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COLIGAÇÃO PORTUGUESA
PARA A EMPREGABILIDADE DIGITAL
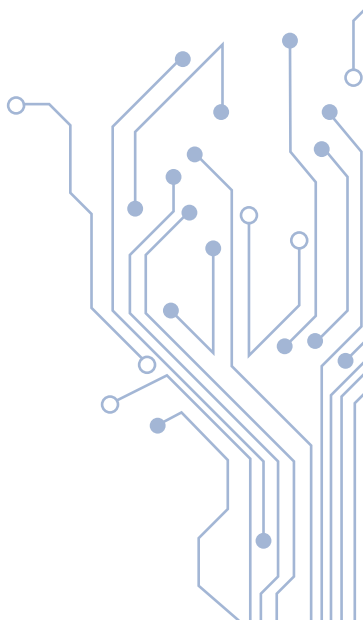
STRATEGY AND ACTION PLAN FOR DIGITAL JOBS 2015-2020

INDEX

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Under the initiative *A European Information Society for growth and employment* (COM (2005) 229 final), which aimed to promote the efficiency of the European economy through the generalized use of Information and Communication Technologies (ICT), the European Commission adopted the communication *A Digital Agenda for Europe* (COM(2010) 245 final) in May 2010, **defining a strategy for the digital economy until 2020**.

The Digital Agenda for Europe constitutes one of the seven emblematic initiatives under the EU 2020 Strategy for an intelligent, sustainable and inclusive growth. It outlines policies and actions designed to get the most out of the benefits of the digital era for all of the society and economy sectors, namely through the creation of a single digital market, the improvement of skills and inclusion (Digital Literacy), and the application of ICT to face certain societal challenges.

The Digital Agenda for Portugal was approved in December 2012 with the aim to stimulate the digital economy, the knowledge society and advancements in the scientific and technological fields. Aligned with the priorities of the *Digital Agenda for Europe* and the *EU 2020 Strategy*, the *Digital Agenda for Portugal* establishes the following goals:
■   to promote the development of the broadband infrastructure;
■   to create the conditions for the growth in number of companies that use e-commerce in Portugal and of exportations in the ICT field;
■   to encourage the use of online public services and the generalized usage of ICT.

Furthermore, the creation of qualified jobs in the ICT sector which increase the employability of the ICT workers, is an established priority within the employment policies in Portugal. The development of human resources in ICT is very dynamic in Europe, especially considering the annual average growth on the number of ICT specialists since 2000. Yet, this progression raises new and important challenges in the employment context that reflect the need for a co-operative strategy for the digital employability. A strategy that promotes the use of ICT among workers and companies in two ways: the modernization of the business fabric by grounding it on the knowledge economy and on its internationalization, which is crucial to business competition, assuring the development of new businesses with a technological foundation; the creation of jobs in some population groups and thus the reinforcement of social cohesion.

Accordingly, the innovative *Grand Coalition for Digital Jobs*, a European Commission initiative, comprises the creation in every Member State of a **Coalition for Digital Jobs** that brings together educational institutions, various levels of training and companies. It lies in five key priorities:
■   adequate training in ICT;
■   mobility of professionals between the Member States;
■   certification of qualifications in ICT;
■   awareness raising for careers in ICT and in Science, Technology, Engineering and Mathematics (STEM);
■   education and training innovation in the aforementioned professional fields.

Notwithstanding the notorious European progression in the creation of ICT jobs, Portugal stands amongst the countries with a small proportion of professionals in those areas, which leads us to conclude that the ICT employment potential goes under-exploited. The increase of ICT professionals in Portugal and the promotion of the national digital economy, while simultaneously nurturing economic growth, will be crucial to address the estimated deficit of ICT jobs in 2020. Therefore, it is important to take advantage of highly specialized human resources and infrastructures in Portugal, in order to create the conditions to excel in Digital Employability and pinpoint Portugal as an international reference in this matter.

GOALS AND PRIORITY AXES

In Portugal there is a considerable skill gap in the ICT sector. Given the high level of unemployment, especially among the younger generation, as well as the high number of businesses that don't make use of ICT (and thus limiting the development of the digital economy at national level), the main goals of the *Strategy and Action Plan for Digital Jobs* in Portugal are:
■   to reduce the deficit of ICT professionals;
■   to improve access to ICT skills in the public and private sector, as well as to the common citizen;
■   to leverage the number of businesses that use digital or are digital-based, and to develop digital markets and economy.

The *Strategy and Action Plan for Digital Jobs* is inspired not only by a set of community guidelines, but also by national strategic guidelines such as, and namely, the Connecting Portugal initiative (*Ligar Portugal*). This project's goal is to disclose the progress of ICT general usage in Portugal, comprising a regular and transparent evaluation of the public service information systems, an Integrated Strategy for the Information and Knowledge Society (*Estratégia Integrada para a Sociedade de Informação e do Conhecimento*) and the National Initiative for the Information Society (*Iniciativa Nacional para a Sociedade de Informação*). It also relies on the strategic *Horizon 2020* - the EU framework programme for Research and Innovation. The goal is for the *Strategy and Action Plan for Digital Jobs* to lead concrete actions that can be implemented in a short and a medium term, aligned with the time period set in *Portugal 2020*.

Rooted in the **Portuguese Coalition for Digital Jobs**, The *Strategy and Action Plan for Digital Jobs* supports the completion of the *EU 2020 Strategy*, through the following action lines:

■   **Increase in a large scale the human resources that are qualified on different levels in ICT:** to develop new products/services for businesses in the global market, to streamline business models and pursue opportunities in the global market. This bet on human resources will result in both the promotion of ICT-based learning practices and in the generalized training of active people, employed or unemployed.

■   **Fuel the private investment in activities based on the development of ICT solutions.** The growth in investment should take on four levels:
I) entrepreneurship reinforcement, making Portugal a country with a growing capacity to generate spin off of R&D (Research and Development) Universities and Institutes and of start-ups with global vocation;
II) strengthen the presence of Portuguese information technology businesses in European programmes and international partnerships;
III) attract multinational companies to undertake different types of functions in Portugal;
IV) support the Portuguese presence in scientific diplomacy and in the international scientific networks.

■   **Raise awareness among the young population for the ICT** as a set of skills that widen up employment opportunities
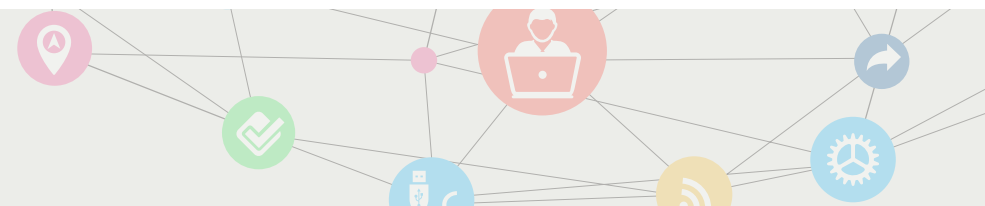
According to the abovementioned guidelines, the **Strategy and Action Plan for Digital Jobs** establishes four priority axes:

AXIS 1

Qualification and Requalification for Employment in ICT

AXIS 2

Business Growth and New Jobs in ICT

AXIS 3

Society awareness for the digital;

AXIS 4

Internationalization of the ICT sector and acquisition of foreign direct investment.

Axis 1 proposes to encourage qualification procedures focused on both the early qualification of the youth and in the requalification of working age unemployed people, grounded on a lifelong learning system;

Axis 2 considers the need to expand the pool of human resources with ICT key skills for business as well as the need to value training processes in the ICT domain;

Axis 3 proposes to raise awareness within the Portuguese society - people and families, schools, universities and polytechnic, businesses and State - to nowadays demand of ICT skills, the need for continuous and systematic ICT-based learning and, specially, for the job opportunity in ICT;

Axis 4 bets on attracting investment through the qualification of human resources, partnerships between companies, universities and technological centres or the high level of existing infrastructures in Portugal.

The **Strategy and Action Plan for Digital Jobs** aims to accomplish the ambitious goals of growth and employment over three courses:
- to accelerate a broad process of digitization among the SMEs;
- to facilitate businesses scale profits, through emerging/existent ICT services;
- to fuel technological-based entrepreneurship in order to place Portugal on the front line of digital innovation at European level.

Thus, the **Strategy and Action Plan for Digital Jobs** presents itself as a relevant contribution to the country's development since it involves synergies between the private and the public sector, a strong bet on internationalization and investment attraction, together with the systematization of human resources lifelong learning, qualification and training in technology and R&D.

METHODOLOGY AND EVALUATION

The global evaluation model in use supports a common approach for the proposals in "4 Axes" and the "governance system". The **Portuguese Coalition for Digital Jobs** – constituted by a Coordinator, a Plenary and Sectoral Teams - will be materialized through a group of institutions (consortium of firms, public bodies, education and training institutions and civil society bodies). Together, these organizations will promote initiatives, spread information and support projects that contribute to the increase of demand of qualification in the digital areas and, or, seek further adjustment between jobs demand and supply.

The **Portuguese Coalition for Digital Jobs** will also encourage local networks of qualification - namely through the articulation between Higher Education Institutions, R&D Centres, incubators, Science and Technology parks or Foundations - that will allow to coordinate and settle, at regional and local levels, the needs of educational and training offer and the promotion of ICT learning practices. The sectoral teams will be monitoring and evaluating the initiatives, by mapping relevant information and drawing improvement plans when necessary.

The activities for the implementation of the present **Strategy and Action Plan** may have the respective costs supported by the public and private sector. The investments sustained by the public sector will be subject to budgetary availability, although there is also the possibility of being partly ensured by funds from applications or pledges to European funds that are approved (namely the Operational Programme of Human Capital and the Operational Programme of Social Inclusion and Employment, the European Programmes that aim to reduce the youth unemployment, such as *Youth Guarantee* or other communitarian programmes, as for example, *Horizon 2020* or *COSME*).

The strategic goals identified in each Axis will be aligned with the initiatives **Horizon 2020** and the **Digital Agenda for Portugal**. The implementation evaluation of the **Strategy and Action Plan for Digital Jobs** will take into account the instruments for intervention and the work development, thus focusing on monitoring the implementation process and confronting the program with the dynamic of its application.

The evaluation will analyse various elements in order to conclude about the full implementation of the proposed goals. The results of the evaluation of the implementation process are intended to enhance the support for the **Strategy and Action Plan** development, by improving effectiveness and efficiency and addressing final results in the light of the prior expected results.

It is important to stress that the evaluation should essentially identify improvements to the implementation in order to assure good performance; measure the internal coherence of the **Strategy and Action Plan**, identifying possible needs for revision or reprogramming.

DIAGNOSIS[1]

The evolution of the ICT workforce in Europe between 2000 and 2012 was very dynamic, as the employment of these specialists grew significantly in the European Union (EU).

The dimension of the ICT workforce depends, evidently, on the definition that is used. Using a strict definition, focused on core professionals and technicians, we can observe that the **qualified ICT** jobs grew 2 million during this period, from 3.1 million in 2000 to 5.1 million in 2012, resulting in an increase of the share of the ICT employment in the employment total from 1.6% to 24%. If we consider a wider definition, the increase was to 6.1 million, or 2.8% of the employment total in 2012, against 1.9% in 2004.

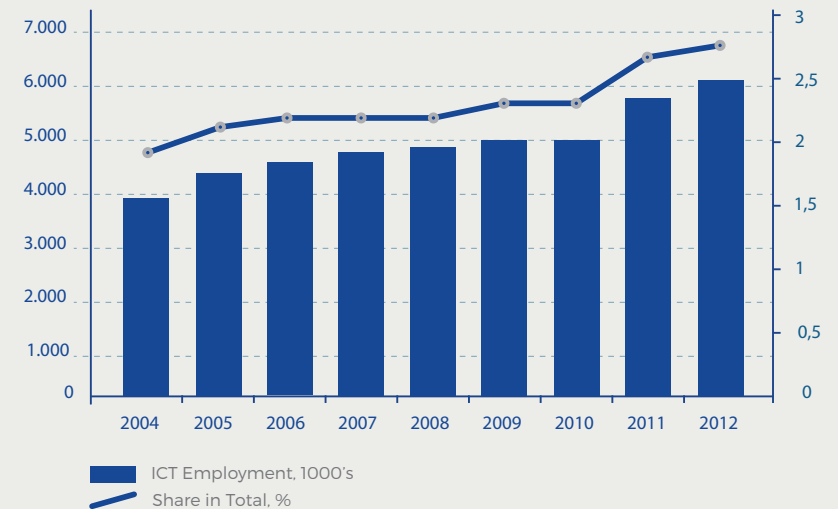Fig. 1 Evolution of ICT employment in the EU 2004-2012
Source: *JRC (IPTS) "The evolution of EU ICT employment 2000-2012" Technical Report (forthcoming)*

The **employment of ICT specialists** grew, in average, over 4% per year since 2000, seven times more than the growth of the employment total on the same period

1- *Digital Agenda Scoreboard 2014, Digital Inclusion and Skills*; European Commission, May 2014

Therefore the growth of the ICT employment was 4.3% in average (strict definition) during the period 2000-2012, over seven times more than the growth of the employment total on the same period. Under a wider definition, the growth rate appears to be even higher.

Most of the EU countries increased the share of specialized ICT work. Portugal, however, is among the countries will a smaller proportion of workers in these occupations. According to the European Commission, Portugal has less than 2.5% workers in ICT which is one of the lowest levels in the EU (Shared with Romania, Lithuania and Greece), far from average EU

27 average (3.7%) and even further from the countries with the best performance (Finland, Sweden, Slovakia and United Kingdom, where the weight of the workers in ICT professions exceeds the 5%).

Despite the strong positive evolution in the employment of ICT professionals in the EU over the last decade, the potential of employment in ICT is still suboptimal. Evidence shows that there is a widening gap between the demand and supply of ICT specialists all over Europe. If we don't take action, it is expected that this gap can arise to 900 000 jobs that won't be filled by 2020.
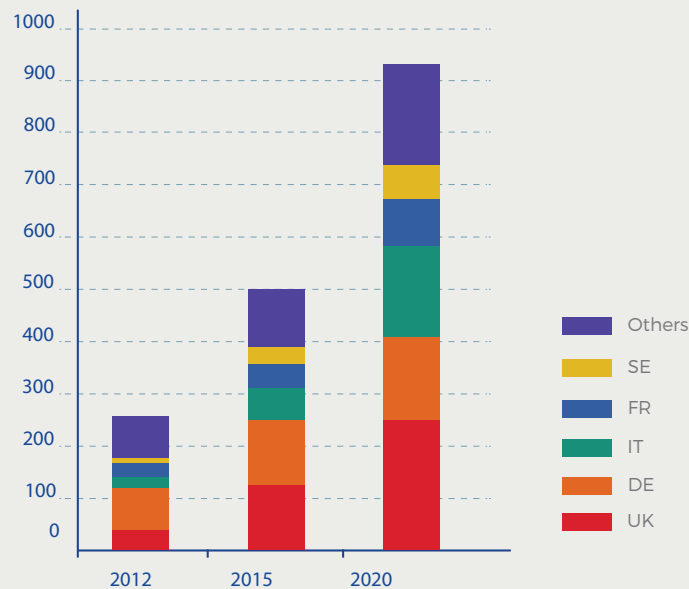
On the other hand, the possession of digital skills in the workforce is, in average, superior to that of the population in general. In the EU only 14% of the workforce lacks digital skills. If, cumulatively, we add to this value the per-

centage of workforce that has a low level of digital skills, the result is approximately two fifths of the EU's workforce (39%), which can be considered insufficiently digitally qualified.
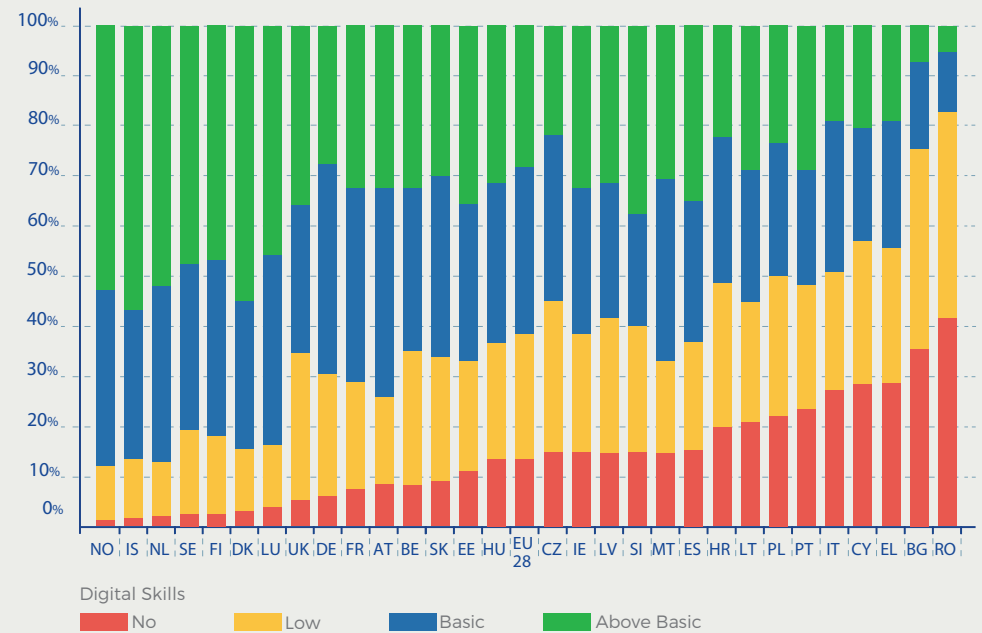
Fig. 3 Digital skills of the EU's workforce 2012
Source: *Commission services based on Eurostat data*

39% of the EU's workforce has **insufficient** digital skills, **14% doesn't have** digital skills at all

Fig. 2 Prediction of job vacancies in ICT employment in the EU 2012-2010.
Source: *Empirica model forecast*

The EU has a growing **deficit** of ICT professionals, which is predicted to rise up to **900.000** jobs in **2020**.

In Portugal, the problem of working age adults' qualifications remains. It is a challenge with three dimensions:
- fight the structural deficit of school qualifications;
- consolidate a lifelong learning system;
- promote an individualized certified training, based on real qualification needs in different territories and economic sectors.

Given the urgency to circumvent the estimated deficit of job vacancies in ICT by 2020, it will be crucial to increase the supply of ICT professionals in Portugal and, thus, contribute for the development of the national digital economy while powering, simultaneously, the economic growth.

Encourage the scientific activity and Research and Development (R&D) with the purpose of:
- fuelling investment by capitalizing existent infrastructures and highly specialized human resources in Portugal;
- creating dynamics for lifelong learning and conditions for digital employment;
- creating conditions for digital employment;
- to implement good practices that enable a new economic identity based on digital knowledge.

The ICT are a crucial part of our everyday life, with a growing importance in today's society. So much so that the political leaders are fully aware that the future in each country is affected by the social and economic action of ICT and by the way in which these are assimilated by the society, by the speed of its absorption, by exploring opportunities and by the strategy of its application in the economy.

However, policy makers aren't the only ones that are aware of the importance of ICT in the economy. Organizations in general - from the public to the private sector - are also widely aware of the importance of introducing ICT to face market competition and the need to reinforce technical and technological capacities, as well as their own improvement (including management practices, entering the global market, enhancing the enlargement of the markets).

The Information Society is the society in which the knowledge that provides innovation and the so called "technology intellect" gains prominence. The latter is capable of responding to very complex problems that arise, namely, from the use of information systems.

The Internet is seen as a key platform that can help to support the necessary gains of productivity, open new business opportunities and create new and better jobs. But, at the same time, the Internet is forcing a significant reorganization of businesses, and that affects employment[2]. The workers need specialized ICT skills to perform their tasks at work. This suggests a continuous growth of the sector employability and stresses the need to promote these skills among workers[3].

Thus, the progressive trajectory of analogical to digital, of machine to network, is shaping the way we see the work routine: the working environment will be as such and increasingly dematerialized. In this digital world with higher autonomy in electronic execution of the tasks, with the emergence of electronic market and convergence of telecommunication sectors, the organizations need to recognize the need to explore new opportunities of work arrangement.

The human capital is a key factor for the economic growth of a country and, in a globalized world, betting in knowledge, in technology and innovation will turn out to be the cornerstone for the development of businesses and economies.

Already in 2000, in Portugal, the *Inter-ministerial Commission for the Information Society* was created and launched the *Internet Initiative,* inspiring the public action and the private initiative while supporting social inclusion and fuelling international cooperation. In the same way, a Statistical Information System was established for the follow-up of the developments in Information Society. In 2001 emerged the first public *Internet Spaces,* that are still today one of the most important means of access to the Internet in Portugal.

In 2001 the *Basic IT Skills Diploma* was also created, and the *Inter-ministerial Commission for the Information Society* launched a contest for the evaluation of websites of the State's administrative bodies and the connection of the country's schools to the Internet. In 2002 a *Unit for the Innovation and Knowledge Mission* (UMIC) was established to define and guide public policies for the Information Society and the Electronic Government in Portugal.

The concept of a **strategy for digital employment** it's thus associated with this evolution. As well as to the Initiative *Connecting Portugal* – which priority is to disclose achieved progresses in the domain of ICT social usage in Portugal, within a regular and transparent evaluation of the information systems of public services - and, also, the *Integrated Strategy for a Society of Information* organized namely around the *Digital Cities Programme,* the *National Initiative on Electronic Commerce* or the *Digital Signature.*

Estimates for Portugal show that in 2020 we may observe 15 000 job vacancies in the ICT domain, circa 5 times more than in 2002. Consequently, it is of the utmost importance to modernize the learning models and instruments by conceiving and implementing a strategy of digital educational resources that promote the creation, dissemination and use of digital content in the learning processes, aiming to qualify the population in ICT.

The purpose of the *Strategy and Action Plan for Digital Jobs* is to identify initiatives, their respective goals, guidelines and organizations responsible for their implementation. That way one is able not only to circumvent the problem of lack of professional skills in the ICT domain, but also to encourage the businesses competitive abilities, taking advantage of market opportunities and aligning skills.

In short, the aim is to make Portugal an international reference in the ICT sector by including ICT key actors in innovation procedures, R&D, knowledge transfer, advanced training, production and commercialization of products and services, marketing and internationalization until 2020.

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2 - *Measuring the Internet Economy: A Contribution to the Research Agenda, OECD Digital Economy Papers, n.º 226,* OCDE 2013
3 - *Skills and Jobs in the Internet Economy, OECD Digital Economy Papers, n.º 242,* OCDE 2014

The European Union and the *National Coalitions for Digital Jobs*

The ICT's crosscutting nature and the fast growth of the sectors that produce software and digital content, as well as those rendering informatics services or building informatics equipment (for communications and telematics networks), has lead the EU to launch an emergency programme with the goal to redirect training and employment in these areas, given that Europe can reach a deficit of 900 thousand workers in ICT. This bet on digital jobs aims to safeguard the future of Europe competitiveness in the digital technologies and take advantage of an opportunity for a drastic reduction of youth unemployment.

The initiative launched by the European Commission involves the creation in each Member State of a *"Coalition for Digital Jobs"* that gathers training institutions from various levels, business producer/users of IT services and products, having already obtained commitments from different actors at the European level, from multinationals to consortiums of SMEs or training institutions.

The *Grand Coalition for Digital Jobs* initiative is grounded on five pillars:

- ◼ Appropriate training in the ICT domain;

- ◼ Professional mobility among Member States;

- ◼ ICT Qualifications certification;

- ◼ Communication and awareness raising for ICT and STEM careers;

- ◼ Innovative education and training in these areas

- ◼ Programming

Why the focus on digital jobs in Portugal?

The multiple activities that have been being developed around the crosscutting use of information technologies, telecommunications and Internet, are today a foundation for employment creation in Portugal, without equivalent and far from being worn out.

It is so because, on one hand, the gradual transfer to the cyberspace of marketing, transactions, costumer relations and technical assistance for users became crucial for the Portuguese businesses competitiveness in the domestic market, as well as for their internationalization.

On the other hand, the multinational businesses have been choosing Portugal to execute a set of tasks for their organizations and clients, a trend that is also far from depleting. One should highlight the important role that services rendered to companies at distance by Portugal can represent as an area of specialization and its importance increase in value chains. The same country features of attractiveness have been used by Portuguese businesses to position themselves in external markets either to offer products, to render services or even to distribute contents.

This vast group of activities, to which one may add the e-commerce, interactive advertising and multimedia contents for use in various platforms, constitutes one of the most promising areas for qualification and requalification of tens of thousands of young individuals and the educated workforce (namely with qualifications but no job) who lack competences that lead to employment.

It is recognized that, beyond the Engineering courses taught in Universities and Polytechnic Institutes, there is nowadays in Portugal an educational offer in multiple professional profiles needed for those activities, though not always presenting the contents considered crucial for businesses or with a guaranteed desired quality.

However, there is a problem with the demand of training and qualifications in the digital area, reflecting a low level of attractiveness of the Computer Sciences, for which the demand is limited and decreasing.
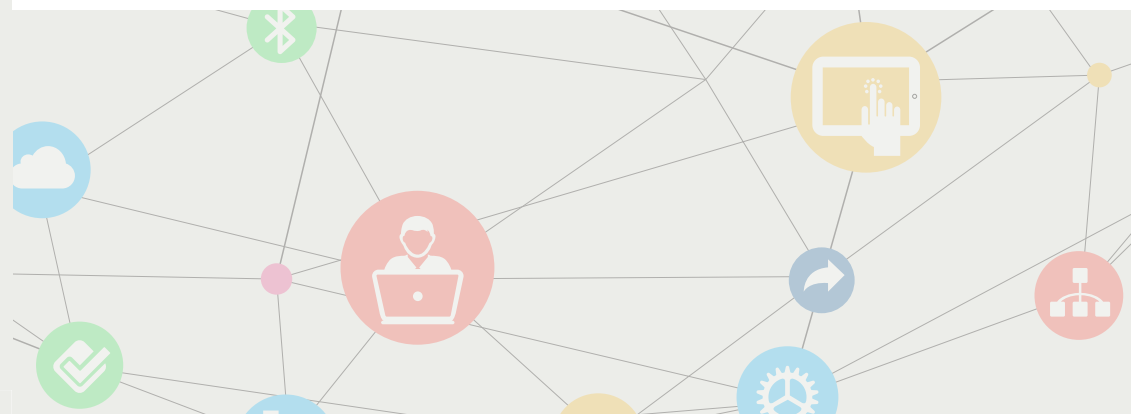
PORTUGAL HAS AS ITS AMBITION:

To become a country of reference in Europe for the development of solutions, products and services in the ICT area and for rendering services to businesses, combining local entrepreneurship with the attraction of global operators that perceive Portugal's unique set of features;

To become an economy and a society that make ICT and cyberspace integration a competitiveness lever on the exterior and of innovation in the functioning of cities, basic social systems (education, training and health) and of the relationship between the state and the citizens;

To develop a combination of artistic creation and innovation in technologies in order to acquire a more prominent role in the digital entertainment market, as one of the most dynamic segment of Portugal's creative industries.

This triple ambition will assure the creation of jobs and the expansion of human capital accumulation, breaking deeply apart with the present situation.

The *Portuguese Coalition for Digital Jobs* takes on the following strategic intervention vectors:

A — **A large scale increase of human resources qualified at the different levels in ICT:** to develop new products, to render services to businesses in the global market, to streamline business models, as well as to increase the effectiveness and efficiency of the operations and capture opportunities in the global market.

This expansion of human resources will result both from the promotion of ICT-based learning practices, capitalizing motivations since the 1st cycle of basic education, and from a process of youth guidance towards these education areas in secondary school, polytechnic and university. It will also be a result from requalification of the younger generation and graduates who are unemployed or in ICT unskilled jobs so as to offer new products and services, contents or concepts. Finally, in the generalized training of workers or unemployed people with any level of education for end-user basic skills.

B — Boost the corporate investment in Portugal in activities with a certain degree of complexity, based on the development of ICT solutions, so as to transform the country in one of the most important centres of exportations of creative industries services/contents and one of the main qualified employment generators in Portugal. This investment boost should rely on three drivers:

1 - Entrepreneurship reinforcement, making Portugal a country with a growing capacity to generate Universities and R&D Institutes spin offs and start-ups with global vocation;
2 - Reinforcement of the presence in the international markets of Portuguese businesses already present in various IT-based sectors, strengthening its participation in European programmes and international partnerships;
3 - Attraction of multinational companies for different types of functions to undertake in Portugal - from R&D centres to skills centres, from IT outsourcing to the localization of back office / shared services operations and of contacts with clients;
4 - Bet in scientific diplomacy and in international scientific networks.

C — Awareness raising of the youth to the information technologies as a set of skills that open up opportunities for employment and evolution in professional careers. This awareness should be centred in dissemination, from the elementary to the high education, not only of end-user ICT skills but also to forerun programming skills. At the same time, it is necessary to make families aware of the added value of this early initiation, dissemination and use of digital contents in the learning processes, based on practice communities composed by professors, students and parents.

STRATEGICAL ORIENTATIONS

In December 2012 the *Digital Agenda for Portugal* was approved. Its aim is to stimulate, through six priority areas of intervention, the digital economy, the scientific and technological development and the knowledge society. Aligned with the priorities of the *Digital Agenda for Europe* and the *EU 2020 Strategy,* the *Digital Agenda for Portugal* presents the following goals:

- to promote the development of a broadband infrastructure;
- to create conditions that allow for the growth of the number of companies that use e-commerce in Portugal and that enable the growth of exportations in ICT;
- to promote the use of online public services and the generalized use of ICT;
- to ease the attraction of investment to Portugal in technological employment providers;

- to stimulate Portuguese technological businesses to retain talent from businesses through the development of digital skills;
- to support the development and expansion of digital employment providers present in Portugal and to promote the use of online public services.

Given the existence in Portugal of a lack of ICT skills and considering the high unemployment, particularly in the younger generation, as well as the countless businesses and institutions that don't resort to ICT at a national level, thus limiting the development of the digital economy, the strategic goals of this *Action Plan for Digital Employment* are:

to reduce the deficit of ICT professionals - responding to the estimated 15 000 job vacancies in ICT by 2020;

to improve the conditions for the **acquisition of ICT skills** in the public and private sector, as well as to the common citizen;

to leverage the number of **businesses that use digital** and of **digital-based businesses**;

to develop Portugal's **digital markets** and **economy.**

IMPLEMENTATION AND GOVERNANCE

The P*ortuguese Coalition for Digital Jobs* will be implemented through a series of commitments to be adopted by consortia of firms, public bodies, education and training institutions and civil society bodies, namely Foundations, Professional Associations, Confederations and Business Associations. Together, these will promote initiatives, advertise information and support projects that contribute to increase the demand of digital qualifications and further adjustment to employment's supply and demand.

The implementation of the *Portuguese Coalition for Digital Jobs* will be done through the following governance structure:

Coordinator - that will anchor the *Portuguese Coalition for Digital Jobs*. A role ensured by the Foundation for Science and Technology, I.P.;

Plenary - where all the members of the *Portuguese Coalition for Digital Jobs* have a seat. Its role is to proceed to an annual analysis of the

It will try to stimulate local networks of qualification - namely through the articulation between Higher Education Institution, R&D Centres, incubators, Science and Technology parks or Foundations - that allow to coordinate and reconcile, regionally and locally, the needs of educational and training offer.

project evolution and eventually decide on new guidelines for the following year;

Sectoral Teams - one for each axis of the Strategy, to whom is given the task to plan the follow-up and evaluation of the initiatives conducted within the respective axes.

FINANCING

The initiatives that lead to the implementation of the present *Strategy and Action Plan* might have associated costs, supported by investments from both the public and the private sector, given that there is also the possibility that they are partly assured through funds coming from applications or pledges to European funds that might be approved, namely:

- Operational Programme of Human Capital and Operational Programme of Social Inclusion and Employment, of the Partnership Agreement with the European Union;

- The European Programmes that aim to reduce the youth unemployment (*Youth Guarantee*);
- Other Community Programmes (for example, *Horizon 2020* or *COSME*).

The *Portuguese Coalition for Digital Jobs* can still support and disclose self-financed actions and/or involving costs for the beneficiaries, which can be completed by bank credit arrangements to be standardized.

AXIS 1
QUALIFICATION AND REQUALIFICATION FOR THE EMPLOYMENT IN ICT

AXIS 2
BUSINESS GROWTH AND NEW JOBS IN ICT

AXIS 3
SOCIETY AWARENESS OF THE DIGITAL

AXIS 4
INTERNATIONALISATION OF THE ICT SECTOR AND ACQUISITION OF FOREIGN DIRECT INVESTMENT

AXIS 1

QUALIFICATION AND REQUALIFICATION FOR THE EMPLOYMENT IN ICT

The job potential in ICT is suboptimal, whilst the existence of a growing gap between demand and supply of experts in this domain. The projections made for Portugal point to a possibility of having, in 2020, 15 000 job vacancies in the ICT domain, circa 5 times the number that was estimated back in 2002. The situation is all the more paradoxical as we verify that the unemployment and youth unemployment rates at national level are higher within the EU. The promotion of job creation depends greatly on the capacity to qualify individuals in the ICT domain.

If businesses continue to increase their demand for ICT skills, the data shows that a significant part of the adult population lacks basic ICT skills. This lack of ICT skills in the adult population must be envisaged as an area of special concern for politicians, since social groups with less ICT skills tend to be the demographic groups with a higher risk of losing jobs in the ongoing technological transformation of the workforce[4].

The *Strategy and Action Plan* to promote qualification begins with a diagnosis that identifies the constraints that affect the potential of mobilization to educational and training offers in the ICT domain, and it seeks to take action over them. Indeed, given the perspectives of evolution of the employment necessities and attending to the unemployment rates, the promotion of the qualification processes should focus on both the initial qualification of the young and in the requalification of unemployed in working age - the emphasis being on the available graduates for an ICT requalification as an employability factor. Adding to that, these qualification processes must be consolidated in a strategic Action Plan which relies on a lifelong learning system and that enshrines the 2020 time horizon.

It should also foresee initial training, at various degrees of complexity, in new competence areas that may emerge and review them regularly and accordingly.

A shortage of specialists and qualified technicians in the ICT domain has been registered for several years at a national level. Recent data shows that the ability to form senior and middle managers in Information, Communication and Electronic Technologies (ICET) changes in regard to different of levels and segments of education and training.

The study Mapping of the Educational and Training ICET Supply in Portugal (Mapeamento da Oferta Educativa e Formativa TICE em Portugal) was conducted in April 2015, promoted alongside the establishment of the *Portuguese Coalition for Digital Jobs* and coordinated by Professor Ana Claudia Valente. The referred study shows that, in higher education, the supply occupation rates in the core sector of the ICET[5] reveal that Electronics and Automation got to 75% on the academic year 2013/2014 while degrees in Computer Sciences registered, in the same period, a 32.5% occupation rate, one of the lowest in the ICET core and only half of the higher education total (64.4%). Furthermore, albeit the growth of circa 16% in the number of graduates in ICET between 2010/11 and 2012/13 (almost twice the total registered in higher education), there's a reduction of the demand of degrees in ICET (-8.8%) in 2013 and 2014, going in hands with the higher education global trend.

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4 - *ICT Skills and Employment: New Competences and Jobs for a Greener and Smarter Economy, OECD Digital Economy Papers,* n.º. 198, OCDE 2012

5 - which includes Informatics (CNAEF 48), particularly Computer Sciences (CNAEF 481), Electricity and Energy (CNAEF 522) and Electronics and Automation (CNAEF 523

Still regarding higher education, one must stress that the STEM areas represent circa 30% of the enrolled students, corresponding to over 100 000 students of which 64% have non-ICET training; in a background of *ICT skills gap* endurance, these students represent a huge reserve of qualified resources with a potential of requalification for ICET core areas.

The supply of Technological Specialization Courses (CET), aimed at training medium-level qualifications (level 5 in the national qualifications framework), takes on an important part in attracting more students to pursuit further higher studies. The core ICET areas have a meaningful weight within the CET in view of representing, in 2013/14, 25% of the available CET and 28% of the total number of registrations (46.6% of which in Computer Sciences). The CET in Computer Sciences have been registering an increase in demand and also in the number of graduates.

In the context of double certification in high school, there has also been a global growth of the number of students in core ICET areas, even though the behaviour associated with the two main modalities is rather different.

As the matter of fact, the Learning Courses registered a very significant reduction of the number of enrolled students in Computer Sciences (to the advantage of other technological areas with employment potential), whilst the Professional Courses have had a considerable increase. It is also worth stressing that the students' lack of motivation for learning mathematics/sciences and their insufficient performance level in these subjects are an important constraint for pursuing education (higher education training in ICET) and for their success in the double certification courses in high school.

In this context, the qualification and requalification for ICT employment has to be weighted in order to answer the fundamental question: how to avoid wasting ICT employability.

The **specific guidelines** regarding Qualification and Requalification for ICT employment come down to:

- Increase the human resources *pool* with key skills for the development of the supply of solutions, contents and innovative services by businesses in Portugal;
- Increase the offer of basic skills for the use of ICT by the corporate fabric and, in particular, the use of cyberspace for marketing, publicity and transactions;
- Enhancing the processes of educational and professional guidance in the ICT domain;
- Creating and/or revising the study programme, particularly that of high school and of training references as well as didactic resources;
- Promote the supply of education and training in ICT;
- Qualify trainers that ensure the reinforcement of programing and IT teaching in elementary and high school;
- Increase the awareness and motivation of potential students/graduates for education and training in ICT;
- Ensuring the existence of study programmes, training and education references, and keep them updated as a guarantee of the employability potential;
- Diversify and improve the flexibility of offers in education and training in ICT, covering different levels of qualifications by including the younger generation, mainly in initial qualification, and people in working age in requalification processes;
- Develop pilot projects in ICT, searching to strengthen motivation and to improve performance levels in that domain.

This orientation unfolds in a group of **action lines**:

- The significant increase of human resources with degrees, masters and PhDs, in Computer Sciences and in Computer Engineering, following the evolution of skills demanded by the sector at an international level (see *Big Data* and *Analytics*);
- The launch of training initiatives in association for the requalification of unemployed or underemployed graduates (consortia that involve businesses in need for qualifications, Universities and Polytechnic Institutes, in order to define, together, curricula and learning modalities);
- The offer increase of intermediate levels of qualification that allow the dissemination of the use of ICT in the corporate fabric, including in the areas of e-commerce and interactive advertising;
- The introduction of computer programming in primary education and of a specific training network in ICET in secondary education, oriented for access to higher education;
- Teaching and dissemination of successful experiences of transformation in learning methods using ICT, as well as vocational guidance for the young for ICT areas.

1.3. INITIATIVES AND INSTRUMENTS

INSTRUMENTS	ENTITIES			PERFORMANCE INDICATOR(S)	SCHEDULE
	COORDINATOR(S)	EXECUTOR(S)			
MANAGEMENT OF CRITICAL INFORMATION					
Online information mapping of the provision of updated education and training in TICE	CPED	Consortium Maior Empregabilidade		Online Site	2015
UPGRADING VOCATIONAL AND EDUCATIONAL GUIDANCE PROCESSES					
Promotion of mechanisms that value the provision of education and training in the ICT field	IEFP, DGE, ANQEP, DGES	IEFP, DGE, ANQEP, DGES, training centres, schools, higher education establishments, training entities, CQEP		Mechanisms to promote the provision of education and training in ICT	2015 - 2017
Awareness raising and preparation of professional teams of educational/vocational guidance for the importance of ICT	IEFP, DGE, ANQEP, DGES, EPIS	IEFP, DGE, ANQEP, DGES, training centres, schools, higher education establishments, training entities, CQEP, companies		No. of Professionals involved Annual evolution in number and percentage of 1st time enrolment in education or training courses	2015 - 2017
CURRICULAR/REFERENCE PROGRAMS FOR TRAINING AND DIDACTIC RESOURCES					
Strengthening the inclusion of digital competences in the general context of school curricula and CNQ training references	DGE, ANQEP	DGE, ANQEP, IEFP, CSQ		Regularity of the revision and update processes of ICT related content	2015 - 2020
Revision and update of curricular programs and training references specifically linked to the field of ICT, according to the sector's evolution trends.	DGE, ANQEP	DGE, ANQEP, IEFP, CSQ		Regularity of the revision and update processes of ICT related content	2015 - 2020
Design or adapt manuals and resources into digital formats and for NEE (Special Education) students	DGE	DGE, publishers of didactic resources		Materials (no.)	2015 - 2020
PROVISION OF EDUCATION, TRAINING, REQUALIFICATION AND CERTIFICATION					
Strengthen the training provision in ICT within the modalities of Learning, Technological Specialisation and Professional Courses	IEFP, IAPMEI, ANQEP	Schools, professional training centres, training entities, companies, universities		Courses (no.) Trainees (no.) Evolution of the proportion of trainees that conclude ICT courses	2015 - 2020 3 consecutive cycles (after approval in legal diploma)
Strengthen the training provision in ICT in the context of Modular/Active Life training or special requalification projects	IEFP, ANQEP	Employment and professional training centres, training entities, companies, higher education establishments, other entities		No. employed/unemployed that conclude (re)qualification courses in the ICT field	2015 - 2020
Promote and strengthen the internationally recognized sector's competence certification processes	IEFP	Employment and professional training centres, ICT sector		No. of individuals with certification of competences	2015 - 2020
Balancing the annual openings in ICT(TICE) educational provision in higher education	DGES	DGES, higher education establishments		Evolution of the proportion of students in ICT (TICE) courses in higher education	2015 - 2020
Promoting school or training success of young people in the ICT(TICE) ranks	DGE, DGES, EPIS	DGE, DGES, IEFP, EPIS, schools, higher education establishment, professional training centres, local authorities		Evolution of the proportion of the no. of young people finishing TICE courses at different levels of qualification or degrees of education	2015 - 2020
PILOT PROJECTS IN THE FIELD OF ICT					
Development of projects in the area of programming, integrated in the basic and secondary levels curricula or in supplementary activities	IEFP, DGE, ANQEP, Academia de Código (Programming Academy)	IEFP, DGE, ANQEP, Academia de Código, schools, training centres, other training providers		No. of projects implemented No. of students/trainees covered	2015 - 2020

2

AXIS 2

BUSINESS GROWTH AND NEW JOBS IN ICT

Creating more digital employment implies the growth of Portuguese businesses. In turn, the growth of the national corporate fabric lies in the introduction of ICT tools, services and applications in different sectors of the economic activity; the proximity to big businesses; and internationalization by facilitating the involvement of Portuguese scientific and technological institutions in international networks and partnerships.

Portugal needs to grow better and faster, which implies widening the pool of businesses with competitive capacity in the global market that, in turn, enhances the creation of more and better jobs. The country disposes nowadays of the most advanced communication infrastructures in Europe and the World and also of a technological offer that allows the national corporate fabric to mature a sustained strategy for development and internationalisation, relying on ICT tools.

SMEs play fundamental part in the economic evolution of the contemporary societies, especially in the employment domain. This circumstance, coupled with the element of diversity which also flows into the composition of the corporate fabric of modern economies, constitute one of the most critical factors for competitiveness in any country.

It is also known that SMEs are an important catalyst of the economic growth. Their characteristics translate a great potential for a more productive and efficient use of the resources, for reinforcing the competition, for jobs creation and, in a way, for resilience in times of crisis.
Consequently, all of this justifies an intervention towards the conditions that limit this segment of businesses in their ability to define innovative business models and to ensure sustained advances in competitiveness.

In addition, one should recognize that in an environment increasingly globalized, competitive and based on the fields of knowledge and information, success (or even survival) of many SMEs depend on their ability to perceive those variables as a truly critical resource. The information's access (and management) plays, thereby, an increasingly important role in the decision processes and in the formulation of value creation strategies. The best performances are increasingly achieved by companies that value information, knowledge and its intelligent application. Also, they know how to use the information and communication technologies to achieve great levels of efficiency and effectiveness demanded by global markets, thus the importance of the qualification of human resources and the reinforcement of innovation and R&D on their behalf.

However, because of their specific nature, SMEs often have the biggest difficulties in accessing and managing information, in knowledge and use of ICT. In general, apart from specific factors of diversity (e.g. Sectors, "age"), this segment of business' level of ICT use is significantly low and demands significant improvement, especially when it comes to new business models and betting in the digital economy. Even so, it is possible to register important developments concerning ICT service companies, namely in emergent domains and of great global technological sophistication.

In these circumstances, as we walk the path towards meeting the "growth and employment" goals, the more the three vectors that push the digital employment demand merge:

■ Accelerate and widen the process of efficient digitization of business procedures and SMEs models as a way to reduce competition disadvantages, such as distance or corporate dimension;

■ Facilitate businesses' scale gains, through emerging/existent ICT services;

■ Boost tech-based entrepreneurship (namely digital) as a way to position Portugal in the front line of digital innovation and for taking advantage of the digital single market.

In respect to the SMEs' non-ICT sectors, it is important that these goals and instruments speed up a wider process of efficient digitization of business's processes and models.

In order to address the contribution of this initiative to business growth (namely SMEs *start-ups*) and thus for a sustained increase of "digital jobs" supply, one must focus two realities with distinct characteristics.

The **specific orientation** concerning qualification and requalification for ICT employment comes down to:

■ Multiply and increase the number of businesses in the ICT sector, ensuring the best conditions for efficiency gains, scale gains, as well as for a sustainable approach to internationalisation and consolidation of an innovative profile that generates value;

■ Accelerate the wider process of the efficient digitization of business processes and models, in particular in areas where the competitiveness gains appear to be more critical for the growth and creation of value;

■ Evaluate and systematize specific needs and the main constraints to businesses' digitalization and to the introduction of digital skills in companies;

■ Stimulate entrepreneurship with a technological base, particularly digital-based;

■ Encourage the link to the business sector, supported by the introduction of doctorates in businesses and PhD degrees of businesses' collaborators, allowing them to benefit from R&D skills, as well as from programmes for the creation of *start-ups*.

These orientations translate into the following **lines of action**:

■ Support entrepreneurship in ICET through the reinforcement of a network of existing incubators integrated in innovation ecosystems of Universities and Polytechnic Institutes, or other existing incubators and accelerators;

■ Grant incentives to entrepreneurship in the areas of digital entertainment and digital contents production;

■ Develop a venture capital component in innovation ecosystems that can generate new business IT initiatives;

■ Insert in the system of businesses' incentives to internationalisation an element that makes it possible to:
■ accelerate the digitalization of business processes and models of SMEs, particularly in the areas where the competitiveness gains are critical for the growth and value creation;
■ identify areas that can be digitally transformed through legislative changes (e.g. Electronic invoice, IRS submission)

It is important to define right from the start the goals and instruments that address the issue of growth and consolidation of ICT businesses by providing them the best conditions for efficiency gains, scale economies gains and sustainability in the processes of internationalisation and of consolidation of an innovative profile that generates value.

Thus, the goal for the Strategy and Action Plan for Digital Jobs is to lead concrete actions that can be implemented in short and medium term, in line with the time period of the Partnership Agreement - Portugal 2020.

2.3. INITIATIVES AND INSTRUMENTS

INSTRUMENTS	ENTITIES			PERFORMANCE INDICATOR(S) (NUMBER OR PERCENTAGE)	SCHEDULE
	COORDINATOR(S)	EXECUTOR(S)			
MAPPING OF CRITICAL INFORMATION					
Diagnosis of SMEs needs, of the potential of efficient digitalisation and of failures in matching services/solutions/digital employment supply in non-ICT sectors	IAPMEI	APDC, TICE.PT and other associations		Survey with at least 8 sectors Survey with the identification and definition of at least 3 validation actions	2016 (1st T) 2016 (2nd T)
ACTIONS TO BOOST AND PROMOTE GOOD PRACTICES					
Corporate Responsibility Programs to bring closer large companies and SME	APDC, IAPMEI	TICE.PT and other associations		Definition of program and methodology No. of set up partnerships No. of work sessions between large companies and SME	2016 (1st T) 2016 – 2020
Test/pilot - Users clubs/ICT clients (aggregation demand/approach to *clusters*)	IAPMEI	APDC, TICE.PT and other associations		At least 3 pilots	2016 (4th T) – 2017 (3rd T)
Program for identifying good practices and success cases - digitisation processes in SME	IAPMEI	APDC, TICE.PT and other associations		Program launching Previous Editions No. of participants No. of good practices identified	2016 2018 and 2020
SUPPORT TO TECHNOLOGICALLY-BASED ENTREPRENEURSHIP (ICT)					
Support programme to technologically-based entrepreneurship (ICT)	IAPMEI and other	Incubators, accelerators, business angels, associations and other relevant entities		Incentive granted (M€) No. of applications submitted No. of applications approved No. of supported entrepreneurs Supported projects	2016 - 2020
AWARENESS, INTEGRATION, AND TRAINING ACTIONS					
Workshops cycles - SME and related actors (awareness raising, training) in ICT areas (e. g. digital marketing, digital business) articulated with incentive to investment programs	IAPMEI	IEFP, TICE.PT and other associations		No. of workshops, total and per edition No. of participating companies, total and peredition No. of companies that advanced for investment/hiring	2016 - 2020
Traineeship program (ICET jobs in SME)	IEFP, IAPMEI	Associations, companies, and other entities		No. of young people in traineeships No. of SME involved	2016 - 2020
Training-action program (digital area)	IAPMEI	IEFP, TICE.PT and other associations		No. of SME involved Trainees (no.)	2016 - 2020
Support for hiring human resources in ICT areas	IEFP	IAPMEI, AICEP, TP (within the scope of Incentives Program for the Innovation and Qualification of SME, Associations, Companies and other entities		Incentive granted (M€) No. of applications submitted No. of applications approved No. HR hired	2015 - 2020
Promote and support doctorates for collaborators of companies	ANI, FCT			Definition of regulation	2015 (3rd T)
SUPPORT TO CONSOLIDATION AND DIGITALISATION PROCESSES					
(Financial) incentives to acquire Digital Solutions	IAPMEI	to be defined		No. of editions/ calls No. of applications/investment No. of projects supported/incentive	2015 - 2020
Task force to negotiate the support to massive adoption of the Digital	APDC, IAPMEI	to be defined		No. of SME in international TICE entrepreneurship and innovation networks Simplification of insolvency proceedings "Zero Bureaucracy" Initiative	2015 - 2016
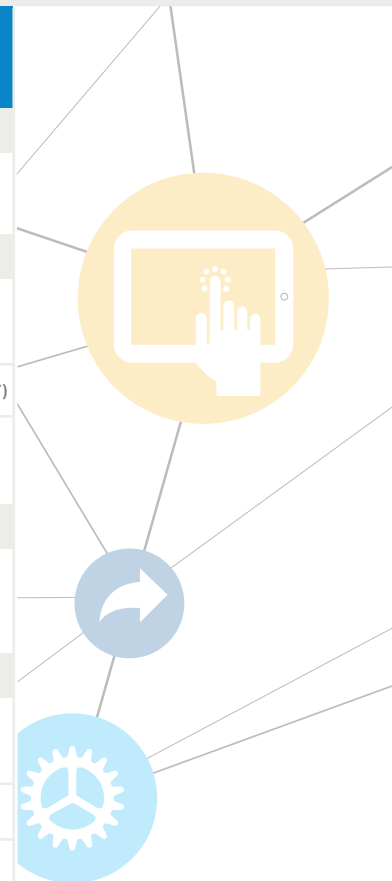
AXIS 3

SOCIETY AWARENESS OF THE DIGITAL

Aiming to reinforce the use of ICT and of the digital to improve the qualification of talent and foster a learning culture in which specific ICT skills are valued, this axis' target is to speed up society's acceptance and adoption of ICT while publicizing the opportunity that it represents for the country's competitiveness and employment.

Therefore, it is essential to create instruments that allow the identification of constraints when searching for ICT (ICET) education and training and thus to outline an effective communication strategy.

The era of the Information and Knowledge Society, highly influenced by the quick progress of research, innovation, application and the mass use of the information and communication technologies opens new perspectives on business, employment and in the creation of new professions. Entrepreneurs and managers with e-business and e-leadership skills, digital entrepreneurs, experts in business analysis and system integration, experts in big data and cloud computing, and many others, are among the professional profiles that are estimated to be in growing demand.

Given its importance for the present and the future, digital employability is a subject that has been widely studied and debated, existing many studies that point out the permanence or even growth (disruptive in some scenarios) of the *ICT skills gap* in Europe. The most recent projections of labour needs and supply in ICT in *Horizon 2020* point to the existence in Portugal of 15 000 potential job vacancies due to a lack of qualified human resources.

This "problem" constitutes a big opportunity for Portugal to lay the basis for the sector's high employability rate in the future, all the more significant as it's known that Portugal keeps very high rates of youth unemployment. This opportunity's potential becomes clearer on the SME's side, where there is an appropriation of the benefits of technology applied to businesses - inevitable given the expansion of digital economy – which in consequence implies an even bigger demand for professionals with these skills.

In order to take advantage of this opportunity in an extensive and systematic way, it is crucial to introduce everyone to the job possibilities generated by digital technologies by encouraging the interest in the areas of Sciences, Technology, Engineering and Mathematics, as well as in carrying out study plans, training and/or requalification and of ICT related careers. Strategies proceed in that way, of which, as an example, there are the following:

- to speed up the adoption of ICT in society by promoting the opportunity that they represent for the competitiveness and employment in the country;

- to raise awareness in the Portuguese society, particularly the youth, families, women and unemployed professionals, schools, universities, polytechnics, businesses and the State for the potential demand of ICT skills in Portugal and in Europe, for the existing gap and, mainly, for the opportunity of effective employability in ICT.

- to create instruments that allow the identification of constraints when searching for ICT education and training, and, consequently, the definition of better ways to act around a strategy for effective communication;

- to raise awareness of unemployed professionals, particularly the younger generation with high academic qualification in areas of low employability, to the possibility of developing a career through requalification;

- raise awareness in entrepreneurs of micro, small and medium-size companies for the need to resort to qualified ICT professionals, as an important tool for competitiveness, hence stimulating the adoption of a flexible management structure;

- intensify and diversify the interventions of vocational and professional orientation, etc.;

- awareness in public institutions for the need to continuously and systematically modernise ICT learning by hiring more researchers, hence ensuring scientific jobs and contributing towards attracting highly qualified young people in order to make public institutions more oriented towards the youth.

The time of the Information and Knowledge Society is a period characterized by profound economic and social transformations, with the rise and fall of different areas of the economic activity, and respective emergence and extinction of "new" and "old" professions, being those strongly associated with jobs of intensive knowledge that require high level education.

In this era, Knowledge's obsolescence doesn't seem to slow down. It is estimated that, in the digital domain, obsolescence is around 30% per year. In 3 years, without reinvestment in enhancing or recycling, the professionals are in serious danger of getting their knowledge and skills out of date. This situation isn't compatible with the demands of the labour market in ICT[6]. Thus, it becomes necessary to consolidate a lifelong learning system, revitalizing the education and training of adults, whether by creating paths of education-training according to the need of the ICT groups, or by creating counselling mechanisms that allow the referral of graduates in digital knowledge according to their profile and training needs.
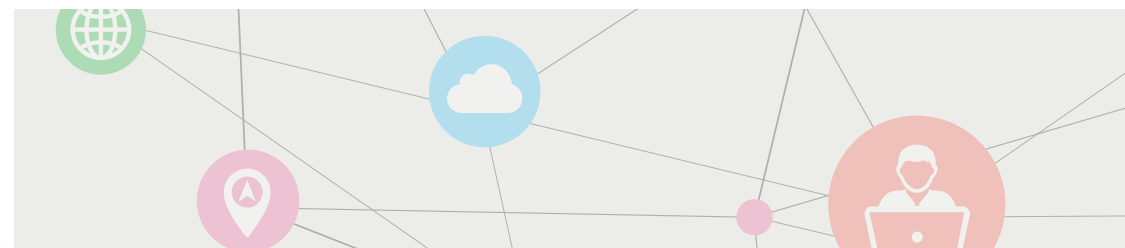
6 - "Mapping of the Educational and Training ICET", preface by António Murta, April 2015.

The axis of awareness proposes an integrated and crosscutting version of all the axes and involves the performance of different entities, aiming to frame ICT and employability policies and actions, assuring that an intervention is based on evaluation processes in view of the redefinition of communication and methodology strategies, and therefore identifying indicators of performance and success in the implementation of the Strategy and the Plan.

This area of intervention combines three big **lines of action**:

- the mapping of strategic information as to identify constraints in the search for ICT education and training and, once that information is gathered, to define communication and improvement strategies that favour a wide range of activities with concerted measures, particularly those which may improve the sector and ICT careers' image and attractiveness;

- innovation and/or improvement in this context, hence proposing the restructuration of teaching methods by using digital technology in teaching and learning processes and thus favouring a culture where specific ICT skills are valued. This also contributes towards the sector's attractiveness in the context of choosing a career, not forgetting to encourage the adoption of ICT by the companies;

- awareness accelerators, which comprise several initiatives that are oriented towards specific target audiences and seek to improve access to using technology and building digital skills, including the development of entrepreneurship and e-leadership skills.

3.3. INITIATIVES AND INSTRUMENTS

Instruments	Entities			Performance Indicator(s) (number or percentage)	Schedule
	Coordinator(s)	Executor(s)			
Mapping of strategic information					
Diagnosis of constraints of the ICT education and training demand and definition of over-coming strategies	CPED	FCT		Survey	2015 (S2)
Diagnosis of the access to ICT training and employment ranks by specific groups (women, people with functional limitations)	CPED	FCT, ECWT		Survey	2015 (S2)
Digital Employability in Portugal Communication Plan	FCT	CPED		Communication Plan	2015 (S2)
Innovation and/or improvement in Context					
Review (aiming the amendment) of the strategies and teaching methods pursued in the exact sciences subjects	DGE and ANQEP	DGE and ANQEP		No. of proposals for revision	2016 (S1)
Diagnosis of the teachers proficiency level in the use of ICT in the promotion of learning, through an online tool, aimed at the diagnosis of training needs	DGE	DGE		No. of teachers	2015 – 2018
Increase the capacity of teachers, trainers and other agents of the education and training systems (requalify) to adopt ICT as a resource in teaching and training	DGE, DGES and IEFP	DGE, DGES, IEFP and Training Entities		No. of teachers and trainers covered	2016 - 2020
Massification of ICT integration in learning and in pedagogical innovation	DGE, DGES and IEFP	DGE, DGES, IEFP and Training Entities		No. of teaching institutions that adopt virtual learning platforms	2016 - 2020
Awakening ICT vocations, motivation strategies and vocational guidance in schools	DGE	DGE, EPIS, higher education institutions and companies		No. of students in the areas of Science and Technology	2016 - 2020
To awake companies latent necessities of ICT adoption	IAPMEI	APDC, APDSI, TICE.pt and sector		No. of ICT professionals in micro and SME	2016 – 2020
Awareness Accelerators					
Segmented communication and information campaigns (young people, guardians, educators, women, unemployed people, companies, citizens with functional limitations, among others)	FCT	CPED		No. of campaigns	2015 - 2020
Creation or increase of leisure activities for the promotion of ICT among students of the 1, 2, and 3 cycles of basic education	DGE	APDC, APDSI, DGES, TICE.PT, higher education and sector		No. of beneficiaries involved	2016 – 2020
To foster the inclusion of equal opportunities, particularly that of gender and citizens with functional limitations, among others, in the ICT employability agenda	CPED	ECWT, DGE, DGES, IEFP		No. of women in ICT education and training courses No. of citizens with functional limitations in ICT educational and training courses	2016 – 2020
Actions to disseminate European guidelines and quality labels directed to entrepreneurship and e-leadership	IAPMEI	AICEP, APDC, APDSI, CIONET, TICE.PT		No. of dissemination actions No. of curricula with entrepreneurship and e-leadership European seals of quality	2016 – 2020

4

AXIS 4

INTERNATIONALISATION OF THE ICT SECTOR AND ACQUISITION OF FOREIGN DIRECT INVESTMENT

The ICT is perceived as a fundamental strategic element for the national economy, ensuring at the same time the competitiveness of Portuguese businesses and the country's ability to be an attractive investment destination.

Portuguese businesses need to attain greater initiative in new markets and need to keep on attracting foreign investments, confirming the country's competitive advantages through the creation of an environment that enables talent and businesses attraction and retention. It becomes therefore imperative to establish a link between the activities of attracting demand and those of entrepreneurship promotion, to develop in synchrony by the identified public and private entities.

The bet on internationalisation and investment attraction, together with the train in technology, R&D and the qualification of human resources - based on the systematization of digital related education consolidated by higher education institutions collaborating upon the establishment of consortia - are the common thread in the Digital Economy activity in the upcoming years.

To this extent, the strategic goals identified for this Axis will be aligned with the Horizon 2020 initiatives (oriented to research and innovation) and with the Digital Agenda for Portugal (targeted at SMEs), on which it is foreseen a significant reinforcement of financial instruments for the sector's internationalisation. Other components will be added in order to reinforce:

■ Portugal's role as a *nearshore* platform in telecommunications services, IT software/services and shared service centres;

■ Portugal's role in the competitive offer of creative industries in digital entertainment.

The instruments to be implemented should be demonstrative of a modern, technological and creative Portugal that, simultaneously, lays the ground to ease the access to businesses with innovation potential in new markets. These should settle the participation of companies in international businesses, its involvement in European programmes and networks of digital companies; the critical knowledge/information of markets and articulated participation of public and private partners in international actions/events that lead to the identification of opportunities; investment decision making that favours Portugal.

The ICT sector is in a stage of significant expansion and international recognition. The Portuguese *software* is present in over 90 countries and circa 150 mobile telecommunications operators worldwide that use Portuguese solutions. This reality is mirrored by the supply of solutions for banking, railway undertakings and airlines or for other areas such as healthcare, telecommunications and distribution.

The sector includes 11 599 companies and employs 79 926 workers. In 2012, according to the Portuguese National Statistical Institute, the turnover was of 13.2 million Euros. According to the data of the Bank of Portugal (Banco de Portugal), in 2014 the exportations of ICT services came up to a total of 1054.8 million Euros, which represents a growth of 6,8% compared to the previous year (989.4 million Euros).

There are 1 927 export companies, the majority of which are SMEs, being 96% of national base. Telecommunications represent 49% of the turnover and consultant and programming are the activities with a greater number of businesses (64%). The large enterprises represent half of the turnover in the sector (6 420 million Euros). Only 3% of the enterprises export above 1 million Euros[6].

In the services with a technological basis (intensive use of ICT and with skills often associated with R&D) in areas such as education, engineering, computer sciences, healthcare and social sciences, Portugal has had the ability of attracting new investments. That is due to the quality of human resources, to the partnerships between businesses, Universities and Technological Centres, to high level infrastructures and to an attractive package of training incentives, employment and taxation.

According to the *World Economic Forum*, Portugal has gone from the 51st to the 36th most competitive economy worldwide in the *Global Competitive Index* 2014/2015 and, according to *Gartner*, it's in the 7th position in 2014 *Leading Offshore Services Location* for services with a technological base in Europe, Middle East and Africa.

In the area of *Business Services and R&D, the EY's attractiveness survey* Portugal 2014 identifies 46 new foreign investment projects in Portugal in 2012 and 38 in 2013, from Germany, Spain, France, United States of America, United Kingdom and Brazil. There are over 100 technology-based Service Centres in Portugal that operate for a vast number of markets in Europe, Angola, USA and Canada, according to a recent survey of the Portugal Commerce and Services Confederation.

The human resource factor isn't unrelated to this impulse of new investments: Portugal is the 5th European country with the biggest number of PhDs in science and technology per 1000 inhabitants between the ages of 20 and 29. It is also worth mentioning the partnerships that the Portuguese Universities have been settling with internationally renowned institutions like *Massachusetts Institute of Technology*, Texas University, *Carnegie Mellon and Fraunhofer*.

Based on the number of businesses monitored by AICEP (with circa 900 SMEs and 171 Large Companies with a national technological background, the latter resulting essentially from direct foreign investments), most businesses confirmed having short-term internationalisation plans. The bet on personnel training by Universities and its connection to businesses (through pioneering programmes in information systems, mathematics and computer sciences) hasn't gone unnoticed, inclusively to multinationals.

The business's international component has surely a relevant weight in all of these enterprises, given the characteristics and dimension of the national market. Investors look at Portugal as an appealing destination and a platform for other geographies in which Portugal takes on a strategic position.
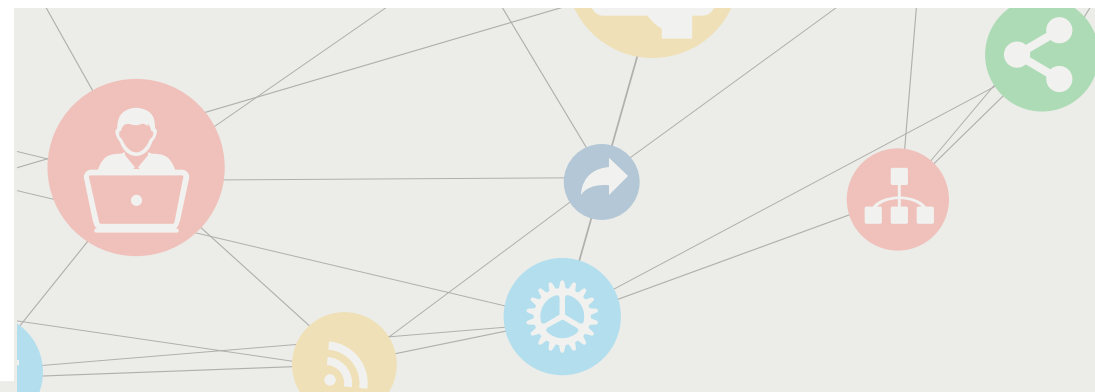
It further reveals the need to focus the action in mature markets that look for services of excellence (as for example the USA, Germany, United Kingdom or Spain); markets of high potential where a significant increase of the Portuguese exportations has taken place (as Mexico, Chile, Colombia, Peru or Ecuador or the USA and Singapore); and markets with a propensity for solutions of national base as Angola, Mozambique and Brazil.

National technological companies will continue to internationalise in order to grow and international companies set up in Portugal will continue to look for new sources of revenue beyond the internal market.

In the view of the national context, the following big **specific goals** and respective **lines of action** are defined in terms of internationalisation of the ICT sector and attraction of foreign investment:

■ Support the internationalisation of tech-based Portuguese companies or with an ICT external offer;

■ Facilitate the attraction of investment for Portugal in technological employment generator centres (business services, digital entertainment, user applications, etc.);

■ Support Portuguese technological companies in talent retention through the development of digital skills;

■ Back up the development and expansion of digital employment generation centres in Portugal;

■ Attract citizens of the Portuguese diaspora to come back to Portugal to develop ICT-based companies, as well as individuals properly skilled and experienced from other countries.

4.3. INITIATIVES AND INSTRUMENTS

Instruments	Entities			Performance Indicator(s) (number or percentage)	Schedule
	Coordinator(s)	Executor(s)			
Mapping of critical information					
International *Benchmark* of good practices to attract Foreign Direct Investment (FDI)	AICEP	CIONET and DGACCP		No. of replicable good practices	2015 - 2020
Clustering the Technology Sector	TICE.PT	AICEP, CIONET, DGACCP, ANI and IAPMEI		Global Map of Entities (No. of entities and network nodes)	2015 (3m)
Contribution to the acceleration of Poles/Technological Clusters	TICE.PT	IAPMEI		Survey and no. of proposals for legislative update	2015 (12m)
Innovation in Context Mechanisms					
Digital Diaspora -> Tax Benefits	GPEARI	AICEP and IAPMEI		No. of proposals for Tax Benefits in the creation of Digital Companies	2015 (12m)
Creation of Digital *Ambassadors*	CDP	AICEP, CIONET and DGACCP		List and invitation of DA entities/personalities No. of DA enrolled	2015 (24m)
Accelerative Instruments of internationalization of Digital SME					
International SME passport	*Go Global* Program	TICE.PT	AICEP, IAPMEI, CIONET and APDC		No. of entities/SME enrolled in the Program	2015 (12m)
Rapid measures of integration in digital companies' networks					
Boosting segmented partnerships, based on the integration of SME provision in the portfolio of multinational companies, through partnerships	AICEP	APDC, IAPMEI, CIONET and TICE.PT		No. of set up partnerships	2015 (18m)
Boosting segmented partnerships based on the *Venture Capital/ Private Equity - International* Ecosystem	AICEP	APDC, IAPMEI, CIONET and TICE.PT		No. of set up partnerships	2015 (18m)
Integration in international networks -> SME Expansion of existing networks for foreign markets	Portugal *Ventures*	IFD, AICEP, CIONET and TICE.PT		No. of partnerships (SME) created within the mapping of entities in network No. of partnerships (Networks) created within the mapping of entities in network	2015 (24m)
Foreign investment attraction to Portugal					
Dissemination and sharing of successful case-studies	CCP Fórum dos Serviços	AICEP, CIONET, APDC, IAPMEI, TICE.PT		No. of new investors in digital jobs	2015 (36m)
Coordinated participation in international events (attraction of international clients to the use of Portuguese companies' products/services)	AICEP	CCP Fórum dos Serviços, APDC, TICE.PT		No. of new foreign clients of digital services % increase of invoicing coming from international clients	2015 (36m)
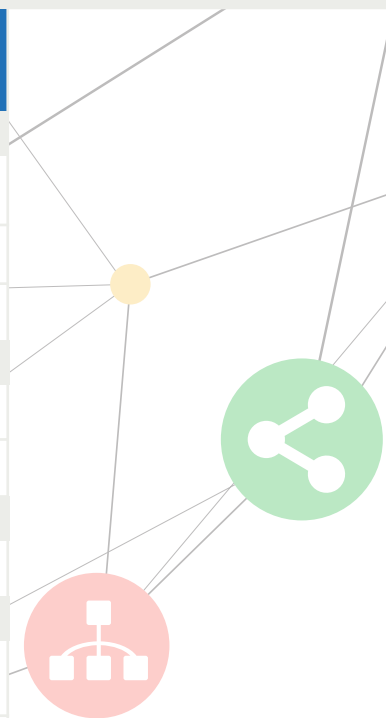
Academia de Código - Programming Academy

Aicep Portugal Global, E.P.E., Agency for the Investment and Commerce External to Portugal

National Agency for the Qualification and Professional Education

Portuguese Association for the Development of Communications

Association for the Promotion and Development of Information Society

Portuguese Commerce and Services Confederation

CIONET Portugal

General Administration for Education

General Administration for Higher Education

European Centre for Women and Technology

Entrepreneurs for Social Inclusion

Calouste Gulbenkian Foundation

Foundation for Science and Technology, I.P.

IAPMEI - Agency for Competitiveness and Innovation, I.P.

Professional Job and Training Institute, I.P.

Ordem dos Engenheiros - Portuguese Engineers

Portugal Telecom

Hub of Technologies of Information, Communication and Electronics

LIST OF ACRONYMS

ANI	National Agency for Innovation, S.A
C&T	Science and Technology
CDP	Council of the Portuguese Diaspora
CET	Technological Specialization Courses
CNAEF	National Classifier of the Areas of Education and Training
CNQ	National Catalog of Qualifications
COM	European Commission
CQEP	Centres for the Qualification and Professional Education
CSQ	Sectoral Councils for Qualification
CTEM	Sciences, Technology, Engineering and Mathematics
DGACCP	General Administration for Consular Affairs and Portuguese Communities
GPEARI	Office for the Planning, Strategy, Evaluation and International Relations
IFD	Financial and Development Institution
NEE	Special Educational Needs
PCDJ	Portuguese Coalition for Digital Jobs
PME	Small and Medium-sized Enterprises
R&D	Research and Development
R&DT	Research and Technological Development
TIC	Information and Communication Technologies
TICE	Hub of Technologies of Information, Communication and Electronics
TP	Tourism in Portugal, I.P.
UE	European Union
UMIC	Knowledge Society Agency
USA	United States of America

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