e-SKILLS IN EUROPE

FRANCE

COUNTRY REPORT

JANUARY 2014

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1 Overview

While companies in the ICT sector employ 690,000 people in France, total employment in ICT jobs was 888,000 in 2012. The number of tertiary graduates from the educational system is at about 20,000 at bachelor's level or higher per year. Industry voices from the ICT sector speak of a skills gap of 3,000 master level professionals per year – a gap which has been observed to exist for the past 20 years. Little data are available about shortages of ICT practitioners outside of the ICT sector, but the gap in the non-ICT sector is probably even higher.

The ICT skills gap does not only appear to be a quantitative problem but also a qualitative one. Available evidence suggests that the skills gap varies greatly according to the specific skills required and to local labour market characteristics. For example, there is an unmet demand for mobile technology and cloud computing skills, which is not the case for skills in less advanced technologies. In the same way, some regions have more difficulties than others finding ICT specialists, due possibly to an insufficient educational offer and to lack of attractiveness of their employment market. Finally, the ICT training offer, which focuses on short-term programmes, seems ill adapted to the demand of firms mainly interested in highly-qualified professionals.

National experts comment that tension on the ICT job market is likely to continue due to two major trends: the retirement of the baby boom generation and the appetite of employers for candidates from the "Generation Y", i.e. the age cohort born roughly between the early 1980's and the early 2000's. Nevertheless, the skills gap could be mitigated by factors which work in the opposite direction, especially:

- Changes in the growth rate of the economy: A slowing down economy expresses a smaller demand for qualified workers;
- More (effective) policies and measures that broaden the student basis: A good example of such policies would be the development of apprenticeship and sandwich training which allow students with limited economic possibilities to engage in longer-term education.

Against this background, experts have welcomed the **creation of a ministerial position** dedicated to the Digital Economy, along with the adoption in 2013 of the **Roadmap on Digital Policy** which sets a number of clear priorities. These are considered positive signs of the government's awareness and involvement in the digital challenge.

Nevertheless, some observers note that implementation of this ambitious programme will be challenging. Industry voices deplore that the French government had shown little interest, up to now, for the European e-Skills Agenda. They also underline that promoting a digital economy was a long term endeavour which would not match the legislative cycle.

Over the last 10 years, there are clear indications of positive developments, for instance:

- There has been a major extension of digital training in engineering schools.
- Business schools have partned with engineering schools and can now offer dual trainings.
- Development of the apprenticeship system in the digital sector is making good progress, although lack of funding remains an issue.
- ICT sector firms have played a role in this training effort, dedicating much more than legally requested to help their employees raise their competencies through continuing education.[1]
- More focused immigration policies have resulted in students and young ICT professionals from Northern Africa and Eastern Europe being attracted to France.

[1] According to the latest available data, ICT sector firms dedicate 3 to 4% of their gross payroll to continuing education, compared to a legal obligation of 1.5% for firms with 10-19 employees and 1.6% for firms with 20 or more employees.

- Finally, in recent years the information systems topic seems to have left the IT Departments and started to diffuse into in business or administrative departments. New concepts such as Information System Human Resources and Information Systems Purchase Activities have emerged. Today, Digital Business Directors tend to be former Marketing Directors rather than IT Directors, and business school students show an enhanced interest in ICT related skills.

Of course there have been negative developments as well. These include:

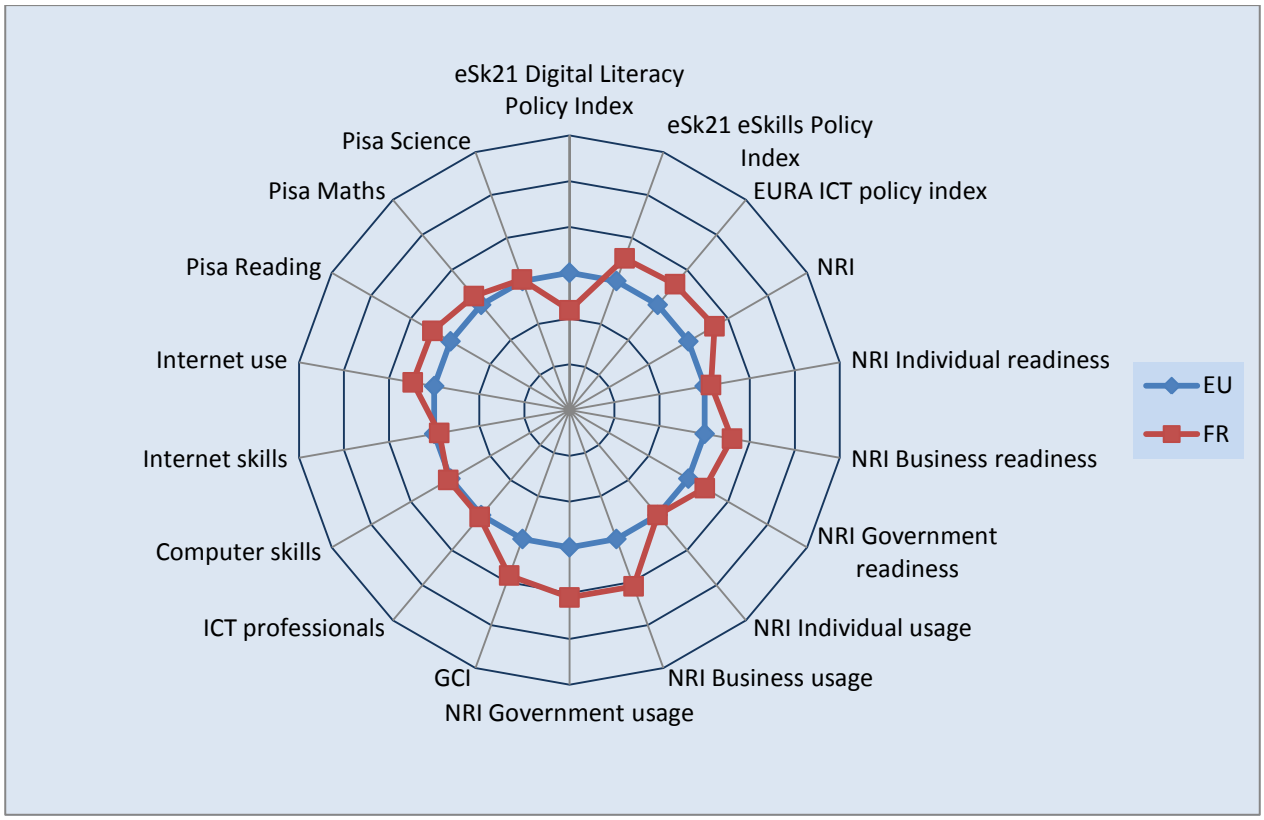
- Lack of investment in ICT training of all types and across all education levels.
- Lack of coordination between actors, especially on the governmental side.
- A tendency in the business sector, during an economic downturn such as the current one, to favour short-term training over longer-term investments in competence-building, in spite of the fact that firms are looking for highly trained specialists. Under these conditions, the skills gap might be difficult to close.

New challenges that have emerged in recent years include the rapid spread of new technologies which ICT practitioners need to master and the necessity to improve the attractiveness of the sector. Technologies are rapidly evolving in the ICT sector, and staying in touch with the latest technological developments is a challenge in itself. What is more, new technologies often do not replace old ones but add to them. People working in the ICT and digital sectors thus have to master both older and new technologies, and anticipate on coming ones.

In this context and with the development of big data, experts foresee a need for competencies in architecture. Efforts will have to be made to attract new recruits, especially amongst the youth. the terminology used to describe jobs in the sector is changing and not always well understood. People might have a sense of what “internet” or “web jobs” are but seem puzzled by the concept of information systems or business intelligence. Imagining the job opportunities offered by a digitized economy is particularly difficult for older generations, and schools cannot rely on parents to speak in favour of digital careers. Surprisingly, younger generations also appear to have difficulties imagining opportunities and fully grasp the value of specializing in ICT.

2 Indicators on innovation, competitiveness and ICT skills

France						
	Score 2009/2010	Rank 2009/2010	Score 2011/2012	EU27 Rank 2011/2012	Change (Rank)	Comment
eSkills21 study: 'e-skills' index 2010	**3**	**9**				Max.: 5.0
eSkills21 study: 'Digital literacy' index 2010	**2**	**20**				Max.: 9.0
EuRA e-skills index	**3.9**	**9**				Max.: 5.0
ICT practitioners in % of total employment 2012			**3.44%**	**11**		EU average: 3.43%
Digital literacy skills of the population 2009/11:						
• Individuals with high level of computer skills	**30%**	**5**	**29%**	**12**		EU average: 28.52%
• Individuals with high level of Internet skills	**12%**	**6**	**13%**	**11**		EU average: 13.67%
• Individuals using the Internet (last three months)	**69%**	**12**	**78%**	**11**		EU average: 71.33%
Global Competitiveness Index (GCI) 2010/12	**5.1**	**7**	**5.14**	**8**		Max.: 5.61 EU median: 4.52
Networked Readiness Index (NRI) 2010/12	**5.2**	**8**	**4.92**	**8**		Max.: 5.6. EU median: 4.5
• Individual readiness	**6.11**	**6**	**5.12**	**12**		
• Business readiness	**5.51**	**9**	**4.89**	**9**		
• Government readiness	**5.03**	**8**	**4.59**	**11**		
• Individual usage	**4.13**	**11**	**5.01**	**11**		
• Business usage	**5.65**	**7**	**4.43**	**4**		
• Government usage	**5.03**	**8**	**4.92**	**5**		
PISA scores (2009) in:						
• Mathematics	**497**	**8**				EU median: 493
• Science	**498**	**13**				EU median: 498
• Reading	**496**	**8**				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
FR

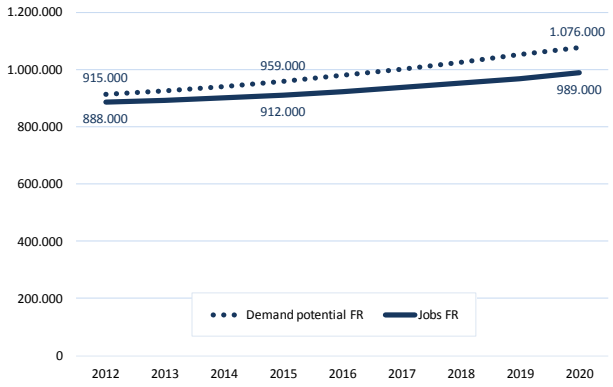
3 E-skills demand and supply forecasts 2012 – 2015 - 2020

France			
	FR	Rank EU27	EU27
ICT practitioner workforce 2012	888,000	3	7,403,000
ICT practitioner workforce 2012 as percent of total workforce	3.4%	11	3.4%
Assumed excess demand 2012	27,000	3	274,000
Forecast excess demand 2015	47,000	4	509,000
Forecast excess demand 2020	87,000	4	913,000
Forecast ICT practitioner jobs 2015	912,000	3	7,503,000
Forecast ICT practitioner jobs 2020	989,000	3	7,950,000
Workers 2012 - Management, business architecture and analysis level	130,000	3	1,477,000
... as percent of total workforce	0.5%	16	0.7%
Workers 2012 - ICT practitioners, professional level	365,000	3	3,393,000
... as percent of total workforce	1.4%	14	1.6%
Workers 2012 - ICT practitioners, technician and associate level	393,000	2	2,532,000
... as percent of total workforce	1.5%	6	1.2%
Growth core ICT workforce 2001-2010	1.5%	23	3.0%
Growth core ICT workforce 2008-2010	2.9%	10	2.6%
Growth core ICT workforce 2011-2012	-0.5%	22	3.9%
Growth broad ICT workforce 2011-2012	2.5%	17	1.8%
ISCED 5A/B first degree graduates in Computer Science, 2011	20,431	1	113,000
... graduates per 1000 population aged 20-24	5.1	2	3.6
... graduates 2011 as percent of 2006 (= peak EU)	104%	10	88%
Vocational training graduates in Computer Science, 2011	158	16	67,000

Sources and notes: see annex.

ICT workforce: Demand and Jobs in France 2012-2020

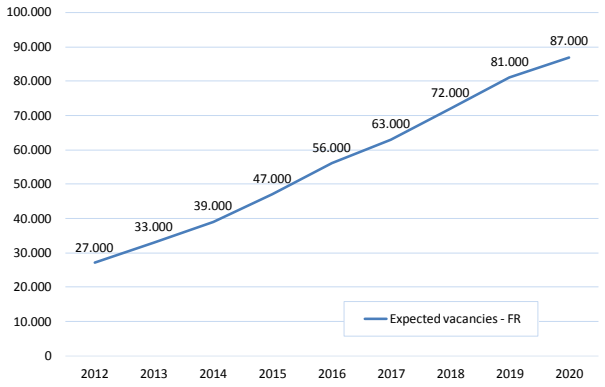
(Main Forecast Scenario)



Source: empirica 2013

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

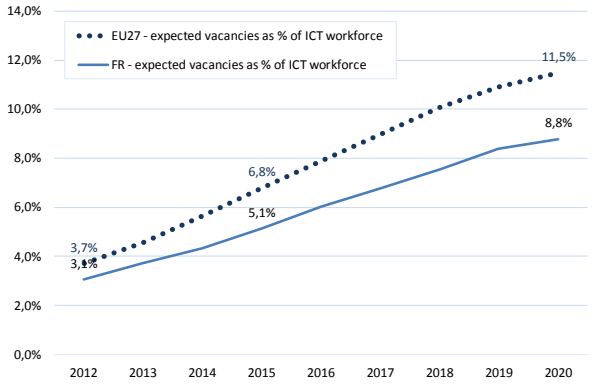
(Main Forecast Scenario)



Source: empirica 2013

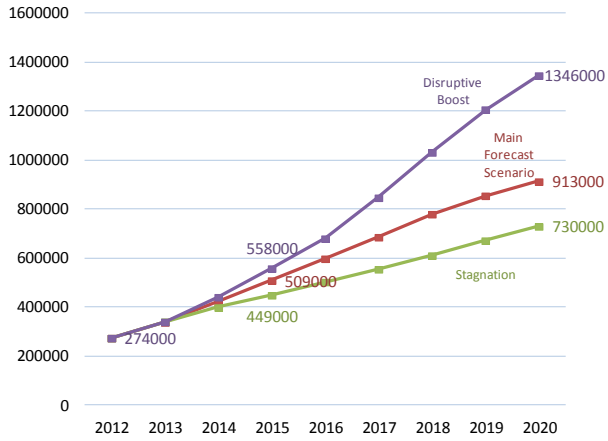
Potential vacancies as percent of ICT workforce France 2012-2020

(Main Forecast Scenario)



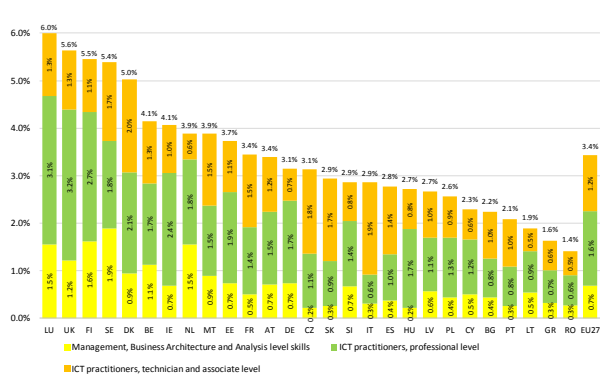
Source: empirica 2013

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



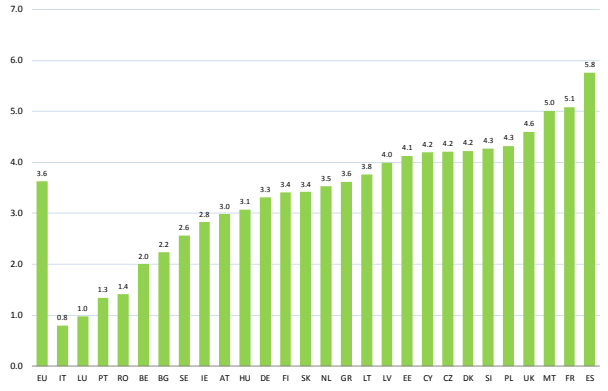
Source: empirica 2013

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 France, responsibility for digital policy is shared between four ministries: the **Ministry of Education**, the **Ministry of Higher Education and Research**, the **Ministry of Economy** and the **Ministry of Labour and Employment**. The Ministry of Economy seems to have taken the lead in coordinating efforts in this area, with the creation, in 2003, of the **Delegation for Uses of the Internet** (DUI) and, later in the 2000s, of a **Secretariat dedicated to the digital economy**[2] whose Head was promoted to Minister in 2012.

Created in 2003, the Delegation for Uses of the Internet (DUI) has been a major public player in fostering **digital literacy**. As announced by its tag line "Internet for everyone and Internet for tomorrow", the DUI designs and coordinates policy measures to increase access to digital technologies but also to help digital firms adapt to the evolutions in ICT. The Delegation works in cooperation with local governments, associations and the business sector.

Most of the programmes initiated or supported by DUI focus on e-literacy and on fighting e-exclusion and the digital divide through access to infrastructure on the one hand and training and advice on the other hand. One of the most successful initiatives championed by the Delegation is the **NetPublic programme for Digital Public Spaces** (EPN), granting internet and multimedia access and advice to the general public. So far, over 5,000 EPNs have been created throughout the country and located in the premises of public services or associations. The DUI participates in the promotion and improvement of these spaces through the training of its personnel and the provision of common tools such as a GPS directory or an **Internet and Multimedia Passport**[3] (PIM). This PIM is a true e-literacy training tool that allows people to experiment and assimilate ICT and the main uses of the internet. Although it does not give access to a professional certificate, it also is an evaluation tool which certifies the ability to use digital equipment and basic services. The **programme "Ordi 2.0"** is yet another way to fight against the digital divide. It organizes the collection, refurbishing and re-distribution of ICT appliances to people in need through a dedicated website, 150 partner firms and 12 regional centres. **Netemploi** gathers information and resources to help the Unemployed use the Internet in their job search. Finally, in the line of the European programme "Safer Internet", the DUI has developed a website called **Internet Without Fear**, which promotes the good and safe uses of Internet for children, teenagers, parents and educators.

Only one initiative of the DUI directly focuses on **ICT practitioner skills**: the **Portal of Internet Jobs** (see the description in the next section).

More recently, in an effort to clarify the country's digital policy and make it more effective, Fleur Pellerin, Minister of Digital Economy, presented a **Roadmap on Digital Policy**[4], which was adopted by the Government in February 2013. This roadmap defines the Government's vision and priorities, reinforces its commitment to the European Digital Agenda and asserts its ambition to play a leading role in the definition of "an ambitious European digital policy". It is to be translated by each Ministry into concrete measures which will be monitored by an annual inter-ministerial meeting. Wishing to work with the other actors of the sector, the Government also created, on 18 January 2013, a new **National Digital Counsel** (Conseil National du Numérique) to be consulted for advice on its digital policy.

In the **Roadmap on Digital Policy** the Government defines three pillars: (1) opening opportunities for the youth, (2) reinforcing the competitiveness of firms and (3) promoting values.

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2 Secrétariat d'état de la prospective et du développement de l'économie

3 Passeport Internet et Multimédia

4 Feuille de route du Gouvernement sur le numérique, Office of the Prime Minister, 28 February 2013

The Roadmap's **first pillar: Opening Opportunities for the Youth** is particularly relevant to e-skills. On the one hand, it stresses promotion of e-literacy throughout the educational system, for pupils, students, teachers and professors, as well as development of an online educational offer. Curricula for the 11th and 12th grades have already been amended, with the "Terminale S" section now including an option "science du numérique" which introduces students to ICT user skills; about 1,500 teachers have received training to deliver theory and basics concepts of ICT. On the other hand, the Roadmap's first pillar promotes the attractiveness of digital jobs and their educational offer.

Digital technology will be a key aspect of the re-foundation of primary and secondary education framed by the **School Orientation and Programming Law** to be discussed in Parliament in 2013. This law should include the promotion of e-literacy amongst pupils, the training of teachers (150,000 over two years) to the pedagogical uses of ICT, the possibility for all final year of A level pupils[5] to choose a specialization in ICT and digital Sciences and finally the provision of very high speed broadband to schools through a support to local governments. At the tertiary level, the **"France digital universities" project**[6] aims at creating an online training offer. It should be launched before the summer 2013 and could benefit from a dedicated fund by the General Commissariat for Investment[7] and the Caisse des dépôts.

Besides these general measures, the government also works directly at promoting the attractiveness of digital jobs to meet the demand of firms in this sector. In the line of the European Grand Coalition for Digital Jobs, the Minister for Higher Education and Research[8] is working on an **action plan to direct more youth towards the digital jobs** needed in the ICT sector. This action plan should be presented in September 2013. Furthermore, **a prospective survey contract** should be signed in 2013 between Syntec Numérique and the Ministry of Labour to promote the emergence, the recognition and the training to the new jobs in the ICT sector. With these two measures, the Government aims to raise the number of young graduates trained for digital jobs by 3,000 per year. Other measures have been designed to attract and train youth with low or no qualification. For example, the Government is building **partnerships with schools and firms** to offer struggling students and dropouts the possibility, through tailored programmes, to train for specific digital jobs, such as web developer, archivist or digitalization operator. 2,000 so-called **"Jobs for the future"**[9] will also be offered in the Public Digital Spaces (EPN) to help their users. The people hired will be able to develop digital skills through their job and associated training. Each one of them will be followed by two sponsors from the EPN sponsor and a local firm. The current facilitators will be helped to move upwards. The Government is currently discussing with ICT unions and associations on the possibility to extend this programme to the business sector, including home and personal services[10].

The Roadmap's **second pillar: Reinforcing the Competitiveness of Firms** does not relate to e-skills directly, but some of the measures programmed are very relevant for the present study. These include the creation of **"digital neighbourhoods"** in 15 cities to gather, in one geographical space, institutions of higher education, training for dropouts, research, business incubators, innovation centres of big firms, co-working spaces, and so forth. These neighbourhoods will benefit from a programme of excellence to identify and support digital firms with a strong international potential. They will also be represented abroad in the main places of digital innovation by "French Digital

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5 Terminale

6 "France Universités numériques"

7 Commissariat Général à l'Investissement

8 Geneviève Fioraso, Ministre de l'Enseignement Supérieur et de la Recherche

9 The "emplois d'avenir" are jobs sponsored by the Government (75% of the minimum wage) in the non-business sector to give under-qualified or unqualified youth the opportunity to get their first job or acquire skills to get better jobs. They are full-time jobs with long-term contracts or short-term ones from one to three years

10 Services numériques à la personne

Houses". The Government has also identified **five strategic technologies for future digital services**, which will benefit from public subsidies and tax breaks.

The Roadmap's **third pillar: Promoting Values** includes measure relevant to the development of digital literacy, including **development of vocational training in ICT** through a systematic offer of certificates such as the C2i (see description in next section).

Other **public sector initiatives** of interest include the following:

- In the area of **ICT user skills**, the Ministry of Education offers a certification programme, called B2i, to encourage pupils from all three levels of French school (primary school, college and high school) to keep training their ICT skills. The National Handcraft and Trade Conservatory has developed a similar programme for adults called C2i. This programme offers training and certification in both basic and professional e-skills for different careers.
- In the area of **ICT practitioner skills**, governmental initiatives mainly address vocational training and awareness building. Working as an operator for the Ministry of Labour and Employment, the **National Agency for Vocational Training (AFPA)** offers eight certified vocational training programmes in ICT, ranging from secondary school to master level. These trainings mainly target jobseekers, and, more marginally, people benefitting from a subsidised individual leave for training (CIF). Interestingly enough, AFPA has concluded partnerships with two main ICT business players, CISCO and Microsoft, and now participates to the CISCO Networking Academy and the Microsoft Dynamics Academic Alliance. These partnerships have helped AFPA lower substantially their hardware and software costs and gave them access to state-of-the-art e-learning material which is used to enrich their academic offer. Furthermore, some of the AFPA trainings, such as level three "ICT and Telecom Higher network technician" (A level +2 years), can be bridged to higher level CISCO training programmes. Apart from this certified training offer, AFPA includes ICT in its 25 core horizontal competency portfolio to describe the level required by trainings and the skills gap of applicants.
- Besides this, several public sector institutions[11] have developed awareness-building activities about professional e-skills either for students and job seekers or for workers looking for conversion.

As far as initiatives of **other key national stakeholders** are concerned, there are only three organisations of the non-governmental sector in France that seem to be working within the European e-skills framework: **CIGREF**, a network of large firms promoting "digital culture"; **Syntec Numérique**, the first professional union of the ICT sector; and **Pasc@line**, an association which promotes dialogue between academia and ICT business (see description in next section). These three organisations frequently engage in common projects in the e-skills domain

Created in 1970, **CIGREF** is a network of large firms whose objective is to "promote the digital culture as a source of innovation and performance". In 2013, it gathered over 130 members, including some of France's major business players, such as Danone, Axa or Sanofi-Aventis. The network's main objectives are: a) to voice the challenges, opportunities, limitations and risks brought about by Information systems as perceived by their users, as opposed to their producers; b) to highlight Information system jobs, including by sharing best practises; c) to provide a long-term vision on the impact of ICT on firms, the economy and society. CIGREF has launched several educational initiatives worth mentioning. In collaboration with Grenoble Business School, CIGREF created, in 2004, the School for Information System Management (EMSI) to train future digital leaders. CIGREF partnered with the Paris Dauphine University, to create, in 2005, a Master on Information System Management (MSI). This four month training course, which is aimed at CIO's

[11] National Conservatory of Arts and Crafts (www.cnam.fr) , Cité des métiers (www.cite-sciences.fr), Office national d'information sur les études et les professions (www.onisep.fr) Observatoire de l'emploi, des métiers ét des compétences du Centre national de la fonction publique territoriale (http://www.observatoire.cnfpt.fr)

teams, delivers a diploma which is not recognized by the State. CIGREF frequently collaborates with The Advanced Business School of Paris (HEC) since 2001, particularly within two Master's programmes: the Master on International Risks and the Master on Information System and Technology Management created in collaboration with Mines Paris Tech. CIGREF was responsible for the **IT Job Profiles Nomenclature** project which had the objective "to respond to a need to clarify the management of human resources in ICT work". The Nomenclature provided a tool to help CIGREF companies to build their own HR reference arrangements. The Nomenclature, establsihed in 1991, has since then been updated every 2-3 years The latest version (from 2012) includes the competence descriptions from European e-Competence Framework (e-CF). Finally, CIGREF is currently working in collaboration with the National Conservatory of Arts and Crafts, to create an Institute for the Digital Transformation of Firms (ITNE), which would help train firms' Chief Digital Officers and their teams. CIGREF plays a leading role in spreading the work of the European Commission on e-skills amongst French firms. Interestingly enough, as all CIGREF member firms have switched to using the European e-skills framework, CIGEF is the single one organisation which has converted most users to the framework in Europe.

The **Syntec Numérique** is the first professional union of the ICT sector, representing 80% of its turnover and 364,000 jobs. Syntec serves the interests of three of the five branches of the digital economy – ICT service companies, software publishers and online firms – and has developed partnerships with the two other branches – Telecom suppliers and operators and digital machine makers. The Union is in charge of the "Syntec" collective agreement and is involved in training, apprenticeship and employment policy. Syntec has carried out several projects on e-skills. For example, the 2007 awareness campaign, called "Changers of the World", invited young people to participate in a manga inspired game on its dedicated website which made them discover digital jobs and offered them the possibility to win an internship in one of the Syntec' member firms. In 2013, Syntec has launched another awareness campaign, called "The S'Nums" targeting teenagers from 15 to 18 years old through a web series, a Facebook page, an interactive quiz and a social game. More recently, the Union has started to work on e-skills and e-leadership as well as on women in the digital sector through a dedicated commission, the Women of the Digital Sector Commission (**Femmes du Numérique**), set up in cooperation with major companies from the ICT sector. The Commission's mission is three-fold: to promote equal opportunities for women and men in the ICT sector; to provide SMEs with tools for helping them establish gender equality in their organisations; and to enhance the attractiveness of the ICT profession, especially among girls and young women who know little of the careers on offer. See next section for a description.

Besides these three major players, the **French Association for Standardization Group (AFNOR)** plays a central, yet little known role in articulating the European Digital Agenda with national authorities. It has identified e-skills as a key topic for the future and is engaged in raising awareness through its extensive network, including in national and local governments and chambers of commerce and industry. Through the **European Committee for Standardization (CEN)**, AFNOR has been actively engaged in developing and promoting the **European eCompetence Framework (e-CF)**. AFNOR coordinates the CEN workshop dedicated to this topic. The work on e-skills is well advanced as CEN is about to publish the third version of the e-CF at the end of 2013.

Most **education providers** offer information on digital jobs and careers, contributing to the awareness building on the digital sector. **INRIA** is a public research body established in 1967, the only one in France which is fully dedicated to computational sciences. Its role is to creatively integrate basic research with applied research with a view to solving real-world problems, for which it collaborates closely with the main players in public and private research in France as well as innovative companies including partners Alcatel-Lucent, EDF R&D , France Telecom / Orange Labs, STMicroelectronics; Bull and Andra. INRIA is engaged in awareness raising activities including the Computer Beaver Contest (Concours Castor informatique) which seeks to introduce computer technology and digital sciences to children in four age ranges between 11 and 18 years (part of the

Bebras Contest international network). **Supinfo**, which seeks to become the state-of-the-art institution in ICT university-level education, launched in 2009 an Internet portal on digital and computer jobs[12], including detailed training curricula, professional profiles and job matching orientations. The **Conference of Higher Education Schools** (CGE)[13] is potentially an interesting source of information on e-leadership training, as many of its members try to combine business and ICT curricula. CGE has developed quality labels for the trainings provided by its members. Nevertheless, it is to be underlined that each education provider uses its own definition of skills and jobs (which does not improve the clarity of the offer) and first looks for their own interest – attract students to their institution – which could explain the little interest they show in adopting reference definitions, such as the e-skills framework[14].

A highly publicised private initiative in 2013 was the creation of a new digital school called **"École 42"** from the personal funds of **Xavier Niel**, founder of the French Internet service provider Iliad trading under the Free brand, see description in the next section.

Several **think tanks**, such as Digital rebirth[15] and Montaigne Institute[16], are involved in a reflexion on the impact of the digital revolution on the French economy and society. Digital rebirth[17] has published several reports on the development of digital technology in France, such as the "Digital balance of France and its region"[18] or on the importance of this topic in the 2012 presidential campaign. Interestingly enough, this think tank also engages in an intensive lobbying activity to raise awareness on the importance of the digital agenda amongst policy makers and business leaders. For example, in 2011, Digital rebirth started a campaign to raise the awareness of members of the parliament, through 577 volunteer digital Ambassadors, one per election district. Members of parliament and volunteer ambassadors gathered in 2012 to exchange views later reflected in a report. Digital rebirth considers that its activity has resulted in some of the recent major advances in the Government's digital policy, such as the creation of a dedicated ministerial position. In spite of being a public institution, The Technology Academy[19] plays a similar role of informing Society, and the government, on the best uses of technology. As for the Montaigne Institute, it is currently working on e-leadership, in collaboration with Pasc@line and CIGREF. Other sources of information on e-skills and jobs are professional associations, such as the Association for the Employment of Executives (APEC), which has recently published an interesting paper on emerging jobs[20], or the Observatory of the Evolution of Insurance Professions.

On the **non-profit** side, the association CRéATIF gathers a series of local associations which implemented concrete actions in the area of public access and training in digital literacy.

Finally, it should be underlined that specific initiatives have been developed to improve women's representation in the digital sector, such as the associations "Women engineers" and "Digital women". The campaign "You'll be an engineer, my daughter" was launched in 2010 by Pasc@line and Elles Bougent to improve the attractiveness of engineering careers for women.

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[12] Métiers du numérique http://www.metiers-du-numerique.fr/fr/Default.aspx

[13] Conférence des Grandes Ecoles http://www.cge.asso.fr/

[14] Source: Interview with Christian Colmant, General Delegate of the Pasc@line Association carried out on 19 April 2013.

[15] Renaissance numérique http://www.renaissancenumerique.org/

[16] L'Institut Montaigne http://www.institutmontaigne.org/site/page.php

[17] Created in 2005, Digital Rebith gathers over 70 members, including 12 Research professors and 60 digital entrepreneurs

[18] Bilan numérique de la France et de ses régions (2011)

[19] Académie des technologies was created in 2000 http://www.academie-technologies.fr

[20] APEC, *Les métiers en émergence*, Hors série les référentiels des métiers cadres, 2013

Summary Assessment of French e-Skills Activities: ●●●●

Until adoption of the Roadmap on Digital Policy in 2013, France was lacking policy leadership in the e-skills domain, apart from activities for promotion and awareness raising and those focusing on certification, the VET system and the European e-competence framework. The situation is expected to improve considerably now, also because of the strong engagement of the non-governmental sector (Pasc@line, CIGREF and Syntec Numérique) and innovative initiatives from business leaders (École 42).

Summary Assessment of French Digital Literacy Activities: ●●●

French Digital Literacy Activities include training measures of the workforce and promotion measures as well as measures regarding ICT equipment kits and Public Access Points (NetPublic programme for Digital Public Spaces).

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

The need to enable the education system to provide e-leadership skills is acknowledged by more and more key stakeholders, and some education providers are running or developing course programmes in the area. The Digital Policy Roadmap calls for support to digital entrepreneurship under its Second Pillar ("Reinforcing the Competitiveness of Firms").

Like in the precursor study[21] 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)[22] for each of the 27 Member States.

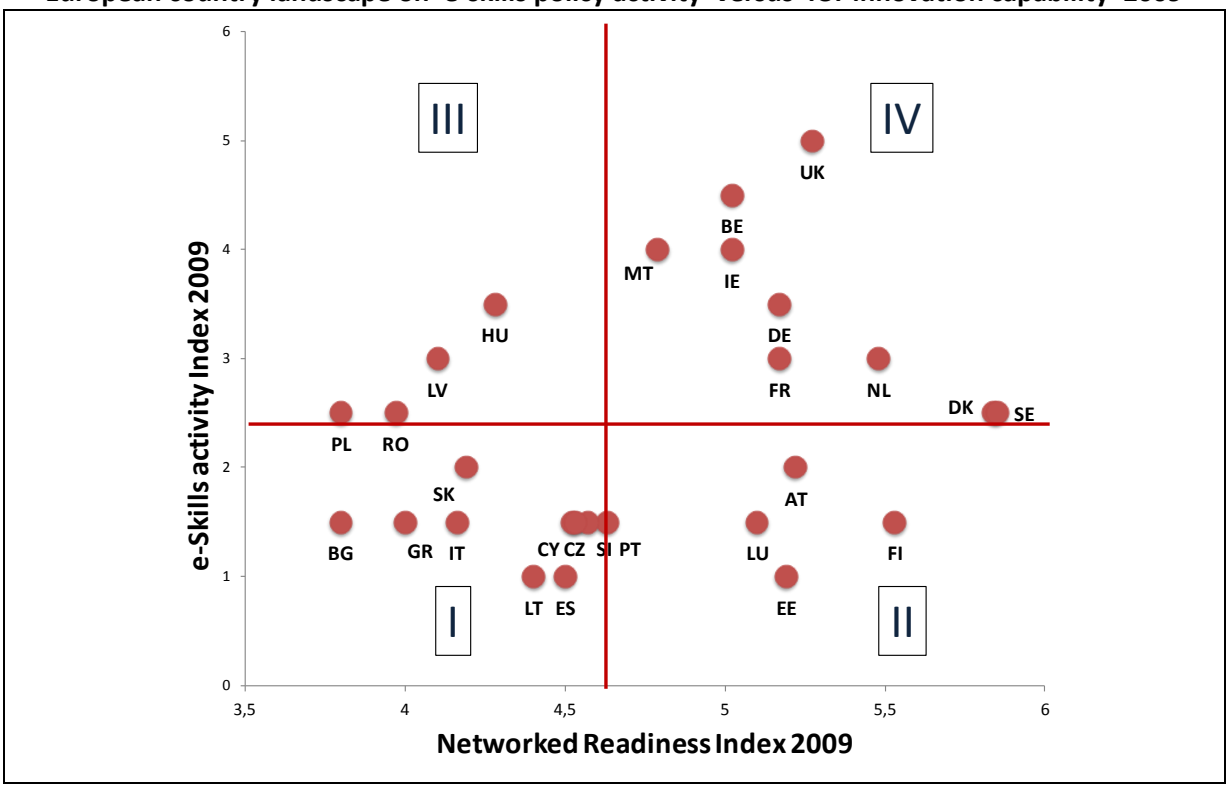
This allows for putting the results of the e-skills policy and activity analysis in the different countries in the wider context of each country's propensity to exploit the opportunities offered by ICT using data which can be obtained from the country values on the Networked Readiness Index (NRI).

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.

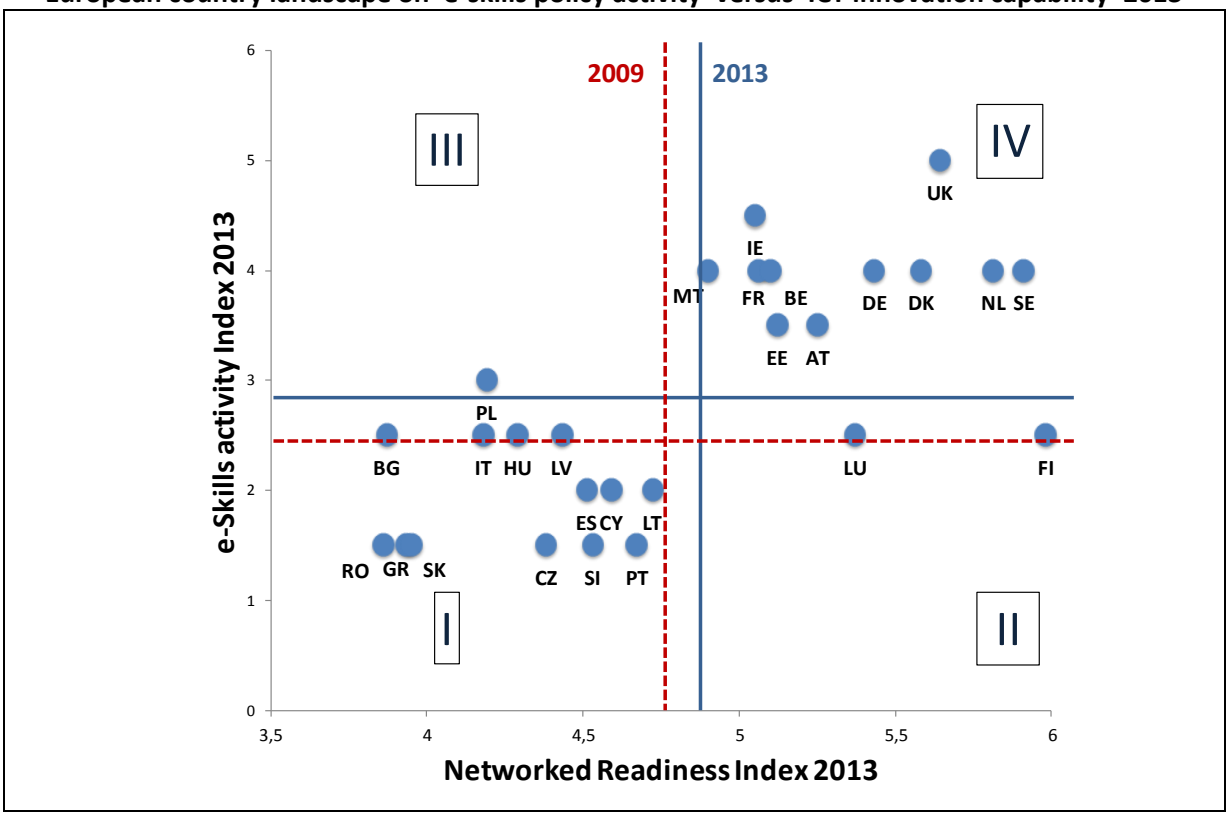
[21] Hüsing, T. and Korte, W.B. (2010) "Evaluation of the Implementation of the Communication of the European Commission 'e-Skills for the 21st Century'", URL: http://ec.europa.eu/enterprise/sectors/ict/files/reports/eskills21_final_report_en.pdf

[22] 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' 2009



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:

- **C2i – certificate**: This initiative by the Conservatoire National des Arts et Métiers started in 2006 and is still ongoing. The certificate demonstrates competence in computer skills and networks. It is established for the purpose of developing, strengthening and validating mastery of ICT by training students in institutions of higher education. It is scheduled for two levels: a) Level 1 requirement applicable to all students and trainees from training. This first level must be acquired later than the degree level but preferably at the beginning of graduate studies. It will eventually be payable at the entrance to the IUFM. b) Level 2 subject to higher requirements along the lines of professional training provided through pre-professional courses and routes. This second level should be acquired at the Master 2. C2i Level 2 encompasses the: 1) C2i level 2 "Teacher"; 2) C2i level 2 "Trades of law"; 3) C2i level 2 "Health Professions"; 4) C2i level 2 "Engineering Jobs"; 5) C2i level 2 "Environmental Careers and sustainable development" is being developed. The total number of participants has risen from 6,150 in 2006 to 18,300 in 2009. In 2006 53% of the participants have passed their exams and obtained the C2i – in 2009, 69% of all participants were handed out the certificate (in total: 12,600). Even though there is a positive trend for the past three years, the numbers have declined from 2008 to 2009.
- **Portal of Internet Jobs**: The portal targets individuals interested in a career in Internet related fields, be them students looking for initial training or adults looking for vocational tanning. The Internet sector is constantly creating new jobs to serve the development of technology, services and uses of the web. The Portal of Internet Jobs aims to help the actors of the Internet – firms, students and jobseekers alike – to understand these new jobs and acquire the competencies they need. In particular, the Portal seeks to contribute to: Counselling of youth looking for an initial training and adults looking for vocational training; Description of digital skills required by firms; Definition of training programs (both public and private). The portal is a public initiative led by the Delegation for Internet Uses (DUI), in partnership with the School of Higher Studies in Information and Communication Science (CELSA), responsible for job descriptions, and the National Information Office for Training and Professions (ONISEP), responsible for the training offers. Initially, 14 other public and private organisations participated in the creation of the Portal, mainly associations, schools and Unions. The portal lists and presents job offers and the trainings that lead to them. It offers six main entries: Jobs from A to Z, News on Internet Jobs, Trainings, News on trainings, portraits and testimonies. Jobs are regrouped in 7 families, and each job is described by a spec sheet specifying its missions, scope, tasks and required competencies and trainings. The job list is thus linked to the training list. The Portal is also present on social media with a Facebook page and a Twitter feed.
- **Pasc@line Association [selected as Good Practice]**: The association was set up in 2006 as a multi-stakeholder partnership between over 75 higher education institutions – mainly engineering and management schools – and over 1,200 companies plus two sector-specific trade unions (Syntec Numérique and CICF Informatique) with the goal to promote dialogue between academia and the ICT business sector. Pasc@line works in collaboration with the Ministry of Education, the Ministry of Higher Education, INRIA and other public institutions. The association openly refers to the European e-skills framework and wishes to strengthen its collaboration with the European Commission. Most objectives of the association seek to promote the attractiveness of ICT jobs amongst the youth in order to: raise numbers of ICT graduates; help develop high standards for ICT in secondary and higher education; and ultimately to promote ICT as a growth driver for the national economy. Completed projects include a reflection and campaign on competencies in higher education institutions, very much

inspired by the works of the European Commission, and an information campaign “You’ll be an engineer, my daughter !”, to entice girls to choose engineering education and careers. In 2013 the association prioritizes the following three projects: (a) development of “ISN” course, i.e. ICT as an optional subject for final A level pupils (in cooperation with Ministry of Education and the National Institute for ICT and Automation Research); (b) Master level "Sandwich courses" and (c) e-leadership. The association also advocates for an extension of sandwich training to master’s level. Finally, Pasc@line is carrying out research on e-Leadership through its Observatory and wishes to develop its collaboration with the main actors on this topic: the European Commission, CIGREF and the Montaigne Institute.

- **Commission Femmes du Numérique**: The "Women of the Digital Sector Commission" aims to improve the attractiveness of digital jobs for young women and to promote gender equality in the ICT sector. It has been set up by **Syntec Numérique**, the main trade union of the ICT sector in France, in cooperation with a number of leading ICT companies operating in the country, including Altran, IBM, Lefèbvre, Oracle and SAP. The Commission builds on the success of earlier initiatives of Syntec in the area, such as an awareness campaign in 2007 called “changers of the world”, which invited young people to participate in a manga inspired online game, in the process making them discover career options in the digital sector and combined with the offer of internship in one of the Syntec's member firms. The Commission has carried out empirical studies of the role of women in the French ICT sector; published a range of guides to the different target groups (e.g. young women; decision-makers in businesses, especially SMEs), and works with "role models", i.e. women who share their experience of successfully following an ICT career path.
- **École "42"**: A highly publicised private initiative in 2013 was the creation of a new digital school called "42”. This school was created on personal funds by Xavier Niel, founder of the French Internet service provider Iliad trading under the Free brand, France’s second-largest ISP, in collaboration with former collaborators of well established digital schools. It targets young people with little to no qualifications, and offers 1,000 of them a three year training programme in digital jobs, using state-of-the-art methods, free of charge. This initiative caused a stir, particularly in the academic field where it was described by some as a pure marketing operation. Others argue that, with this school, Mr. Niel tries to train cheap digital workers for his companies, the main issue being that the Diploma of ”42” won’t be recognized by the State.

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"

Long-term cooperation between the three main non-government stakeholders, namely **Pasc@line**, an association which promotes dialogue between academia and ICT business, **CIGREF**, the long-established representation of large companies in France promoting "digital culture", and **Syntec Numérique**, the professional union of the ICT sector is very well developed. All of these also engage in various forms of collaboration with major actors from the public sector, such as the **Ministry of Education**, the **Ministry of Higher Education and Research**, the **Ministry of the Economy** and the **Ministry of Labour and Employment** as well as the National Institute for ICT and Automation Research.

Other interesting initiatives include the already mentioned partnerships developed by the National Agency for Vocational Training (AFPA) with two main ICT business players, CISCO and Microsoft.

Nevertheless, national experts indicate that progress in the e-skills domain in still hampered by lack of coordination between stakeholders, especially on the governmental side.

"Human resources investment"

Investment in e-Skills will be a key aspect of the overhaul of primary and secondary education framed by the **School Orientation and Programming Law** to be discussed in Parliament in 2013. This law should include the promotion of e-literacy amongst pupils, the training of teachers (150,000 over two years) to the pedagogical uses of ICT, the possibility for all final year of A level pupils to choose a specialization in ICT and digital sciences and finally the provision of very high speed broadband to schools through a support to local governments. At the tertiary level, the **"France digital universities" project**[23] aims at creating an online training offer. It should be launched before the summer 2013 and could benefit from a dedicated fund by the General Commissariat for Investment[24] and the Caisse des dépôts.

One means to make investments in human resources more effective is development of the country's **apprenticeship system**. Developing apprenticeship in the digital sector has not been easy, as this form of training, very common in the industrial sector, seemed alien to the ICT sector. Polytech Paris UPMC set the example through the creation of an apprenticeship programme. Another example is the apprentice training centre of the **IT Engineers Apprentice Training Association**, which provides apprenticeships in ICT jobs as defined by CIGREF and the European e-skills framework.

A major barrier for progress concerning apprenticeship in ICT is lack of funding. In France, apprenticeship is funded by a tax paid by firms and distributed as follows: 30% go to training centres for apprentice; 22% go to the National Fund for the Development and Modernisation of Apprenticeship (FNDMA) which distributes it to Regional Governments which use it discretionally;

[23] "France Universités numériques"

[24] Commissariat Général à l'Investissement

the remaining 48% may be used by firms to fund the apprenticeship organisations of their choice. In a situation of economic crisis such as in recent years, with a high level of unemployment, the most vulnerable people on the job market tend to be given the highest priority. For example, 20% of trainings are currently channelled to people with low to no skills. Lifelong acquisition of skills comes second, leaving apprenticeship in a less privileged position.

Another means to make investments in human resources more effective would be to ensure a wider adoption of the **e-Competence Framework**, particularly in the education sector. Currently, each school uses their own definition of competencies, which hampers quality control, mobility and transparency of qualifications. Unfortunately, the framework is even ignored by public programmes such as the the Portal of Internet Jobs. Several reasons can explain this lack of interest from French actors, beyond the language barrier. The educational system is still very much focused on initial education, leaving less room for e-skills. It is also still diploma-oriented rather than competency-oriented. Moreover, union representation of the French ICT sector is caught up in turmoil, leaving the Council of European Professional Informatics Societies (CEPIS) without French representatives at the moment. Nevertheless, the situation is bound to change as the e-CF is becoming a European norm in 2014, subsequently to be translated into national norms in all EU countries.

"Attractiveness of ICT jobs"

The three main non-government stakeholders, Pasc@line, CIGREF and Syntec Numérique, have been engaged in a large range of activities for promoting careers in ICT and the digital sector amongst young people in France, see description in the section on policy and stakeholder initiatives.

The national Government's main initiative in the area has been the Portal of Internet Jobs (see previous section), as this did not only aim at increasing awareness about the large variety of digital jobs and trainings but also at promoting their attractiveness. Experts complain, however, that partners from the private sector have shown little engagement in this process; moreover, the portal does not use the European Competence Framework, which must appear like a missed opportunity to achieve stronger synergies at European level.

Specific initiatives have been developed to improve women's representation in the digital sector[25], including the associations "Women engineers"[26] and "Digital women"[27] and the Pasc@line campaign "You'll be an engineer, my daughter"[28].

"Employability and e-inclusion"

Since its set-up in 2003, the **Delegation for Uses of the Internet (DUI)** has been a major driver in fostering **digital literacy**, also for workers. Most of the programmes focus on providing access to ICT infrastructure on the one hand and training and advice on the other hand. For example, the **Netemploi** scheme gathers information and resources to help the unemployed use the Internet in their job search.

The Ministry of Education offers a certification programme, called **B2i**, to encourage pupils from all three levels of French school to keep training their ICT skills to prepare them to successfully enter the labour market after finishing school. The National Handcraft and Trade Conservatory has developed a similar programme for adults called C2i. This programme offers training and certification in both basic and professional e-skills for different careers.

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[25] As underlined by Christian Colmant, Although women represent 48% of students in Sciencen they only make up 20% of engineers

[26] Femmes ingénieurs (http://www.femmes-ingenieurs.org/)

[27] "Femmes du numérique" belongs to Syntec http://www.femmesdunumerique.com/

[28] "tu seras ingénieur ma fille" This campain was launched in 2010 by Pasc@line and "elles bougent" to improve the attractiveness of engineering careers for women.

In spite of these initiatives, France currently suffers from high rates of unemployment. It will arguably be necessary to ramp up efforts to equip the unemployed with ICT user and ICT practitioner skills as demanded on the labour market. New approaches are currently being proposed from within the business community, such as in the case of **Xavier Niel**, founder of the French Internet service provider Iliad trading under the Free brand, whose plan to set up a digital school called "**42**" targets young people with little to no qualifications. the school is expected to offer 1,000 young people a three year training programme in digital jobs, using state-of-the-art teaching methods.

"Lifelong acquisition of e-skills"

The National Adult Vocational Training Association (AFPA) has been engaged in a range of activities for promotion of lifelong learning measures for the acquisition of up-to-date ICT user skills. Industry associations such as CIGREF have also worked to keep the topic on the agenda, even in times of economic crisis which has weakened the capability and willingness of companies, especially SMEs, to invest in continuous ICT training. As the French state offered financial incentives to help maintain continued employment and cushion the effects of the crisis, employers have been encouraged to use vocational training in e-skills during periods of under-activity Some have taken advantage of subsidies to train their employees on short-time working to help them to maintain and/or improve their qualifications. These employees are paid an allowance, e.g. through the use of the individual training right benefit (DIF).[29]

"Closing the e-Skills gap"

The French digital and ICT sector suffers from a skills gap estimated to 3,000 master level professionals each year. The number of tertiary graduates in ICT from the educational system is at about 20,000 at bachelor's level or higher per year. Industry voices from the ICT sector speak of a skills gap of 3,000 master level professionals per year – a gap which has been observed to exist for the past 20 years. Little data are available about shortages of ICT practitioners outside of the ICT sector, but the gap in the non-ICT sector is probably even higher. Experts point out that the shortage of ICT practitioners has hindered the development of the ICT sector as well as that of the national economy at large.

The digital skills gap in France is discussed not only as as a quantitative but also as a qualitative problem. Not only are there too few graduates in digital technologies, but their skill set does not match the demand of firms in the sector. According to CIGREF, which represents large firms that seek to promote digital culture in France, the country's digital companies are faced with strong financial and commercial pressure, in response to which they have developed high standards concerning their potential future recruits. Often they prefer to postpone recruitments or hire apprentices rather than to risk a costly mismatch. In the end, they might have to lower their expectations, but this might have repercussions on the sectors international competitiveness.

Independent experts see the situation somewhat more nuanced. They emphasise that the skills gap varies greatly according to the specific skills required and to the local markets. For example, there is an unmet demand for mobile technology and cloud computing skills, which is not the case for many less advanced technologies. In the same way, some regions have more difficulties than others finding ICT specialists, due to an insufficient educational offer or to a lack of attractiveness of their employment market. Most agree that the skills gap is, to a large extent, a qualitative problem; the ICT training offer is very developed in France but sometimes lacks quality. In particular, schools seem to focus on short-term programmes when firms require highly-qualified professionals.

[29] Source: Perspectives 2010: Employment and training in small and medium-sized businesses, special issue, training and the economic crisis: perception of small businesses, AGEFOS PME.

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For the European Commission
DG Enterprise and Industry

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.