e-SKILLS IN EUROPE

SPAIN

COUNTRY REPORT

JANUARY 2014

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1 Overview

Spain has seen some positive developments with regard to securing the supply of the labour market with sufficient numbers of suitably skilled ICT practitioners. However, according to various national experts, improvements have been achieved in isolated initiatives, while the general trends are still problematic.

On the supply side, a lack in adaption of ICT professional careers to the real market needs is observed. Universities do not provide a direct link to the industry and curriculum of studies is not being adopted as fast as the needs call for. The main challenge lies on providing the missing link between university and the research field, industry and the real market. Given their social responsibilities, universities should provide an adequate offer, in line with society's actual needs, in order to best guide students towards market demand. However, private universities seem to have an advantage with this regard, being on top of these adoptions, but still many recognitions and a stable framework seeks development. Public universities started recently to react with this regard as well.

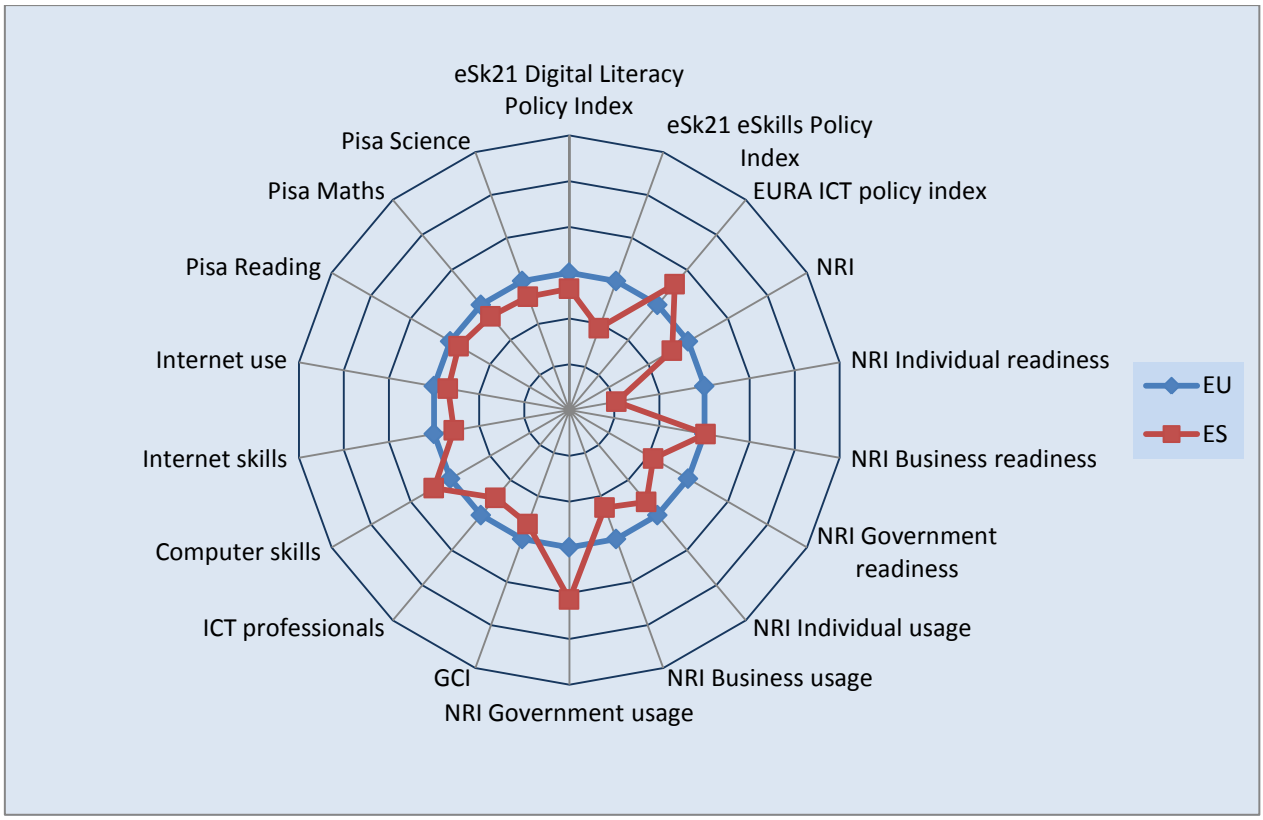
Unfortunately, education sector in Spain is always the last sector to achieve innovation. There are no synergies between supply and demand (learning-jobs), as they are both considered separately and not as a unique issue. Channing this point of view and start considering the market as a whole (from education up to the job market) is a very challenging approach. Curricula and careers are too closed and there is no space for innovation or adaptation to real market needs. There are no mechanisms that allow for adoption of student's new interests with the opportunity to study in topics related to these interests, as everything is already settled. Furthermore, in order to make things work in the right way, hierarchic systems should be left aside and organisation of work must be more cooperation oriented , in the form of 'networking', open transparent and reliable.

Most of the Spanish firms are not aware of the recent development in the field of e-skills and the urgent need for adaptation of their human capital competences in line with the market trends. For this reason, they remain on a secondary position with respect to other international (mostly American) firms operating in Spain. As result of a delayed reaction, they need to double their efforts in order to succeed and remain competitive. However, both universities and the industry should be aware of this matching and should take proper measures to foster employment by supporting start-ups, spin-offs, etc. (also supporting self-employment if necessary). Nowadays, establishing a business in Spain without any support is considered to be a very hard approach, mainly due to the international competitiveness, but also because ICT practitioners usually do not take the initiative themselves alone.

Recently, the situation started to change as the National Government is fostering this matching by working both with the Universities and by providing incentives to the industry. New specific departments have been created within the Government. For instance, a sub-direction devoted to Digital Contents. Measures are being developed in order to support innovation to flow in both senses (University - Industry). Furthermore, Government is encouraging the international positioning of businesses, creation of innovation poles and excellence centres, creation of infrastructures via ERDF funds etc. Concerning education, specific and adapted educational plans will be awarded. This way, Universities which foster cooperation among the sector and raise awareness on this topic will have incentives to do so. All these recent implemented measures are believed to contribute in improving the actual lack of ICT practitioners in the country.

2 Indicators on innovation, competitiveness and ICT skills

Spain						
	Score 2009/2010	Rank 2009/2010	Score 2011/2012	EU27 Rank 2011/2012	Change (Rank)	Comment
eSkills21 study: 'e-skills' index 2010	**1**	**24**				Max.: 5.0
eSkills21 study: 'Digital literacy' index 2010	**2.5**	**15**				Max.: 9.0
EuRA e-skills index	**3.9**	**9**				Max.: 5.0
ICT practitioners in % of total employment 2012			**2.77%**	**18**		EU average: 3.43%
Digital literacy skills of the population 2009/11:						
• Individuals with high level of computer skills	**28%**	**11**	**32%**	**6**	↑	EU average: 28.52%
• Individuals with high level of Internet skills	**8%**	**12**	**11%**	**17**	↓	EU average: 13.67%
• Individuals using the Internet (last three months)	**60%**	**17**	**67%**	**17**	→	EU average: 71.33%
Global Competitiveness Index (GCI) 2010/12	**4.6**	**13**	**4.54**	**13**	→	Max.: 5.61 EU median: 4.52
Networked Readiness Index (NRI) 2010/12	**4.5**	**18**	**4.33**	**17**	↑	Max.: 5.6. EU median: 4.5
• Individual readiness	**5.66**	**18**	**4.24**	**26**	↓	
• Business readiness	**5.12**	**12**	**4.56**	**13**	↓	
• Government readiness	**4.5**	**16**	**3.71**	**19**	↓	
• Individual usage	**3.57**	**16**	**4.78**	**15**	↑	
• Business usage	**4.85**	**19**	**3.33**	**20**	↓	
• Government usage	**4.5**	**16**	**4.95**	**4**	↑	
PISA scores (2009) in:						
• Mathematics	**483**	**19**				EU median: 493
• Science	**488**	**21**				EU median: 498
• Reading	**481**	**18**				EU median: 489


eSk21 Digital Literacy Policy Index
eSk21 eSkills Policy Index
EURA ICT policy index
NRI
NRI Individual readiness
NRI Business readiness
NRI Government readiness
NRI Individual usage
NRI Business usage
NRI Government usage
GCI
ICT professionals
Computer skills
Internet skills
Internet use
Pisa Reading
Pisa Maths
Pisa Science
EU
ES

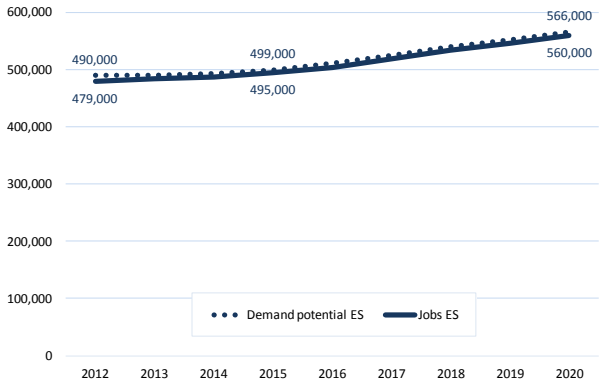
3 E-skills demand and supply forecasts 2012 – 2015 - 2020

Spain			
	ES	Rank EU27	EU27
ICT practitioner workforce 2012	479,000	5	7,403,000
ICT practitioner workforce 2012 as percent of total workforce	2.8%	18	3.4%
Assumed excess demand 2012	11,000	6	274,000
Forecast excess demand 2015	4,300	16	509,000
Forecast excess demand 2020	6,400	15	913,000
Forecast ICT practitioner jobs 2015	495,000	5	7,503,000
Forecast ICT practitioner jobs 2020	560,000	5	7,950,000
Workers 2012 - Management, business architecture and analysis level	64,000	8	1,477,000
... as percent of total workforce	0.4%	20	0.7%
Workers 2012 - ICT practitioners, professional level	168,000	5	3,393,000
... as percent of total workforce	1.0%	20	1.6%
Workers 2012 - ICT practitioners, technician and associate level	247,000	5	2,532,000
... as percent of total workforce	1.4%	8	1.2%
Growth core ICT workforce 2001-2010	6.3%	8	3.0%
Growth core ICT workforce 2008-2010	2.5%	12	2.6%
Growth core ICT workforce 2011-2012	-7.5%	23	3.9%
Growth broad ICT workforce 2011-2012	-6.8%	24	1.8%
ISCED 5A/B first degree graduates in Computer Science, 2011	14,790	4	113,000
... graduates per 1000 population aged 20-24	5.8	1	3.6
... graduates 2011 as percent of 2006 (= peak EU)	86%	14	88%
Vocational training graduates in Computer Science, 2011	11,088	3	67,000

Sources and notes: see annex.

ICT workforce: Demand and Jobs in Spain 2012-2020

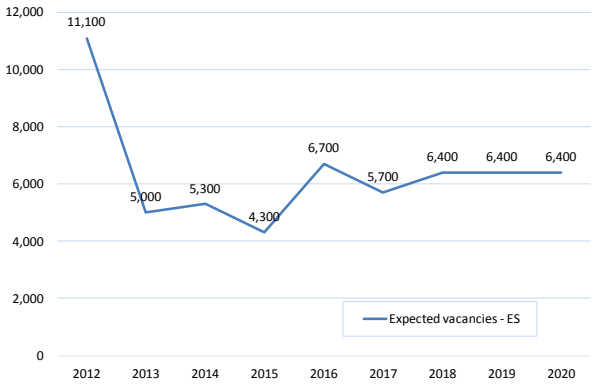
(Main Forecast Scenario)



Source: empirica 2013

e-Skills shortage: Potential vacancies in Spain 2012-2020

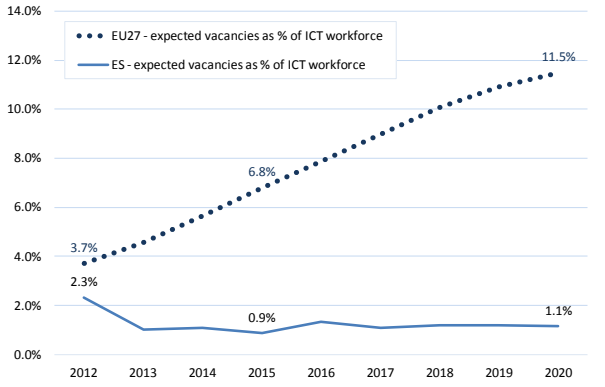
(Main Forecast Scenario)



Source: empirica 2013

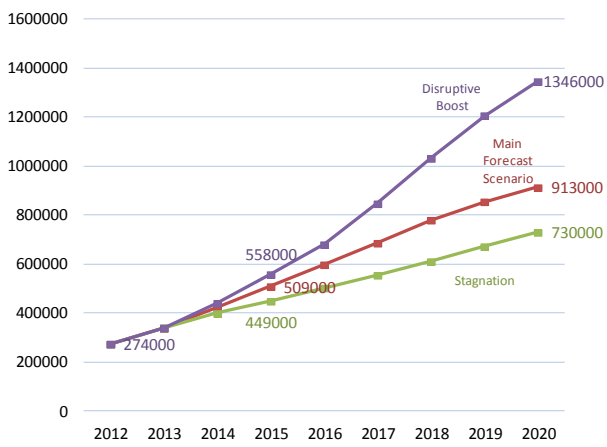
Potential vacancies as percent of ICT workforce Spain 2012-2020

(Main Forecast Scenario)



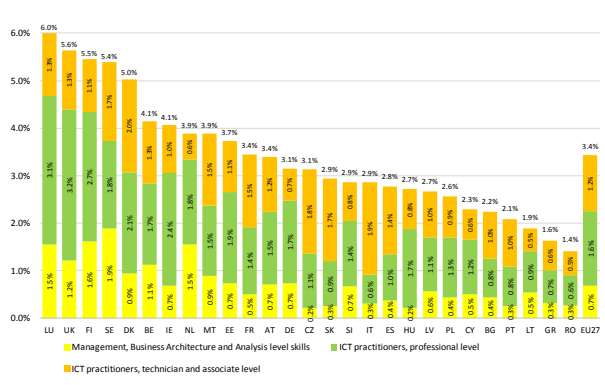
Source: empirica 2013

Potential vacancies in Europe (EU27) by scenario 2012-2020



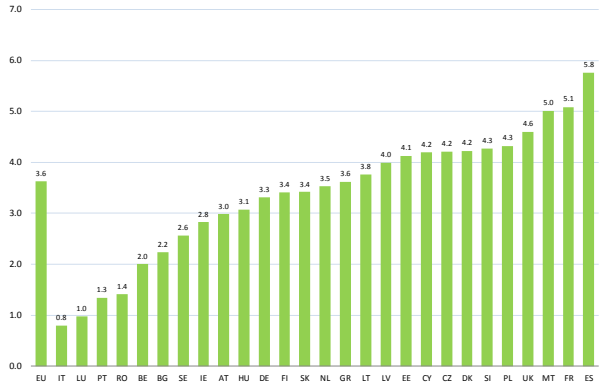
Source: empirica 2013

ICT practitioner workforce as percent of total workforce in EU Member States in 2012



Source: empirica 2013

First degree graduates in Computer Science (ISCED 5A/B) per 1000 population aged 20-24, 2011



Source: empirica 2013

4 Policy and major stakeholders initiatives

In November 2005, the Spanish government adopted a new law dealing with the development of the Information Society and the convergence of Europe with the autonomous communities and autonomous cities. Under this law, the Spanish Government created a National Plan, called "**Plan Avanza**", as part of the central themes of the **Spanish National Reform Programme** designed to achieve the objectives of the Lisbon Strategy.

The focus of **Plan Avanza** was to achieve an adequate use of ICT, with the aim of contributing successfully to economic growth, by increasing competitiveness and productivity, promotion of social equality and improvement of the welfare and the quality of life for citizens. To achieve these objectives, Plan Avanza developed a structure formed by five axes of action: Training, Contents and Digital Services, Development of the ICT sector, Infrastructures and Confidence and Security. Specifically, the training axe was in charge of implementing the actions related to e-skills and digital literacy. It was divided into two parts: the first one – Citizen training, aiming at citizen inclusion; and the second one – SME training, aiming to promote the use of ICT in SMEs.

On July 16th 2010, the Council of Ministers approved the 2011-2015 Strategy for **Plan Avanza 2**. This second stage gives continuity to Plan Avanza's course of action. It includes projects already in progress and updates initial objectives to adapt them to the new challenges of the network society. Now that most of the objectives set have been achieved and being aware of the need to move towards a Knowledge Society, a new phase starts consisting of 5 action areas: Infrastructures, Trust and Security, Technological Training, Digital Content and Services, and ICT Sector Development. One of the main objectives of Plan Avanza 2 is to contribute to an economic model change in the country through ICT, as spreading ICT use allows for an increase in competitiveness and productivity, and favours equal opportunities by boosting the economy and consolidating a sustainable model of economic growth.

Citizen training is an important part of the Plan Avanza strategy which aims at informing citizens about the advantages of internet usage and ICT. There are eight programmes scheduled which intend to include people into the information society. Each of these programmes aims at a different target group and all of them include commissioning studies, dissemination activities, training, social networking and provision of computer equipment where necessary. In brief, these programs include:

- The Technology Training Programme aims at generally all citizens with the mission of improving the quality of life and preventing digital exclusion. The financial budget is 120 million euro.
- The Gender Programme promotes especially the incorporation of women into the information society by reducing the digital gap between men and women. The financial budget is 40 million euro.
- The Seniors Programme is intended to integrate seniors in order to achieve their social integration, avoid digital exclusion and improving their quality of life. The financial budget is 26.5 million euro.
- The Disability Programme aims at the inclusion of disabled persons into the information society. The financial budget is 46.2 million euro.
- The Childhood Programme aims at guiding the young generation to a secure and reasonable use of ICT. The financial budget is 20 million euro.
- The Immigrants Programme seeks to bring immigrants to the information society. The financial budget is 350.000 euro.

- The Other groups Programme hosts activities related to other groups not included in the abovementioned programmes. The financial budget is 13 million euro.
- The Equipment and connectivity programme has a financial budget of 11.1 million euro to provide citizens with infrastructure necessary to connect to the information society.

SME training makes up another important part of the Plan Avanza strategy, with the objective to train SMEs in ICT and help them achieve implementation of e-business solutions, including electronic invoicing, to improve competitiveness and productivity, with the final goal of moving SMEs towards the knowledge economy. A total of 1,874 million euro is dedicated to these actions. Since September 2009, the Ministry of Education together with the Autonomous Communities through the Steering Committee of ICT is coordinating the **Escuela 2.0** project, a nationwide ICT plan for schools. This project aimed at launching the twenty-first century digital classrooms and equipping the classrooms with technology infrastructure and connectivity in order to generalise the access to hardware and digital content in schools and pedagogically integrate ICT into school life. Over two years (2009-2011) nearly 650,000 students in the third cycle of primary education and the first cycle of ESO were provided with a laptop as a learning tool, 30,000 digital classrooms have been put into operation, 160,000 teachers have participated in training related to ICT and has provided a significant impetus to the production and use of digital educational content. The Ministry has also expanded the range of courses in the ICT Network Instruments and its methodological aspects, experimentation and innovation.

Telecommunications and Information Society sector developments in Spain are monitored and analysed by the **National Observatory for Telecommunications and the Information Society** (ONTSI), a body attached to the public corporate entity Red.es. ONTSI, currently the leading public observatory of the information society in Spain, gathers and synthesizes various indicators, prepares studies as well as provides informative and updated services related to the Information Society. In addition, ONTSI also enables dialogue between the ICT sector and the different public administration bodies for the definition of policies and their subsequent evaluation. Three main focus areas of ONTSI studies include: Digital Economy, Digital society and Digital Public services. Besides, ONTSI is also in charge of monitoring and evaluating the Information Society Promotion Programmes implemented by red.es (e.g. Plan Avanza).

Following the government's strategy on development of the digital economy and society in Spain during the period 2013-2015, the Council of Ministers adopted on February 2013 the **Digital Agenda** for Spain. This strategy is set as the umbrella of all government actions on Telecommunications and Information Society and it is jointly led by the Ministry of Industry, Energy and Tourism and the Ministry of Finance and Public Administration. The agenda sets guidelines on the targets to be with regard to ICT and e-Government in order to achieve the Digital Agenda Europe 2015-2020 objectives. The main objectives of the Digital Agenda for Spain include: Encourage the deployment of networks and services to ensure digital connectivity; develop the digital economy for growth, competitiveness and internationalization of Spanish companies; improve e-government and digital public services; building confidence in the digital; Boost RTD and innovation in the industries of the future; promote inclusion and digital literacy and ICT training new professionals. Meanwhile, in order to achieve the above mentioned objectives, seven specific plans have been published during the first half of 2013: ultrafast telecommunications and networks; ICT in SMEs and e-commerce; promotion of the digital economy and digital content; international Plan for technology companies; trust in the digital; development and innovation in the ICT sector; digital inclusion and employability. While, two more plans on eGovernment General State Administration and Digital Utility will be made publicly available during the second half of 2013.

Given that the Spanish Educational System has transferred its powers in educational competences to the Autonomous Communities, the policies and initiatives can be implemented in heterogeneous ways depending on their application scope and the strategies of the different regional

governments. Due to these extended legislative competencies of Spanish Autonomous Communities, several agreements have been reached between the National Government and the Regional ones. With this regard, all Communities have adapted their administrations to e-administration and have cooperated in the development of digital contents and fostering the ICT industry (digitalization of resources, development for free software, knowledge centres devoted to ICTs).

Examples of initiatives taken by Spanish Autonomous Communities include **Red CEMIT** and the **Literacy Plan and digital training for Barcelona 2010-2015**, both described in the next section. In addition, Generalitat of Catalonia, under the improvement plan of the city of Can Vidalet, has funded the **Digital Intergenerational Literacy Program** which aims to bridge the digital divide and promote the intergenerational cooperation by involving the group of older students and school district so that adults and children can work together and learn from each other. The objective of this program is to provide the participants the right skills necessary for the everyday use of ICTs. The program has been integrated into the participant school's curriculum within hours of computer work. During 2009-2011 two schools participated in the program, and during 2011-2012 the program has been running in two new schools.

The country's **ICT industry** has also become active in efforts to boost e-skills in general and supply of ICT practitioners in particular. **AMETIC**, the association of the Spanish Electronics, ICT, Telecommunications and Digital Contents industry, is engaged in ICT training to unemployed individuals through its foundation **FTI**, which was established in 1996. The purpose is to make training an object of differentiation within companies to address the challenges being faced both in the ICT sector and in user organisations. ICT training is provided to job seekers according to the current demand in the labour market. This means that once they complete their specialization, they have very good chances to be hired. The programme is 100% funded by the Agency of Employment of Spain (SEPE). An evaluation showed that to date more than 60% of the 11,000 students who have received training have been hired by ICT companies. However, due to budget cuts, in 2013 the funding programme has not been launched.

Finally, ATI in multi-stakeholder partnership with a range of national stakeholders has set up a **National Point of Contact of the European Centre for Women and Technology (ECWT)** in Spain. The organisation is engaged in a number of activities for promoting the presence of women in the ICT profession and digital entrepreneurship.

Summary Assessment of Spanish e-Skills Activities: ●●

Spanish policies have long concentrated mainly on digital literacy. Initiatives for securing sufficient supply of ICT practitioners have recently gaining ground, most notably in the context of the new Digital Agenda and at Autonomous Community level (e.g. Catalonia).

Summary Assessment of Spanish Digital Literacy Activities: ●●●●

Spanish Digital Literacy Activities are extensive and include training measures of the workforce and promotion measures as well as measures targeted towards SMEs. Grassroots initiatives such as Cibervoluntarios have been instrumental for boosting digital literacy as well.

Summary Assessment of Spanish e-Leadership & Digital Entrepreneurship Activities: ●

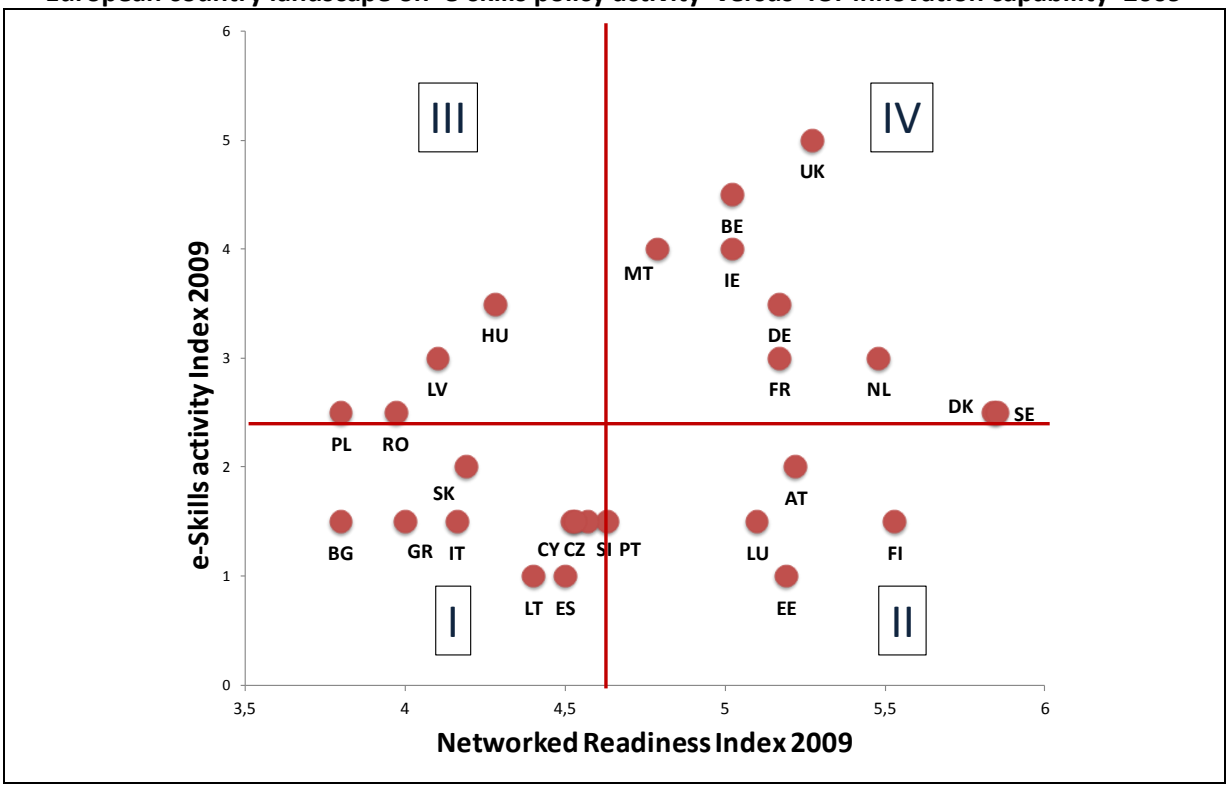
No initiatives have been identified.

Like in the precursor study[1] the assessment of the information gathered resulted in two activity indices, one for digital literacy and one for e-skills computed for each country. These were computed based on data from 2009 and 2013. The e-leadership skills activity index was computed only for 2013, as no data had been collected on this topic in 2009. In the following the focus will be on the e-skills activity index; we first mapped the e-skills activity index values against the Networked Readiness Index (NRI)[2] for each of the 27 Member States.

This allows for putting the results of the e-skills policy and activity analysis in the different countries in the wider context of each country's propensity to exploit the opportunities offered by ICT using data which can be obtained from the country values on the Networked Readiness Index (NRI).

The following figure allows a comparison of the results from this exercise for 2009 and 2013. In the graphical illustrations four quadrants are shown which are built by using the European averages on the NRI and those on the e-skills policy activity index for the respective years in order to group the countries into four main clusters.

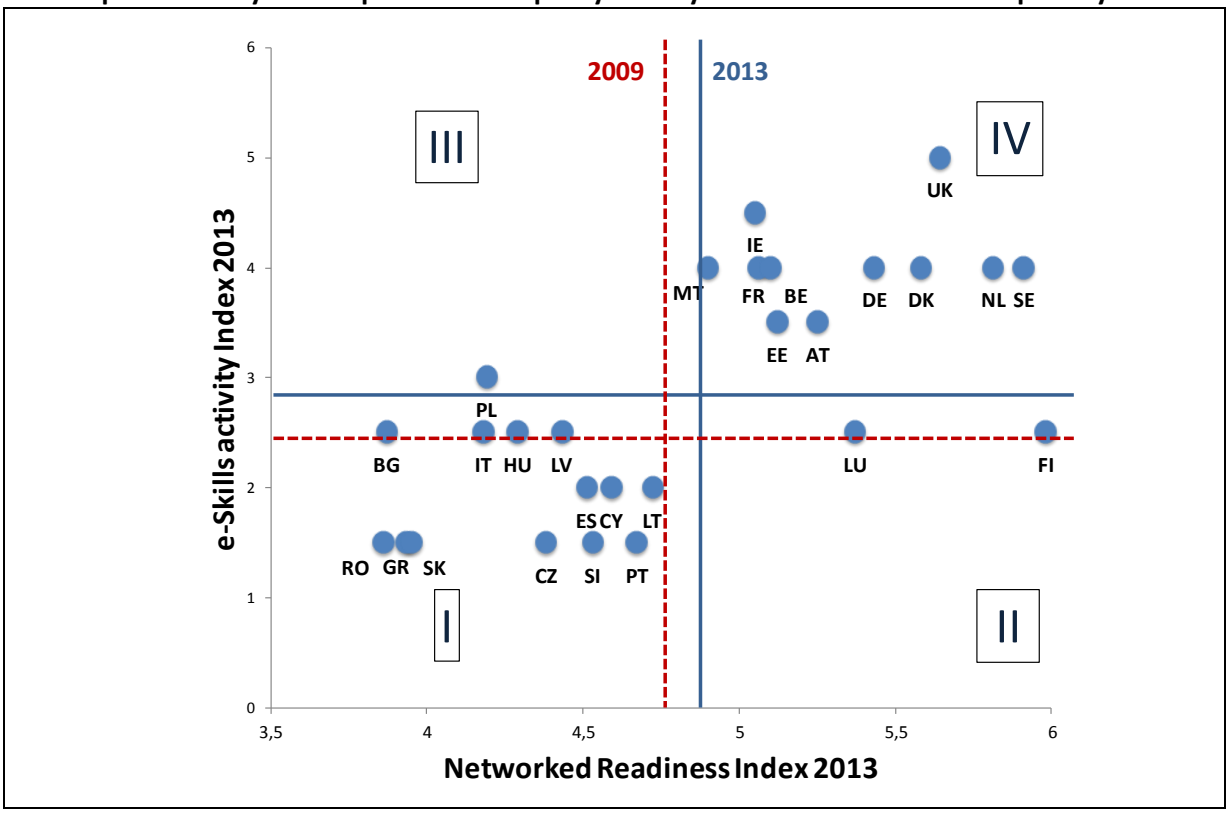
European country landscape on 'e-skills policy activity' versus 'ICT innovation capability' 2009



[1] Hüsing, T. and Korte, W.B. (2010) "Evaluation of the Implementation of the Communication of the European Commission 'e-Skills for the 21st Century'", URL: http://ec.europa.eu/enterprise/sectors/ict/files/reports/eskills21_final_report_en.pdf

[2] The World Economic Forum's Networked Readiness Index (NRI) measures the propensity for countries to exploit the opportunities offered by ICT. It is published annually as part of the Global Information Technology Report. The NRI is a composite of three components: the environment for ICT offered by a given country (market, political and regulatory, infrastructure environment), the readiness of the country's key stakeholders (individuals, businesses, and governments) to use ICT, and finally the usage of ICT amongst these stakeholders. For further information on the NRI see www.weforum.org/issues/global-information-technology.

European country landscape on 'e-skills policy activity' versus 'ICT innovation capability' 2013



Overall and for e-skills related policies and initiatives a strong increase of activity levels over the five-year time span can be identified. The unweighted average e-skills policy index score increased from 2.4 to 2.9 between 2009 and 2013. This is encouraging news.

Our analysis revealed that in 2009 three of the four quadrants are well populated by different countries with only 7 countries belonging to the group of top performers both, in terms of e-skills policy index as well as NRI, and 11 Member States constituting those best described as low activity countries (bottom left quadrant).

Five years later the situation has changed significantly; we are now faced with a situation which can be described as a dichotomy in Europe on these indicators: top performing countries as opposed to countries with low activity levels and NRI performance, with only three countries (Poland, Luxembourg and Finland) in transition phases between these clusters.

The group of top performers has grown from 7 to 11 with Sweden, Denmark, Austria and Estonia entering this cluster to which the United Kingdom, the Netherlands, Belgium, Ireland, Malta, Germany and France already belonged in 2009. However, the group of low activity countries is still substantial in terms of numbers of countries with 13 EU Member States – almost 50% showing a below average performance on the NRI and on the e-skill skills policy activity index.

EU Member States fall into two very distinct groups: 41% of the Member States are top performers, almost 50% are low activity countries, and 11% located between these two clusters.

While the former have been successful on the e-skills front and capable of exploiting ICT to become innovative and more competitive the latter group of low activity countries still has a rather long way to go to achieve both.

A look at the Member States' positions in the NRI ranking (Networked Readiness Index) reveals that again, those countries with high NRI positions also show high e-skills policy activity levels. The countries moving up in terms of migrating into the 'top performers' cluster include Sweden,

Denmark, Austria and Estonia, as well as the Netherlands and France which managed to further increase their e-skills policy activity level.

Countries at the risk of losing ground include Hungary, Latvia and Romania which dropped down into the first cluster of countries, i.e. those lagging behind.

European country clusters on 'e-skills policy activity' versus 'ICT innovation capability' 2013

I : low NRI + Low level of e-skills policy activity	**II : High NRI + low level of e-skills policy activity**
Romania, Greece, Slovakia, Czech Republic, Slovenia, Portugal, Spain, Cyprus, Lithuania, Bulgaria, Italy, Hungary, Latvia	Luxembourg, Finland
III : Low NRI + high level of e-skills policy activity	**IV : High NRI + high level of e-skills policy activity**
Poland	United Kingdom, Ireland, Sweden, Netherlands, Denmark, Germany, Belgium, France, Malta, Austria, Estonia

5 Selected multi-stakeholder partnerships

The following is a list of multi-stakeholder partnerships of major relevance to the e-skills issue:

- **Literacy Plan and digital training for Barcelona 2010-2015**: The main objective of the 5-year programme, overseen by the Barcelona City Council, is to assess the state of the current situation in digital training, evaluate the actions already performed, and define a joint strategy on digital literacy. A training programme for a period of 5 years is to be executed. Special attention is drawn to means for closing existing gaps in IT related skills. Targets include: 12,500 Professionals to be trained in technology to improve their technological skills; 12,000 young people to be given the chance of improving their professional orientation, adding technological competition to their orientation process; 22,000 unemployed people to receive technology training; 1,200 individuals aged 55 years and older to be given the chance to participate in ICT programmes; 30,000 additional citizens to receive training in basic technology. The total budget of the programme is € 6.4 million.
- **Red CEMIT**: Under this initiative (2011-13), 98 ICT centres across Galicia are set up for getting the general population acquainted with new ICTs. A main component of the initiative is training (from ICT practitioners to citizens and employees in the public sector) provided both online and in presence. Free use of "open classrooms" is offered to all stakeholders. Hands-on support is offered by ICT experts. Dissemination and awareness raising activities are conducted as well. The training offer consists of basic training in ICT, ICT for enterprises and entrepreneurs, ICT for the unemployed, e-administration, social networks, operations through the Internet, leisure on the Internet, ICT equipment, image and audio, open software solutions and specific courses upon demand. The total budget of the programme, which represents a multi-stakeholder partnership between enterprises, public administration, civic society associations of women and the elderly etc., is about € 660 million for the whole period (2 years). Achievements so far include 10,000 persons trained in 2011, 38,000 hours of free training offered in 2012, and 30,000 users at the time of writing.
- **"Soy mayor y me gusta navegar"**: Cibervoluntarios, an NGO with more than 1,500 voluntaries, has the mission to bring ICT closer to more than 10,000 persons per year who would otherwise risk staying excluded from the information society. The objective is to teach elderly citizens about how ICTs can be useful in their daily life. This implies going one step beyond providing basic e-skills and showing them that ICTs are fun and can be used on a daily basis for meeting their needs and interests: leisure, doctor, mobile phones, music, videos, potentiality of network, etc. The initiative has started in 2011 and is ongoing.
- **CENATIC- Training with and within free software**: CENATIC is the National Reference Center for free software based ICTs. Its main goal is to assess and disseminate useful applications of free software in the public sector. Besides this, it works as disseminator of complementary services to users of free software. It makes the link between the free software code developed by the Spanish public sector and provides it to the private sector and enterprises, in order to boost the industry of ICTs in Spain. Several services are provided, one of them being the training in the use of ICTs applications and e-skills. The objective is to show the advantages of free software and disseminate the benefits of working in an ICT open community: sharing knowledge and resources, fostering public-private partnerships, raising awareness around ITCs, making a more competitive community and business sector thanks to the use of ICTs. Stakeholders involved include: the Spanish Ministry for Industry, Energy and Tourism; the Regional Governments of Extremadura, Andalucía, Asturias, Aragón, Catalunya, Balearic Islands, Galicia and the Basque Country; and Telefónica.
- **Plan Avanza 2 National Plan (Action area "ICT Training: enterprises")**: One of the main objectives of Plan Avanza 2, the major Spanish information society strategy for the period

2011-15, is to contribute to a paradigm shift in the economics of the country through ICT, based on the observation that spreading the use of ICT can be a means to improve competitiveness and productivity, favour equal opportunities, boost the economy and establish a sustainable model of economic growth. The first stage of Plan Avanza, initiated in 2005, aimed at catching up with EU mainstream, especially regarding IT network coverage and connectivity. Plan Avanza 2 seeks placing Spain on a leading position in terms of development and use of advanced ICT products and services. Plan Avanza 2 focuses on 10 objectives: 1) Promoting innovative ICT processes in the Public Administration, 2) Spreading ICT in healthcare and for the welfare, 3) Modernizing the education and training model through the use of ICT, 4) Spreading telecommunication networks and increasing their capacity, 5) Spreading trustworthy ICT among citizens and enterprises, 6) Increasing the advanced use of ICT solutions among citizens, 7) Spreading the use of ICT business solutions in enterprises, 8) Developing technological skills in the ICT sector, 9) Strengthening the digital content sector and intellectual property rights in the current technological context and within the Spanish and European legal framework, 10) Developing green ICT.

6 Success of e-skills policies and activities in meeting the objectives of the EU e-skills agenda and other relevant European initiatives

The extent to which policies, initiatives and multi-stakeholder partnerships have been successful in helping meet the objectives of the EU e-Skills agenda and other relevant European e-Skills initiatives as seen by national experts is further described below along key actions and action lines of the EU e-Skills strategy and other relevant EU initiatives.

"Longer term cooperation"

The country is making progress in meeting the EU e-skills agenda even though with very slow improvements. In February 2013, the Spanish Government approved the Spanish Digital Agenda, as good starting point to complement other existing measures and improve the skills gaps in the country. Similar to the European PPP forum, CPP-TIC forum has been launched aiming at propel collaboration between the Public and Private Sector (CPP) in the area of Information Technology and Communications (ICT). The crisis and evident need for proving sustainability of ICTs applications and resources are pushing long term cooperation among different actors and stakeholders in Spain. However, according to civil society, these cooperations are still not enough involved at the national level policies. The approach remains closer to the institutional reality rather than to the real needs of the civil society and stakeholders. Things are getting better in the last years, but there is still a lot of work needs be done.

"Human resources investment"

Recently, there has been a huge impulse for adapting ICT careers and simplifying burdens for fostering ICT studies, recognition of qualifications and new studies adapted to real needs. Since the adoption of the Spanish Digital Agenda, bilateral agreements are developed between Universities and the Governments in order to boost this investment and implement measures to foster a real increase of human resources in the field. During the last six months, public funds and incentives are being provided for promoting e-skills in the country.

Also in the curriculum, ICT is considered as a key competence and is covered in all subject areas of the primary and secondary education. The main goal in the primary education is to get familiar and begin to use information and communication technology. While, in the secondary school level of education ICT is encountered as a separate subject ("technology" and/or "computer science"). However, some autonomous communities (as Extremadura or Galicia) have integrated ICT use completely in their education systems, as a key element and not just a separated subject. In these schools, ICT is no longer an external resource but a day-to-day tool. All educational centres are provided with the necessary infrastructures (broad band to all educational centres even in remote rural areas, 1 computer for each one or maximum 2 students, digital blackboards, etc), fostering initiatives which involve parents-teacher-students for learning purposes (digital educational TV linked to the schools and centres, educational platforms, follow-up online of missed courses, SMS when students do not attend classes, etc.) ICT is integrated in all activities and subjects. For achieving this transversal use of ICTs, specific teams and structures are created and digital literacy is included in the curriculum topic as a horizontal subject to be tackled within all general subjects. (i.e., educarex, espazo Abalar)

"Attractiveness of ICT jobs"

ICT jobs and other career opportunities in the related fields are not properly promoted by universities, which do not foster selection of IT jobs by students. In the educational system, approach towards ICTs is too official and there are no specific tools settled for making this fled

more attractive to the users and make them aware of ICT utility and potential. Lack of attractiveness towards these fields of study has negatively influenced in the skills gap and supply does not properly address real market needs. Currently, no direct approach exists for motivating students to learn about open opportunities, market new trends and innovations.

In order to improve the situation, the Spanish Government has presented a plan which aims at fostering the public-private partnerships between universities and private sector. This initiative, together with the above mentioned ones, is believed to foster dissemination of ICT related issues, improve the vision of ICT jobs by the population and help to raise awareness with regards to huge possibilities this field offers.

"Employability and e-inclusion"

Despite recent improvements in the information society, evidence indicates that 30% of the population has never used internet (65% because they don't find it useful and 29% because they don't know how to use it), and most of them are disabled, people with low rates of earnings, elderly, unemployed, or with a low level of studies.

Based on these figures, the Spanish Government considers improvement of the above situation as one of its priorities and has developed a group of measures for this purpose, as part of the e-inclusion strategy for the period 2013-2015. This strategy will be focused in avoiding social exclusion and will be jointly developed with the third sector, in order to assure a real impact in the society. It will target the above mentioned groups and the civil society in general, also accompanied by other global measures such as: e-skills plan or Equal Chances for Men and Women in the Information Society Plan. However, experts of the field are very sceptical about the real achievements of the strategy, as they see it as a 'theoretical inclusive approach than a real one'.

"Lifelong acquisition of e-skills"

Evidence form the last five years indicates for various plans implemented at the national level with the purpose of developing e-skills in the country, such as the Plan Avanza as well as other several agreements between national and regional level. However, despite recent developments and awareness increase, the main problem lies in matching the supply with the demand dynamics for different ICT practitioner skills in line with the real market needs. In order to have a better understanding of the current situation on skills supply and demand, the National ICT professional profiles will be updated as result of a measure to be implemented during 2013. This classification will serve to identify the most demanded ICT profiles, in order to devote funding and resources for lifelong training to the real market needs and help reduce ICT practitioner gap in the country.

Besides many options available for acquiring e-skills on a lifelong learning basis, such as several courses and possibilities based directly on ICTs, quality remains still an issue. However, most of the people take advantage of these offered possibilities and if someone does not so, it's not because he or she does not want to but because he or she can't do it. As nowadays everybody needs these skills on its own daily basis, education becomes an obligation rather than just a right.

"Closing the e-Skills gap"

The high demand for ICT practitioners in Spain is not satisfied by the current skills supply due to non adequate training or specialisation, leading to a lack of ICT practitioners in the country. Most of IT firms in Spain are based in Madrid where around 63% of job offers come from, while 15% are based in Barcelona. Results from a survey indicate that 33% of the interviewed IT candidates (out of 10.000) would not agree to change their residence due to a job position, an indicator this which assesses the flexibility of the workforce in the country.

The most demanded ICT professional profiles in Spain comprise programmer, analyst programmer, consultant, functional analyst and organic / technical analyst, etc., are among. 60% of ICTs job

offers require a specific diploma in the field and one out of each seven firms demands an extra certification (CCNA, CCNP and Microsoft). On the other hand, there is a demand from 25% of firms for JAVA/J2EE developers, followed by .net, Cobol, Hibernate/Spring and Struts. The job market mainly demands for professionals in the areas such as SAP, consulting or J2EE, Oracle, Unix, CICS and DB2 programming, etc., and most common job offers in Spain seek for Java Script, Html, PHO and C/C ++, professionals. In addition, 34.5% of job offers require a previous experience of about 3 and 5 years, while 33% of the companies extend this requirement to 5 and 10 years.

In fact, supply for all the above mentioned skills is very hard to match the ICT professional market needs. The recent trends indicate for a decrease in the ICT graduates rate during the next 2 years (40% less ICT graduates during 2014 relative to the 2007 statistics). Based on evidences, the actual gap between supply and demand for adequate skills results in a high competition at the junior level positions (5.4 candidates for 1 post).

In addressing the e-skills challenge, e-skills promotion and awareness rising as well as modernised pedagogy should need to play a crucial role. Unfortunately there exist no specific qualifications or studies (or at least not recognised) for specialist in SEO/SEM, community manager, game designer, webmaster, social manager, IP law expert, etc. As the first step in attempt to efficiently match supply and demand, existing studies' curricula need to adapt to these new trends, fostering a new framework of qualification to the real market needs. Moreover, these qualifications also need to be linked to the industry, providing for a broader framework which impulses mobility and internationalization.

The National Government is taking various measures in reinforcing the tools for supporting improvements in e-skills gap in the country. However, according to AMETIC, the association of the Spanish Electronics, ICT, Telecommunications and Digital Contents industry, there is still not enough commitment from the National Government for supporting the creation of these jobs and a bottom-up work needs to be done with this regard.

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Annex: data sources

	Source
eSkills21 study: 'e-skills' index 2010	eSkills21 study carried out by empirica. Report available at http://goo.gl/WKV7r
eSkills21 study: 'Digital literacy' index 2010	
EuRA e-skills index	EU-RA 2009: Financial and fiscal incentives for e-Skills: State of play in Europe. Synthesis report. http://www.e-skills-funding.com/images/stories/PDF/synthesisreport.pdf
ICT practitioners in % of total employment 2012	LFS data made available by Eurostat
Digital literacy skills of the population 2009/11:	Eurostat, database "isoc_ski"
• Individuals with high level of computer skills	
• Individuals with high level of Internet skills	
• Individuals using the Internet (last three months)	
Global Competitiveness Index (GCI) 2010/12	The Global Competitiveness Report 2011-2012: http://www.weforum.org/reports/global-competitiveness-report-2011-2012
Networked Readiness Index (NRI) 2010/12	The Global Information Technology Report 2011-2012: www.weforum.org/issues/global-information-technology
• Individual readiness	
• Business readiness	
• Government readiness	
• Individual usage	
• Business usage	
• Government usage	
PISA scores (2009) in:	OECD, http://www.oecd.org/pisa/
• Mathematics	
• Science	
• Reading	

Indicator	Source	Further remarks
ICT practitioner workforce 2012	Eurostat Labour Force Survey. Some imputations and assumptions not in the original data but done by empirica apply	The definition can be looked up in the final report, Gareis et al. 2014: E-SKILLS: MONITORING AND BENCHMARKING POLICIES AND PARTNERSHIPS IN EUROPE.
ICT practitioner workforce 2012 as percent of total workforce		LFS based, number of ICT practitioners / number of workers in all occupations
Assumed excess demand 2012	Empirica, IDC	This is calculated using the percentage of vacancies per existing job and is based on a survey carried out in 2012. As some countries were not covered, several assumptions apply
Forecast excess demand 2015		Forecasts are scenario based and the methodology can be found in the final report (see above). Forecast of demand in the six largest countries (DE, UK, FR, IT, ES, PL) is based on country specific economic scenarios, for the 21 smaller countries only an aggregate scenario was developed and figures allocated according to ICT employment shares.
Forecast excess demand 2020		
Forecast ICT practitioner jobs 2015		
Forecast ICT practitioner jobs 2020		
Workers 2012 - Management,	Based on Eurostat Labour Force	LFS based, definitions can be looked up in the final

business architecture and analysis level	Survey, some definitions and calculation by empirica. Some imputations and assumptions not in the original data but done by empirica apply.	report.
... as percent of total workforce		
Workers 2012 - ICT practitioners, professional level		
... as percent of total workforce		
Workers 2012 - ICT practitioners, technician and associate level		
... as percent of total workforce		
Growth core ICT workforce 2001-2010	Based on Eurostat Labour Force Survey, some definitions and calculation by empirica. Some imputations and assumptions not in the original data but done by empirica apply.	ISCO-88 groups 213 and 312. Due to the break in series in 2010/11 only partly comparable to later data.
Growth core ICT workforce 2008-2010		
Growth core ICT workforce 2011-2012		ISCO-08 groups 25 "ICT professionals", 35 "Information and communications technicians".
Growth broad ICT workforce 2011-2012		Equals the "ICT practitioner workforce"
ISCED 5A/B first degree graduates in Computer Science, 2011	Eurostat, database "educgrad_5"	This figure represents a count of first degrees in ISCED 5A and first qualifications in 5B. See discussion of this indicator in the final report.
... graduates per 1000 population aged 20-24	Eurostat, databases "educ_grad5" and „demo_pjangroup"	Graduates as above. The denominator is used to make data comparable but there is no age restriction in the number of graduates. Some imputations and assumptions may apply.
... graduates 2011 as percent of 2006 (= peak EU)		
Vocational training graduates in Computer Science, 2011	Eurostat, database "educ_grad5"	Number of Computing graduates in Upper secondary education (level 3) - pre-vocational and vocational programme orientation and Post-secondary non-tertiary education (level 4) - pre-vocational and vocational programme orientation. Some imputations and assumptions may apply.