



diversITy Series

Promoting e-skills training for a diverse tech workforce

Country report for Spain

February 2019



The *diversITy series* of reports presents information collected and compiled by empirica, supported by J.P. Morgan, on the technology skills training landscape in seven target countries: Spain, Germany, the United Kingdom, Ireland, Poland, France and South Africa. External sources of information and data have been credited accordingly where applicable.

The term *Information and Communications Technology (ICT) sector* used in this report refers to the technology or digital sector in all target countries.

The term *ICT skills* used in this report comprises two main categories:

ICT user skills: the capabilities required for effective application of ICT systems and devices by the individual. ICT users apply systems as tools in support of their own work, which is, in most cases, not ICT. At the general level, they cover “digital literacy”: the skills required for the confident and critical use of ICT for work, leisure, learning and communication.

ICT practitioner skills: The capabilities required for researching, developing and designing, managing, producing, consulting, marketing and selling, integrating, installing and administering, maintaining, supporting and servicing ICT systems.

The term *ICT skills training* refers to programmes and initiatives aimed at improving or upgrading peoples’ skills and knowledge in ICT user and practitioner skills.

The term *ICT specialists* refers to the European Commission’s definition of ICT specialists as workers whose main job involves ICT and who can deal with a wide range of tasks concerning corporate ICT systems. The terms *ICT specialists* and *ICT workers* are used interchangeably in this report.

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Preface

The diversITy project carried out an evaluation and assessment of ICT skills and training programmes to support diverse populations to enter the labour market.

It identified and analysed ICT training programmes that aim to prepare and place jobseekers into meaningful tech jobs, with a focus on diverse target groups, including women, youth at risk of social exclusion or from difficult socio-economic backgrounds, people with migrant background or unemployed adults changing careers.

In the context of this study, the term ICT skills includes both, ICT user and ICT practitioner skills. However, more importance is given to ICT practitioner skills, which the European ICT skills Forum defines as, “The capabilities required for researching, developing and designing, managing, producing, consulting, marketing and selling, integrating, installing and administrating, maintaining, supporting and servicing ICT systems”.¹

The target countries are Germany, France, the United Kingdom, Ireland, Spain, Poland and South Africa.

The work product of the diversITy project informs policy development on the European and national level and provides practical recommendations to non-profit organisations and training providers. An initial assessment and evaluation of identified ICT skills training programmes in the target countries produced a repository of 96 inclusive programmes. Brief descriptions of these 96 cases are available on the diversITy online repository, which can be accessed at www.eskills4diversity.com. In addition to the online repository of case studies, we produced seven country reports for each target country, analysing in-depth each country’s ICT skills gap and unique training landscape. In each report we showcase a set of good practice show cases, setting a benchmark to foster exchange.

The diversITy project is part of the J.P. Morgan New Skills at Work initiative that aims to identify strategies and support solutions that help improve labour market infrastructure and develop the skilled workforce globally. This \$250 million five-year global initiative, first launched in December 2013, brings together

leading policymakers, academics, business leaders, educators, training providers and nonprofits with the goal of connecting labour market policy with practice, supply with demand and employers with the workforce.

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¹ See European Commission (2004), *e-skills for Europe*.

Executive summary

- Spain accounts for the fifth-largest information and communications technology workforce (ICT) workforce in Europe and one of the highest levels of educational attainment of ICT workers yet employers report difficulties in filling ICT positions.
- Despite recent improvements in labour market performance Spain's high youth unemployment is particularly unfavourable for long-term unemployed youth and youth not in employment, education or training (NEET).
- The representation of women in the Spanish ICT sector is an urgent challenge as the percentage share of women is less than that of men in every single occupation.
- The Spanish government has implemented action plans for the development of ICT and provision of digital public services. There have also been comprehensive policies to address socio-economic challenges, with some positive results but little data is available at the national level.

Current developments in the ICT labour market in Spain

Spain's digital economy has grown rapidly in recent years but employers struggle to find talent with the required skills to fill ICT positions. In 2017, there were 32,300 registered unemployed ICT specialists but employers reported that job vacancies for ICT specialists were one of the most difficult to fill. Prevailing vacancies for ICT jobs are increasingly attributed to a lack of appropriate skills demonstrated by candidates, which include both technical and soft skills.

There is high likelihood of cross-border migration for ICT graduates in Spain. 79 percent of ICT specialists in Spain have an academic degree, which is well above the European Union (EU) average of 62 percent. Unable to find a well-paid job in the national labour market, ICT graduates migrate to other countries and enter the ICT specialist workforce there. There is however, less likelihood of internal migration as graduates are less willing to move to other regions for jobs. Low geographical mobility implies that graduates in surplus provinces are not necessarily willing or able to move to other provinces that are affected by ICT skills shortages.

Forecasts indicate that the potential for new jobs and the ICT skills gap is likely to be 22,000 in 2025. This presents an opportunity for both employers and policy makers to provide new avenues for ICT education and training. Employers have not invested as much as other countries in ICT skills training in Spain and the re-skilling of employees has been relatively delayed. There is a lack of integration of women in ICT education and employment. Women's employment

rate today is roughly the same it was in 2007 and they constitute 19 percent of all ICT workers in Spain. More women than men graduate from tertiary education in Spain but more men choose ICT as an educational specialisation.

Digital policy actions focus mainly on digital literacy and awareness. The Digital Agenda for Spain was published in 2013, which focuses primarily on ICT infrastructure, accessibility and provision of digital public services. There have been comprehensive policies to fight youth unemployment such as the Strategy for Entrepreneurship and Youth Employment 2013-2016 (The Estrategia de Emprendimiento y Empleo Joven 2013-2016) and the Youth Employment Operational Programme (Programa Operativo de Empleo Juvenil²⁴, POEJ). The policies are mainly contributing to the implementation of the Youth Guarantee initiative, the EU-wide reform aimed at ensuring that all young people up to 25 years of age are given a job, education, learning or work experience.

Better activation measures for unemployed young people have been introduced. Activation programmes, unlike free employment service programmes, are targeted to unemployed individuals who are recipients of unemployment benefits. Participation in activation measures, such as interviews with employment counsellors, applying for job vacancies and building individual action plans for joining training or job creation programmes is obligatory for the relevant target groups to bring them closer to employment.

Improvements in Spain's system for vocational education and training (VET) such as the introduction of a new dual VET system as part the government's modernisation plans. The Spanish government introduced a new dual VET system in 2012 which resulted in alternating work-based and classroom learning. Public policy has attempted to strengthen the links between employers and VET-providers to increase opportunities for training in the workplace through apprenticeship contracts. However, dual VET contracts are still a minority in the Spanish labour market and much like VET programmes in general, are perceived as a less attractive alternative to higher education in universities.

ICT skills training programmes are contributing to solving Spain's ICT skills challenge. Trainings address the challenge of trainees' lack of market relevant

technical and soft skills. ICT vendor qualifications such as those from Cisco, Microsoft and Oracle, among others, have the most value in terms of labour market impact. For employers, it is easy to assess the level of skills based on standardised benchmarks used in ICT vendor qualifications.

Trainings address the challenge of unemployed and inactive NEET youth in Spain but there is a need for further action. Due to the enormity of youth unemployment, a higher proportion of ICT skills training are aimed at the cohort aged roughly between 16 and 30 years. Very few programmes that focus on technical ICT skills development are targeted exclusively to girls and women. Active policies should be initiated to encourage more female participation in the ICT sector.

Key Recommendations to Policymakers

Interventions must be targeted at earlier education levels

- Women mentors, especially in STEM, can encourage girls to choose education pathways and careers in technology through shared experiences, advice and networking.
- Summer or afterschool programmes in STEM or specialised ICT courses can be promoted to engage students from at-risk and underrepresented groups.
- Awareness raising campaigns such as 'Girls in ICT Day' can be adapted to the national and local level with the help of participation from enterprises and the non-profit sector.

Expand opportunities for vocational education and training

- Increase employer participation in Dual VET training.

Improve opportunities for lifelong learning

- Employers should utilise dedicated training programmes to upgrade existing ICT skills for slightly older cohorts and unemployed graduates.
- Workplaces can engage in special learning initiatives for low skilled adults that focus on high-growth occupations that do not require academic degrees.
- Accelerated learning programmes can incentivise training for older workers and women with families due to quicker progress and shorter learning duration.

Enable greater employer engagement for market-relevant training

- Business-education partnerships should be enabled by stakeholders to develop market-relevant training and ensure action from employers and education and training providers.
- Greater employer engagement is necessary to have an adequate knowledge of relevant ICT skills in the market. This ensures that trainees develop skills in occupations for which jobs are available, ensuring that employer needs for skills are also met.

Introduction

Spain's digital economy has grown rapidly in recent years. As the industry becomes increasingly dependent on technology, employers struggle to find job seekers with the required skills to fill ICT positions. In addition, Spain faces considerable challenges in terms of inequality between different socio-economic groups. We conducted a comprehensive survey inclusive ICT training programmes to determine the impact and challenges of inclusive e-skills training programmes for diverse groups to enter the digital labour market in Spain. In this report, we provide an analysis of our main findings.



Introduction

Spain's digital economy has grown rapidly in recent years. In terms of integration of digital technologies by enterprises and provision of digital public services, Spain ranks well above the European Union (EU) average.² As the Spanish industry becomes increasingly dependent on technology, employers struggle to find job seekers with the required skills to fill ICT positions. empirica's Information and Communication Technology (ICT) labour market survey indicates that there is a sizeable structural mismatch for ICT skills in the technology sector in Spain. In 2017, the national public vacancy search engine counted roughly 4,700 vacancies for ICT jobs in December 2017. At the same time, there were 32,300 registered unemployed ICT specialists in Spain. Forecasts indicate that the ICT skills gap is likely to be around 22,000 in 2025. For a detailed look into the methodology, please refer to Annex A at the end of this report.

In addition, Spain faces considerable challenges in terms of inequality between different socio-economic groups. Despite recent improvements in labour market performance, Spain's long-term unemployment persists at a rate of 9.5 percent. The situation is exacerbated by high youth unemployment resulting in poor socio-economic outcomes for long-term unemployed youth and young people not in employment or education or training (NEET). The latter can be found especially among the low-skilled at a serious risk of poverty.³

Public and private actors in Spain recognise that the need is critical for targeted action if the policy vision of an inclusive, smart economy is to be realised. Many of these actions focus on improving the access of diverse groups to enter the labour market by providing resources for employability through ICT skills development. Spain's Digital Agenda is a setting stone in this regard as it establishes a broad framework for improving the provision of digital skills and strengthening the role of the education system in promoting digital competences.

One of the main shortcomings of Spain's ICT skills ecosystem is the lack of sufficient capacity in its vocational education and training (VET) system. There has been a wealth of discussion supporting reforms in the education system; however it will be long before the results of these reforms emerge.⁴ It is for this reason that private actors, such as those from industry and the non-profit sector are involved in providing training for ICT skills in a bid to place people from diverse groups into stable and lucrative jobs in the ICT sector.

We conducted a comprehensive survey of inclusive ICT skills training programmes in Spain to assess the effectiveness of such programmes to improve the employability of diverse groups in the ICT sector. In this report, we provide an analysis of our main findings with the aim of understanding different approaches towards ICT skills training in Spain. We focus on diverse groups, such as NEETs, unemployed job seekers, young people from disadvantaged economic backgrounds and others at risk of social exclusion.

Section 1 of this report presents the ICT skills forecast for Spain, followed by the current diversity situation in the Spanish ICT labour market in Section 2. Section 3 gives an overview of policies and frameworks introduced by the public sector to address the development of the ICT sector in Spain. Section 4 presents the findings from the survey of private sector approaches towards inclusive ICT skills training programmes. It provides a brief look into the pathways available to gain an entry into the digital labour market and investigates the success factors and challenges of a suggested training taxonomy. In the last section, we offer recommendations to key stakeholders for future action.

² See European Commission (2017).

³ See Carcillo, Fernández, Königs, and Minea (2015) for a detailed discussion on NEET youth in the aftermath of the crisis in Spain.

⁴ See Pont et al. (2014).

1

ICT Skills Forecast

The ICT workforce in Spain accounts for 546,000 workers, or 3.1% of the total workforce. In absolute terms, this is the fifth largest headcount of ICT workforce in Europe. Since 2011, the number of ICT workers has not increased in Spain but slightly decreased. In addition, it is remarkable that quite unlike in other countries such as Germany, France and the UK the fastest growing ICT jobs in Spain are lower skilled jobs that do not usually require an academic education. The average annual need for new ICT specialists according to our model is 26,300 and the new entries are mostly covered by the 24,800 domestic graduates. This is quite different to other countries, where massive structural gaps exist.



Baseline figures and forecast for Spain

The ICT skills challenge for Spain

Spain's digital economy has grown rapidly in recent years but employers struggle to find talent with the required skills to fill ICT positions. In 2017, there were 32,300 registered unemployed ICT specialists.

Based on our own survey of Spanish employers and reports from recruitment firms, job vacancies for ICT specialists are one of the most difficult to fill. According to an analysis undertaken jointly by Polytechnic University of Madrid and the Worker's Commission of Industry (Comisiones Obreras de Industria), the existing shortages can be related to a lack of candidates with appropriate skills; not only technical skills but also soft skills such as the ability to work in teams and taking initiative.⁵ The Spanish national public vacancy search engine counted roughly 4,700⁶ vacancies for ICT jobs in December 2017, which is low compared to the other EU Member States but still indicating a mismatch between ICT skills demanded by employers and those supplied by the workforce.

Spanish workforce data for years 2011 to 2015 is only available at a coarse breakdown. Observing the development of jobs in terms of workers, the variation of growth rates can only be analysed at a higher aggregation level (Table 1). The first finding is that the number of ICT workers in Spain has slightly increased since 2011. Secondly, it is remarkable that quite unlike other countries, the only group with growth is broadcasting and telecoms technician jobs which do not usually require an academic education (below skill level 4).

A closer look at the annual figures confirms that the overall development in Spain is rather inconclusive in terms of current growth and the data shows results of recession in 2012 and slow recovery (Figure 1). Based on the longer timeline provided by Eurostat and without the breakdown by occupation, a long-term positive linear trend of 12,300 jobs per year can be observed.

Table 1 ICT workforce per ISCO-08 classification in Spain

	Skill Level ⁷	Number of Jobs		Growth			Linear Trend
		2015	2011	Total	% (CAGR)	Rank	P.A.
ICT service managers	4	10,800	13,300	-19.5%	-5.3%	6	-700
ICT Professionals - software	4	106,300	115,300	-7.7%	-2.0%	4	-2,200
ICT Professionals - Database and network	4	34,200	34,400	-0.4%	-0.1%	2	-40
ICT operations and user support technicians	3	165,500	167,400	-1.1%	-0.3%	3	-500
Telecommunications and broadcasting technicians	3	42,900	34,800	23.4%	5.4%	1	2,000
Electronics mechanics and servicers	2	77,500	84,600	-8.4%	-2.2%	5	-1,800
Total (including imputed data for jobs not incl. above)⁸		545,800	561,700	-2.8%	-0.7%		-4,000

Source: Eurostat (2017)

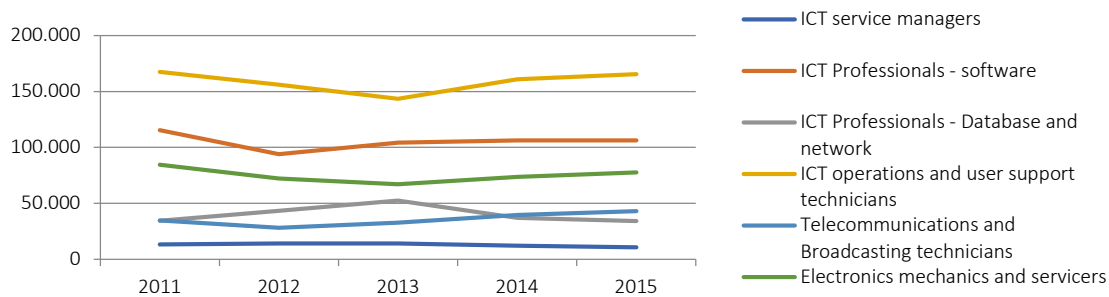
⁵ See Martínez and Bustamante (2016).

⁶ El Servicio Público de Empleo Estatal [SEPE] (2017).

⁷ See ILO (2012), International Standard Classification of Occupations.

⁸ Data imputation for other jobs which are partially covered by three-digit groups were calculated by taking the national three-digit totals and applying European average distributions of four-digit occupations within it to the national three-digit category total. The imputation concerns less than 20% of the resulting total and do only cover stock, not growth. Even if Spain does not follow the European growth trends, there is probably no better way to assess stock (not growth) distribution.

Figure 1 ICT workforce by key sub-major groups in Spain 2011-2015



Source: Eurostat, "Employed ICT specialists"

Trends in education and training of ICT specialists

In Spain, 80.7% of ICT specialists have an academic degree. This is well above the European average of 62.3% and places Spain at the third rank in the EU after Lithuania (83.4%), Ireland (83.2%), Cyprus (81.6%) and well above the United Kingdom (64.7%) and Germany (50.1%). According to the latest available figures, there have been 10,700 vocational education graduates and 14,100 tertiary education graduates in 2015 (Table 2). Data for vocational education from 2001 to 2015 shows a significant increase in graduates from 2008 until a peak in 2012, followed by a slump in 2013 (Figure 2). In 2015, figures show a recovery with 10,700 graduates. For higher education graduates, the timeline data indicates a decrease in graduate figures since its peak in 2004, with a further decrease in 2012 and a slight recovery in the years following 2012. The overall trend in ICT education indicates that Spain does not face a significant ICT skills supply challenge.

The issue of low geographical mobility in Spain must also be considered. There is evidence of low geographical mobility in Spain, which means that graduates in surplus provinces are not necessarily willing or able to move to other provinces that are affected by ICT skills shortages. This means that shortages can exist at local and regional levels despite a balance of supply and demand at the national level.

The other main mobility related issue concerns movements across borders, most prominently of Spanish ICT graduates who, unable to find a well-paid job in the national labour market, migrate to other countries and enter the ICT specialist workforce there

– a development which has been discussed in recent years under the term 'brain drain'. However, recent

data shows that Spain has one of the lowest emigration rates in the EU.⁹ 13% of enterprises in Spain provide training for ICT skills development to their own specialists. However, employers in Spain have not invested as much as other countries in ICT training and re-skilling of employees has been relatively delayed.¹⁰ While in 2005 in countries like

Germany (69.5%), France (73.8%) or Ireland (66.9%) the share of enterprises providing continuing vocational training (CVT) ranged between three third of even three quarters it was just 47.1% in Spain. In the meantime the situation has changed with Spain reaching a similar share after 2010.¹¹

But with a participation rate of 43.4% in education and training in the last year Spain still ranks below the European average (45.1%). This figure compares to 52.1% in the UK, 52% in Germany and 51.3% in France. The spectrum in Europe ranges from 7% in Romania to 64.1% in the Netherlands.

In 2017, according to the Adult Education Survey (AES) more than one tenth (10.9 %) of the EU-28 adult population the highest participation rates for adult learning were recorded in the Nordic Member States, France and the Netherlands (with figures above 20% in many of the regions), while the lowest rates were registered in Eastern Europe and Greece with figures below 5% of the population aged 25-64 that received formal or non-formal education or training in the last four weeks. Spain also still ranks low with figures varying between regions and showing shares between 5% and 15%.

⁹ See OECD (2015), 'Connecting with Emigrants'.

¹⁰ See Zamora and Arruffi (2017).

¹¹ Eurostat: Enterprises providing CVT, 2005, 2010 and 2015 (%25 of all enterprises) ET18 ll.png
[https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Enterprises_providing_CVT,_2005,_2010_and_2015_\(%25_of_all_enterprises\)_ET18 ll.png](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Enterprises_providing_CVT,_2005,_2010_and_2015_(%25_of_all_enterprises)_ET18_ll.png)

Table 2 ICT graduates in Spain	Total (2015)	% ICT Graduates	% Women
Upper secondary education - vocational	9,370	6.2%	23.9%
Post-secondary non-tertiary education	1,317	11.7%	26.3%
Short-cycle tertiary education	8,957	7.4%	12.2%
Bachelor's or equivalent level	5,104	2.9%	15.8%
Master's or equivalent level	2,558	1.9%	16.9%
Doctoral or equivalent level	726	6.4%	24.1%
Approximate maximum labour market inflow with ICT degree (1+2+3+4)	24,800	3.9%	14.5%

Source: Eurostat [uoe_grad02]

Spain's ICT workforce composition

Table 1 presents Spain's ICT workforce composition per ISCO-08 (international standard classification of occupations). Out of around 550,000 workers in Spain (Figure 3), the most jobs can be found among skill level 3, ICT operations and user support mechanics, followed by skill level 4, ICT professionals – software. A positive linear trend is recognisable for skills level 3 Telecommunications and broadcasting technicians (+ 2,000 per year)

Education and training

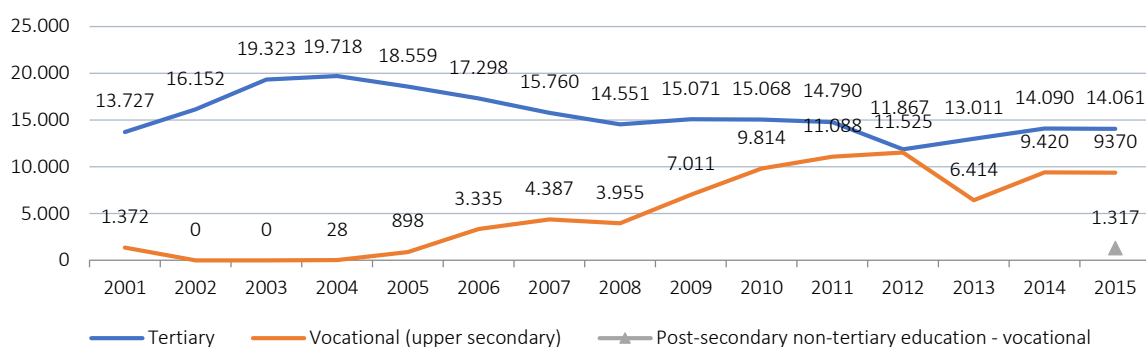
Approximately 25,000 graduates enter the Spanish job market each year (Table 2), with an average of 14.5% being women. While the number of tertiary graduates has declined and since 2012 slightly resurged, the number of vocational graduates has peaked in 2012 and regained momentum in 2014 (Figure 3). The share of women (Table 2) in vocational (23.9%) and non-tertiary (26.3%) ICT education is significantly higher than the share of women in tertiary education (17.3%).

ICT skills forecast model for Spain

In terms of ICT skills demand, while there has only been a minor expansion of the workforce of 12,300

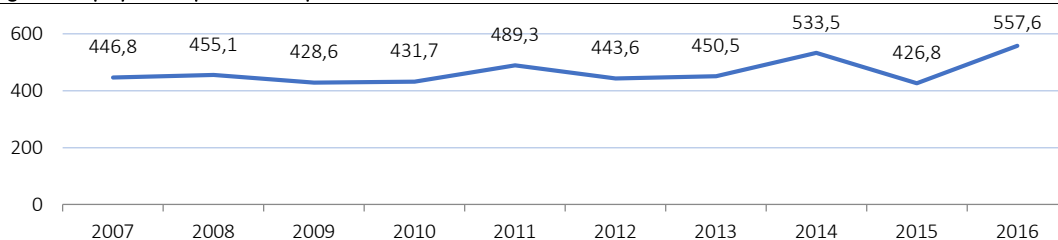
workers, there has been replacement demand for workers who leave the workforce temporarily or for good. This is estimated as 14,000 per year. This figure is based on Cedefop's baseline scenario for demand and supply of skills in Europe. It publishes estimates of future replacement demand by occupation at ISCO-08 two-digit level. For the largest relevant groups of ICT professionals (ISCO-08 group 25) and the smaller group of ICT technicians (group 35), this is on average 2.6%/year and 2.5% respectively in Spain. We apply a weighted average of 2.6%. 2.6% of the ICT workforce of 546,000 translates in a headcount of replacement demand of 14,000. We assume this a stable figure for the next few years. Based on this estimate, the average annual need for new ICT specialists is 26,300; i.e., the sum of expansion (12,300) and replacement demand (14,000). For a detailed look into the methodology, please refer to Appendix A at the end of this report. We additionally account for 4,700 vacancies for ICT specialists. In terms of skills supply, we can roughly calculate the number of ICT graduates leaving schools and universities for the labour market per year to be 24,800. The numbers are slightly higher in Germany (28,600), around half of that in France (12,600) and highest in Poland (34,700) and the UK (70,800).

Figure 2 Spain - ICT graduates, first degrees from 2001 – 2015



Source: Eurostat [educ_grad5] and [uoe_grad0]

Figure 3 Employed ICT specialists in Spain 2007-2016



Source: Eurostat, "Employed ICT specialists"

Assuming all 24,800 ICT graduates in vocational and tertiary education went into the ICT labour market, there will still be a slight imbalance with the demand for 26,300 graduates. The number of people entering the ICT labour market without a domestic vocational or higher education degree in ICT is therefore comparably small; i.e., at least 1,500 (26,300-24,800).

This represents a minimum "degree gap" of 1,500. This is quite different to other countries, where massive structural gaps exist. This small structural gap is a hypothetical construct that does not take account of other sources of labour market inflow that are not so well captured statistically, for example, immigration and emigration of ICT workers, lateral entries of non-ICT graduates, and re-entry of former graduates. Data for these categories is not captured well statistically and challenges exist for its availability. The ICT skills forecast for Spain is presented in the Box 2.

Box 1 Snapshot: Spain's ICT Workforce

In Spain, the ICT specialist workforce accounts for 546,000 workers, or 3.1 percent of the workforce. In absolute terms, this is the fifth largest headcount of ICT workforce in Europe, accounting for 7 percent of Europe's ICT specialists. As a share of domestic workforce, Spain's ICT workforce ranks 17th among all EU countries. The highest shares are found in Finland, Sweden, the UK, Netherlands and Luxemburg, all of which have a share of 5 percent or more of domestic workforce working in ICT jobs. The larger continental countries all rank further below in the league table: Germany (11th), France (16th), Spain (17th), Italy (18th) and Poland (24th).

Table 3 Key figures at a glance	DE	Rank
ICT workforce	546,000	5
As % of domestic workforce	3.1%	17
% female	17.4%	10
Estimated annual replacement need	14,000	
Latest vacancy figures	4,700	
Vocational graduates	10,700	4
Tertiary graduates (only first degrees)	14,100	3
Projected jobs potential until 2025 (8 years)	229,000	
Of which expansion	117,000	
% of enterprises that employ ICT specialists	25%	7
% of enterprises providing training for ICT specialists	13%	6
% of ICT specialists with tertiary education	79%	3

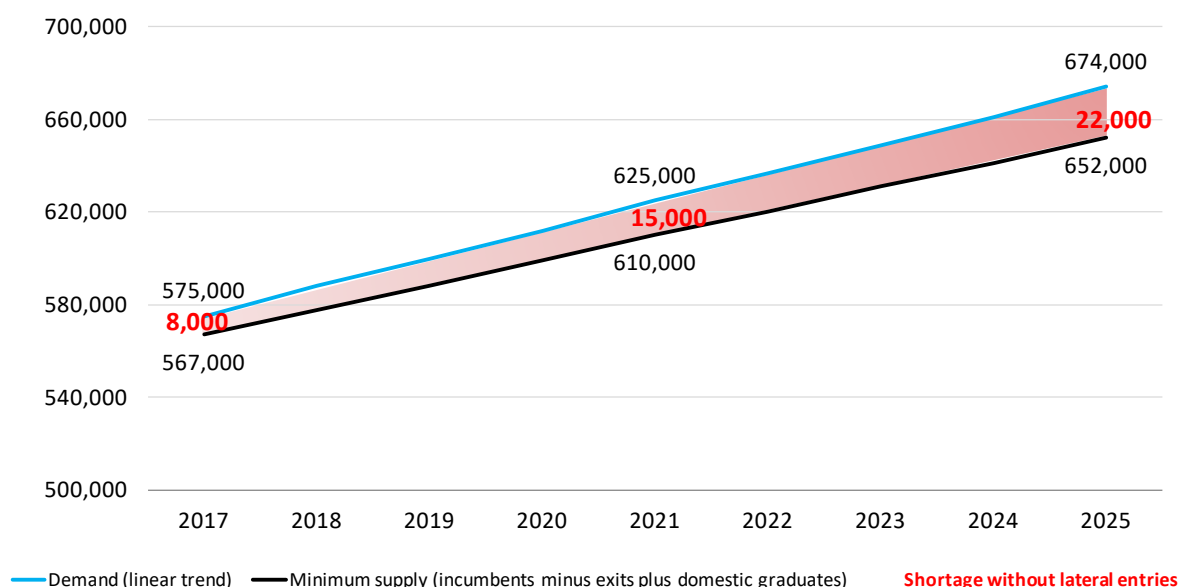
Source: Eurostat (2015).

Box 2 Baseline projection for Spain's ICT Skills Gap

A simple projection is estimated for Spain, which rests on the assumption of a baseline scenario with a steady state of flows. This is a “Things stay the same”-scenario and shows the number of jobs to be filled in the near future if the demand keeps growing in a linear fashion and the annual supply of new labour remains as it was in the last five years. The projection is calculated on a baseline scenario, and not necessarily the one empirica would deem most likely after a profound analysis of technological, socio-economic and political trends. The model rests on these inputs:

- Demand growth follows an “only” linear trend, i.e., grows by an absolute figure per year and not a percentage. Demand is set to grow by 12,300 p.a.;
- New supply is set by the supply of the last available year, i.e. 24,800;
- The degree gap or minimum lateral inflow has been 1,500 on average and this remains the case.

Figure 4 Baseline projection scenario for Spain's ICT labour market from 2017 – 2025*



The shortage of skills of 21,700 in 2025 is highlighted in red in the above figure. It does not take account of lateral entries, i.e. people without a domestic degree in ICT. It is the cumulative minimum scope for outsider entries to the ICT labour market. The model is constructed such that the actual projected shortage is exactly as “today”, meaning at starting point of the model, i.e. 4,700. The total potential for new jobs from 2017 until 2025 will be 229,000 in this model (117,000 expansion and 112,000 replacement demand). Spain is exceptional in that the total potential of 229,000 new entrants to the ICT labour market by 2025 is likely to be almost completely be filled by graduates, whereas the outsider potential is limited to 21,700 in this model.

Source: empirica (2017)

(*) See yearly breakdown in Appendix A.

Trends in Diversity

Spain's long-term unemployment rate at 9.5% is more than double the EU average. Almost one in two unemployed persons (46%) has been out of work for at least 12 months. High youth unemployment and growing numbers of NEETs are particularly harmful if they affect low-educated youth as they can have negative long-term consequences by reducing future employment and earnings potential for not only for affected youth but in general. In terms of gender, Spain's gender employment gap is the same as the EU average and has decreased by almost half compared to ten years ago. However, this decrease is not due to growth in the employment of women but rather a sharp fall in the employment rate of men. NEETs are another problem group in Spain and the country also ranks top (together with Malta) on the share of early leavers from education and training.



Employment and diversity in Spain's workforce

Table 4 Employment and unemployment indicators for diverse groups

	Spain	EU28	ES Rank
Long-term unemployment rate	9.5	4.0	27 th
Young people not in employment, education and training (15-24 years) – NEET	14.6	11.6	22 nd
Youth unemployment	44.4	18.7	27 th
Employment rate of older workers (55-64 years)	49.1	55.3	19 th
Age employment rate gap (15-64 vs. 55-64 years) in p.p.	10.4	11.4	12 th
Gender employment rate gap (15-64 years) in p.p.	10.5	10.5	19 th
Non-natives born outside the EU, as share of total population	8.5	6.9	10 th
Non-native employment rate gap ¹² , in p.p.	4.1	8.3	17 th
Disability employment gap, 2011, in p.p. ¹³	16.2	19.6	8 th

Source: Eurostat (2016)

Spain's long-term unemployment rate at 9.5% is more than double the EU average (Table 3). Almost one in two unemployed persons has been out of work for at least 12 months. For countries that were hit hardest by the financial crisis, such as Spain and Greece, youth unemployment and NEET rates have been particularly high. High youth unemployment and growing numbers of NEETs are particularly harmful if they affect low-educated youth as they can have negative long-term consequences by reducing future employment and earnings potential for affected youth. For Spain, the decline in youth employment almost exclusively affected individuals with low to medium- educational qualifications.¹⁴ This can partially be attributed to a variety of targeted interventions, including for instance special education programmes and mentoring and probably also the fact that Spain was the biggest beneficiary of the EU's Youth Guarantee scheme, which EU leaders agreed on in 2013 and which was initially backed by 6.4 billion Euros in funds to get young people into work.

Spain's gender employment rate gap – although the same as the EU average – is however, larger than in the best performing member states, Lithuania, Latvia, Sweden and Finland, where it is less than 3 percentage points. The gender gap in Spain in 2016 decreased by almost half compared to ten years ago, when it was 20.8 percentage points. However, this

decrease is not due to growth in the employment of women but rather a sharp fall in the employment rate of men. In fact, women's employment rate today is roughly the same it was in 2007.

We use the share of non-natives born outside the EU as an indicator for the labour market situation of minorities in Spain. In relative terms, Spain has the tenth largest immigrant population in the EU. The employment rate gap of non-EU, non-natives in Spain is 4.1 percentage points, which is better than the EU average of 8.3 percentage points and significantly better than other EU countries with large non-EU immigrant communities, such as France and Germany.

Women in Spain's ICT workforce

The share of women in the ICT workforce is quite small with 19% on average, but above the EU28 average of 16.1%. There is data from a national study undertaken by Polytechnic University of Madrid and Worker's Commission of Industry (Comisiones Obreras de Industria) based on 2015 national labour force survey data¹⁵ which concluded that women constitute 19 percent of ICT workers in Spain (Table 4). This figure is 26 percentage points below the share of women in total employment in Spain. The female share is lowest for technical engineer, installer and repairer jobs and highest for occupations in technical quality control and analysts, software and multimedia designers with some of the latter likely to have growth potential.

¹² See Ivan and Agafitei, Eurostat (2016).

¹³ Disability is defined as having difficulty in performing basic activities.

¹⁴ See Carcillo et al. (2015).

¹⁵ See Martínez and Bustamante (2016).

NEETs and school drop outs in Spain

The term NEET is used to describe young people not in employment, education or training. The concept is now centrally embedded in the policy discourse at EU level. Currently, 14.2% of the population aged 15–29 are NEETs.

The European Foundation for the Improvement of Living and Working Conditions summarises the situation in Spain¹⁶ as one where the youth labour market situation is comparatively disadvantageous. While the activity rate is close to the EU average (54.8% compared to 56.4%), only one third of young people (33.1%) are employment and 20.7% are NEET.

The NEET group in Spain is mainly composed of long-term (39.9%) and short-term unemployed (29.3%) which together make up for almost 70% of NEETs.

Two thirds of NEETs in Spain (66.3%) are currently registered with public employment services.

According to the OECD labour force participation among youth has declined during the economic crisis in nearly all OECD countries: The drop was strongest in Ireland (-11 percentage points), Spain (-10 percentage points) and Denmark (-8 percentage points). The unemployment ratio, i.e. the share of unemployed among all youth, is highest in countries that were severely hit by the economic crisis, notably in Greece (20% of all youth) and Spain (19%).¹⁷

Older workers in Spain's ICT workforce

The share of workers aged 55 or older in Spain's ICT workforce is significantly smaller than in total employment. The older worker share is particularly small for occupations analysts and designer jobs, computer programmers and databases and network specialists

Table 5 Distribution of ICT workers according to occupation and gender in Spain

	Total	% Men	% Women
Electrical, electronic and telecommunications engineers	47,498	75.8	24.2
Technical engineers in electricity, electronics and telecommunications	31,269	92.4	7.6
Analysts and software and multimedia designers	113,120	73.4	26.6
Specialists in databases and computer networks	34,789	81.1	18.9
Engineering technicians	112,185	78.4	21.6
Engineers quality control technicians	51,245	63.3	36.7
Technicians in operations of information technology and user assistance	91,480	79.5	20.5
Computer programmers	84,955	87.4	12.6
Technicians in audio-visual recording, radio broadcasting and telecommunications	48,739	86.7	13.3
Installers and repairers of electronic and telecommunications equipment	79,821	96.7	3.3
Total	695,101	81.0	19.0

Source: Martínez & Bustamante (2016) based on the microdata of the LFS of III Quarter of 2015.

¹⁶ Eurofound: Exploring the diversity of NEETs: Country profiles (2016):
<https://www.eurofound.europa.eu/sites/default/files/ef1602en2.pdf>

¹⁷ Carcillo, S. et al. (2015)



3

Policy Overview

The Spanish government has implemented different action plans for the development of ICT and provision of digital public services at both the national and regional levels. Responsibilities for policy action for an inclusive ICT sector are primarily overseen by the Ministry of Employment and Social Security and the Ministry of Industry, Energy and Digital Agenda. Digital policy actions for Spain, despite being comprehensive, have focused primarily on ICT infrastructure, accessibility and provision of digital public services. Policies on ICT skills development and digital inclusion have mainly included strategies for awareness raising and digital literacy.



Policy initiatives to address ICT skills challenges in Spain

Over the past few decades, the Spanish government has implemented different action plans for the development of the ICT sector and provision of digital public services. Responsibilities for policy action for an inclusive ICT sector are primarily overseen by the Ministry of Employment and Social Security (*Ministerio de Empleo y Seguridad Social*) and the Ministry of Energy, Tourism and Digital Agenda (*Ministerio de Energía, Turismo y Agenda Digital*). National and regional digital policy actions in Spain, despite being comprehensive, have focused primarily on ICT infrastructure, accessibility and provision of digital public services. Policies on ICT skills development and digital inclusion have mainly included strategies for awareness raising and digital literacy.

Recent national digital policy plans introduced in Spain

The most recent set of policy actions is the *Digital Agenda for Spain*¹⁸, which was published in 2013. Among nine broad actions outlined by the Digital Agenda, the two most relevant are the promotion of digital inclusion and digital literacy in Spain. The first phase of the Digital Agenda lasted from 2013-2015. Its strategies focused on the inclusion of the most socially deprived groups through cooperation with non-profit organisations and private enterprises. The Digital Agenda incorporated two targets set by the EU; the first was to achieve a rate of regular internet use of at least 75 percent of citizens in general and 60 percent of citizens with special needs; and the second was to reduce the percentage of citizens who have never used the Internet.¹⁹

Since 2017, an updated version of the Digital Agenda with revised targets has been expected and is prepared under the new policy action, '*Digital Strategy for an Intelligent Spain*'. In 2017, there was a public consultation to determine the challenges and corresponding policies to be developed in the new plan. The main areas under consideration by the Spanish government are improving ICT skills of the Spanish workforce; science, technology, engineering and mathematics (STEM) training and measures to increase the quantity and quality of ICT specialist skills; and, improvements in the education system to

promote these competences. With 9% of tertiary education graduates in STEM subjects in 2015 Spain is lagging behind countries such as the UK where the corresponding share is 17% and Germany with 14.4% of graduates being STEM graduates. With 10.3% even the EU28 average is higher than the figure for Spain.²⁰ This illustrates the catch-up demand in this area faced by Spain and which the new digital strategy of the government is intending to address amongst others.

On top of that there is no other field of tertiary education not only in Spain but throughout Europe, except manufacturing and construction, where the woman share of students is lower than in STEM subjects.

Other national level policy plans were introduced by the Spanish government to counter the economic imbalances resulting from the crisis, most of which target youth unemployment.

- The *Operational Programme for Social Inclusion and Social Economy (Programa Operativo de Inclusión Social y de la Economía Social, POISES)*²¹ was launched by the Ministry of Employment and Social Security in 2014 to fight unemployment, especially within diverse groups. The government invested €1.1 billion in the programme with financial contributions from the European Social Fund (ESF). It was set up to help social groups which are furthest away from the labour market and at risk of discrimination, including women, single parents and young people, ethnic minorities and immigrants.
- The *Strategy for Entrepreneurship and Youth Employment (Estrategia de Emprendimiento y Empleo Joven 2013-2016)*²² was a working plan with recommendations and incentives to reduce youth unemployment. It had a broad focus on the acquisition of skills for entrepreneurship; however, language and ICT skills were also

²⁰ Eurostat: Distribution of tertiary education graduates: [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Distribution_of_tertiary_education_graduates_by_field,_2015_\(%25\)_YB17.png](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Distribution_of_tertiary_education_graduates_by_field,_2015_(%25)_YB17.png)

²¹ See 'Operational Program for Social Inclusion and Social Economy' (2014).

²² See 'Strategy for Entrepreneurship and Youth Employment' (2013).

¹⁸ See 'Digital Agenda for Spain' (2013).

¹⁹ See Muñoz, Bolívar, and Alcaraz-Quiles (2016).

included in the plan. The programme was financed by the government and the European Social fund (ESF) with approximately 3.5 billion Euros. The plan set a target to reach more than 230,000 people aged under 30 by 2016.

- The *Youth Employment Operational Programme (Programa Operativo de Empleo Juvenil, POEJ)*²³ is being run from 2014 to 2020 and will mainly contribute to the implementation of the Youth Guarantee initiative, the EU-wide reform aimed at ensuring that all young people up to 25 years of age are given a job, education, learning or work experience. The plan also focuses on gender equality in the labour market. Measures for unemployed youth are grouped around four specific objectives, including better activation, improved employability and skills, greater entrepreneurship and greater indefinite recruitment.

Policy actions for digital education introduced in Spain

In all these policy initiatives, modernisation of Spain's system for vocational education and training (VET) is a key ingredient given the country's much discussed shortcomings in the area. In 2015, a major reform of the system was launched by means of new legislation. The 'National Catalogue' of professional qualifications was updated and 27 new qualifications of the basic VET approved in 2016, including a Basic Professional Degree in ICT. New sector-based partnerships and structures have been set up to bring together social partners to ensure that each sector's training needs are fully reflected in publicly funded training schemes. Some regions have developed comprehensive modular approaches for apprenticeships. First assessments have shown that "the modular approach is yielding positive results, such as partial qualification and certification". Enrolment numbers, however, have so far been below expectations.²⁴

Box 3 Snapshot: Implementing EU's Youth Guarantee Initiative in Spain

The EU's Youth Guarantee (YG) initiative was a commitment signed by EU Member States in 2013 to ensure that young people under the age of 25 years receive a good quality offer of employment, continued education, apprenticeship or traineeship within a period of four months of becoming unemployed or leaving formal education. In Spain, it has been implemented under the *Youth Employment Initiative* (YEI) and the POEJ, receiving over 80 percent of YG's funding. In its initial years, the YG was not implemented effectively in Spain and its achievements have been limited. The initiative's coverage has been lower in the regions with high NEET rates. Offers have focused more on supply-side interventions, such as further education and training and this has not been effective for young people who already have higher education qualifications and are unable to find jobs. Only 31 percent of the offers within the YG have been for employment since the initiative began in Spain. In addition, regional employment services have not managed to effectively deliver services due to limited capacity. In 2016, the Spanish government introduced reforms to improve implementation of the YG in Spain. The revised strategy includes:

- strengthening coordination between the Ministry of Employment and Social Security and the Autonomous Communities (regional governments in Spain);
- expanding partnerships of all regional Public Employment Services (PES) and other public and private stakeholders; for example, Red.es, the public entity responsible for implementing the Digital Agenda in Spain joined the partnership in 2016;
- modifying eligibility conditions to simplify the registration process and enlarge coverage; for example, the requirement of not having worked in the previous 30 days, and not having participated in education or training activities have been eliminated to allow for greater absorption of NEET youth.

Source: Youth Guarantee and Youth Employment Initiative Spain, Country Briefing: Spain (2017) European Parliament.

²³ See 'Youth Employment Operational Program' (2014).

²⁴ See Education and Training Monitor Spain (2017).

Recent digital policy actions introduced by regional governments

Several *Autonomous Communities* have introduced policy actions complementing those at the national level. These actions target the development of ICT and the promotion of digital inclusion and literacy. For example;

- The *Barcelona Digital City, 2017-2020 (Barcelona Ciutat Digital)*²⁵ introduced by the City of Barcelona is an inclusive and mission-oriented technology and innovation strategy of digitization. The plan focuses on investing in digital public infrastructures and has three axes: 'Digital transformation', 'Innovation', and 'Empowerment'. The axis 'Digital Empowerment' consists of three important components on the promotion of ICT for diverse groups; these include digital education and training, digital inclusion, and democracy and digital rights.
- The *Plan de Inclusión Dixital de Galicia* was launched in 2015 and is part of the *Digital Agenda of Galicia 2020 (Axenda Dixital de Galicia 2020)*²⁶, which is aligned with the national and European strategies of the same name. It is structured into three major strategic axes: digital literacy, digital training and digital and participative social innovation. The actions target all Galician citizens and facilitate the progress of the use of ICT, with special attention on groups at risk of social exclusion. The aim is to integrate these groups, especially in rural areas, by increasing accessibility to the Internet and advancing digital literacy.
- The *Basque EIT Coalition*²⁷ was launched by the government of Euskadi (Basque Country) in 2013. The plan is aligned with the European Commission's Grand Coalition for Digital Jobs. The Basque EIT Coalition plans to create a model and platform of evaluation, certification and recognition of digital competence. It also intends to develop a 'Coalition for Digital Competence' at regional level. Its aim is to improve ICT skills and education for digital jobs to; promote a competent digital society; increase ICT competitiveness; and, improve the quality of life of individuals through the provision of ICT services.

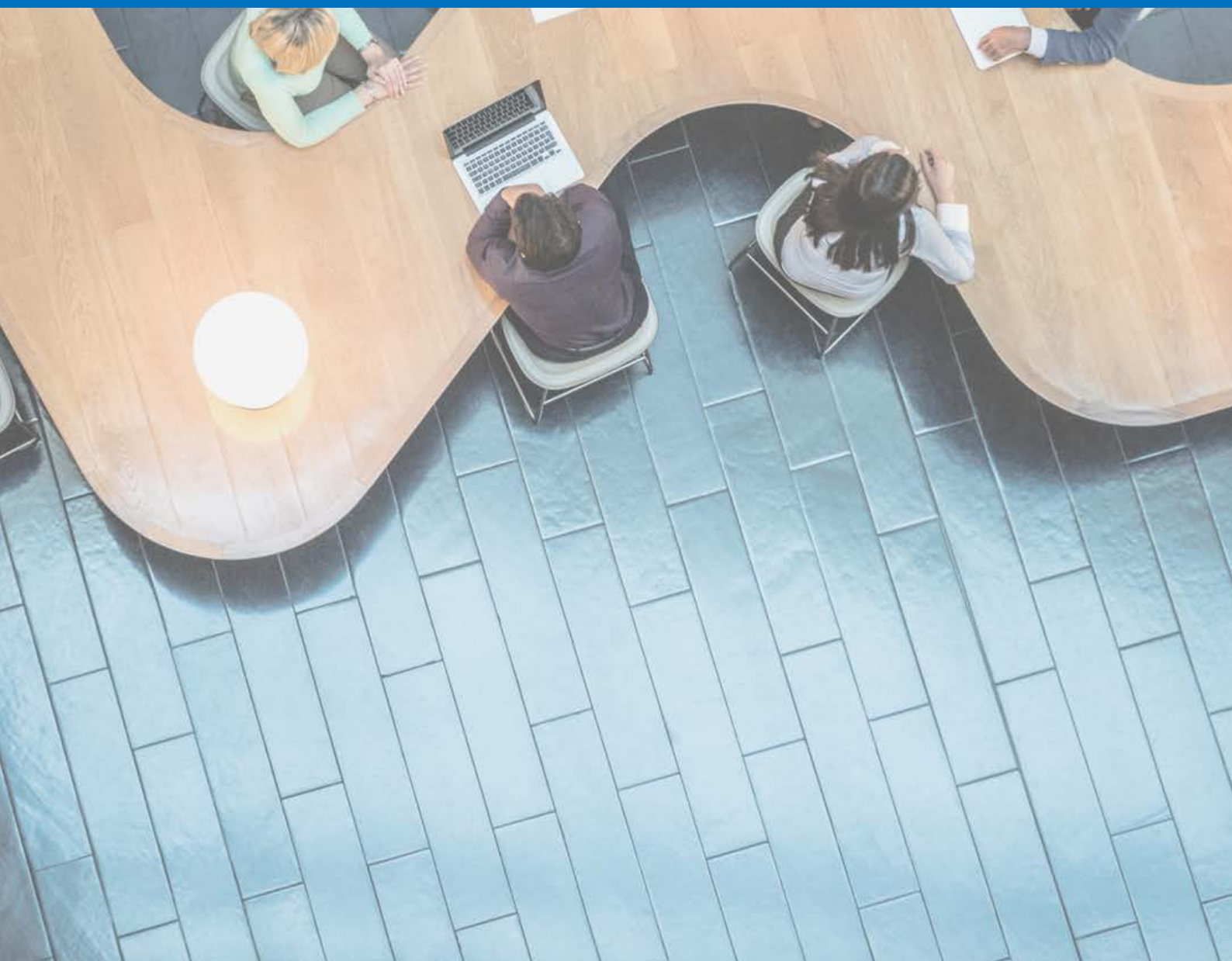
²⁵ See 'Barcelona Digital City' (2017).

²⁶ See 'Digital Agenda of Galicia' (2015).

²⁷ See 'Pledge of Basque EIT Coalition' (2013).

Findings

Out of 115 inclusive ICT skills training programmes identified in Spain, 63 programmes were found to be directly relevant to inclusive ICT skills training as defined in the scope of our study. In this section we analyze the results of our survey of private sector approaches towards inclusive ICT skills training programmes. We provide a brief look into the pathways available to gain an entry into the digital labour market in Spain and suggest a taxonomy to classify the programmes surveyed. We conclude this section with a summary of lessons learned from our selected programmes.



Methodology and research

We conducted a comprehensive survey to determine the impact and challenges of inclusive ICT skills training programmes for diverse groups to enter the digital labour market. Our research combined both qualitative and quantitative methods, including surveys, individual interviews with training providers, and in-depth interviews with the selected good practice showcases and employers.

In the context of this study, the term ICT skills include both ICT user and ICT practitioner skills. However, more importance is given to ICT practitioner skills, which the European ICT skills Forum (European Commission, 2004) defines as, “The capabilities

required for researching, developing and designing, managing, producing, consulting, marketing and selling, integrating, installing and administrating, maintaining, supporting and servicing ICT systems.”

Out of 115 programmes identified in Spain, 63 programmes were found to be directly relevant to inclusive ICT skills training as defined in the scope of our study. These programmes were specifically targeted towards underrepresented and disadvantaged socio-economic groups. Figure 4.1 and 4.2 show a further breakdown of these programmes in terms of target groups addressed and stakeholders involved in inclusive ICT training in Spain.

Figure 5 Share of target groups in inclusive ICT training in Spain, % of programmes surveyed

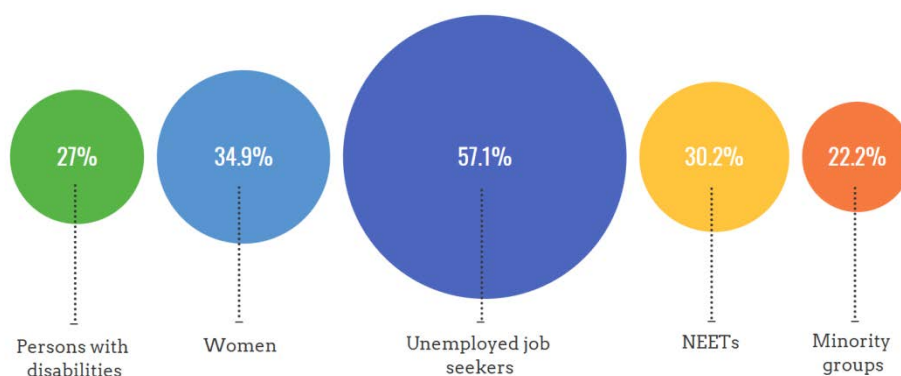
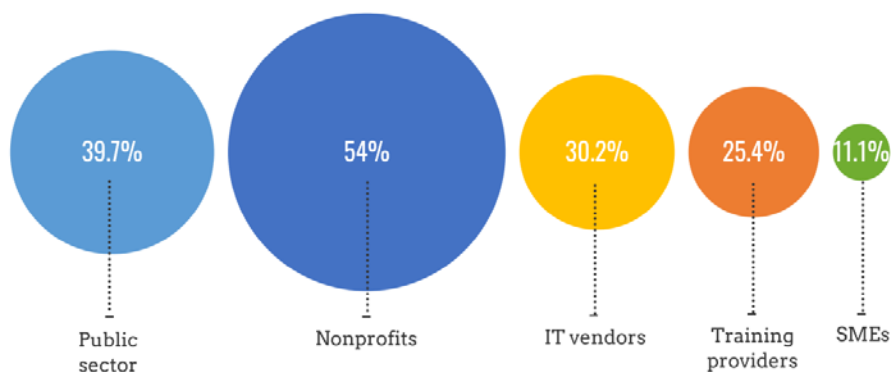


Figure 6 Share of stakeholders in inclusive ICT training in Spain, % of total programmes surveyed



Source: *diversITy Survey, empirica (2017)*

Pathways to ICT skills training and jobs

There are multiple pathways for individuals to gain an entry into the digital labour market; in Spain, traditional education in the form of university degrees is the most common. Findings from our survey show that many students with degrees ranging from liberal arts to music find ICT careers more attractive because of better job prospects. This trend appears to have

increased the demand for ICT skills training among fresh graduates who have an educational background in fields other than technology. As a result, new pathways have emerged for young people seeking to transition from other industries into the ICT sector. The four main pathways in Spain are discussed below.

Pathways to digital jobs in Spain

University education

In Spain, the most common traditional pathway for students is a university degree in Computer Science or a related subject. This is a four-year bachelor's degree, usually followed by a one to two-year master's degree. Most of the graduates working in the ICT sector have a university degree.

Vocational education and training

Another traditional pathway option for students is to complete a two-year vocational training in a technology field. In Spain, it provides direct pathways into the labour market. It leads to an advanced certificate after which students can either enter the job market, pursue a university degree, or opt for additional training to increase the value of their VET certificate. According to the OECD the Spanish VET system provides good labour market outcomes. At the same time, the jobs for low skill levels are increasing the most in Spain.

Industry-lead trainings

Many students who enrol in ICT skills training in Spain have a higher educational background in subjects other than Computer Science, such as Humanities or Social Sciences. They may choose to do so for better career prospects or stable and higher-paying jobs.

Employers consider Industry-lead / ICT vendor trainings as useful further training certificates. The certificates enjoy a high reputation and are accepted as valuable also for career transitioning youth and adults and specifically if obtained from reputable international ICT vendors. However, they are not regarded as substitute for formal education degrees but rather as an add-on.

Lifelong learning

Trainings provide an important pathway for individuals who do not have an academic degree or certificate of education. It includes continuing professional education (CPE) of different type that is conducted for participants in various professional fields and that consists of updated knowledge and other pertinent information beneficial for a person's career. Further examples are programmes and courses addressed to those whose job is at risk helping in changing career paths. This includes but is not limited to those individuals who have an interest in technology and who dropped out of school or college and unemployed adults seeking to transition into technology careers.

Pathways to jobs and employment

Based on responses from our employer survey, most employers demanded an academic background. This is different to countries such as Germany with a VET

tradition and well defined IT VET schemes and corresponding occupations at that level. This presents a challenge because for many individuals from diverse socio-economic backgrounds, an extensive educational background is a difficult criterion to meet

due to considerable investment of time and finances. For most employers, conventional education remains an important factor for potential employment opportunities. Our survey of ICT training programmes in Spain shows that the largest stakeholder groups that provide ICT training to diverse groups consist of non-profits and the public sector (Figure 6). Thus, the most forward way into ICT labour is per university degree. However, other pathways exist next to the rather long and expensive traditional education.

Vocational education and training in Spain

In Spain, ICT qualifications in the vocational education and training (VET) system are offered at the lower secondary, upper secondary and tertiary education levels. Vocational education and training can be an attractive alternative to higher education for several reasons. First, VET provides direct pathways into the labour market for individuals who lack the funding, ability or motivation to continue higher education. VET option may be attractive to at-risk youth and young people from disadvantaged social backgrounds and no or unqualified school-leaving certificate. This is due to the fact that VET requires less of a financial investment and a faster entry into the labour market. Many school dropouts have issues with the traditional way of education; these students might be more susceptible to the more hands-on VET approach.

In Spain, both students and adults can access 'Basic VET' if they were unable to complete lower secondary education. Basic VET allows these students to access intermediate VET courses at the upper secondary level, opening access to higher education as well as the labour market. VET additionally acts as a safety net for early school dropouts. In Spain, early dropout rates have been particularly high for students from disadvantaged socio-economic backgrounds. The

Spanish government has attempted to promote educational improvement in the VET system in recent years by increasing vocational pathways available to students in the final years of lower secondary education.

There are two types of school-based VET programmes with different certificates for intermediate and higher level VET. The Técnico (or Técnico de Grado Medio) is an initial vocational education training that can be achieved within 1 to 2 years at vocational schools. Higher vocational education is provided by the programme Técnico de Grado Superior. Graduates gain access to university studies. Besides, the Spanish education policy established dual training structures ("Formación Profesional Dual") in 2012 in order to increase access to VET and support young people in transition to the labour market. The autonomous regions are responsible for the dual VET programmes. Graduates receive a technician certificate from 26 'familias profesionales', which in the ICT field includes the 'Informática de Oficina' and 'Informática y Comunicaciones'.

Since 2015, Spain has taken measures to reform and strengthen its dual VET system. Actions were run to provide the long-term unemployed and beneficiaries of the Youth guarantee with training opportunities. The OECD, in their review of the Spanish labour market, concluded that "a relatively small share of secondary students opt for a vocational programme, despite relatively good labour market outcomes". Additional efforts in this regard include the introduction of a new dual VET system in 2012 that combines training with employment.

Good Practice Showcase: TecnoLab

A digital maker approach to learning new skills

TecnoLab was initiated by La Rueda Asociación to facilitate personal and community development for young people in Madrid. These young people belong to communities that are at a higher risk of exclusion from formal education systems. It offers training courses in 2D and 3D animation, 3D design printing and other creative digital competences. Its training programme began after an invaluable partnership with FAB LAB Madrid CEU, a digital manufacturing laboratory of the CEU San Pablo University.

Why a good practice showcase?

- Highly successful in terms of targeting young people at risk of social exclusion: TecnoLab addresses this challenge through a strategy of active campaigning in open learning spaces and through a network of local partners. It recruits learners from both formal and non-formal education systems, including local schools and community centres from the region.
- A successful approach in terms of engagement with target groups and overall positive impact in the communities of operation: At the heart of TecnoLab's approach is social transformation through collaborative teaching, learning and creating – and ultimately, encouraging students to act for the benefit of their communities and neighbourhoods.
- Positive impact in terms of increasing the employability potential and opening pathways for learners from diverse groups; for example, by encouraging girls to pursue careers and entrepreneurial ventures in technology: Training programmes focused on creative arts using technology give young girls attractive opportunities to develop essential skills they may otherwise not be encouraged to learn. Moreover, more than 90% of the 161 candidates who enrolled graduated within one year; 22% of the graduates signed a work contract and entered the labour market. In light of the target group of dropouts with the lowest levels of education, this is a success.

For full details of the case, see Appendix E.

Dual training further emphasises the importance of experiential training for employability in Spain. However, dual VET contracts are still a minority in the Spanish labour market and much like VET programmes in general, are perceived as a less attractive alternative to higher education in universities.²⁸

ICT certifications through industry-lead trainings

ICT vendor certifications, such as those mentioned above, provide an added value for both trainees and employers. Next to state and vocational certification, an ICT vendor certification is the most widely accepted form of certification – typically as a further training certificate. The benefits of IT-vendor certification are recognition and comparability. These types of certification can be used for skills assessment of trainees and a benchmarking as they are standardised test developed around a vendor-specific product. If inclusive ICT training programmes can provide IT-vendor certificates, it benefits graduates

and helps them to more easily find a job. However, if training programmes offer their own certificate, it only becomes relevant if the training programmes already have a well-known reputation.

Moreover, these certifications are designed based on a variety of specific skill sets, which can be adapted and updated to match the changing needs of the ICT sector. For this reason, vendor certified programmes generally require individuals to retake assessments at regular intervals. The added advantage of skill-specific certifications is that many of them do not require an extensive educational background. Training providers can utilise this advantage by focusing on training content that specifically addresses low-skilled ICT occupations in Spain that do not require an educational background and for which certifications are enough for finding employment in the ICT sector in Spain. Based on the results from our survey however, there is little indication that training providers in Spain are effectively using such an approach to increase chances of employment for at-risk individuals.

²⁸ Sancha and Gutiérrez (2016)

Good Practice Showcase: Generation

An employer-driven partnership for guaranteed jobs

Generation is a nationwide initiative created by McKinsey & Company as an independent non-profit that recruits, trains, and places unemployed young adults in sustainable jobs. It is an employer driven programme; before launching in any city, it works with employers to confirm job vacancies into which its training graduates can be placed. Digital training courses are provided in digital marketing and web development, among other specialisations. The programmes follow a short and intensive approach, where learners get to practice the most important activities, that is, the 'breakdown moments' of the target profession. This helps learners to integrate the relevant technical, behavioural, and mind-set skills needed for day to day job activities.

Why a good practice showcase?

- A successful initiative in terms of employment through an employer-driven approach that guarantees job placement: Generation involves employers from beginning to end; in identifying promising fields, developing programmes, and guaranteeing jobs for graduating trainees. In 2017 Generation had 400 companies on board. From the 654 enrolments 94% managed to graduate. Right through the process from registration to subscription and graduation women performed 24% better than men.
- High effectiveness in terms of developing industry-relevant ICT skills through the design and implementation of a flexible and responsive training programme: Generation commits to the fast creation and delivery of high quality curricula through its 'skills-mapping' process with employers and technical experts. Generation has managed to bring 80% of its graduates into employment within 6 months after graduation after having trained the above technical skills and behavioural skills (see next point). 63% of woman graduates find a job already within 90 days, 72% after 180 days after graduation. The average figures including male graduates are very similar; 81% and 74% respectively.
- Highly effective in terms of delivering impactful training by integrating behavioural skills training and active mentorships to develop soft skills: Generation provides social-support services where needed and mentorship from 'life mentors' to allow learners to manage their lives during the training. Mentorship continues for the first three months as trainees adjust to their new jobs.

For full details of the case, see Annex E.

Box 4 Snapshot: The Training and Recruiting Landscape in Spain

- **Educational background and experience are the most important for employment in the Spanish ICT labour market.** Most of the Spanish employers interviewed indicated a university or college degree as the minimum entry standard for a potential employee in their company. It was also indicated that on-the-job training without a related university or college degree or VET certificate is generally considered insufficient to meet job entry requirements.
- **ICT vendor certificates are important for young people and adults who want to transition into the ICT sector.** For career transitioning youth and adults, employers considered ICT vendor certificates to be relevant for most technological job profiles. However, for most employers such certificates are only relevant if obtained from reputable Spanish or international training institutions.
- **For individuals who do not have an academic degree and who dropped out of school or college, ICT training programmes should ideally introduce options of studying ICT-related subjects.** Evidence from our survey shows that most such programmes in Spain are targeted specifically to young learners. For younger cohorts, training programmes like these emphasise the importance of opening pathways to explore future possibilities in ICT education.
- **Job applicants with well-developed soft skills are better positioned to be recruited by employers.** These soft skills range from effective communication and coordination, problem-solving, negotiation, teamwork and collaboration, and decision making. Employers indicated that graduates and trainees with no prior work experience tend to lack such skills. The prevailing perception among employers is that higher education institutions in Spain do not sufficiently address the need for experiential or practical learning.
- **According to employers, ICT skills training should also address the development of behavioural and mind-set skills.** This approach helps to prepare trainees for actual situations encountered at work. One of the main reasons experiential trainings are successful is because they address a need employers feel is not being met by traditional educational institutions in Spain.
- **Mixed or integrated approaches to training are the most desirable for both trainees and employers in Spain,** particularly those in an experiential learning setting. However, only well-structured programmes with significant support from sponsors and businesses can provide this type of integrated training.
- **Business support is especially relevant for designing curricula of training programmes** for both technical and soft skill-sets because employer-driven programmes respond better to market demands for ICT and work-relevant skills.

Source: diversITy survey (2017), empirica.

Training taxonomy

We classified the ICT skills training programmes identified in Spain in six categories based on the programmes' approaches to learning. The most promising programmes use multiple methods that are

a combination of two or more approaches. These approaches are discussed in the following training taxonomy



Bootcamps

Intensive training programmes generally lasting for one month and up to three months. Training can be full- or part-time depending on the programme and consists of lessons, individual and team projects, 1:1 tutoring and tests.



Workshops

Best explained as mini-bootcamps lasting between one and three days. Training is on specialised topics and consists of presentations and interactive peer-to-peer sessions.

A variety of training providers use both bootcamps and workshops. Coding bootcamps for example have a skill-intensive focus that cover areas such as intermediate to advanced programming languages, supplemented by smaller sessions or workshops on soft skills training.

Success factors

- **Affordability:** Bootcamps are an affordable alternative to a four-year university degree as they require less time to complete and tend to cost less.²⁹
- **Flexibility:** Compared to university programmes, bootcamps are more flexible in terms of curricula and can respond faster to changing market demands.
- **Prior Experience:** Bootcamps are less selective than universities in terms of prior qualifications. Individuals who are interested and do not necessarily have an ICT background can enrol in training bootcamps.

Challenges

- **Certifications:** Bootcamps tend to not offer standardised certifications but rather follow a variety of teaching and training techniques.
- **Employability:** In terms of employability, bootcamp qualifications are not sufficient and employers tend to require more traditional technology qualifications or longer work experience in the ICT sector.

²⁹ A bachelor's degree earned at a public university can cost between 680 and 1,280 Euros per school year. At a private university, this figure varies between 5,500 and 18,000 Euros per school year (Quacquarelli Symonds (QS) 2018).



Classroom

Traditional, instructor-led training in a classroom setting, in most cases using tailored e-learning platforms. Training usually leads to a certificate and can last for several months.



Virtual Learning

Training includes but is not limited to massive open online courses (MOOCs). Courses are available on online platforms, are mostly free to join and may or may not have instructors. Assessments are either self-administered or based on peer-to-peer feedback.

Classroom training with online learning elements is by far the more popular approach towards ICT skills training used by most training programmes in Spain.

Success factors

- **Flexibility:** Learning through online platforms can be more flexible as trainees can access courses and schedule tests based on their own availability. However, this may not be possible with classroom training if programmes follow a strict in-house schedule.
- **Certifications:** Courses include but are not limited to content provided by IT vendors, such as Microsoft, IBM, Cisco and Oracle. Vendor-specific trainings follow a partner-centric approach in which companies create the curriculum which is then delivered by partners.
- **Employability:** Such trainings have the advantage of providing certifications that are valued by employers; additional discussion on ICT vendor certification follows below.

Challenges

- **Affordability:** Classroom training following a vendor-specified curriculum resulting in a certification tends to cost more, both for trainees and training providers. These programmes, unless funded through sponsors and other mechanisms are unable to provide low-cost or free training.
- **Prior Experience:** These programmes, especially if offered for free, tend to be more selective when choosing prospective participants. Stricter selection criteria have the risk of excluding those who may have the most to gain from such employability skills.



Experiential

A mix of technical and experiential learning including classroom-oriented learning and company placements. In most cases, placements take place once trainees have passed all the learning components. Training normally lasts from six to nine months.



Mentorships

Not a stand-alone training type and is integrated with other types. A trainee can choose or is appointed a mentor who is an experienced instructor or employee. The mentor is responsible for providing guidance.

Experiential programmes such as an internships or compulsory workplace experience are a more recent approach towards ICT skills training. Depending on the programme, training can last from six months to more than a year. The latter type is usually a dual programme which results in a certification or degree. Moreover, many of such ICT trainings in Spain are developed due to effective business-education partnerships as the training curriculum is designed to reflect the demands of employers. In this study, we focus on shorter experiential training programmes.

Success factors

- **Certifications:** Depending on the programme, a trainee may or may not receive a certification. However, the number of hours worked are recognised as formal work experience.
- **Employability:** Internships and workplace learning programmes have high added value for trainees as they learn both technical skills and a variety of valuable soft skills.
- **Employer involvement:** As training is structured to reflect the demands of employers, employers can benefit from being involved in the training by getting relevant skills in return. This is a major success factor of experiential training programmes, especially those developed with the help of business-education partnerships.
- **Mentorships:** In many such programmes, technical training is accompanied by mentorships. Mentors are a valuable source of learning for new trainees or employees at the beginning of their careers. Additionally, many programmes utilise the mentorship model to encourage girls and women to consider ICT careers by providing access to female mentors and role models.

Challenges

- **Prior Experience:** Trainees must be enrolled in a training programme to get placed into an internship. Few training programmes guarantee an internship for all participants and places might be limited. Training programmes that offer compulsory work experience tend to be more selective in terms of prospective participants.
- **Affordability:** It is challenging for training providers to find employers who are willing to train and hire interns because of the resource burden on employers. Usually, experiential training is offered by well-reputed training programmes with a vast network of partners.

Good Practice Showcase: Empleo Digital

An experiential training pathway to ICT skills and employability

Empleo Digital is a nationwide initiative that began in Spain in 2016 as part of Fundación Telefónica's 'Employability and Entrepreneurship' programme. It offers free and certified digital skills training to unemployed learners aged between 18 and 35 with the goal of integrating them into the digital labour market. The teaching methods consist of both traditional and blended learning approaches. Learners have virtual access to interactive digital resources; they are invited to various employment forums; and lastly, they get to participate in work sessions with professionals from partner companies.

Why a good practice showcase?

- Successful in attracting and sustaining participation from diverse target groups by providing scholarships and grants: Empleo Digital learners are unemployed young people who have either graduated from university or lack a formal education. It also caters to young people who have different fields of study but want to transition into the technology sector. Learners in training programmes are supported by scholarships, grants and job placements.
- Effective in terms of developing industry-relevant ICT skills to address digital skills mismatch: Empleo Digital works with a vast network of partners to develop the most in demand technological profiles and training programmes which exclusively cater to these profiles. In 2017 Empleo Digital was cooperating with around 300 partner companies to develop curricula and profiles and offering on-the-job experience as part of the training.
- A successful initiative in terms of employability and opening future pathways for learners through experiential and blended learning experiences: Learners are placed into companies for experiential training and are given an opportunity to work on actual projects. This experience eases the transition of learners into the job as by the result of 61% (854) of the learners having been recruited and found a job in the labour market.

For full details of the case, see Annex E.

Lessons learnt

Based on the previous discussion, two types of training approaches are specifically relevant for Spain. The first addresses the challenge of unemployed and inactive NEET youth in Spain. Due to the enormity of youth unemployment, a higher proportion of ICT skills training is aimed at the cohort aged roughly between 16 and 30 years. Developments at the policy level

have attempted to increase pathways for individuals at different levels of educational attainment through the VET system. Training programmes such as TecnoLab that focus on introducing pathways to further education and training have been particularly successful in this regard.

Box 5 Key Lessons Learnt from ICT Training in Spain

Outreach



- Programmes target a variety of socio-economic groups (see Figure 2.A). A higher proportion of programmes are geared towards unemployed job seekers without much differentiation as to their target group.
- Outreach to highly vulnerable groups is done jointly with the public sector, for example, through employment offices to address issues such as high youth unemployment.
- Non-profit organisations are the most effective in terms of outreach, particularly through active campaigning in open learning spaces and remote communities.

Training



- Business-education partnerships are essential for developing training curricula. Training programmes designed collaboratively with industry experts or ICT vendors can better reflect the market need for ICT skills.
- An added advantage of ICT vendor programmes is the lower risk of training being outdated because of frequent new qualification offers and options to renew past certifications.
- Successful trainings combine a variety of training methods. The most important aspect of multi-level training is the development of both technical and cognitive skills, such as the ability to work in teams, effective communication and problem-solving skills.

Employability



- Certifications have a high added value for job seekers. Employers prefer hiring those candidates who have successfully completed high quality training from reputable training institutions. This is usually in addition to university or college degrees earned prior to training.
- For employers, both the level of technical skills and prior experience in the work environment is important. Therefore, experiential training has more value for both trainees looking to enter the job market and for prospective employers.

Source: diversITy Survey, empirica (2017)

Based on our employer survey, employers also indicate fresh graduates and trainees often lack market relevant technical skills as well as soft skills. Experiential training programmes address this need to some extent, as evidenced by our example cases of Empleo Digital and Generation. The former has substantial business-education partners who collaborate on developing training for market-relevant and highly demanded skills profiles. Generation addresses the development of behavioural and mind-set skills by using different exercises that simulate the work environment and prepare trainees for actual work-related situations. The impact in terms of employment has been the highest for both these programmes – with 61 percent of trainees finding employment after graduating for

Empleo Digital in 2016 and 80 percent for Generation (see Annex B for more information on results).

In terms of certifications, ICT vendor qualifications such as those from Cisco, Microsoft and Oracle, among others, have the most value for both employers and students as further training certificates. For employers, it is easy to assess the level of skills based on standardised benchmarks used in ICT vendor qualifications. For trainees, vendor certifications provide added value based on the qualifications' demand and recognition. An additional advantage of skill-specific certifications is that many of them do not require an extensive educational background. If utilised correctly, low-skilled individuals can access better employment opportunities with the help of such certifications.

5

Conclusion

Given that efforts are already underway to improve Spain's economic condition, there is renewed vigour in the economy to utilise this opportunity by placing young people into ICT jobs. However, some key challenges must be addressed before this can be achieved. Despite the high educational attainment of Spain's ICT workforce, traditional education pathways have not been successful in placing the most vulnerable groups into employment. 25.5% of the Spanish youth is not in education, training or employment. The training programmes studied in this report offer some promising alternatives to fill in this gap. Foremost, intervention mechanisms must be developed to reach a variety of vulnerable communities.



Conclusion

What one learns from the overall ICT landscape in Spain is that there is a mismatch between the supply of ICT specialist skills and the demand expressed by companies for these specialists. There are also indications, based on our simple projection scenario, that demand for ICT skills is expected to grow. Given that efforts are already underway to improve Spain's economic condition, there is renewed vigour in the economy to utilise this opportunity by placing young people into ICT jobs. However, some key challenges must be addressed before this can be achieved.

Despite the high educational attainment of Spain's ICT workforce, traditional education pathways have not been successful in placing the most vulnerable groups into employment. 25.5% of the Spanish youth is not in education, training or employment – this includes men and women aged between 20 and 24 years.³⁰ An OECD survey³¹ shows that 9% of young people aged between 16 and 20 years' experience important periods of inactivity, moving directly from school to unemployment.

In their skills forecasts and labour for trends up to 2025 Cedefop states that there are significant numbers of job opportunities requiring medium-level qualification and the demand is going to increase. This trend is running across all occupations including ICT jobs. While in Spain today 26% of jobs require medium level qualifications the figure is going to increase to 31% in 2025 whereas those requiring high-level skills will increase from 36% to 38%.³² This development and 6% increase may open up opportunities for some of the target groups addressed in the present report.

Frameworks already in place such as the VET system have improved in recent years but are still less attractive than higher education programmes in

universities and colleges.³³ For the target groups in question, traditional pathways of employment appear to be difficult without large-scale change and modernisation of these systems.

The training programmes studied in this report offer some promising alternatives to fill in this gap. Moreover, they have the potential for scale with its operators (Telefonica Foundation, McKinsey & Company) intending to also address the Latin America market. Foremost, outreach to the groups under consideration is an important factor. Training partnerships especially with stakeholders from the civil society have addressed this to some extent by reaching remote communities. However, much more needs to be done to ensure that the education and training offered by these programmes is effective. Following from this, we develop the key takeaways and recommendations from the Spanish ICT training survey.

³⁰ See OECD (2016), NEET indicator.

³¹ See Carcillo et al. 2015.

³² Cedefop: Spain: Skills forecasts up to 2025 (2015 edition): <http://www.cedefop.europa.eu/en/publications-and-resources/country-reports/spain-skills-forecasts-2025>

³³ See Sancha and Gutiérrez (2016).

Recommendations

Develop intervention mechanisms for at-risk groups.

Targeted outreach strategies must be developed to reach a variety of vulnerable communities, taking into consideration the needs of different at-risk groups. Evidence from ICT training programmes surveyed in Spain points to most programmes using a ‘one-size-fits-all’ approach to training, an approach that does not sufficiently address the needs of different target groups. In Spain, TecnoLab has targeted at-risk groups in communities furthest away from the labour market. TecnoLab has created a nurturing and inclusive learning environment for at-risk youth in a local setting. Its training programmes do not use standard assessments or even conventional learning methodologies. Instead, it has utilised creative digital learning to develop technical competencies in learners and to encourage them into technology vocations.

Moreover, given that the earliest age for transitioning into inactivity is 16 years, intervention mechanisms must be built into the traditional education system to address the challenge of drop-outs and early inactives in Spain. An important consideration is that such interventions must be targeted at earlier education levels, for example, in secondary or upper-secondary schools; examples of such intervention strategies include:

Awareness-raising. Intervention in the form of awareness-raising is already being utilised in a global movement to encourage young people to contemplate careers in technology. For example, the United Nations’ ‘International Girls in ICT Day’ is celebrated each year to advance the inclusion of women in ICT fields.³⁴ Such campaigns can be adapted to the national and local level with the help of participation from enterprises and the non-profit sector. An example of such a campaign is the ‘CodeWeekEU’, which was held in 2016 and hundreds of Spanish companies, training providers and other organisations participated in learning and awareness-raising events in Spain.

Mentorships. Mentoring programmes have been discussed previously as a training approach in experiential learning. There is, however, the possibility of mentorship programmes for students during their

education, specifically for students from diverse backgrounds and minorities. Mentors help guide and motivate students. Women mentors, especially in STEM, can encourage girls through shared experiences, advice and networking. Therefore, it is necessary, that teachers and schools, training programmes and providers emphasise mentorships for girls and women in ICT, promote relatable role models and publicly promote these.

Summer or Afterschool programmes in STEM or specialised ICT courses can be promoted to engage students from at-risk and underrepresented groups. Advantages of afterschool programmes are manifold, such as providing free tutorship in challenging subjects, holistic curricula that addresses cognitive skills development, and providing academic or career counselling for older students.

Providing opportunities for up-skilling through dedicated training programmes. For slightly older cohorts, such as recent unemployed graduates and adults, there is a strong need for dedicated training programmes to upgrade existing ICT skills. In the previous section, we also addressed the absence of targeted ICT skills training programmes for adults in Spain. Adult learners with incomplete education or those who face a lower market demand for their learned trade or vocation are also vulnerable to long-term unemployment and its accompanying risks. There are opportunities in the Spanish ICT labour market represented by certain occupational growth, for example, ICT technicians that do not require an academic background. Possibilities for public and private stakeholders in ICT training could be to target those occupations that fulfil this criterion, hence generating better employment outcomes for low-skilled individuals. Adult learners in Spain can access Basic VET but there are a range of possibilities for up-skilling that can be additionally utilised; for example:

- Workplaces can engage in special learning initiatives for low skilled adults.
- Accelerated learning programmes to incentivise training due to quicker progress and shorter learning duration. Accelerated training is especially relevant for part-time learners with children, jobs or other responsibilities, such as caring for older family members.
- Specialised training content that focuses on occupational learning.

³⁴ See UN News ‘Girls in ICT Day’ (2017).

- Training for high-demand or high-growth occupations to increase chances of employment.

the resource burden on employers; this can be addressed by a better incentivisation framework.

Enabling business-education partnerships to develop market-relevant training.

Training programmes have addressed upgrading skills to some extent, with the most promising approaches involving large business-education partnerships. Successful programmes from Spain, such as Empleo Digital and Generation, actively engage employers to develop ICT training curricula. Greater employer engagement is necessary to have an adequate knowledge of relevant ICT skills in the market. This has advantages for both employers and trainees; trainees develop skills in occupations for which jobs are available and employer needs for skills are also met. Moreover, for various occupations that do not require an intensive academic background, employers can widen hiring criteria to include training-focused or training-only profiles, for example, those based on skill-specific ICT vendor certifications.

However, our survey of the ICT training landscape in Spain suggests that such partnerships are highly resource-dependent; most of these efforts are a result of considerable public and private investment. It is challenging for training providers to find employers who are willing to train and hire workers because of

Summary of Recommendations

Recommendation 1

Targeted outreach strategies to reach and train the most vulnerable groups

Targeted outreach strategies must be developed to reach a variety of vulnerable communities, taking into consideration the needs of different groups. Given that the earliest age for transitioning into inactivity is 16 years, intervention mechanisms must be built into the traditional education system to avoid and discourage drop-outs and early inactives. Targeted strategies for intervention must be developed with a focus on key pathways available to vulnerable groups. Training approaches in such a scenario should equally emphasise awareness-raising activities and inspirational mentorships for young people in secondary schools.

Recommendation 2

Providing opportunities for up-skilling through dedicated training programmes

For slightly older cohorts, such as recent graduates, there is a strong need for dedicated training programmes to upgrade existing ICT skills. This is especially relevant for those ICT professions that have lower skills requirements and do not usually require an academic education. Possibilities for public and private stakeholders in ICT training could be to target those occupations that fulfil this criterion, hence generating better employment outcomes for low-skilled individuals.

Recommendation 3

Enabling business-education partnerships to develop market-relevant training

Greater employer engagement is necessary to have an adequate knowledge of relevant ICT skills in the market. This has advantages for both employers and trainees; trainees develop skills in occupations for which jobs are available and employer needs for skills are also met. Moreover, for various occupations that do not require an intensive academic background, employers can widen hiring criteria to include training-focused or training-only profiles, for example, those based on skill-specific ICT vendor certifications.

Recommendation 4:

The right partnership

Successful inclusive ICT training programmes need to be carefully tailored to give job seekers skills to compete for sustainable jobs in the emerging knowledge economy and by creating a fast track to marketable technical skills for those most vulnerable to sustained long term unemployment. Ideally courses are accessible and results are achievable even for people who may not have taken part in formal education for many years. This requires successful partnerships for ICT training programme development and operation. Such a partnership should include a variety of stakeholders such as organisations representing or with direct access to the target groups, training providers, industry and businesses but also employment agencies, recruitment companies and staffing industry players. This is reflected in the involvement of such stakeholders in several of the Good Practice Showcases.

Recommendation 5:

Need for a coordinated and regular country-wide exchange of experiences and joint learning

Specifically the large group practitioners at the national workshop in Madrid in 2018 and the international practitioner exchange event in Brussels in 2019 – expressed the desire for a coordinated and regular country-wide exchange of information and experiences to help better coordinate inclusive ICT training activities, learn from each other and thereby increase the likelihood of the emergence of strongly focussed and successful programmes with a strong impact in terms of job placements etc. Practitioners stated that the workshop had been the first of that type in Spain. For the first time it brought together practitioners who sometimes had heard about each other but did not know the details. Continuation of such exchange and learning workshops at regular intervals was seen as highly desirable.

Recommendation 6:

Mentorship is a must

The crucial importance of a mentor: Mentoring is seen as crucial for the success of inclusive ICT training programmes. The GPS make intensive use of these and offer this service either throughout the duration of a training course or even up to three years after course completion. It has to be seen as one of the most critical success factors. Mentoring programmes can be viewed as a training approach in experiential learning and as an important offer for students and trainees during their education, specifically for women and people from minority groups. Mentors can play an important role as role models who help question traditional gender roles; they can demonstrate career opportunities for groups currently underrepresented in the ICT workforce; and they can provide practical, tried-and-tested ways how to address obstacles in day-to-day training.

Source: empirica (2018)

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Appendices

Appendix A: Forecast methodology

Methodology for baseline projection of ICT skills gap

Demand is following a linear trend, i.e. the average absolute growth of the last few years with plausible data is extrapolated.

Minimum supply is calculated as incumbents' workforce in a previous year minus exits plus domestic graduates. Exits are calculated using a percentage derived from Cedefop applied to the last year where data for the incumbent workforce available (it is fixed, i.e. static, to avoid repercussions from the model itself). Domestic graduates are assumed to be constant and equal to the latest available plausible official statistics. Graduates counted are VET graduates, short cycle programme and bachelor level graduates. Masters and PhD level graduates are not counted because they usually have previously earned a bachelor's degree and would hence be double counted.

Supply in a scenario with constant lateral entries adds also the "Minimum lateral entry inflow" to minimum supply

Minimum lateral entry inflow is the calculatory structural gap that remains when the number of

domestic graduates (as defined in minimum supply) is subtracted from the need for new labour market entries (expansion and replacement).

Shortage without lateral entries is the gap that remains when the need for new labour market entries were only covered from domestic graduates.

Shortage with constant lateral entries ("everything stays the same") is the gap the remains when a constant number of lateral entries flows into the labour market.

The total potential for new jobs until 2025 is calculated as:

Demand 2025	674,000
Minus incumbent jobs 2016	- 557,000
Plus cumulative replacement 2017-2025	+ 112,000
Jobs potential	229,000

Yearly breakdown for baseline projection of ICT skills gap in Spain (2017-2025)

(in '000s)	2017	2018	2019	2020	2021	2022	2023	2024	2025
Demand (linear trend)	575	588	600	612	625	637	649	661	674
Minimum supply (incumbents minus exits plus domestic graduates)	567	578	588	599	610	620	631	641	652
Supply in a scenario with constant lateral entries	571	583	595	608	620	632	644	657	669
Shortage without lateral entries	8.1	9.8	11.5	13.2	14.9	16.6	18.3	20.0	21.7
Shortage with constant lateral entries ("everything stays the same")	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7

Source: empirica (2017)

Appendix B: Definition of ICT occupations according to ISCO

ICT Specialists by skill level according to ISCO (International standard classification of occupations)

Level	ISCO (International standard classification of occupations)
High	Management, architecture & analysis
Mid	Core ICT practitioners – professional level
Mid	Other ICT practitioners – professional level
Lower	Core ICT practitioners – associate / technician level
Lower	Other ICT practitioners – associate / technician level

Eurostat: ICT specialists according to ISCO

Management, architecture & analysis

133 ICT Service managers
2511 Systems analysts

Core ICT practitioners – professional level

2512 Software developers
2513 Web and multimedia developers
2514 Application programmers
2519 Software and multimedia developers and analysts not elsewhere classified
2521 Database designers and administrators
2522 Systems administrators
2523 Computer network professionals
2529 Database and network professionals n.e.c.

Other ICT practitioners – professional level

2152 Electronic engineers
2153 Telecommunication engineers
2166 Graphic and multimedia designers
2356 Information technology trainers
2434 ICT sales professionals

Core ICT practitioners – associate / technician level

3511 ICT operations technicians
3512 ICT user support technicians
3513 Computer network and systems technicians
3514 Web technicians

Other ICT practitioners – associate / technician level

3114 Electronics engineering technicians
3521 Broadcasting and audio-visual technicians
3522 Telecommunications engineering technicians
7421 Electronics mechanics and servicers

Appendix C: Workforce diversity indicators

Indicator	Definition/Source
Long-term unemployment rate	Share of persons unemployed for 12 months or more in the total number of active persons in the labour market. Source: Eurostat [une_ltu_a], data from 2016.
Young people neither in employment nor in education and training (15-24 years) – NEET	Percentage of the population in age group 15-24 years who is not employed and not involved in further education or training. Source: Eurostat [edat_lfse_20], data from 2016.
Youth unemployment	Number of persons under 25 years who are unemployed, as share of the total number of young people in the labour market. Source: Eurostat [une_rt_a], data from 2016.
Employment rate of older workers (55-64 years)	Number of persons in age group 55-64 years who worked at least one hour for pay or profit during the reference week or were temporarily absent from such work, as share of the labour force in that age group. Source: Eurostat [lfsi_emp_a], data from 2016.
Age employment rate gap (15-64 vs. 55-64 years) in p.p.	Difference in percentage points between the employment rates of persons in age group 15-64 to age group 55-64 years. A positive figure denotes that the employment rate for older persons is lower than for the entire workforce. Source: Own calculation from Eurostat [lfsi_emp_a], data from 2016.
Gender employment rate gap (15-64 years) in p.p.	Difference in percentage points between the employment rate (15 to 64 years) for women and the rate for men. A positive figure denotes that the employment rate for women is lower than for men. Source: Own calculation from Eurostat [lfsa_ergaed], data from 2016.
Non-natives born outside the EU, as share of total population	Total population born outside of the EU (borders as of 2016) on January 1. Source: Eurostat [migr_pop3ctb], data from 2016.
Non-native employment rate gap, in p.p.	Difference in percentage points between the employment rate (15 to 64 years) for population born outside of the EU (borders as of 2016) and the rate for the population born in the reporting country. A positive figure denotes that the employment rate for persons born outside of the EU is lower than for those born in the reporting country. Source: Own calculation from Eurostat [lfsa_ergaed], data from 2016.
Disability employment gap, 2011, in p.p.	Difference in percentage points between the employment rate (15 to 64 years) of persons reporting difficulties in performing basic activities, and the rate for persons reporting no such difficulties. Difficulties can relate to seeing, hearing, walking, and communicating, and must have lasted or be expected to last for six months or more. A positive gap figure denotes that the employment rate for persons facing difficulties in basic activities is lower than for those without. Source: Own calculation from Eurostat [hlth_dlm010], data from 2011 (latest available).
Disability unemployment gap, 2011 in p.p.	Difference in percentage points between the unemployment rate of persons reporting difficulties in performing basic activities, and the rate for persons reporting no such difficulties. Difficulties can relate to seeing, hearing, walking, and communicating, and must have lasted or be expected to last for six months or more. A positive gap figure denotes that the unemployment rate for persons facing difficulties in basic activities is higher than for those without. Source: Own calculation from Eurostat [hlth_dlm030], data from 2011 (latest available).

Appendix D: Survey methodology

Research framework and survey design

The analysis and findings of this report are a result of extensive desk research and two surveys carried out with ICT skills training providers and employers across the target countries. The approach to select and benchmark good practice showcases of ICT training programmes was based on a four-step process illustrated below. The research findings were further analysed and strengthened expert workshops. Three expert workshops were held in Spain (Madrid), Germany (Berlin) and United Kingdom (London) and attended by a panel of experts from academia, policy, the non-profit sector and businesses.

Step 1: Collection of 300 initiatives	Step 2: Selection of 96 initiatives for the online repository
<p>The first phase of the project, using comprehensive desk research we identified more than 300 initiatives based on the following criteria:</p> <p>Type of programme: Any type of ICT training programme activity, project, initiative and multi-stakeholder partnership of different levels of government, PPPs (public private partnerships), MSPs (multi-stakeholder partnerships), non-profit organisations, IT vendors, addressed to:</p> <p>Target group: diverse target groups, including women, vulnerable youth with low educational achievement or from difficult socio-economic backgrounds, people with migrant background, unemployed adults changing careers, etc.,</p> <p>Scope: to enable them to obtain and develop in-demand ICT skills and support their entry into the labour market.</p> <p>The process started with the:</p> <ol style="list-style-type: none">1 Analysis of around 300 e-skills programmes and initiatives identified in desk research throughout selected countries, followed by: <p>Identification of further programmes not covered by the initial list by national correspondents from the empirica Global Network for Innovation Research (ENIR) (www.enir.org) and other national experts where appropriate.</p>	<p>In the second phase, 96 inclusive programmes were shortlisted from the 300+ collected cases. Each case was given a score on a scale from 0 (low) to 2 (high) based on the following evaluation scheme:</p> <ol style="list-style-type: none">1 Outcome: To what extent is the programme effective in enabling diverse populations' access employment opportunities through the acquisition of demand-driven e-skills?2 Target Fit: To what extent does the programme or initiative target diverse populations to support to enter the labour market?3 Scalability and Continuity: What is the potential for the initiative or programme to replicate, expand or continue to reach more beneficiaries and contribute to the skills development at regional and national level?4 Maturity: Has the programme been in operation for long enough to make it possible to assess performance and to learn from its experience?5 Policy Fit: To what extent is the programme or initiative embedded in a broader policy context? <p>Textual descriptions of the relevant inclusive ICT skills training programmes were developed based on a common format to get an overview of training measures and how these were addressed and implemented. The selected training programmes are part of an online repository of an estimated 96 programmes, which were selected for further analysis.</p>

Step 3: Identification of Good Practice Showcases	Step 4: Evaluation of Good Practice Showcases
<p>The selection of good practice showcases from the shortlisted programmes was based on the following framework, with each case given a score from 1 (low) to 3 (high):</p> <ol style="list-style-type: none"> 1 Relevance: To what extent is the programme relevant in terms of creating a diverse skilled workforce responding to demands in the labour market? 2 Transparency: To what extent is it possible to have access to information about the programme? 3 Effectiveness: How effective is the programme in providing participants with the ICT knowledge and skills, in line with current demands in the labour market? 4 Efficiency: How efficiently has the programme been implemented? 5 Impact: What were the effects of the programme on the target groups involved? <p>Sustainability: To what extent are the achieved benefits from the programme sustainable?</p>	<p>The main objective of the final phase of analysis was to further evaluate and benchmark the 22 good practice showcases against a set of defined criteria (evaluation criteria), to identify best practice elements and lessons learnt. The evaluation and assessment of best practice ICT skills training programmes was carried out making use of a qualitative survey of key stakeholders. This consisted of in-depth interviews (with decision makers from the selected best practice programmes and selected employers) and a SWOT analysis to help address and understand issues relevant and factors influencing the success of training measures from different perspectives.</p>

Employer survey

Format: in-depth telephone interviews of around 60+ minutes duration each plus completion of a questionnaire by the interviewee either prior or after the telephone interview.

Target group: 12 HR key decision makers in mainly large organisations from Spain, the United Kingdom, Germany, France, Belgium, the Netherlands, Poland and South Africa. **Objectives:** to gather **insights about experiences and expectations related to (inclusive) training programmes**. The primary objective was to find out whether the current ICT training(s) are attractive and making use of these would equip participants with the in-demand ICT skill sets and **would qualify them for further consideration by employers**. The interview results served as an input for the policy recommendations developed in the course of the project to inform policy development on the European and national level, and provide practical recommendations to non-profit organisations and training providers.

Structure of interviews:

1. **General – Job profiles:** type of ICT people / professions needed in the organization; roles / competences relevant and required in the organization.
2. **(Digital) skills and competences needed:** relevant digital skills and competences required from an employee in the organisation either already working for the organisation or those applying for a job.
3. **Recruitment criteria:** recruitment process, the different steps involved and main decision makers as well as main sources of recruitment and main prerequisites; minimum entry standards / credentials (e.g. degrees and certifications) required for a potential candidate to be eligible.
4. **Employer involvement and collaborations:** organisation already involved in training schemes addressed to diverse / vulnerable groups of people including vulnerable youth with low educational achievement or from difficult socio-economic backgrounds, people with migrant background or unemployed adults changing careers; providing any offers to such training schemes (internships, apprenticeships, mentoring, training for specific subjects, other) or involved in any collaborations with the training providers (skills needs assessment / matching, curriculum reform, research & development, equipment and facilities, advisory panels, on the job placement, certification standards, other).
5. **Proposed policy interventions and programmes**
6. **Recommendations:** to training providers for assuring delivery of the skills and talent needed in the labour market and the organisation through their education / training programmes as well as recommendations to policy makers.

Timing: October – November 2017

Appendix E: Good Practice Showcases

Annex E.1 TecnoLab

TECNOLAB'S FOCUS IS TO PROVIDE EMPLOYABLE SKILLS AND RESOURCES, USING A DIGITAL MAKER APPROACH, TO YOUNG PARTICIPANTS WHO ARE MOST AT RISK OF SOCIAL EXCLUSION IN THE COMMUNITY OF MADRID.

Target group

Young people from disadvantaged social groups, aged between 15 and 25.




Main activities

TecnoLab was initiated by La Rueda Asociación in 2015 to facilitate personal and community development for young people in Madrid. These young people belong to communities that are at a higher risk of exclusion from formal education systems. Its training programmes began after an invaluable partnership with FAB LAB Madrid CEU, a digital manufacturing laboratory of the CEU San Pablo University. TecnoLab offers free training courses in 2D and 3D animation, 3D design printing and other creative digital competences. The trainings have both face-to-face and online elements and are certified by Escuela Pública de Animación y Educación en el Tiempo Libre Infantil y Juvenil (EPAEJ), a resource centre for education located in Madrid.

Industry input

Design and delivery with the help of effective partnerships

Many of the programme's actions are designed in partnership with Fundación Orange, Fundación Esplai, non-governmental organization, and EPAEJ. FAB LAB Madrid CEU has been a key sponsor since the beginning of the initiative. It was also instrumental in guiding the early stages of TecnoLab and providing technical expertise and specialised machinery. It played a key role in the later development stage of the programme by offering support through existing FAB LAB networks.

Impact		
		
161 young learners improved their IT and technology skills (10/2017-10/2018)	148 learners successfully passed training courses from Oct. 2017 to Oct. 2018	33 of the learners (22%) signed a work contract and entered the labour market (Dec 2018)

Funding and sustainability

TecnoLab's financing strategy allows for medium- and long-term sustainability of the programme. The strategy's main components include the diversification of financiers at both private and public levels – as the programme is dependent on external support, it is constantly opening new lines of partnerships.

Lessons learnt

- TecnoLab has effectively reached young people at risk of social exclusion by campaigning in open learning spaces and through a network of local schools and community centres.
- Its strategy of social transformation through collaborative teaching, learning and creating has encouraged learners to provide services to their communities.
- Training programmes focused on creative arts using technology have given young girls attractive opportunities to develop essential technology skills.
- It is **difficult to integrate learners into the job market** with limited hours of training. Instead, TecnoLab's strategy is to develop and encourage its learners' vocations towards technology fields.

Annex E.2 Empleo Digital

EMPLEO DIGITAL AIMS TO SERVE AS A BRIDGE BETWEEN TECHNOLOGY COMPANIES AND YOUNG TALENT BY SELECTING, TRAINING AND PLACING YOUTH INTO THE SPANISH ICT LABOUR MARKET.

Target group

Unemployed youth and adults aged between 18 and 35 years, NEET youth and youth at risk of long-term unemployment.

Main activities







Empleo Digital started in Spain in 2016 and is expanding into Latin America with the support of Fundación Telefónica's presence in the target countries. Since its inception, the programme has supported 6,500 young Spaniards through VET grants, internships in the technology sector and job placements. It provides free ICT training of two types:

- On-site: offered in five-month programmes in digital profiles such as cyber security, video game design, big data and data visualization, among others. The teaching methods consist of both traditional and blended learning approaches.
- Online: consists of high-quality MOOCs lasting from four to eight weeks in digital profiles such as machine learning, social entrepreneurship, agile project management and digital competencies.

Industry input

Design and delivery with the help of effective partnerships

Empleo Digital ensures that its curricula respond to current market demand for labour. Consequently, curriculum development involves cooperation with industry experts, as well as educational experts to provide a well-rounded learning experience for students. Fundación Telefónica's agreements with partner companies allow the learners to develop and work on existing projects in partner companies. This on-the-job experience speeds up workplace integration once learners move onto actual work placement. Moreover, much of the actual recruitment has been possible through such partnerships. The number of partner companies grew to around 300 – with partners stating Empleo Digital technology profiles as an essential factor driving recruitment into companies.

Impact		
		
1,400 on-site learners supported by scholarships and grants in 2016	854 learners (61%) were placed into employment in 2016	6% of the learners inspired to start own ventures
		
390,000 learners were in online training in 2016	300 partner companies on board	4% of learners moved into further education

Funding and sustainability

Empleo Digital follows a public-private funding strategy. The main sources of funding are through donations and collaboration agreements Fundación Telefónica has in place with public administrations that enable access to facilities and infrastructure needed for training programmes. Co-funding contracts are in place with other institutions, for example, with European institutions. Since the programme's expansion into Latin America, a few financial institutions have expressed interest in joining the co-funding model. Such partnerships provide an avenue for long-term sustainability of Empleo Digital's training programmes.

Lessons learnt

- Empleo Digital has addressed key challenges in the Spanish labour market, particularly regarding NEET youth and young adults looking to transition into technology jobs.
- Most of Empleo Digital learners are unemployed young people who have either graduated from university and are searching for jobs or those

without a formal educational background in technology.

- In addition to classroom and online training, learners can attend value-added master classes for certain modules, giving more depth to their learning profiles.
- Empleo Digital works with a vast network of partners to develop the most in demand

technological profiles and training programmes which exclusively cater to these profiles.

- Learners are placed into companies for **experiential training and can work on on-the-job projects**. This experience has showed to ease the transition of learners into the job.

Annex E.3 Generation

GENERATION HAS A TWO-FOLD MISSION TO EMPOWER YOUNG PEOPLE TO BUILD THRIVING, SUSTAINABLE CAREERS AND TO PROVIDE EMPLOYERS WITH HIGHLY-SKILLED AND MOTIVATED TALENT.

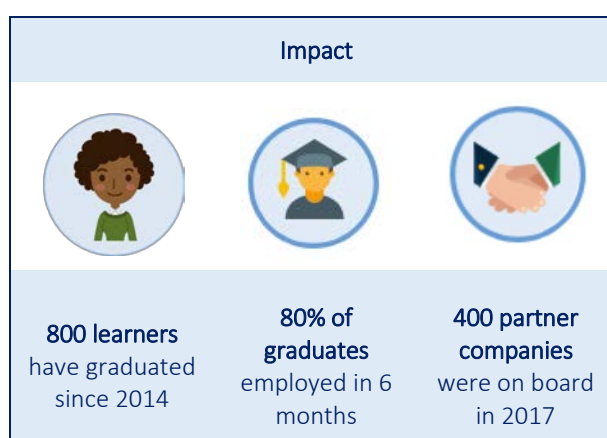
Target group

Unemployed youth aged between 18 – 29 years, half of them women.

Main activities

Generation was created by McKinsey & Company as an independent non-profit to counter Spain's high unemployment and resulting skills gap. The initiative recruits, trains, and places unemployed young adults in sustainable jobs. It is an employer driven programme; before launching in any city, it works with employers to confirm job vacancies into which its programme graduates can be placed. It also works together with employers to develop curricula. The programme targets the youth who are hardest-hit by unemployment. Generation Spain's digital training programme include:

- **Digital Marketing:** a ten-week programme where participants learn fundamentals such as digital marketing strategy and master the tools needed to run, analyse and optimise digital marketing campaigns.
- **Web Development:** a 14-week programme in which participants learn how to design and build powerful websites and apps using HTML, CSS, JavaScript and other key tools. Moreover, they learn the skills to become a high-performing member of an agile development team.



The programme follows a short and intensive approach, where learners get to practice the most important activities, that is: the 'breakdown moments'

of the target profession. This helps them to integrate the relevant technical, behavioural, and mind-set skills in every module. Generation provides social-support services where needed and mentorship from 'life mentors' to allow learners to manage their lives during the training.

Generation also rigorously tracks the programmes' short- and long-run impact about the well-being of participants, return on investment for employers, and programme efficacy. Data lies at the heart of Generation's work – and is a reason for its success.

Industry input

Design and delivery with the help of effective partnerships

Generation focuses on industries where there is a significant gap between skills offered by young unemployed people and the needs of employers. The programme's curriculum is based on the output of Generation's skills mapping process, during which it works closely with employers (both large companies and SMEs) to identify:

- Value-drivers that lead to real top/bottom-line impact.
- Key technical and behavioural skills required to be successful in a role.
- Breakdown moments that prevent employees from being successful.

Additionally, Generation collaborates with specialists to incorporate technical content that allows for in-depth knowledge of technical skills. It should be noted, however, that Generation goes beyond technical skills, creating a curriculum where technical skills, behavioural skills, and mind-sets are integrated into meaningful practical application.

It works with a network of educational training entities such as Opinno, PUE, Netmind and other partners to deliver the programme. Trainers are screened and go through a ten-hour induction course to ensure consistent quality. Moreover, student surveys during and after the programme further measure quality indicators.

Funding and sustainability

Generation's programmes are free for learners and funded through the following mechanisms:

- **Public Programmes (80% of programmes):** Generation works with European Social Fund intermediaries, such as EOI (Escuela de Organización Industrial) and Fundación INCYDE (Chamber of Commerce Foundation), which cover up to 92% of total programme costs.
- **Private Programmes (20% of programmes):** Private programmes are funded by the companies which required tailored trainings.
- **McKinsey:** McKinsey supports the Foundation by covering the 8% gap of public funds as well as the Foundation costs. Additionally, McKinsey provides a team of four consultants that are dedicated full-time to Generation.

Lessons learnt

- The initiative involves employers from beginning to end; in identifying promising fields, developing programmes, and guaranteeing jobs for graduates.
- Generation commits to the fast creation and delivery of high quality curricula; old programmes are constantly updated and; Generation uses various technology tools for innovative delivery of

its programmes as well as blended learning formats such as simulations, case studies and role playing.

- The programmes integrate technical and behavioural skills, mind-sets, and employment essentials; it is simply not enough to have excellent technical skills – Generation’s aim is to demonstrate to its learners the right way to work, to communicate, to perform in different situations and work successfully in teams.
- Generation monitors real-time dashboards at the micro and macro levels to track progress and to identify and manage problems. Altogether, 80% of those who completed the programmes in Spain progressed into employment within 180 days. Out of the young people employed, 52% have an indefinite contract. These results are well above the employability ratios for young people participating in Youth Guarantee training programmes published by the European Union for 2015.



NEW SKILLS AT WORK
J.P.Morgan