 1. INCLUSION: Ensure that the whole population has access to digital technologies to obtain information, communicate, and interact with others.

1.1. Promotion of digital competences

Campaigns aimed at mobilising citizens to realise the importance of digital competences and informing them about the existence of digital competences training programmes. Special attention should be given to campaigns aimed at information-excluded groups and campaigns that address gender issues, people with disabilities, or people with special needs.

Coordinating agencies: FCT, DGE, IEFP
Entities involved: AMA; EMPIS; ANPRI; RNBP; UMP; RUTIS; Escolhas Programme (Choices Programme); Rotary Clubs; APDC; ACEPI; APDSI; foundations; NGOs/IPSSs representing vulnerable groups; the social responsibility programmes of different companies; the European Centre for Women and Technology; and others.

1.2. Development of a digital competences self-diagnosis system for citizens

Online system that allows any citizen to benchmark their level of digital competences, built on a dynamic digital competences reference framework that is in line with the European reference framework, DigComp 2.0.

Coordinating agencies: FCT
Involved: Higher education institutions; DGE; ANQEP; among others.

1.3. Digital competences training from the user's perspective, including the most vulnerable groups of citizens

Training aimed at acquiring the competences necessary for full digital citizenship, including access to online public services. Particular attention should be given to the most vulnerable groups of citizens and to digital mediators by creating specific campaigns aimed at these groups.

Coordinating agencies: FCT, IEFP
Involved: RUTIS; Escolhas Programme (Choices Programme); EMPIS; higher education institutions; UMP; RNBP; Rotary Clubs; NGOs/IPSSs representing several vulnerable groups; among others.

1.4. Creation of a digital resource platform in Portuguese and free access to digital training support

Development of a digital resources repositories aggregating platform needed for training to promote digital inclusion, literacy and citizenship. The platform will be in Portuguese and openly accessible. This digital resource aggregating platform aims to meet the needs of different population groups. The tools should follow the axes of user-centred design.

Coordinating agencies: FCT
Involved: Higher education institutions; AMA; ANPRI; municipalities; among others.

1.5. Development of a digital competences certification system for citizens

Design and maintenance of a system to certify citizens' non-professional digital competences, whereby they can be awarded a basic, advanced, or advanced certificate, which can also be used to obtain other certifications.

Coordinating agencies: FCT
Involved: IEFP; ANQEP; higher education institutions; among others.

Axis 2. EDUCATION: Ensure the education of the youngest sections of the population by stimulating and reinforcing digital literacy and digital competences at all levels of schooling and as part of lifelong learning

2.1. Promotion of pedagogical innovation in teaching and learning processes

Reinforcement of analytical and critical competences, through the promotion of pedagogical projects and practices in the field of logic, algorithms and programming, ethics applied to the digital environment, media literacy in the digital age, and citizenship in the digital age.

Coordinating agencies: DGE and DGES
Entities involved: CFAE; higher education institutions; among others.

2.2. Development of digital educational resources

Design, development, certification and dissemination of digital educational resources for different levels of education, disciplines, curriculum components and training components, promoting innovative educational environments.

Coordinating agencies: DGE
Involved: Higher education institutions; RBE; among others.

2.3. Training pre-school, primary and secondary education teachers

Programme for training primary and secondary school teachers, with the participation of the Schools Association Training Centres (CFAE) and higher education institutions.

Coordinating agencies: DGE
Involved: CFAE; higher education institutions; among others.

2.4. Promotion and dissemination of the Robotics and Digital Literacy Code

Campaigns to promote the Robotics and Digital Literacy Code, supported with a 3, 5, 10 and 15-year plan aimed at young people in primary and secondary education. The campaigns aim to convey a positive impression of the ICT sector and industry in general, stimulating an interest in developing digital competences and pursuing STEM careers.

Coordinating agencies: DGES
Involved: DGE; RBE; higher education institutions; ANPRI; among others.

2.5. Use of digital technologies in a context of inclusion for specific education and training needs

Development and democratisation of digital media in learning, and supporting training in schools and higher education.

Coordinating agencies: DGE
Involved: Higher education institutions; RBE; among others.

Axis 3. QUALIFICATION: Professionally train the active population by providing them with the knowledge they need to become a part of a labour market that relies heavily on digital competences

3.1. Identification of the digital competences needed for employability

Development of a decision support information system that makes it possible to analyse and anticipate the digital competences needed from the workforce, working closely with the Qualification Needs Anticipation System and the job market.

Coordinating agencies: DGES and ANQEP
Involved: Higher education institutions; IAPMEI; APDC; ACEPI; APDSI; among others.

3.2. National Network to Support Long-Distance Interactive Training

Implementation of a national content development system for digital training and specialisation through online courses, especially with videos and interactive platforms, with an accredited list of short courses.

Coordinating agencies: Engineering Schools Network
Involved: CCISP; higher education institutions; FCT (FCCN unit); among others

3.2.1. Academia Móvel.pt, with blockchain accreditation

Implementation of a training and digital specialisation system using blockchain mobile technologies, with applications available only on mobile phones, with an accredited list of CCISP level short courses.

3.3. CNQ level 4 and 5 ICT qualifications, including access to specialised certifications

Equipping the active population with competences suited to business needs, in specific ICT areas, including in programming languages, through certified intermediate level training or by obtaining specialised certifications offered by the industry.

Coordinating agencies: ANQEP and IEFP
Involved: Vocational Training Centres; Qualifica Centres; IAPMEI; among others.

3.4. National network of short courses at a professional and higher level, TESP

Implementation of a nationwide network of top-level short courses, TESP, in digital competences (which may already exist or are yet to be created), and maintain a disclosure information system and encourage their use.

Coordinating agencies: DGES
Involved: CCISP; IAPMEI; among others.

3.5. Network of academies and digital labs at IEFP Polytechnic Institutes and Training Centres

Implementation of a broad network of academies and laboratories equipped to provide digital competences training at IEFP Professional Training Centres and at higher education institutions, in particular at Polytechnic Institutes, in order to train and equip citizens with the competences they need to be successful in the digital economy, in close collaboration with companies.

Coordinating agencies: CCISP and IEFP
Involved: DGES; IAPMEI; business associations; companies; among others.

3.6. Re-qualification and professional integration of unemployed graduates

Development of special rehabilitation training projects aimed at unemployed graduates and the long-term unemployed, equipping them with digital competences and helping them begin or resume professional activity; promote and strengthen internationally recognised certification processes in industrial digital competences.

Coordinating agencies: IEFP
Involved: DGES; CCISP; Higher Education Schools; among others.

3.6.1 Re-qualification programme for professionals with teaching qualifications in pre-school education and in primary and secondary education

Training programme with Polytechnic Institutes and Universities, with a special emphasis on polytechnics (Higher Education Schools), but not exclusively. Campaign with incentive mechanisms and clear monitoring routines, involving Higher Education in the re-qualification of these professionals.

3.7. Upgrading and qualifying adults, workers and the unemployed, including the long-term unemployed

Reinforcement of training in the form of adult education and training courses, modular training, Vida Ativa and Qualifica, in coordination with private initiative training actions.

Coordinating agencies: IEFP
Involved: Companies; IAPMEI; Vocational Training Centres; Qualifica Centres; among others.

3.8. Digital qualification of workers in public positions

Action to be taken within the scope of formulating a human resources management policy aimed at bridging the digital competences deficit in Public Administration. A set of training modules on the different competences and levels of proficiency will also be available, which will allow people to create a personalised training programme. The system may provide certification for competences acquired in this way.

Coordinating agencies: INA
Involved: DGAEP; AMA; higher education institutions, among others.

3.8.1. Digital competences dynamic reference framework for Public Administration

Creation of a digital competences reference framework, in line with DigComp 2.0, adapted to the specific needs of workers in public positions and taking into account the strategic ICT processes in Public Administration.

3.8.2. Self-diagnosis system for digital competences in Public Administration

Development of an online self-diagnosis system, developed according to the competences framework, allowing each worker in a public position to identify the gaps in their digital competences.

3.8.3. Data life cycle management in the AP

Extensive re-qualification of Public Administration agents, in order to stimulate the Government's open data strategy, through a training programme for Chief Data Officers.

3.9. Training of digital competences teachers and educators

Training programme for teachers and educators, with the participation of IEFP Training Centres, higher education institutions and other training entities, particularly the Polytechnic Institutes.

Coordinating agencies: IEFP
Involved: ANQEP; among others

3.10. Reinforcement of higher education training in partnership with companies in the area of industry digitisation

Promote initial higher training (TeSP) and short-term post-graduate training in digital competences applied to industry (i.e., global connectivity of the supply and distribution chains, including IoT - Internet of Things, the increasing digitalisation of the means of design and production, the generalisation of additional manufacturing technologies, and the general robotization of operations, or "industry 4.0"), in close collaboration with companies and business associations.

Coordinating agencies: ANI and IAPMEI
Involved: CCISP; CRUP; APESP; higher education institutions; Companies and Associations; among others.


SAÍDA

Axis 4. SPECIALISATION: Promote specialisation in digital technologies and applications to improve employability and create higher added value in the economy

4.1. Promotion of digital competences in higher education

Reinforcement of primary-level training courses in the priority areas of this programme, with an emphasis on cooperation between higher education institutions and companies in their development and implementation, enhancing active educational procedures and including on-the-job training. It also includes the implementation and maintenance of a decision support information system that makes it possible to analyse and anticipate the competences needed, aimed at higher education students. The aim is to adapt/streamline the relationship between supply and demand for ICT courses in emerging areas.

Coordinating agencies: DGES
Involved: CRUP; CCISP; APESP; higher education institutions; among others.

4.2. Network of advanced training programmes throughout working life

Implementation of a nationwide network of short-term continuing education programmes on digital competences (TeSP), as well as refreshment or postgraduate courses, in response to the training needs of professionals working in the field or of recent graduates. Maintaining a disclosure information system and encouraging its use.

Coordinating agencies: DGES
Involved: CRUP; CCISP; APESP; higher education institutions; IAPMEI; among others.

4.3. Network of masters specialising in digital competences

Promotion of master's level professional training in digital competences applied to a set of specific sectors: industry, agriculture, health, rehabilitation engineering and support technologies, tourism, construction, among others. It includes the promotion of specialised training at master's and postgraduate level in digital competences related to the global connectivity of supply and distribution chains, including IoT - Internet of Things, the increasing digitalisation of design and production means, the generalisation of additional manufacturing technologies, and the general robotization of operations, or "Industry 4.0".

Coordinating agencies: ANI and IAPMEI
Involved: CRUP; CCISP; APESP; higher education institutions; companies; Business Associations; among others

4.4. Network of digital competences and innovation labs

Creation of a network of laboratories that encourage participation from higher education students in teams working on innovative projects. These projects are credited to their studies and are aimed at developing experiences and competences in the creation of new products and services, requiring or benefiting from the application of digital competences. It includes the participation of students in R&D projects with a digital technology component, in connection with the Research Units.

Coordinating agencies: ANI and IAPMEI
Involved: CRUP; CCISP; APESP; higher education institutions; companies; Business Associations; among others.

4.5. Creation of a network of chair professors i4.0, under the FCT Chairs Programme

Contribution to the creation of a network of chair professors in i4.0, with the objective of integrating a set of contents and competences in the training plans, focused on industry 4.0.

Coordinating agencies: FCT, ANI, and IAPMEI
Involved: Higher education institutions; Companies; Associations of Business; among others.

Axis 5. RESEARCH: Ensure conditions are in place for the production of new knowledge and active participation in international R&D networks and programmes

5.1. National Programmes for the Development of Advanced Computing Initiatives

Encouraging new R&D activities in the areas of scientific computing, quantum sciences and technologies, artificial intelligence, digital media, with an emphasis on four key areas:

- Advanced Cyberinfrastructure (ACI) - including all advanced scientific computing fields.
- Computing and Communication Foundations (CCF) - includes quantum computing, among other R&D areas.
- Computer and Network Systems (CNS) - including big data, cloud computing, and the IoT, among others.
- Information and Intelligent Systems (IIS) - including artificial intelligence, as well as human-centred computing in relation to digital media.

Coordinating agencies: FCT
Involved: Higher education institutions; among others

5.2. International partnerships

Reinforcement, development and promotion of partnerships between Portugal and science and technology centres of great international relevance, through programmes aimed at emerging new technologies and digital applications. These initiatives should include mechanisms to support scientific employment in collaboration with enterprises and advanced training programmes, as well as access to new markets and strategic links to innovative programmes, initiatives and technologies around the world, including through the following programmes and initiatives:

- Carnegie Mellon Portugal Programme: ICTI - Information and Communication Technologies Institute (under review);
- UT Austin Portugal Programme: CoLab on Emerging Technologies (under review);
- MIT Portugal programme (under review);
- Indian Institutes of Technology Programme - Portugal (training);
- Fraunhofer Portugal programme (under review);
- Participation of Portugal in CERN (ongoing);
- Participation of Portugal in the ESA (ongoing);
- Internationalisation initiatives for polytechnics (in preparation)

Coordinating agencies: FCT, with higher education institutions, CRUP, and CCISP.
Involved: Carnegie Mellon; MIT; UT Austin; Indian Institutes of Technology; Fraunhofer; among others.

5.3. Mediterranean Interaction Initiative: applying digital technologies to food systems, sustainable development, heritage

Promotion of a set of advanced human resources qualification activities at the various levels of digital competences, with a view to strengthening and opening up opportunities for scientific, technological and economic collaboration between Mediterranean countries, specifically with applications in the areas of agriculture, water, energy and the preservation/dissemination of heritage.

Coordinating agencies: FCT
Involved: Mediterranean and African countries

5.4. Atlantic Interaction Initiative: applying digital technologies and space systems to study the interactions between climate, energy, the atmosphere, and oceans in Atlantic regions

Promotion of a set of advanced human resources qualification activities at the various levels of digital competences and space systems, with a view to strengthening and opening up opportunities for international scientific, technological, and economic collaboration, particularly with applications in the areas of space and the oceans.

Coordinating agencies: FCT
Involved: Mediterranean and African countries

5.5. Acquisition of competences that empower “Open Science”

Training the new generations of researchers and professionals in digital competences they need for collaborative scientific work and to affirm the concept of “Open Science”.

Coordinating agencies: FCT, with DGES
Involved: Higher education institutions, with CRUP; CCISP; APESP; among others.

5.6. Academic Library of the Future

Creation of a Digital Academic Library, adding “Digital Resources”, to be shared between higher education libraries, with a view to accessing and sharing information as part of creating a type of future knowledge centre, including a programme for the training of librarians in digital competences, particularly in the use of digital data management and visualization tools (research librarian/co-investigator concept).

Coordinating agencies: FCT (FCCN unit)
Involved: CRUP; CCISP; among others.

5.7. Science in Portuguese Programme - Infrastructure for Knowledge and Research

Connecting the National Directory of Digital Repositories to repositories and directories in Portuguese around the world. Programme to encourage the storage, dissemination, and reuse of scientific digital content in Portuguese.

Coordinating agencies: FCT (FCCN unit)
Involved: CRUP; CSISP; APESP, among others.

5.8. National and European Roadmap for Research Infrastructures

Dissemination and promotion of the use of available scientific infrastructures, in line with the ongoing “Open Science” strategy, with particular emphasis on scientific computing infrastructures and digital content dissemination.

Coordinating agencies: FCT
Involved: RCAAP; CRUP; CCISP; APESP; among others.

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