



diversITy Series

Promoting e-skills training for a diverse tech workforce

Country report for France

February 2019

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

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

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

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

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

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

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

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Table of Contents

LIST OF TABLES, FIGURES AND BOXES	4
Preface	5
Executive Summary	6
INTRODUCTION	11
ICT SKILLS FORECAST	14
Baseline figures and forecast for France	15
TRENDS IN DIVERSITY	20
Employment and diversity in France's labour force	21
POLICY OVERVIEW	24
FINDINGS	28
Methodology and research	29
Pathways to ICT skills training and jobs	30
Training taxonomy targeting training needs	35
Lessons learnt	40
CONCLUSION	42
Recommendations	43
References	47
APPENDICES	49
Appendix A: Definitions and methodology	50
Appendix B: Definition of ICT occupations according to ISCO	51
Appendix C: Workforce Diversity Indicators	52
Appendix D: Survey Methodology	53
Appendix E: Good practice showcases	56

List of Tables, Figures and Boxes

Tables

Table 1 ICT job vacancies in France 2015-2017	15
Table 2 ICT occupations in France	16
Table 3 ICT graduates in France	16
Table 4 Key figures at a glance	18
Table 5 Key figures on groups at risk of exclusion from the labour market in France	21
Table 6 ICT graduates in France by gender, 2015 data	23

Figures

Figure 1 France - ICT graduates, first degrees from 2007 - 2015	17
Figure 2 Employed ICT specialists in France 2011-2015	17
Figure 3 Baseline projection scenario for France's ICT labour market from 2017 – 2025	19
Figure 4 Share of target groups in inclusive ICT training in France, % of programmes surveyed	29
Figure 5 Share of stakeholders in inclusive ICT training in France, % of programmes surveyed	29

Boxes

Box 1 Snapshot: France's ICT Workforce	18
Box 2 Baseline projection for France's ICT Skills Gap	19
Box 3 Snapshot: Grande École du Numérique	26
Box 4 Key lessons learnt from ICT training in France	41

Preface

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

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

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

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

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

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

initiative, first launched in December 2013, brings together leading policymakers, academics, business leaders, educators, training providers and nonprofits with the goal of connecting labour market policy with practice, supply with demand and employers with the workforce.

We greatly acknowledge the support and collaboration of J.P. Morgan to produce this report.

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

Executive Summary

- The French economy faces severe challenges in recruiting sufficient numbers of adequately trained ICT specialists. The current vacancy backlog amounts to roughly 40,000 ICT specialists.
- This is much more than the 12,600 ICT graduates produced each year by the country's education system. Our forecasting model predicts that the shortage of ICT specialists will grow substantially and at all skills levels between now and the year 2025.
- In no other country in Europe has the topic of inclusive ICT training been as high on the policy agenda as in France.
- Yet, large numbers of people, in particular among the young, are unemployed or not participating in the labour force at all. Moreover, France faces severe difficulties in getting non-natives into employment, as they also make up a large share of the NEET population. At the same time, French legislation puts strong limitations in place to hire foreign (non-EU) workers.
- In France, like in most other European countries, a career in ICT continues to lack sufficient appeal for most young women which is an unacceptable situation given the growing demand for digital talent.
- The higher share of women in STEM education fields, in comparison to ICT related subjects (40% in STEM as opposed to 18% in ICT), does not translate into a higher share of women in ICT jobs.
- A major government activity to make pathways into the ICT sector more inclusive is the flagship initiative Grand École du Numérique with its more than 750 training programmes and initiatives.
- The 2017 Sector Plan for Diversity in the Digital Profession has also addressed gender equality in the digital workforce. Focussing particularly on young people in the vocational stream measures implemented aim to make the digital sector more appealing to young women and make employers to increase the diversity of their workforce.

Current developments in the ICT labour market in France

The country's ICT workforce accounts for about 900,000 workers, or 3.4% of the total workforce. In absolute terms, this is the third largest headcount of ICT workers in Europe after Germany and UK. Between 2013 and 2015, the number of ICT workers has grown at a rate of 48,500 per year, with most of the growth coming from graphics and multimedia designers as well as applications programmers.

The average annual need for new ICT specialists according to our model is about 80,000, the sum of expansion (48,500) and replacement demand (31,000). This is much more than the 12,600 ICT graduates produced each year by the country's education system. Our model therefore predicts that the shortage of ICT specialists will grow substantially between now and the year 2025, to up to 520,000.

France faces considerable challenges in tackling youth unemployment. Large numbers of young people are neither in education nor in employment and training

(NEET). More than 98,000 young people leave school without a diploma or qualification each year. Socio-economic background is one of the main determinants of the likelihood of finding quality employment.

France faces severe difficulties in getting non-natives into employment, as they also make up a large share of the NEET population. At the same time, French legislation put strong limitations in place to hire foreign (non-EU) workers: employers must pay a specific tax if the length of the employment contract is longer than three months.

Given the shortage of ICT specialists in France, it provides an opportunity for NEETs, school leavers and youth from disadvantaged socio-economic backgrounds to enter the job market through training programmes.

Only 16.6% of ICT specialists in France are women.

Looking at the entire labour force, France can boast of one of the smallest employment gender gaps in Europe outside of the Nordic countries. Unfortunately, this is not reflected in high shares of women working

in digital occupations. Little progress has been made in recent years in growing women's share of the ICT workforce.

Similar to other European countries, Women have a low representation in ICT and STEM education and the workforce for manifold reasons.

The share of women in the French ICT workforce is at 18%, which is slightly above the 16% in Germany and the UK and above the EU28 average of 17.2%. The share is still comparatively low. The share of female graduates in science, mathematics and computing (STEM) is 40% in France. This compares to 38% in Germany and around 40% in the United Kingdom. However, this higher share of women in STEM fields, in comparison to ICT related subjects, does not translate into a higher share of women in ICT jobs. Reasons for this are manifold and reach from stereotypical views of women in ICT jobs to a loss of interest in typical STEM careers. According to a Microsoft study, "women generally lose interest in STEM careers before they reach adulthood, with nearly 60% losing interest in the field by the time they enter college."²

The government response

In no other country in Europe has the topic of inclusive ICT training been as high on the policy agenda as in France. This has mainly two reasons: Firstly, the French government's keen interest in reducing youth unemployment, one of the country's major policy challenges since the onset of the latest recession; and secondly, the mounting evidence about a substantial shortage of ICT specialists on the national labour market. Across a range of policy areas, the French government has committed itself to take effective action to tackle both challenges.

The flagship initiative is the Grande École du Numérique, founded by the government and situated within the Ministère de l'Économie et des Finances, is a network of more than 750 training courses in digital professions. It promotes inclusion and meets the needs of recruiters in terms of digital skills. It has published calls for the development of inclusive ICT training programmes that meet a number of criteria: trainings need to target school dropouts, women who are not in training or employment, and/or residents of deprived urban neighbourhoods. Qualifying programmes are issued with a 'Grande École du Numérique label' and

are eligible for funding by École du Numérique to cover development costs. By mid-2018, 410 ICT training programmes have received the label, and about 11,400 people from disadvantaged backgrounds participated in trainings.

The 2017 Sector Plan for Diversity in the Digital Professions has addressed gender equality in the digital workforce. It focuses particularly on young people in the vocational stream after lower secondary education (collège). Measures are planned to make the digital sector more appealing to young women. The plan also seeks to make a case for employers to increase the diversity of their workforce and encourage them to train and recruit more women.

Other policy strategies of relevance for inclusive ICT training include the reform of vocational training and education (VET). The French VET system has attracted a lot of criticism in recent years due to its limited effectiveness (in terms of access and labour market outcomes) and efficiency (in terms of financing and governance). The reform gives employers more control over the definition of qualifications and the design of training measures including apprenticeships. This should benefit the quality of VET programmes preparing for jobs in ICT.

The inclusive ICT training landscape

Traditional academic education in the form of university degrees is by far the most common for ICT specialists in France. In France, 79% of ICT specialists have an academic degree, the fourth highest figure in the EU behind Ireland, Lithuania and Spain.

Employers prefer academic degrees even for entry-level ICT positions. This limits the practical value of alternative training pathways.

The shortage of ICT specialists on the French labour market is, however, slowly changing such attitudes. Strong demand for ICT specialists has resulted in a move towards a higher acceptance of ICT training certifications obtained via non-academic programmes, especially if these have been designed with strong input from industry. Inclusive training programmes benefit from this increase in interest.

Apprenticeships suffer from being perceived as merely a second-class route for those students who failed to succeed in the mainstream French education system. In May 2018, the government has started a further initiative reforming initial vocational education and training (VET). This includes the revision of the range of training programmes offered to lower the number of students enrolling in saturated career fields and to

² EAB: 60% of women opt out of STEM careers by the time they attend college (2nd April 2018)

offer more places in VET programmes preparing for jobs in demand. In spite of general acknowledgment, evidence exists that apprenticeships are already doing a much better job getting young people into employment, including the digital domain.

Second Chance Schools and Production Schools are examples of France's system of training for young persons from at-risk groups. Launched originally as a European project, second chance schools help those who have left the school system without any qualifications to become more employable by providing them with a pathway to employment, combining professional and social support. The young participants study and complete various traineeships. Throughout the training programme, coaches individually guide each student.³

These programmes use an approach that is, by intention, in marked contrast to traditional schools, as a means to overcome deeply engrained aversions against the kind of education context in which participants have a history of failure. These schools have started to engage in training for ICT specialist jobs in recent years.

The programmes operating under the Grande École du Numérique act as a large-scale experiment in how to design inclusive ICT training measures for labour market insertion. While it is too early to draw conclusions about the campaigns' ultimate success, the diversity of approaches offers much insight into the potential ICT training offers for groups currently underrepresented in the ICT workforce.

Grande École du Numérique programmes make extensive use of industry experts who provide classroom and one-to-one training. These include our Good Practice Showcases Simplon.co and WebForce 3. Both programmes take only a few months because of their use of experts as instructors, which may be more suitable for young persons from at-risk groups who require a fast-stream pathway into employment.

Employers demand soft skills ranging from effective communication and coordination to problem solving, negotiation, teamwork and collaboration. Graduates and trainees with no prior work experience tend to lack such skills, which points towards the potential of novel types of ICT training programmes to significantly increase the number of suitable candidates available.

The programmes under the Grande École du Numérique initiative all offer some work placement as part of their pedagogical approach.

The mentorship model is particularly well suited to encourage girls and women to consider ICT careers.

Female role models have been found to play a key role in young women's attitude to working in the digital sectors. Recruiting volunteer mentors among women working in the digital sectors is comparatively easy because they are often keen to help remove gender specific barriers for future generations of women working in ICT.

France has a very strong community of engaged citizens who are working, in particular, to promote equality of chances for women in ICT education and the digital workforce. They are carrying out a large range of activities, many of which by women working in ICT and keen to reach out to girls and young women at a time when they make career choices. Successful examples include Orange Foundation's Maisons Digitales initiative, which makes innovative use of the interest of Orange employees to engage in volunteer work for the common good.

³ https://ec.europa.eu/budget/euprojects/second-chance-school_en

Key Recommendations

Promote ICT careers to women

- The question of reconciling family life and working life remains a barrier to employment of women in the digital domain. ICT training programmes should therefore provide for as much flexibility as possible, making extensive use of ICT (e.g. eLearning) for this purpose.
- Leverage the power and creativity of existing communities of engaged citizens. Their experience is of great value for giving groups currently underrepresented in the ICT workforce a stronger voice, and for experimenting with novel ways to boost diversity and inclusiveness.

Adopt strategies to promote the participation of women in STEM fields

- Develop tailored approaches to increase the participation of women in STEM fields. Strategies for engagement of women into STEM education and careers should be developed for early schooling. Government initiatives for the integration of women into STEM fields remain broad and unaccompanied by strategies aimed at raising awareness at early schooling. This is a potential area for development.
- Part of the task is to encourage greater partnership for joint activities to advance women in ICT fields. One example is the United Nations' 'International Girls in ICT Day' celebrated each year to promote equal access for women and girls in ICT fields. Important stakeholders can assist in adapting such campaigns to the national and local level. In this light, STEM and Gender Advancement (SAGA), is an ongoing global UNESCO project to reduce gender gap in STEM at all levels by exploring the dynamics that affect women's STEM careers and framing suitable policies at national, regional, and global levels. Successful implementation of these policies worldwide will expedite women participation in STEM.

Offer better support to SMEs and training providers to engage them in inclusive ICT training

- A comprehensive support system is required to address the main barriers that keep SMEs from stronger engagement in inclusive training which mainly include organisational constraints such as lack of time or limited financial resources.
- For arranging such a system, multi-stakeholder partnerships at local and regional level have been shown to be most effective.
- Possibilities should be explored to use the high-tech business incubators set up in recent years by major cities for this purpose, for example, Simplon.co's programme #Digit'ESS (digitalisation de l'économie sociale et solidaire)⁴.

Improve the appeal of apprenticeships in the digital sectors

- Apprenticeship-based training suffers from a severe image problem in France, which has a negative effect also on the appeal of modern-type apprenticeships such as those in digital occupations. The latter so far hardly exists. But the government reform of the VET with its vocational baccalaureate (Bac-pro) and vocational aptitude certificate (CAP) which started in May 2018 is supposed to offer more places in VET programmes preparing for jobs in demand (including ICT jobs) and an additional attractive pathway into the labour market. There has already been some positive impact, however, as many employers in the ICT sector are welcoming the attention policy is giving to involving industry in the design, management and provision of vocational training.
- Even if the government's current reform measures in the apprenticeship area turn out to achieve their direct objectives, experience from other countries suggests that considerable efforts will be required

⁴ <https://prod.simplon.co/digitess/>

to promote apprenticeships to young learners.

- This will need to include convincing key influencers such as parents, teachers, as well as the wider public and employers that apprenticeships in the digital domain present a high-quality option towards a career in ICT.⁵ Some employers have already demonstrated the ability to employ without a formal university degree and therefore positively influenced the ICT sector.

Improve the system of career guidance

- The OECD described the situation in France as “a complex training landscape requiring streamlining and better guidance services” ... “This system should be streamlined to reduce transactions costs and make it easier for employees, jobseekers and small firms, in particular, to find the right advisor to help them plan and finance their training. In addition, better information about available training and its quality will be necessary, along with strong individual guidance services.”⁶
- Traditionally there has been lack of awareness of available non-academic education pathways in France together with the negative perception of apprenticeships. In addition, parents but also young girls and women have a limited knowledge about ICT careers. Consequentially, the current guidance counselling at schools needs reform and improvement to better address these issues.
- Actions must target all actors in the career guidance and counselling networks: Pôle Emploi, les Missions locales, Consulting actors in Professional Evolution, Fongecif, as well as guidance counsellors, teachers, and the other main stakeholders.
- Stakeholders concerned about inclusive ICT training should strive to ensure that their priorities are reflected in the new career guidance structures and processes currently being established.

⁵ In France, the vocational educational sector is under reform. The STI2D (technical high school diploma) has been introduced in 2011. Additionally, BEP Systèmes numériques, and various CFA numériques exist.

⁶ Brandt, N. (2015)

Introduction

The French economy faces severe challenges in recruiting sufficient numbers of adequately trained ICT specialists. A career in ICT continues to lack sufficient appeal for most young women. Meanwhile, large numbers of people, in particular among the young, are unemployed or not participating in the labour force at all. One possible way to mitigate all of these problems, widely discussed among stakeholders, is to create opportunities of careers in ICT to groups of people currently underrepresented in the digital workforce, such as women and persons from a challenging socio-economic background. We conducted a comprehensive survey to determine the impact and challenges of inclusive e-skills training programmes for diverse groups to enter the digital labour market in France. In this report, we provide an analysis of our main findings.



In no other country in Europe has the topic of inclusive ICT training been as high on the policy agenda as in France. This has mainly two reasons: Firstly, the French government's keen interest in reducing youth unemployment, one of the country's major policy challenges since the onset of the latest recession; and secondly, the mounting evidence about a substantial shortage of ICT specialists on the national labour market. Across a range of policy areas, the French government has committed itself to take effective action to tackle both challenges.

One of these has been the launch of the Grande École du Numérique in 2015, a multi-stakeholder partnership that aims to promote development of innovative ICT training offers outside of the business schools and technical universities. With its target group of unemployed young persons, female jobseekers and inhabitants of urban policy priority neighbourhoods ("Quartier prioritaire de la politique de la ville", QPVs) with serious socio-economic problems, the initiative is of major interest for the topic of inclusive ICT training. The Grande École aims to promote gender equality in the digital sector and ensure access for women to available opportunities within the field. Accredited courses are therefore tasked with ensuring that at least 30% of their student intake is female. Simplon.co, Social Builder, Webforce3 and École 42 are among several ICT training programmes accredited by Grande Ecole du Numérique.

Simplon.co is a social enterprise, which offers free of charge training programs in the digital sector. Simplon.co operates 34 schools that offer training programmes primarily aimed at unemployed job seekers, 30% of whom should be women. The programmes, which include Web developer and Java developer, provide certified qualification that seeks to be optimally tailored to current needs on the labour market. Simplon.co's innovative educational approach is based on learning by doing, learning by teaching, reverse mentoring and peer education to develop long-term professional and social skills. It focuses on coding and programming, with modules that are continuously adapted to the rapid change in the digital sector. It also puts much emphasis on developing soft skills such as curiosity, creativity, self-learning, leadership and self-esteem.

WebForce 3 is an intensive training programme in web development, conceived to be accessible for everyone, with special attention to jobseekers who

did not continue education after graduating from high school. The main aim is to equip learners with exactly those skills, which will allow them to find a job as fast as possible. Designed by Web professionals, the WebForce 3 programme is based on a proven method conceived to allow fast and sustainable assimilation of all the main techniques that are essential to web development.

École 42 is amongst the most ambitious experiments in ICT training schemes in France, and has been one of the frontrunners in introducing innovative teaching and learning methods. It does not charge any fees and has no preconditions in terms of qualification, but access is limited to those who perform very well in an online assessment of logical reasoning. Little more than one out of ten applicants is accepted.

There are high expectations for these new types of training and ways of accessing employment, as demonstrated by the enthusiasm voiced by the business community. They have raised significant attention for the potential ICT training offers for groups currently underrepresented in the ICT workforce. There is an increasing awareness that non-academic pathways to careers in ICT are required, both to respond to the digital skills crisis and for promoting the socio-professional integration of unemployed people.

However, most SMEs (small and medium-sized enterprises) find it difficult to divert resources to offering trainings or apprenticeships to young persons, especially if they are asked to consider taking on persons from groups currently underrepresented in the ICT workforce. Many of whom need special support in one way or the other which many SMEs find difficult to offer.

For small enterprises, it is often difficult to release workers for training measures. Training outside of working hours would help to improve access, in particular for such workers. It may also help direct more training funds to workers in small firms who have the weakest skills as well as to jobseekers, but this might be more easily achieved by shifting the funding base from a levy on employers to fiscal incentives or direct subsidies.

It is against this background that this document reports on the findings of our comprehensive survey of inclusive e-skills training programmes for diverse groups to enter the digital labour market in France.

Section 1 of this report presents a snapshot of France's ICT workforce today and a forecast for its development over the coming years.

Section 2 provides an overview of the current diversity situation in the French labour market, with a focus on the ICT workforce.

Section 3 summarises policies and frameworks introduced by the government sector to address ICT skills shortages.

Section 4 presents the findings from the survey of existing inclusive ICT skills training programmes. It provides a brief look into the pathways available to gain an entry into the digital labour market and investigates the success factors and challenges of a suggested training taxonomy.

In the last section, we offer recommendations to key stakeholders for future action.



ICT Skills Forecast

The country's ICT workforce accounts for about 900,000 workers, or 3.4% of the total workforce. In absolute terms, this is the third largest headcount of ICT workers in Europe. Between 2013 and 2015, the number of ICT workers has grown at a rate of 48,500 per year, with most of the growth coming from Graphics and multimedia designers as well as Applications programmers. The average annual need for new ICT specialists according to our model is about 80,000, the sum of expansion (48,500) and replacement demand (31,000). This is much more than the 12,600 ICT graduates produced each year by the country's education system. Moreover, there is a current vacancy backlog of about 40,000 ICT specialists. For these reasons, our model predicts that the shortage in ICT specialists will grow substantially between now and the year 2025.



Baseline figures and forecast for France

The current ICT skills challenge for France

According to Textkernel⁷ research done on request of empirica, there were 39,617 vacancies for digital specialists advertised in France during the first week of September of 2017. Textkernel has also researched the corresponding figures for 2016 and 2015 (same date), see Table 1 below. Numbers of vacancies have increased significantly over these three years, in particular for Computer network professionals, ICT user support technicians, Systems analysts, Application programmers and Database professionals.

Cedefop, the EU agency responsible for the development of vocational training, lists ICT professionals among the five main shortage occupations in France. The source reports that 68% of companies indicate difficulties finding candidates that fit their requirements for ICT specialists.⁸

A closer look at the development of the number of

jobs for individual ICT occupations (Table 2) reveals huge variations in growth rates across different ICT occupations. When applied to ISCO classification (international standard classification of occupations, see Appendix A), the required skill levels range from high, to mid, to lower. The available data indicates that growth of ICT jobs takes place at the higher skill levels but also in the area of core and associate / technician level i.e. below skill level 4⁹, such as ICT operations technicians (+6.7%), ICT user support technicians (+30%), and ICT installers and servicers (+12.8%). This seems to be an indication that due to the strongly growing demand for and lack of supply of ICT skilled workers employers in France are no longer only recruiting graduates from universities but starting to become more flexible and are also recruiting graduates below Bac+5 trained through other training programmes probably operating outside the NQF framework.

Table 1 ICT job vacancies in France 2015-2017

		Vacancies		
ISCO code		2015	2016	2017
1330	ICT managers	4116	3924	3779
2511	Systems analysts	1737	1945	2386
2512	Software developers	9752	11280	10876
2513	Web and multimedia developers	1753	1965	2060
2514	Applications programmers	2391	3270	3832
2519	Software and applications developers and analysts not elsewhere classified	580	752	803
2521	Database designers and administrators	1632	2072	1822
2522	Systems administrators	1249	1297	1621
2523	Computer network professionals	1387	2584	3185
2529	Database and network professionals not elsewhere classified	412	351	690
3511	ICT operations technicians	15	12	16
3512	ICT user support technicians	3707	5615	6185
3513	Computer network and systems technicians	2	26	54
3514	Web technicians	338	326	263
3521	Broadcasting and audio-visual technicians	434	431	299
7422	ICT installers and servicers	1548	2335	1746
TOTAL		31,053	38,185	39,617

Data source: Textkernel (2017)

⁷ Textkernel is a specialist in machine intelligence for matching supply and demand on the job market. With its product Jobfeed, Textkernel aggregates information from millions of jobs found on the web:

<https://www.textkernel.com/>

⁸ Cedefop (2016b) 'France: Mismatch priority occupations'

⁹ For skill levels, see International Labour Office (2012) 'International Standard Classification of Occupations', pp. 12-15.

Table 2 ICT occupations in France

	Skill level	Number of jobs		Growth			Linear trend	
		2015	2013	Total	% (CAGR)	Rank	p.a.	Rank
Systems administrators	4	6,110	2,135	186%	69.2%	1	1,988	10
Information technology trainers	4	4,081	1,736	135%	53.3%	2	1,172	14
Graphics and multimedia designers	4	63,649	33,655	89%	37.5%	3	14,997	1
Software and applications developers and analysts not elsewhere classified	4	41,719	26,564	57%	25.3%	4	7,577	3
Electronics engineers	4	30,946	21,779	42%	19.2%	5	4,583	4
Applications programmers	4	247,310	225,513	10%	4.7%	13	10,898	2
Information and communications technology user support technicians	3	28,316	20,778	36%	16.7%	6	3,769	5

Source: Eurostat LFS data (2017)

Trends in education

In France, 79% of ICT specialists have an academic degree. This is well above the European average of 62% and the fourth highest figure in the EU. Only Ireland, Spain and Lithuania have a higher share of academically trained ICT workers. There is no data available as to the field of education, such as whether it is ICT or not, but available evidence suggests that the large majority hold a degree in computer sciences or a related area of ICT.

The number of ICT graduates entering the labour market is therefore a major determinant of the development of skills supply. There were 12,567 tertiary education graduates in 2015 (first degrees), plus a mere 20 vocational education graduates. In total, roughly 12,600 ICT graduates leave schools and universities for the labour market per year. The latest

available education data are found in the table below.

As displayed in the chart below, tertiary graduate figures had a peak in 2011 but have dramatically declined since then.

As the vacancy figures for ICT specialists demonstrate, there are not enough new ICT graduates to suitably fill open positions. Even if all 12,600 ICT graduates

produced each year by the French vocational and tertiary education system went into the ICT labour market, they make up only a small share of the 79,600 new labour market entries needed each year. In

recent years, the number of people entering the ICT labour market *without* a domestic vocational or Higher Education degree has thus been at least 67,000 (79,600 – 12,600).

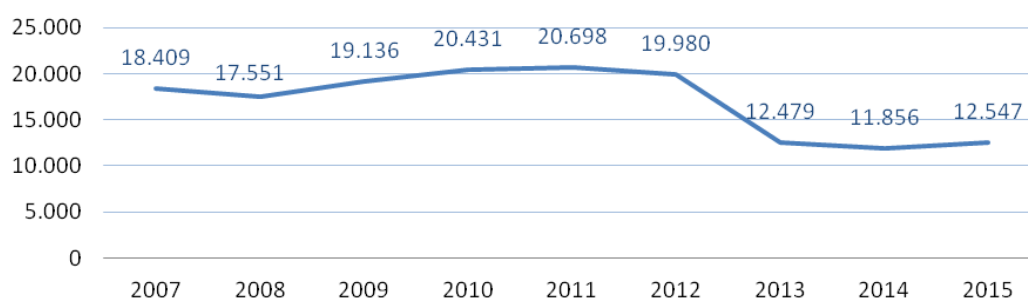
Table 3 ICT graduates in France

	Total 2016(or latest available)	% ICT graduates	Percent female ICT graduates
(1) Post-secondary non-tertiary education	5	0.2%	0.0%
(2) Short cycle tertiary level	3,602	1.7%	8.2%
(3) Bachelor's or equivalent level	9,370	3.6%	14.0%
(4) Master's or equivalent level	9,827	3.4%	21.2%
(5) Doctoral or equivalent level	630	4.8%	26.5%
Approximate max labour market inflow with ICT degree (1+2+3) ¹⁰	12,977	2.7%	12.4%

Source: Eurostat [uoe_grad02] (2017)

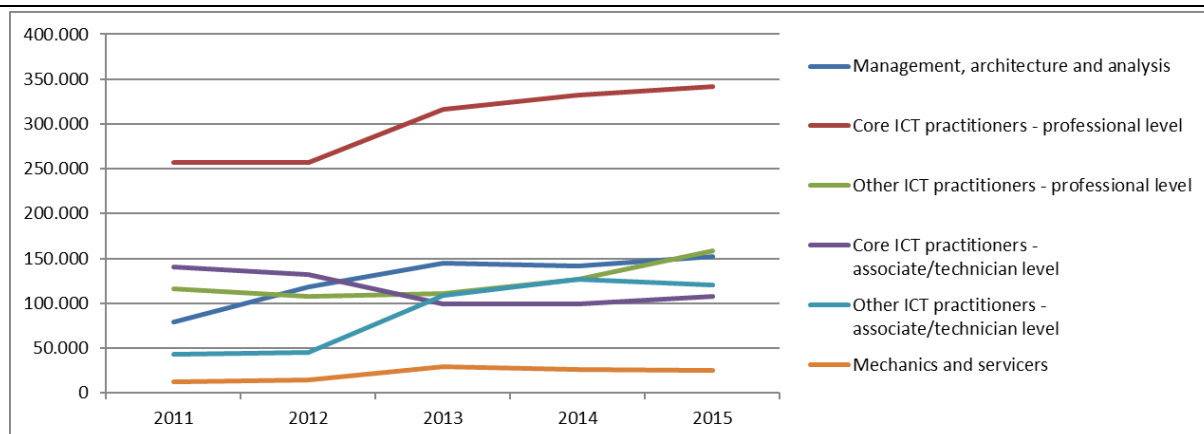
¹⁰ To avoid double counting, we must argue that all bachelor level graduates go *eventually* into the labour market, some with a master's or even PhD "detour", and that the flows from bachelor degree into masters studies are about the same size as the flows from masters or PhD studies into the labour market.

Figure 1 France - ICT graduates, first degrees from 2007 - 2015



Source: Eurostat [educ_grad5 and uoe_grad02] (2017)

Figure 2 Employed ICT specialists in France 2011-2015



Source: Eurostat, "Employed ICT specialists" (2017)

ICT skills forecast model for France

For analysing current and projecting future ICT skills gaps, demand needs to be viewed in terms of changes to the underlying demand exerted by employers (workforce expansion), as well as replacement demand – the need to replace workers who leave the workforce for good or temporarily, typically because of retirement. In terms of supply, the most important determinant is the number of ICT graduates who enter the labour market. Net migration of IT workers and “lateral entries” of non-ICT graduates into IT occupations also need to be taken into account.

For our model, we estimate that workforce expansion will continue along the same lines as it has between 2013 and 2015, i.e. that the number of employed ICT specialists will grow by 48,500 jobs per year (see above). On top of any expansion of the workforce, which compares total employment between two years, there is also so-called replacement demand, replacing workers who leave the workforce for good or temporarily. We derive an estimate of the annual net replacement from Cedefop, the EU agency responsible for the development of vocational training. Cedefop publishes estimates of future

replacement demand by occupation,¹¹ which in the present case is 31,100 per year.

The average annual need for new ICT specialists is thus the sum of expansion (48,500) and replacement demand (31,100). To assess total demand, one has to also account for the current vacancy backlog (39,600). One could also split the demand into met and unmet demand, with the current vacancies being (in a simplistic model) “unmet demand” and actual expansion and actual replacement being “met demand”.

Over the years 2013-2015, the latest period for which robust data are available, the French economy has managed to absorb on average 79,600 new ICT workers per year (roughly 48,500 expansion + 31,100 replacement). We assume in our model calculation that this is natural rate of “inflow” which will be sustained for the near future.

¹¹ Cedefop publishes estimates of future replacement demand by occupation at ISCO-08 two-digit level.

Box 1 Snapshot: France's ICT Workforce

In France, the ICT specialist workforce accounts for 906,000 workers¹². In absolute terms, this is the third largest headcount of ICT workforce in Europe, comprising 18% of Europe's ICT practitioners. A closer look at the data reveals that France has a slightly higher than average share of the highest skilled ICT workers¹³ than the European average.

In relative terms, the share of ICT specialists in France's total domestic workforce (3.4%) puts the country at rank 16 in the EU28. The figure is much higher, in particular, in Finland, Sweden, the UK, Netherlands and Luxemburg, all of which feature a share of 5% or more of the workforce working in ICT jobs. Among the larger continental countries, France ranks behind Germany (11th) but before Spain (17th), Italy (18th) and Poland (24th).

For the analysis of the growth of France's ICT workforce, data is available for the years since 2011. However, this data should be viewed critically. When looking at the development of jobs since 2011 in terms of workers there is a huge variation of growth rates, which probably cannot be attributed to real labour market fluctuations but to redefinition of national classifications or job titles or a combination of both. In total, the number of jobs grew by an average of 48,500 per year over the period 2013 to 2015 for which data is most consistent.

The distribution of France's ICT workforce across economic sectors is roughly the same as the EU28 average. 58% of ICT specialists work outside the ICT sector itself.

Table 4 Key figures at a glance	France	Rank in EU28
ICT workforce	906,000	3
As % of domestic workforce	3.4%	16
% female	16.6%	12
Estimated annual replacement need	79,600	
Latest vacancy figures (including contractor vacancies)	39,600 (6.5%)	
Vocational graduates	0	28
Tertiary graduates (only first degrees)	12,500	4
Projected jobs potential until 2025 (8 years)	725,000	
of which expansion	476,000	
% of enterprises that employ ICT specialists	16%	24
% of enterprises providing training for ICT specialists	9%	20
% of ICT specialists with tertiary education	79%	4

Source: Eurostat (2015)

¹² Eurostat definition, 2015 data

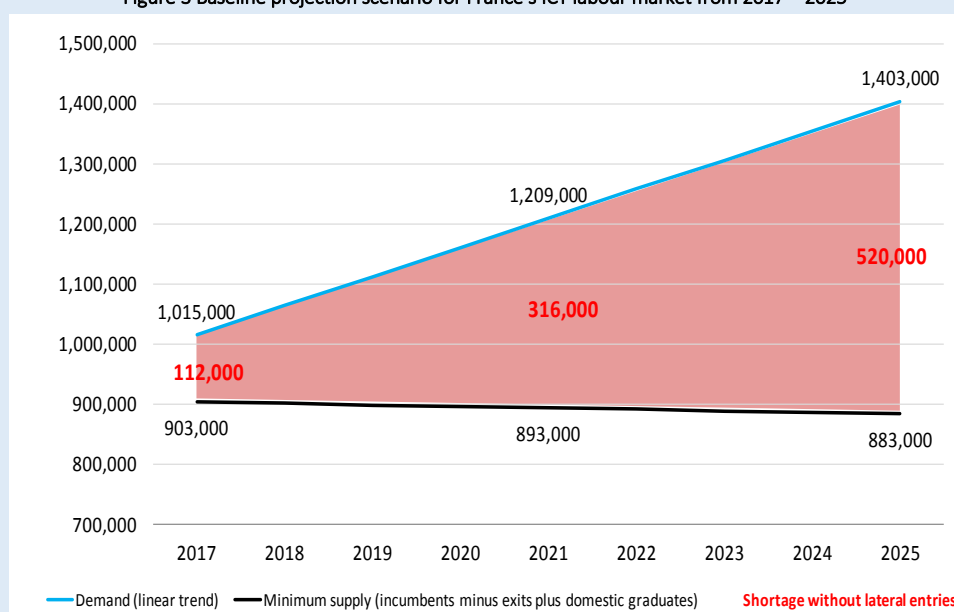
¹³ ISCO major groups 1 and 2: the red, blue and yellow segments of the pie chart above.

Box 2 Baseline projection for France's ICT Skills Gap

A simple projection is calculated that rests on assuming a baseline scenario of a steady state of flows. It should be noted that this is a "Things stay the same"-scenario. It simply shows the number of jobs to be filled in the near future if the demand keeps growing in a linear fashion and the annual supply of new labour remains as it was in the last five years. This is a projection based on a baseline scenario, and not necessarily the one empirica would deem most likely after a profound analysis of technology, socio-economic and political trends. Nevertheless, it shows a basis to ponder on trends and think about likely other, different scenarios, which might include technology leaps or disruptions, but also social, economic or political impact. These are not allowed for in this model. It rests on these inputs:

- Demand growth follows an "only" linear trend, i.e., grows by an absolute figure per year and not a percentage¹⁴. Demand is set to grow by 48,500 p.a.
- New supply is set by the average supply of the last years.
- The *degree gap* or *minimum lateral inflow* has been 67,000 on average and this remains the case¹⁵.

Figure 3 Baseline projection scenario for France's ICT labour market from 2017 – 2025



The shortage of skills of 498,000 in 2025, highlighted by red font in the above chart, is to be understood as the shortage that remains when all expected domestic ICT graduates enter the labour market. It does not take account of the lateral entries, i.e. people without a domestic degree. It is, so to speak, the cumulative minimum scope for outsider entries to the ICT labour market.

It needs to be stressed that the model is constructed such that the actual projected shortage is exactly as "today", meaning at starting point of the model, namely 39,600.

The total potential for new jobs until 2025 will be 725,000 in this model. This number represents the total number of new entrants to the ICT labour market in 8 years. Depending on perspective, both the total potential of 725,000 new entrants to the ICT labour market by 2025, or the outsider potential of 536,000, very well reflect the opportunities that may be grasped by participants of inclusive ICT training measures that are covered in this research.

Source: empirica (2017)

See yearly data breakdown in Annex A

¹⁴ A fixed percentage growth would imply exponential growth. This has been the case throughout more than a decade, but because we expect maturity effects, the linear growth model is chosen here.

¹⁵ It is unknown whether and to what extent this number can be increased by political or other measures. The relative persistence of skills gaps indicates that this is at least not an easy task. In the calculation we assume a yearly lateral inflow of exactly this size, and due to this the current shortage (i.e. the number vacancies, which is 39,600 currently) will persist in the model.

2

Trends in Diversity

France faces considerable challenges in tackling youth unemployment. Large numbers of young people are neither in education nor in employment and training (NEET). Socio-economic background is one of the main determinants of the likelihood of finding quality employment. This is conflated with the difficulties of the labour market to integrate non-natives born outside of the EU: the gap between the employment rate of non-natives and persons born in the country is significantly larger than the EU average. In terms of gender equality, France can boast of one of the smallest employment gender gaps in Europe outside of the Nordic countries. Unfortunately, this is not reflected in a high share of women working in digital occupations. Only 16.6% of ICT specialists in France are women. What is more, current numbers of women enrolled in ICT education offer little hope for significant improvements in the near future.



Employment and diversity in France's labour force

The prevalence of **long-term unemployment**¹⁶ provides an overall indication how many people find it particularly difficult to find a job. In France, long-term unemployment increased continuously since the latest recession, from 2.4% in 2009 to 4.2 in 2017, since then it has receded somewhat. Among EU28 countries, France ranks 21 of 28 on this indicator. Equally worrying is the consistently high rate of **youth unemployment**, which was 24.6% in 2016, almost 6 percentage points (p.p.) more than the EU average.

The number of young persons not in employment, education or training (**NEET**) is 11.9%, closer to the average for all EU member states but still very high when compared to those countries that best succeed in enabling the young to join the labour force, such as the Netherlands and Germany (6.7%). France's Government estimates that more than 98,000 young people leave school without a diploma or qualification each year.¹⁷

These figures clearly show that France has a large group of young people who are at risk of structural unemployment or even exclusion from the labour force, in addition to a high number of older, long-term unemployed individuals. The option of activating a larger share of these groups by means of ICT training leading to employment in one of the skills shortage occupations needs to be explored.

France has a **gender** employment rate gap (6.7 p.p.) that is considerable smaller than most other EU countries, for which the average is 10.5 p.p. The gap has decreased continuously over the last ten years. Unfortunately, this positive trend is not reflected in increasing shares of women working in digital occupations, see below.

As an indicator for the labour market situation of ethnic minorities in France, we use the share of **non-natives born outside of the EU** in both total population and in employment. 8.5% of France's total population are non-natives, which is the 9th highest figure in Europe. The country faces severe difficulties in getting non-natives into employment, as the non-native employment rate gap of 13.4 p.p. indicates. This is more than 5 p.p. more than the EU average. Non-natives from outside of the EU make up a large share of the NEET population. At the same time, French legislation puts strong limitations in place to hire foreign (non-EU) workers: employers must pay a specific tax if the length of the employment contract is longer than three months. This means that efforts to use inclusive ICT training for combating unemployment in France need to take full account of the special requirements of people from ethnic minority communities.

Table 5 Key figures on groups at risk of exclusion from the labour market in France	France	EU28	FR Rank
Long-term unemployment rate	4.6	4.0	21 st
Young people not in employment, education or training (15-24 years) – NEET	11.9	11.6	19 th
Youth unemployment	24.6	18.7	22 nd
Employment rate of older workers (55-64 years)	49.8	55.3	17 th
Age employment rate gap (15-64 vs. 55-64 years) in p.p.	14.4	11.4	17 th
Gender employment rate gap (15-64 years) in p.p.	6.7	10.5	8 th
Non-natives born outside the EU, as share of total population	8.5	6.9	9 th
Non-native employment rate gap, in p.p.	13.4	8.3	20 th
Disability employment gap, 2011, in p.p.	9.9	19.6	3 rd
Disability unemployment gap, 2011 in p.p.	3.6	2.5	19 th

Source: Own calculations based on latest available Eurostat data

¹⁶ For definitions used in this section, please see Appendix B

¹⁷ <https://www.gouvernement.fr/ce-qu-il-faut-savoir-sur-le-decrochage-scolaire>

In contrast, France's performance concerning labour market participation of **people with disabilities** is among the best in Europe. Using a definition based on persons reporting "severe difficulty in basic activities" (rather than formal disability status, which is harder to compare) the disability employment gap is 9.9 p.p. compared to an EU average of 19.6 p.p. This puts France on rank 3 in the EU28. Widespread unemployment among people with disabilities, however, is a structural problem for which innovative solutions are badly needed.

A comparison between socially and economically deprived areas (QPVs) and inclusive urban areas reveals that the amount of NEETs in these areas is considerably higher (36.8% vs. 17.9%)¹⁸. In terms of professions, fewer people from QPVs are employed in ICT jobs than people from inclusive areas (3% vs. 4.3%).¹⁹

Diversity in France's ICT and STEM workforce

This section discusses diversity only in terms of gender, as data on other groups currently underrepresented in the ICT workforce is not available.

The available data suggest that France's ICT workforce is marked by significant underrepresentation of women. The share of women in the ICT workforce is small with 16.6% on average²⁰, similar to the EU28 average (16.1%). Data on the percentage of women for specific ICT occupations is not available.

This is confirmed by another source (OPIIEC), according to which the share of women among "ICT engineers" was 16% in 2016. The source also gives figures for "digital sector jobs", a definition that is wider than ICT specialists only, in which the female share was 27%, versus 48% in all sectors combined.²¹

The current share of women among ICT students does not offer any hope for significant improvements in the near future. Table 6 shows women's shares in ICT graduates on different levels. The situation is worst in short-cycle tertiary education, where the share of female graduates is a mere 10.8%.

The female share of graduates in science, mathematics and computing (STEM) is 40% in France. This compares to 38% in Germany and around 40% in the United Kingdom. However, this higher share of women in STEM fields, in comparison to ICT related subjects, does not translate into a higher share of women in ICT jobs. The number of women in the ICT workforce is threatening to remain low not only because few women are graduates of these sectors but also because turnover observed for women in the ICT workforce is high. The 2017 Gender Scan study showed that graduates of STEM (Science, Technology, Engineering, and Mathematics) display the highest turnover in Europe: 40% of women graduates leave the STEM workforce after only 10 to 15 years of professional life.²²

What are the reasons for women's low representation in ICT education and workforce? Stakeholders agree that stereotypical views on women in ICT and STEM are still the main cause for women's low representation. The three main factors identified in France are the media, parents and the lack of role models. Parents, teachers and peers influence these views early on, including subject choices in school and jobs. Evidence from a survey conducted in 2016 confirms that this is the case. The study also found that both teachers and parents complain about a lack of female role models in the sector. The attractiveness of ICT and STEM careers to girls is often negatively affected early on by (1) a lack of role models with which high school and university students can identify. (2) At the time of orientation, each young person compares the image he or she has of people exercising a profession and the image he has of himself. Thus, in a sector where few women work, young girls may feel that this job is not for them. (3) For choice of orientation in graduate studies, high school girls prioritise reasons like interest and subject related more to studies than to professions and unfortunately, girls still get pushed towards the less technical fields during education.

¹⁸ nactivité et halo autour du chômage dans les quartiers prioritaires. In Observatoire national de la politique de la ville. Rapport annuel 2016
<http://i.ville.gouv.fr/download/reference/14168>

¹⁹ Professions et secteurs d'activité dans les quartiers prioritaires. In Observatoire national de la politique de la ville. Rapport annuel 2016
<http://i.ville.gouv.fr/download/reference/14169>

²⁰ Eurostat data for 2015.

²¹ Ministère de l'Éducation nationale, de l'Enseignement supérieur et de la Recherche et al. (2017) 'Plan sectoriel mixité dans les métiers du numérique'

²² Grande École du Numérique (2017) 'Mixité dans le high-tech'

(4) In addition, increasing sexism on internet portals focusing on questions around coding and ICT more generally has negative effects on young women's perception of the sector in France.²³

Many female ICT specialists "complain of a lack of recognition, appreciation and development prospects, and as a corollary, may be led to doubt their skills. Thus, this risk of devaluing women in office can only have negative repercussions on women aspiring to a career in this sector, and thus devalue the sector". At the same time, the engineering and digital sector do not have a good reputation in terms of work-life-balance (working hours, little flexibility in taking family constraints into account). Discrimination against hiring women aged 25-35 also exist because of fears of pregnancy and maternity leave.²⁴

The same study also carried out a projection of the number of women expected to be available on the labour market, based on current numbers of young women choosing subjects, which are known to lead with a certain probability to a career in ICT. Based on the findings, the researchers conclude that "if no action is taken to attract more women to the digital professions, the number of women trained in digital professions will be lower than the needs of companies and the number of women in the sector may then decrease."²⁵ On a positive note, "an active involvement of the sector in initial training institutions can have a decisive influence on the orientation of young girls towards digital channels." (p. 101)

Microsoft, in 2017, carried out a study at European level to determine the age at which young girls cease to be interested in STEM subjects. They found that

girls' interest in science appears in early adolescence (around age 11) but drops significantly between 16 and 18 years of age. The survey identifies three main factors behind this decline in interest during orientation:

- A lack of female role models;
- A perception of gender inequalities in STEM careers. More than one French girl in two reported that she would dare to embark on a career in STEM if she was assured that the employment opportunities for men and women were equal;
- Perceptions associating ICT and other STEM professions with an abstract nature at the expense of social and creative activities.²⁶

A recent research project²⁷ looked in depth into the influence of role models and personal experience on the attitudes of young women towards working in the ICT domain. It found that practical experience and hands-on exercise have the strongest positive impact, followed by peer group approval and teacher mentors. These findings give some indication about the kind of measures that are needed (see the recommendations in Section 5).

Table 6 ICT graduates in France by gender, 2015 data

ICT graduates	Percent male	Percent female
(1) Post-secondary non-tertiary education	80.0%	20.0%
(2) Short cycle tertiary level	89.2%	10.8%
(3) Bachelor's or equivalent level	86.0%	14.0%
(4) Master's or equivalent level	79.3%	20.7%
(5) Doctoral or equivalent level	74.0%	26.0%

Source: Eurostat (2017) [uoe_grad02]

²³ Commissariat général à la stratégie et à la prospective (2014) 'Lutter contre les stéréotypes filles-garçons'

²⁴ Etude Syntec numérique and OPIEC (2016) 'Attractivité de s métiers du numérique et de l'ingénierie pour les publics féminins en France', p. 22 (own translation)

²⁵ *ibid.*, p. 97 (own translation)

²⁶ Microsoft and KRC Research (2017) 'How role models are changing the face of STEM in Europe'

²⁷ Microsoft & KRC Research (2017) 'How role models are changing the face of STEM in Europe'

Policy Overview

Realising the need for new approaches to ICT training that better respond to the need of the labour market, the French government has embarked on a number of policies that seek to promote inclusive ICT training programmes. The flagship initiative is the Grande École du Numérique, a multi-stakeholder partnership funded mainly by industry. It has published calls for the development of inclusive ICT training programmes that meet a number of criteria: trainings need to target school dropouts, women who are not in training or employment, and/or residents of policy priority neighbourhoods; they need to be free of charge, and provide successful participants with some kind of certification. Qualifying programmes are issued with a 'Grande École du Numérique label' and can obtain seed money for covering development costs. By mid 2018, 410 ICT training programmes have received the label, and about 11,400 people from disadvantaged backgrounds participated in trainings.



In France, policy action dealing with the diversity and inclusiveness with regard to ICT training and the digital workforce has been initiated mainly within the digital policy and the education domains.

Responsibility for digital policy is shared between three Ministries: the Ministry of Education, Higher Education and Research, the Ministry of Economy and the Ministry of Labour and Employment. A key stakeholder is the French Digital Council (Conseil national du numérique, CNNum), an independent advisory commission consulting the government on questions related to the impact of digital technologies on the economy and society.

The government developed **Pix**²⁸, an online public service for the assessment, development and certification of digital skills. It is supported by the public interest group "Pix", created in April 2017 as a "State Startup". Its members are the State (Ministry of National Education and Ministry of Higher Education, Research and Innovation), the National Centre for Distance Learning (Cned), the University of Strasbourg and the National Conservatory of Arts and Crafts (Cnam). It also works in close partnership with the Ministry of Labour and the Interministerial Directorate for Digital and State Information and Communication System (DINSIC). In an effort to clarify the country's digital policy, the Government has adopted, in February 2013, a **Roadmap on Digital Policy**²⁹ defining three pillars: (1) Opening opportunities for the youth, (2) Reinforcing the competitiveness of firms and (3) Promoting values. This roadmap was translated by each Ministry into concrete measures. Some of the measures taken under the first and third pillar target development of e-skills and ICT training programmes to support diverse populations to enter the labour market:

- In 2013, the Ministry of Higher Education and Research launched the "France Université Numérique"³⁰ (FUN). FUN is a platform through which MOOCs from a large number of French universities and other established education providers have been made accessible.

- The "jobs for the future"³¹ programme, designed to provide training to young persons with low or no qualification, has been complemented by tailored schemes to train for specific digital jobs, such as web developer, archivist or digitalisation operator.
- Measures to promote digital literacy have also included several ICT training programmes which issue certificates, such as C2i, to low-qualified and unemployed people. The aims are to boost job search strategies and to develop continuing education in the digital sector.

For many years already, the fact that France suffers from a shortage of ICT specialist at a time of high unemployment and large numbers of young people neither in employment nor in education and training (NEET) has been subject of a lively public debate in France. Suggestions to mitigate the situation have been voiced, for example, by the French Digital Council (CNNum), in its 2013 report on "Citizens of a Digital Society". The document asks for an initiative to create digital jobs for 100,000 poorly qualified young people within three years.

"A scheme that provides access to digital jobs and that focuses primarily on young people – and more generally disadvantaged populations with respect to the digital world (young women, older workers, members of diversity groups) should set high goals for itself: [To] change the way that employment counsellors (and society) view jobs requiring digital skills; encourage businesses to experiment with hiring young school leavers; quickly offer places in training courses to thousands of young people; [and] change the way that digital technologies are taught."

In light of this, one of the outcomes of the Roadmap on Digital Policy was the **Grande École du Numérique**, a multi-stakeholder partnership launched by the Ministry of Labour and Employment in September 2015 – see box below.

A new digital strategy ("**For a Digital Republic**") was adopted by the French National Assembly in January 2016. It is based on an open call for participation to anybody interested in the area, launched by the French Digital Council (CNNum) in October 2014. The

²⁸ <https://pix.fr/>

²⁹ Office of the Prime Minister, France (2013) 'Séminaire gouvernemental sur le numérique'

³⁰ Ministère de l'Enseignement supérieur et de la Recherche (2013) 'France Université Numérique'

³¹ 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

Box 3 Snapshot: Grande École du Numérique

The Ministry of Labour and Employment launched the **Grande École du Numérique** in September 2015, a multi-stakeholder partnership that aims to promote development of innovative ICT training offers outside of the business schools and technical universities. The initiative pursues a two-fold objective: responding to the digital skills needs required on the labour market and promoting the socio-professional integration of unemployed people. Three main target groups were defined: School dropouts with few or no qualification; women who are not in training or employment; and to residents of the so-called urban policy priority neighbourhoods (QPV)³². Grande École du Numérique's main approach is issuing a label to ICT training programmes in France that meet a range of criteria concerning inclusiveness and diversity. Providers of labelled programmes can receive a grant of up to 80% of costs from Grande École du Numérique. Up to 2017, €15 million of seed investment were handed out to training providers. The "Grande École du Numérique" label (GEN) is awarded per course and not per structure. The same project leader can apply for the certification of several training courses. The label is valid for three years. By mid-2018, 410 programmes had already received certification and in a third call for training programmes, 347 new training courses in digital professions received the GEN Label on this occasion. They are in addition to the 410 training courses previously labelled GEN.

Source: CCNum (2013); GoodStudies (2018) 'La Grande École du Numérique (GEN)' <https://www.grandeecolenumérique.fr/>

action plan includes measures for the support of diverse populations to enter the labour market with the aid of ICT. For example, the flagship initiative from Pôle Emploi resulted in the launch of the "Job Store" (Emploi Store)³³ website by the Ministry of Labour and Employment. It brings together the digital applications and services developed by Pôle Emploi, the French public employment services, as well as those developed by third parties based on the Pôle Emploi data in an open innovation approach. The programme aims to help jobseekers to find employment, by training them, helping them prepare their application and get recruited.

Gender equality in the digital workforce has been addressed by the inter-ministerial **Sector Plan for Diversity in the Digital Professions**³⁴ (2017). The plan entails several mechanisms in order to integrate more women in the digital sector. It focuses in particular on young people in the vocational orientation phase. Measures are planned to make the digital sector more appealing to young women. The plan also aims to raise awareness among employers for the business case for diversity to encourage them to train and recruit more women. At the time the Plan was

launched, 15 major stakeholders from the business community had committed themselves to the actions proposed.

The government's **education policy** has seen a number of attempts at reform that are of special relevance for diversity and inclusiveness, also of ICT training. The latest round of reforms has addressed upper secondary and tertiary education in a mutually complementary manner. This has been found necessary because of evidence that "the socio-economic background of students impacts on their type of baccalauréat which in turn is strongly correlated with success or failure at university".³⁵ At upper secondary level guidance and preparation is to be improved, also by introduction of a new, compulsory "Scientific and digital humanities" course. At tertiary level, access to and conditions for success at higher education are being reformed in order to make them more inclusive and less dependent on parental background. One goal is to enable stronger individualisation of pathways.

The 2017 **Law on Equality and Citizenship** takes important steps towards recognition of skills obtained outside of formal education. It allows for the validation by higher education institutions of the knowledge and competences acquired by students through non-academic activities.

Theoretically, the **vocational training and education (VET) system** could offer an alternative to the classic

³² "Quartier prioritaire de la politique de la ville" (QPV) are neighbourhoods facing serious socio-economic challenges, and as such are subject to specific policy interventions, many of which are targeted at NEET youth. 1,500 of these neighbourhoods were identified by the French government in 2014.

³³ <https://www.emploi-store.fr/>

³⁴ Ministère de l'Éducation nationale, de l'Enseignement supérieur et de la Recherche (2017) 'Plan sectoriel mixité dans les métiers du numérique'

³⁵ European Commission (2018) 'Education and Training Monitor 2018', p. 106.

higher education system, thus its quality is of special relevance. Among others, persons from a disadvantaged socio-economic background, many of which lack the means to embark on a university education, and students who prefer a more practical learning benefit from it. The French VET system has attracted a lot of criticism in recent years due to its limited effectiveness (in terms of access and labour market outcomes) and efficiency (in terms of financing and governance).³⁶ A major problem is the system's complexity. The government reform of the VET with its vocational baccalaureate (Bac-pro) and vocational aptitude certificate (CAP) started in May 2018 and is supposed to offer more places in VET programmes preparing for jobs in demand (including ICT jobs) and an additional attractive pathway into the labour market.

In response, an ambitious **VET reform** was launched in 2017, the impact of which will become visible over the coming years. The reform includes an overhaul of the **apprenticeship** system, giving employers (in co-operation with unions) full control over the definition of qualifications and the design of training measures.

All of these measures are expected to improve the VET system's fit with the needs of the labour market. If successful, persons who engage in ICT training programmes within the traditional VET system will benefit in terms of improved employability and more effective links with potential future employers.

³⁶ *ibid.*

4

Findings

Out of 29 programmes identified in France, 21 were found to be directly relevant to inclusive ICT skills training as defined in the scope of our study. In this section, we analyse the results of our survey of stakeholder approaches towards inclusive ICT skills training programmes. We provide a brief look into the pathways available to gain an entry into the digital labour market in France and suggest a taxonomy to classify the programmes surveyed. We conclude this section with a summary of lessons learnt from our selected programmes.



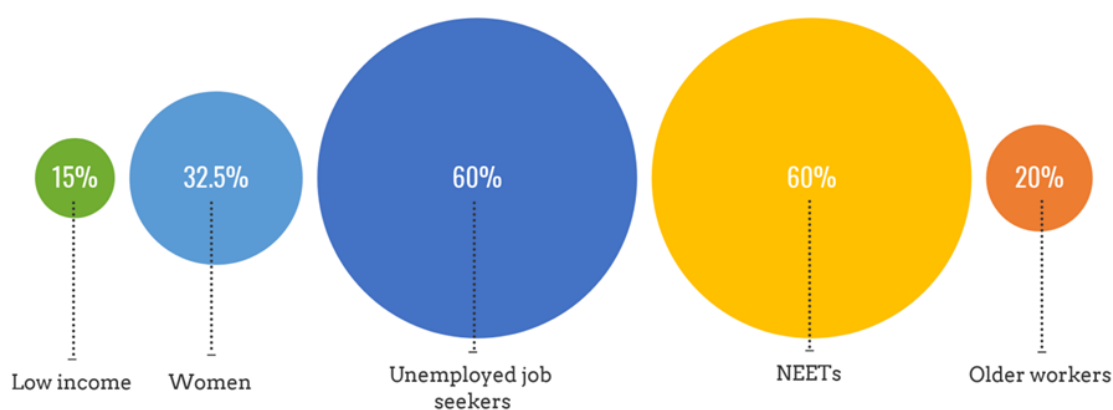
Methodology and research

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

The initial desk research resulted in a selection of 29 initiatives that appeared at first sight to be of relevance to the topic of our investigation. At closer

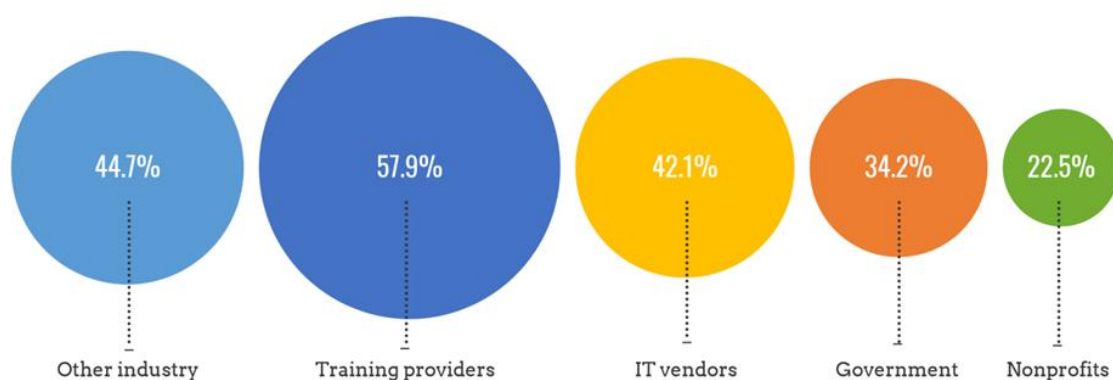
inspection, 21 of these turned out to be directly relevant to the issue of inclusive ICT training. These programmes were specifically targeted towards disadvantaged socio-economic groups such as persons at risk of long-term unemployment and youths not in employment or education and training (NEET). Another frequent focus was on women. Figures 3 and 4 show a further breakdown of these programmes in terms of target groups addressed and stakeholders involved in inclusive ICT training in France.

Figure 4 Share of target groups in inclusive ICT training in France, % of programmes surveyed



Source: diversITy Survey, empirica (2017)

Figure 5 Share of stakeholders in inclusive ICT training in France, % of programmes surveyed



Source: diversITy Survey, empirica (2017)

Pathways to ICT skills training and jobs

There are multiple pathways for individuals to gain an entry into the digital labour market; traditional education in the form of university degrees is by far the most common in France. Recent years have seen strong efforts to overhaul the country's vocational education system with the purpose to increase its contribution to tackling the challenges of both skills shortages and youth unemployment. This process, however, will take many years to create tangible impact. Little can be said at the moment about whether the reforms will achieve the desired results. There has already been some positive impact, however, as many employers in the ICT sector are welcoming the attention policy is giving to involving

industry in the design, management and provision of vocational training.

The shortage of ICT specialists on the French labour market have resulted in a strong demand for possibilities to add digital skills training to educational attainments from another area, such as a degree in the humanities. In addition, there is a move towards more acceptance of ICT training certifications obtained via non-academic programmes.

In response, new pathways have emerged for adults seeking to transition from other sectors into the ICT sector. The five main pathways in France are listed in the table below.

Pathways

Senior high school diploma – technical

On leaving junior high school, students can choose one of three routes: general, technical or professional. The technical route, a particularity of the French system, leads to the *baccalauréat technologique* and prepares students on the basis of their vocational aptitudes for higher-level technical courses of at least two years' duration. A range of technical baccalauréats is available, including for "Science and Technology in Industry and Sustainable Development" (STI2D), which is a common choice for students seeking a career in ICT. These studies can lead to a certificate of professional aptitude (CAP), a vocational education certificate (BEP) or a secondary vocational diploma (Bac Pro). They are designed to provide direct access to employment in entry-level ICT specialist jobs. The training always includes in-company internship.

University education

Multiple degrees exist in the French bachelor and master levels. After one year of studies, a *diplôme d'université* (DU) can be achieved. For ICT, a *diplôme universitaire de technologie* (DUT), a tertiary technical diploma, e.g. in information and communication is a common choice. After two years of studies, a *brevet de technicien supérieur* (BTS), an advanced technical diploma, can be achieved, e.g. in communication and information, (computer science, information

Apprenticeship-based qualifications

Apprentice-based qualifications include employment contracts for young people, which involve a mix of theory-based learning in an apprentice-training centre (CFA - centres de formation d'apprentis) and occupational training on the employers' premises. The framework for apprenticeships can prepare trainees for all the secondary certificates (CAP, BEP, BAC pro). Various CFAs for digital skills exist, providing training for a range of digital jobs. Contracts are for a fixed term of one to three years. The number of graduates entering the labour market through this pathway is small. Since May 2018, the government is investing strongly in the reform and overhaul the country's vocational education system with the purpose to increase its contribution to tackling the challenges of both skills shortages and youth unemployment. One of the objectives is to reduce the number of students in saturated career fields and instead offer more places in VET programmes preparing for jobs in demand including ICT jobs.

Industry-lead trainings

Employers in France consider Industry-led / IT vendor trainings as useful further training certificates. The certificates enjoy a high reputation as such and are accepted as valuable for career transitioning youth and adults and specifically if obtained from reputable international IT vendors. Fees charged by providers can be substantial, but these can often be subsidised or fully paid for by third parties such as the Public Employment Service.

processing, or data transmission). After three years of studies, a *licence*, *licence professionnelle* will be achieved, equivalent to a bachelor's degree, e.g. bachelor of computer science. The last level of university education is the master's degree, e.g. in computer science. Tuition fees at public universities in France are very low in comparison to other countries. Full university education emphasises strong academic learning and some focus on training. In France, it is the most popular pathway towards an ICT job in the labour market. The vast majority of workers in the ICT workforce are following this path.

ICT training specifically targeting unemployed youths

France has a range of government programmes that focus on helping unemployed youths obtain the skills required for finding employment. ICT training has become a common element of these, e.g. in the case of the Production Schools (Écoles de production). The recent Grande École du Numérique initiative has added hundreds of programmes, many of which are operated by NGOs with experience in supporting people at risk of social exclusion, often in co-operation with commercial training providers. In the other countries of Europe, there is nothing like that.

Make ICT training in higher education more inclusive

Regarding the **higher education** pathway, the main issue is the low share of women choosing ICT subjects as well as low retention rates for women in the ICT sector. Experts agree that systematic efforts are required to mitigate the situation, which would need to address all main stages of the talent pipeline, starting from high school to Bachelor's and Master's degree. The French government is engaged in a whole range of policy activity in the area, but there is consensus that real change will require an extended, concerted effort involving all key stakeholders, including government and policy makers, industry, local and regional educational institutions, and more. In the meantime, valuable work is done by NGO programmes driven by engaged citizens' intrinsic interest in boosting diversity, exemplified by Duchess France,³⁷ a voluntary membership organisation focusing on networking, organisation of workshops and other events, as well as promotional campaigns. Another example is the Orange Foundation's Maisons Digitales initiative, which makes innovative use of the interest of Orange employees to engage in volunteer work for the common good.

³⁷ www.duchess-france.org

Apprenticeships and vocational qualification certificates in ICT

Education experts agree that "*formation en alternance*", i.e. trainings that combine classroom training with on-the-job training in companies, substantially improves chances of employment. "Work-study based apprenticeships offer better employment chances than school-based vocational training [...]. Apprentices combining training in a company and study in an apprentice-training centre (centre de formation d'apprentis or CFA) account for only roughly a third of vocational students. Yet, they have a significantly higher employment rate."³⁸

In France, apprenticeships can lead to all vocational certifications registered in the national directory of professional qualifications. This includes the vocational qualification certificates (CQP) created by the ICT, engineering and consulting sectors.³⁹ CQPs are developed in direct response to a skills need recognised by employers, and are often recognised only by the professional branch concerned. CQPs exist as database administrator, systems and network

³⁸ Brandt (2015) 'Vocational training and adult learning for better skills in France'

³⁹ <https://moncqp.fafiec.fr/>

administrator, technical architect, new technology developer, or information security and risk manager.

When analysing the ICT workforce development over the past years and using Eurostat data it becomes apparent that the VET/apprenticeship-level skills jobs have increased in France by almost 20,000 from 2014-2017 from 252,000 in 2014 to 270,600 in 2017. These include the lower to mid-level skills at ICT technician level. This development should be a proof that graduates of this specialisation leave the French education and training system and find a job in the labour market.

Unfortunately, in France apprenticeships have long suffered from the perception that they are merely as a second-class route for those students who failed to succeed in the mainstream French education system.⁴⁰ This is in spite of evidence that apprenticeships are already doing a much better job than is generally acknowledged. Apprentices usually find a job within six months of completing their scheme, as they are generally favoured over other candidates because of their work experience.⁴¹

Against this background, there is a need for concerted efforts to change public perceptions about apprenticeships. The current attempts of the government to give employers (in co-operation with unions) more control over the practical aspects of the system are promising, as they should encourage companies to become more pro-active in attracting apprentices.

e-inclusion incubators

CNNum, an independent expert commission advising the government, in a 2013 report, recommended use the **high-tech business incubators** set up in recent years by major cities also for inclusive ICT training purposes. “Since business incubators and accelerators have successfully launched a number of high-tech products, why not use them for integration and social digital economy projects? Means to stimulate software innovation and the creation of start-ups can also be used with respect to integration.” Companies that receive public subsidies within the context of business incubator and accelerator programmes could be required to provide work placements to members

of groups underrepresented in the ICT workforce. Such “**e-inclusion incubators**” could also provide a new setting for reforming the apprenticeship system “by bringing together technologies, jobs, integration and business creation under the same roof.”⁴²

Second Chance Schools and Production Schools

The French government has launched a number of training initiatives in recent years targeting young persons who are at risk of social exclusion due to limited success in formal education. These programmes use an approach that is by intention in marked contrast to traditional schools, as a means to overcome deeply engrained aversions against the kind of education context in which participants have a history of failure. The new interest in such initiatives is related to the government’s recent announcement that it will make participation in education or training obligatory for all young people up to 18 years old.

One of these is the **Second Chance School** (*Écoles de la deuxième chance*, or E2C), a programme for 16–25-year-olds who experience severe challenges in finding a decent job. Most E2C students have no qualification, and many have dropped out of school at an early age. Participants are identified by local outreach offices (*Missions locales*), who decide whether to send them to an E2C based on an assessment of their needs. The main objective of the E2C is to reintegrate young people into the labour market by equipping them with the basic competences and soft skills required for finding employment. An internship in a local company takes up at least half of each student’s overall training time, which is expected to provide key employability skills but also offer the chance to find a job with the company after finishing the training. The partnerships established with local businesses are a main factor behind the programme’s success.⁴³ Companies employing ICT specialists have started to use Second Chance Schools for training future candidates for entry-level ICT positions.

Production Schools (*Écoles de production*) are private, non-profit, state-recognized, technical education institutions targeting people aged 15 to 18. They are based on the notion of learning-by-doing through realisation of orders to market conditions for real customers. These customers in most cases are local

⁴⁰ Sigere (2017).

⁴¹ Brandt (2015) ‘Vocational training and adult learning for better skills in France’

⁴² CCNum (2013) ‘Citizens of a Digital Society’, p. 60

⁴³ Recotillet, I. and Werquin, P. (2017) ‘Creating ‘second chance’ opportunities for young people’

partner companies who have signed a co-operation contract with the school. Integration into professional life is achieved without work placements in the traditional sense, i.e. both practical work and classroom training take place on the premises of the school. The Production School concept has been in existence in France since the 19th century. It has, however, recently started to attract attention again as a promising approach to combat youth unemployment. Traditionally focused on craft-based trades, recent years have seen the launch of Production Schools exclusively dedicated to the digital domain. For instance, the EDEN School in Lyon provides education for at-risk youths in web and mobile app development.⁴⁴ In 2018 the French government passed a bill that will make Production Schools eligible for receiving funds from the apprenticeship tax, which is expected to make up for a third of the funding needed on average.⁴⁵ Alternative paths to a career in ICT: The Grande École du Numérique

For most ICT specialist occupations, the only qualifications traditionally available were master's degrees and, to a lesser degree, bachelor's degrees. Other kinds of ICT training preparing for a career in ICT were hardly existent. The strong demand for ICT specialists, including for positions that do not necessarily require an academic qualification such as web developers and user support technicians, has led to a call for new training pathways. The government is interested, in particular, in trying out how addressing the ICT skills shortage challenge can be combined with measures to combat youth unemployment and the need for more inclusive pathways into quality employment.

The main vehicle for experimentation in this area has been the Grande École du Numérique (see Box 3). Training programmes are free of charge, and many of them provide successful participants with a degree recognised by the Répertoire national des certifications professionnelles. Training programmes under the GEN label give special priority to NEET youths and must comprise of at least 30% women as their student body.

Prospective learners can receive financial assistance from the Ministry of Education, Higher Education and Research if they are otherwise unable to enrol. Individual programmes also have their own arrangements with sponsors e.g. from industry which are used for this purpose.

By mid-2018, 410 ICT training programmes have received the label, and about 11,400 people from disadvantaged backgrounds participated in trainings. Of these, 65% had been neither in employment nor in training before, 24% are women, and 17% are from priority neighbourhoods in cities.⁴⁶

Course duration ranges from three to 32 months, with an average of 7 months. 4% of the courses were pre-qualifying, i.e. they provide the basis for subsequent continuation in a full course, which will then allow them to gain a certification. Programmes use a variety of pedagogical approaches with an emphasis on modern methods such as learning by doing (91% of all programmes), project-based learning (88%) and collaborative learning (74%). The main objective of these approaches is to expose learners to the kind of challenges they will face in their future job. This is expected to contribute to their smooth integration into the job market. In addition to technical skills, all programmes cover training in soft skills such as CV and application writing, working in project teams, self-learning, and use of social networks for career-building.⁴⁷

Following their training, 40% of the participants in 2016 found a job within three months and 64% of them within six months. Of those who found employment, 16% chose self-employment.⁴⁸

Some of the programmes sporting the Grande École du Numérique label include the selected Good Practice Showcases Simplon.co, École 42, Web@cademy and WebForce 3. For further information, see Appendix D.

⁴⁴ <https://www.edenschool.fr/>

⁴⁵ <https://www.ecoles-de-production.com/taxe-dapprentissage/>

⁴⁶ Arène (2018) '11 400 personnes formées par la Grande école du numérique'

⁴⁷ GoodStudies (2018) 'La Grande École du Numérique (GEN)'

⁴⁸ *ibid.*

A radical approach to ICT training that is adapted to labour market demand, accessible for all regardless of socio-economic background and success in formal education

École 42 provides ICT specialist education to young people in preparation for digital jobs in the ICT sector or in one of the other sectors undergoing digital transformation. The programme is free of charge and open to every young person interested in ICT, no matter whether he or she possesses an academic degree. The selection process takes account of merit only. Only candidates who demonstrate excellent cognitive skills and strong motivation have a chance to be selected, though. The selection process requires extensive preparation, which can be a barrier for populations with low educational attainment and/or distant from the labour market. Learners take about three years to complete their training at École 42. The school does not have any teachers or lectures. Instead, training is based on a system of self-education via peer-to-peer and project-based learning. This means that learning is organised around projects proposed by a pedagogic team. Students acquire the skills for carrying out projects by self-learning using third-party content available on the Internet, and via peer learning, i.e. helping each other. This requires a lot of discipline and will often present a challenge to learners from disadvantaged backgrounds. Feedback on performance does not come from tutors, but from peers. The programme does not issue any diploma or degree. The college offers its students a range of opportunities for professional integration, including projects carried out for companies and internships. École 42 is funded from the private wealth of one of its founders.

Why a good practice showcase?

- **Outstanding success in placing learners in high-quality ICT jobs:** Since 2013, 3,500 students have enrolled in École 42, nearly 900 each year. Around 1,000 of these 3,500 enrolled since 2013 have a NEET background and more than 500 come from socially depressed areas. Out of these 900 students, around 600 launch their career before completing the curriculum, a result of the excellent career opportunities as well as the many links between the school and the industry. All students so far have been successful in finding a job immediately after completing the training.
- **High visibility as an alternative approach to ICT training:** The success of École 42 demonstrates that there is a demand for alternatives to both public and private universities. It opens up novel opportunities, in particular, for talented young people who for one reason or another have failed in formal education and for this reason cannot access public or private tertiary education because they lack the qualification or financial means, respectively.
- **An experiment in application of innovative methods of training provision:** École 42 makes strong use of self- and peer-learning organised around projects. This is enabled by the latest technologies for online collaborative work as well as the wealth of learning content available on the internet.
- **Franchise model for expansion:** École 42 has created a franchise model and expanded in France (le 101), Belgium (19), the Netherlands (Codam), South Africa (WeThinkCode), Ukraine (UNIT), Russia (21) and Morocco (1337).

For full details of the case, see Appendix E.

Training taxonomy targeting training needs

We classified the ICT skills training programmes identified in France in six categories based on the programmes' approaches to learning. The most promising programmes use multiple methods that are a combination of two or more approaches. The advantage of using integrated approaches is that it

allows for the development of both technical and cognitive skills. These approaches are discussed in more detail below.

Bootcamps



Intensive training programmes generally lasting from a few days to several months. Training can be full- or part-time depending on the programme and consists of lessons, individual and team projects, 1:1 tutoring and tests.

Workshops



These typically take one to three days. Training is on specialised topics and consists of presentations and interactive peer-to-peer sessions.

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

Success factors

- **Affordability:** Bootcamps are an affordable method of acquiring knowledge.
- **Flexibility:** Compared to university programmes, bootcamps are more flexible in terms of curricula and can respond faster to changing market demands.
- **Prior Experience:** Bootcamps are less selective than universities in terms of prior qualifications. Individuals who are interested and do not necessarily have an ICT background can enrol in training bootcamps.

Challenges

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

Classroom



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

Online



Training includes but is not limited to massive open online courses (MOOCs). Courses are available on online platforms, are mostly free to join and may or may not have instructors. Assessments are sometimes self-administered or based on peer-to-peer feedback, while others offer the possibility to take a final exam and earn a certificate.

While classroom training is still the most widely used approach towards ICT skills training in France, more and more training providers offer blended learning experiences, i.e. classroom lectures in combination with online learning elements. The main supplier of MOOC in the country is France université numérique (FUN), which

has started as a government initiative in 2013. FUN is a platform through which MOOCs from a large number of French universities and other established education providers are accessible. In recent years, the public interest group behind FUN has spent increasing effort on promoting the platform to stakeholders in the national system for vocational training.

A blended learning approach is followed by WebForce 3. Classroom lectures are delivered by ICT specialists on campuses around the country. In addition, learners spend time learning online every day. The blended learning approach has been found to be particularly suitable for people with limited success in formal education. Participants receive continuous support from mentors who are part of the WebForce 3 team.

Success factors

- **Flexibility:** Learning through online platforms can be more flexible as trainees can access courses and schedule tests based on their own availability. However, this may not be possible with classroom training if programmes follow a strict in-house schedule.
- **Learner engagement:** Classroom training tends to be much more suitable for ensuring engagement of persons who lack self-efficacy, such as often found among NEET youth and the long-term unemployed.
- **Local embeddedness:** Trainings that are fully or partly classroom-based allow a training institution to grow strong links with relevant public and private stakeholders in the local area, thus facilitating access of learners to work placements and jobs.
- **Certifications:** Courses include but are not limited to content provided by IT vendors, such as Microsoft, SAP, Cisco and Oracle. Vendor-specific trainings follow a partner-centric approach in which companies create the curriculum, which is then delivered by partners.
- **Employability:** Such trainings have the advantage of providing certifications that are valued by employers. A disadvantage of vendor programmes is their focus on the vendor's products, which means they tend to be considered by employers as not generic enough to educate on the underlying principles. Stakeholders in the sector report that employers increasingly want employees to cross-certify with multiple vendors.

Challenges

- **Affordability:** Classroom training following a vendor-specified curriculum resulting in a certification tends to cost more, both for trainees and training providers. These programmes, unless funded through sponsors and other mechanisms, are unable to reach low-income groups like NEET youths.
- **Accessibility:** Training programmes which require the presence of the learner at the location of the training provider tend to be available most of all in the major urban centres of the country, as our assessment of the training landscape shows. Other parts of the country tend to be underserved. Classroom based training is also less suited for persons requiring flexibility about when to learn, such as parents of young children – in particular single mothers.
- **Prior Experience:** These programmes, especially if offered free, tend to be more selective when choosing prospective participants. Stricter selection criteria have the risk of excluding those who may have the most to gain from such employability skills.
- **Self-efficacy:** Since most online trainings are self-paced, they require a high level of self-efficacy from learners. This is often result in high dropout rates.

Experiential



A mix of technical and experiential learning including classroom-oriented learning and company placements. Both digital apprenticeships and, to a lesser degree, traineeships are designed around experiential learning.



Mentorships

Not a stand-alone training type and is integrated with other types. A trainee can choose or is appointed a mentor who is an experienced instructor or employee. The mentor is responsible for providing 1:1 guidance.

Experiential programmes such as apprenticeships and programmes including compulsory work placement are a more recent approach towards ICT skills training. Depending on the programme, training can last from a few weeks to several years. The training curriculum is designed to reflect the demands of employers. Mentorship programmes that seek to increase workforce diversity often make use of volunteer mentors who have a personal interest in helping young persons succeed in the ICT sector. The Good Practice Showcase Simplon.co is a typical example of a programme in which local enterprises are involved at each stage of preparation, provision and further development of the training providers. Enterprises participate in the selection of trainees and provide work placements, in exchange for privileged access to graduates after completion of the programme. The same holds true for Web@cadémie where industry partners provide offer support in terms of work placements and mentoring.

Success factors

- **Certifications:** Depending on the programme, a trainee may or may not receive a certification. However, the number of hours worked are recognised as formal work experience.
- **Employability:** Internships and workplace learning programmes have high added value for trainees as they learn both technical skills and soft skills, and get in touch with employers who may want to offer them a job after completion.
- **Employer engagement:** As training is structured to reflect the demands of employers, employers can benefit from being involved in the training by getting relevant skills in return. This is a major success factor of experiential training programmes, especially those developed with the help of business-education partnerships.
- **Mentorships:** In many such programmes, technical training is accompanied by mentorships. Mentors are a valuable source of learning for new trainees or employees at the beginning of their careers. Mentorships work well if mentors are selected based on an intrinsic interest in supporting others during their career.

Challenges

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

Good Practice Showcase Simplon.co

Digital training programmes delivered to unemployed job seekers, tailored to the labour needs of local industry partners

Simplon.co operates with 34 schools that offer training programmes primarily aimed at unemployed job-seekers, 30% of whom should be women. The programmes, which include Web developer and Java developer, provide certified qualification that seeks to be optimally tailored to current needs on the labour market. Most courses last 6.5 months and do not require any prior technical expertise – ICT beginners are accepted. Applicants, however, need to bring strong motivation, a general interest in the digital domain, and an open attitude towards working in teams. Simplon.co programmes focus on coding and programming, with modules that are continuously adapted to the rapid change in the digital sector. It also puts much emphasis on developing soft skills such as curiosity, creativity, self-learning, leadership and self-esteem. Simplon.co is one of the training providers, which are paid by government bodies (Pôle Emploi, OPCA, Regions) for training people excluded from the labour market, with the objective of easing their reinsertion and professional development. Other sources of funding include partnerships with local

employers from industry; services delivered to enterprises (trainings, workshops, events, web and app design); and donations e.g. from industry foundations. Thus far, 2056 people completed the training until 2018 of which 78% were recruited after completion and 22% continued in further education or internships. Currently 35% of participants are women with the goal to reach 50% by the end of 2019.

Why a good practice showcase?

- **Highly inclusive recruitment process:** Local enterprises are involved at each stage of preparation, provision and further development of the training providers. Enterprises participate in the selection of trainees and provide work placements, in exchange for privileged access to graduates after completion of the programme.
- **Pedagogical approach tailored to the target group:** Simplon.co's innovative educational approach is based on learning by doing, learning by teaching, peer education and reverse mentoring. In the latter case trainees are asked to deliver workshops on specific topics to the employees of partner companies.
- **Strong emphasis on promotion, including extensive reporting on social impact:** Simplon.co regularly publishes reports on the social impact of its programme. It has achieved high visibility in the media through a carefully designed PR strategy.

For full details of the case, see Appendix E.

Good Practice Showcase Web@cadémie

Free ICT training using an innovative pedagogical approach fully based on project-based and peer learning

Web@académie was founded in 2010 by ZUPdeCO, a French charitable NGO whose mission is to help students from disadvantaged backgrounds achieve academic success, in partnership with private computer science college Epitech. Epitech has pioneered fully project-based learning in the ICT training landscape in France. Web@académie is a free of charge school for people ages 18 to 25, especially dropouts who left school without a baccalaureate. Any such person is eligible for signing up for the programme in web development. The 2-year training programme is comprised of 12 months of training at an Epitech technology campus, followed by a second year in which classroom-training alternates with periods of internship in an enterprise. The latter allows learners to deepen their skills and apply the knowledge acquired in a real-life business environment. Successful participants receive the Certificate of Integrator and Web Developer from Epitech.

Why a good practice showcase?

- **Effective partnership between a charity and a private sector computer sciences college:** For provision of the inclusive training programme, NGO ZUPdeCO chose a partner with a track record in producing graduates who are highly sought after by employers. Provision of soft skills is of special relevance for members of Web@académie's target group, who typically suffer from low confidence in their learning ability.
- **Success in placing participants in high-quality jobs:** Of the 128 graduates who have completed the programme so far, 98% are already in employment, 80% of whom with a standard (temporary or permanent) employment contract (CDD/CDI).
- **Strong co-operation with industry:** Through Epitech, Web@académie has access to a network of companies from the ICT and related sectors that are keen to participate in the training of their future employees. Apart from acting as sponsors of the programme, industry partners provide essential, non-financial support in the form of work placements and mentoring.

For full details of the case, see Appendix E.

Good Practice Showcase WebForce 3

Intensive, 3.5-months ICT training for jobseekers who require a fast track into employment, including NEET youths

WebForce 3 is an intensive training programme in web development, conceived to be accessible for everyone, with special attention to jobseekers who did not continue education after graduating from high school. Their non-profit arm is called PassW. The main aim is to equip learners with exactly those skills, which will allow them to find a job as fast as possible. Applicants should have some basic knowledge in computer science and well developed cognitive skills. Most participants can access the programme for free as they are eligible for government-funded training for people at risk of unemployment. The training takes 3.5 months, during which students absorb 490 hours in class education and about 15 days of group projects. Classroom lectures are delivered by ICT specialists whose day job is in web development. Provision is on campuses around the country, in the vicinity of learners' place of residence. In addition, learners spend time learning online every day. The blended learning approach has been found to be particularly suitable for people with limited success in formal education. Participants receive continuous support from mentors who are part of the WebForce 3 team. These are also instrumental in establishing links to employers who might be interested in work placements or employment once the programme has been completed. Further development of the curriculum is carried out in close partnership with industry. Between 2014 and 2017, approximately 1,800 participants (from 18 to 45 years old) have started a WebForce 3 course. 98% of the participants have completed the training, and 95% walked away with a certification.

Why a good practice showcase?

- **Success in activating people at risk of unemployment:** About 90% of learners who received a certification from WebForce 3 found work within six months after completing the course, the majority of which in the form of a standard employment contract (CDI or CDD).
- **An effective training model:** The initiative pays much attention to ensure that courses are not targeted at an elite of engineers but truly accessible to a wide scope of people as long as they come with strong motivation. The blended learning model, which includes classroom sessions, is essential for letting learners interact in a diverse group of learners and work jointly on solutions for problems. The fact that lectures are delivered by professional web developers ensures that the training fully reflects the conditions present in real-life work settings.

For full details of the case, see Appendix E.

Lessons learnt

Transversal skills training are as important as technical skills

Feedback from employers reveals that learners with well-developed soft skills are better positioned to be recruited by employers. Digital skills, in particular, are linked to a number of different soft skills such as creativity and communication. For this reason, exposure to the digital tech sector itself is seen as crucial to support someone into employment. Such exposure can take the form of a work placement, which is part of the training course, or an apprenticeship where training and work experience are combined throughout. Soft skills in demand range from effective communication and coordination to problem solving, negotiation, teamwork and collaboration, and decision-making. Employers indicated that graduates and trainees with no prior work experience tend to lack such skills, which points towards the potential of novel types of ICT training programmes to significantly increase the number of suitable candidates available on the job market. The programmes under the Grande École du Numérique initiative all offer some form of work placement as part of their pedagogical approach.

Good ICT skills training programmes in France address the development of soft skills, for example, by using smaller sessions within larger training modules. Such sessions are specialized to account for different needs of the trainees, such as conducting interview simulations, workshops on communication and team-building exercises. Epitech, the ICT training provider behind the Web@académie and École 42 programmes (see Good Practice Showcases in Appendix D), views project-based learning as an ideal way to equip students with soft skills: By having to collaborate closely in diverse teams of learners on solutions for solving real-world challenges, participants acquire the kind of practical skills that employers are particularly keen on.

Mentorship and role models are considered as guarantors for success

For members of groups traditionally underrepresented in the ICT workforce, one-to-one support may be required to help address challenges such as feelings of not-belonging. This is an area where the presence of a well-designed mentorship model can make all the difference. Mentors need,

however, to have both the resources in terms of time availability and the motivation to effectively support mentees. There is evidence from France's traditional apprenticeship system, under which every apprentice is supposed to be assigned to a mentor, that many mentors fail to take the assignment seriously.⁴⁹

Our analysis shows that the mentorship model is particularly well suited to encourage girls and women to consider ICT careers for two reasons: first, because female role models have been found to play a key role in young women's attitude to working in the digital sectors; second, because it tends to be comparatively easy to recruit volunteer mentors among women working in the digital sectors. This is because, as surveys have repeatedly shown, they have typically perceived a range of gender related obstacles themselves during their career, which they are often keen to help remove for future generations of women working in the sector. In this context, women-only training programmes featuring various training taxonomies are an efficient format to help women engage other women in a still predominantly male sector.

Grande École du Numérique, a multi-stakeholder partnership and vehicle for experimentation

The Grande École du Numérique, a multi-stakeholder partnership launched by the Ministry of Labour and Employment as a vehicle for experimentation in the field of (inclusive) ICT training in September 2015 is unique throughout Europe. Today, it is a network of more than 750 training courses in digital professions. It promotes inclusion and meets the needs of recruiters in terms of digital skills. It has published calls for the development of inclusive ICT training programmes that meet a number of criteria: trainings need to target school dropouts, women who are not in training or employment, and/or residents of deprived urban neighbourhoods. So far about 11,400 people from disadvantaged backgrounds participated in trainings. This large-scale government initiative looks like a success story offering a variety of different approaches to inclusive ICT training and good value for money. A thorough evaluation and impact analysis

⁴⁹ ProActive Academy (2017) '9 causes des ruptures des contrats d'apprentissage'

and assessment could help obtain final confirmation on this and reveal evidence-based results and conclusions on the real merits of the approach (see 'Recommendations').

Box 4 Key lessons learnt from ICT training in France

Outreach



- Programmes target a variety of socio-economic groups (see Figure 3). A high proportion is geared towards NEET youth, long-term unemployed job seekers and women.
- Outreach to highly vulnerable groups is mostly done jointly by public sector agencies (such as Pôle Emploi), training providers, industry associations and, where applicable, the NGO sector. Recent years have seen a strong government push for inclusive ICT training, which has greatly supported the visibility of the programmes on offer.
- Initiatives jointly operated by NGOs with major employers in the digital sectors are the most effective in terms of outreach, particularly through effective campaigning using well-established channels of communication. They typically benefit from the personal commitment of volunteers who use their own networks for outreaching purposes.

Training



- Business-education partnerships are essential for developing training curricula. Training programmes designed with strong input from industry or IT vendors can better reflect the market need for ICT skills.
- An added advantage of IT vendor programmes is the lower risk of training being outdated because of frequent new qualification offers and options to renew past certifications.
- Successful trainings combine a variety of training methods. The most important aspect of multi-level training is the development of both technical and cognitive skills, such as the ability to work in teams, effective communication and problem solving. In addition, many successful programmes equip participants with skills in self-marketing.
- Mentoring using (mostly) volunteer, seasoned ICT specialists as mentors and role models has been tried and tested and proven to be able to effectively address challenges in attracting and supporting women, but not yet other underrepresented groups.

Employability



- Employers frequently state that both the level of technical skills and prior experience in the work environment are important. Trainings that combine classroom training with on-the-job training in companies, as in the case of apprenticeships, can therefore offer a direct route into employment, especially for underprivileged groups.
- Programmes that are designed with strong input from employers in the digital sectors and also offer periods of work placement often lead to direct employment of after participants have completed the training. The main challenge in this case is ensuring that the selection process for admitting candidates to the training does not work to keep out members of groups currently underrepresented in the ICT workforce.
- Certifications have a high added value for job seekers. Employers prefer hiring those candidates who have successfully completed high quality training from reputable training institutions. If programmes do not equip successful participants with well-established, third-party certifications, they risk being of limited impact in terms of improving employability.

Source: *diversITy Survey, empirica (2017)*

Conclusion

The topic of inclusive ICT training has been high on the French policy agenda for some years already. A range of initiatives has been taken both to respond to the digital skills crisis and for promoting the socio-professional integration of young, unemployed people. A further focus is finding ways to encourage and enable more women to choose a career in ICT. Against this background, a number of NGOs, training providers, the ICT business community and state agencies have taken the initiative to explore novel options for ICT training. Many of them are taking part in the government's flagship initiative in the area, the Grande École du Numérique. Taken together, the programmes operating under the Grande École du Numérique act as a large-scale experiment of how to design inclusive ICT training measures for labour market insertion. While it is too early to draw conclusions about the campaigns' ultimate success, we can derive a number of recommendations from our analysis of up-and-running training programmes.



The available evidence suggests that Grande École du Numérique has met its numerical targets (400 programmes and 10,000 enrolled learners), but not much is known yet about employment outcomes at the aggregate level. Our research found indications that achieving sustainability over the longer term will come as a challenge for many smaller training schemes, once the start-up funding available under Grande École du Numérique will dry up.

In any case, the initiative together with much-talked about individual programmes such as Simplon Co. has raised significant attention for the potential ICT training offers for groups currently underrepresented in the ICT workforce. There is an increasing awareness that non-academic pathways to careers in ICT are required, both to respond to the digital skills crisis and

for promoting the socio-professional integration of unemployed people.

Taken together, the programmes operating under the Grande École du Numérique act as a large-scale experiment of how to design inclusive ICT training measures for labour market insertion. The four programmes selected as Good Practice Showcases (see Appendix D) differ strongly in terms of approach used. Whereas École 42 relies fully on self- and peer-learning, Simplon.co and WebForce 3 make extensive use of industry experts who provide classroom and one-to-one training. Our investigation of the inclusive ICT training landscape in France found a range of other successful and promising approaches. In the following, we derive several recommendations from our analysis.

Recommendations

Promote ICT careers to women

Only a small share of female students in France enrolls in ICT related subjects, as discussed above. It is therefore of vital importance to give special encouragement to young women in France to consider a career in ICT.

The lack of awareness and potential, together with the lack of appreciation for women in ICT inhibit the promotion of ICT careers for women. Interventions in the form of awareness-raising campaigns and taster programmes are already being utilised by French programmes to encourage young women to consider careers in ICT. Short-term internships, in combination with coding workshops, maker labs for schoolchildren etc., help to raise interest among young women. These activities should be continued and extended to reach many more young women and their main influencers since they all help to reduce what metaphorically is described as the 'leaky pipeline'. In the case of women and ICT it describes the fact that women discontinue education and career paths in the ICT but also STEM (science, technology, engineering and mathematics) fields at a much higher rate than men. As a result, there are many fewer women than men in STEM-related careers, especially in high-level positions.

Women students and employees in the sector must be mobilised for this objective because they are best able to convince their peers. One way to do so is by women-only training programmes as they provide a

format for women engaging other women in a predominantly male sector. This helps create a new female work culture and better promotion of careers for women.

In general, actions should not only be concentrated on the highest levels of qualification but promote apprenticeships and other non-academic pathways as well (inside and outside the NQF) to promote ICT jobs. In France, more than 40% of jobs make up for lower and mid-level skills positions in the growing ICT jobs market. The past government reforms - including the most recent one that started in May 2018 - will (hopefully) soon bear some fruit according to plan. This will then result in a stronger engagement of the social partners in shaping the content of VET curricula, in the definition of clear apprenticeship paths for jobs in demand such as ICT jobs at different skills levels, and the expansion of apprenticeships in all vocational high schools, with alternating periods of classroom-based learning and in-company training.

There should be a high profile, multi-channel marketing campaign on opportunities for women in digital jobs. This also needs to challenge traditional perceptions around non-academic education and include parents, teachers and the wider public.

Leverage the power and creativity of existing communities of engaged citizens

Our analysis has revealed that France has a very strong community of engaged citizens groups who are

working to promote equality of chances for women in ICT education and the digital workforce in particular. They are carrying out a large range of activities, many of which by women working in ICT and are keen to reach out to girls and young women at a time when they make career choices. Examples of NGOs with outstanding success in the area include, StartHer, Girls in Tech Paris and Paris Pionnières.⁵⁰

Their experience should be used best for giving other groups currently underrepresented in the ICT workforce a stronger voice as well. Government funding could also help increase the reach of NGOs that provide effective, short-term ICT training such as coding clubs. It may be a good idea to develop a framework together with performance criteria through which such NGOs could receive accreditation and, based on it, public funding.

Offer training that is adapted to the need of learners for flexibility and support

Different perceptions of work-life balance in the ICT sector exist in France. Still many women choose courses of study that, in their opinion, are more compatible with family life, as the digital sector has no good reputation in this field. At the same time, women in engineering and digital companies say that this is no longer a difficulty, because companies have made efforts in this area. Most of them are gradually committing themselves to ensuring that women wishing to have children are in a good position. Overall, the negative view on this subject is mainly found among students and non-employees.⁵¹

In general, trainings benefit from flexibility in enabling different ways to fit learning and work around people's lives. This applies to women (mothers) but also people with disabilities and health problems, or with caring responsibilities.

Support services that can help overcome practical obstacles may include childcare, eldercare, coaching, networking, and time off from work. Technology can help meet the need for flexibility as well. Existing programmes such as WebForce 3 (see the Good Practice Showcase in the Annex) make extensive use of online provision of training, while the need for attendance is limited to some classroom lectures and

a phase of work placement. Organisation of the latter should aim to allow for as much flexibility as possible to cater, for instance, for parents with care responsibilities for small children or people with disabilities.

Offer better support to SMEs to engage them in inclusive ICT training

Most SMEs find it difficult to divert resources to offering apprenticeships or traineeships to young persons, especially if they are asked to consider taking on persons from groups currently underrepresented in the ICT workforce, many of whom need special support in one way or the other. Financial incentives such as access to government funding alone will not suffice to change the situation.

A comprehensive support system is required to address the main barriers to stronger engagement in inclusive training. For arranging such a system, multi-stakeholder partnerships at local and regional level have been shown to be most effective.

For this purpose CNNum, the independent expert commission advising the government, in a 2013 report, recommended to use the high-tech business incubators set up in recent years by major cities: "Since business incubators and accelerators have successfully launched a number of high-tech products, why not use them for integration and social digital economy projects? Means to stimulate software innovation and the creation of start-ups can also be used with respect to integration." Companies that receive public subsidies within the context of business incubator and accelerator programmes could be required to provide work placements to members of groups underrepresented in the ICT workforce. Such "e-inclusion incubators" could also provide a new setting for reforming the apprenticeship system "by bringing together technologies, jobs, integration and business creation under the same roof."⁵²

Apprenticeships

In France, apprenticeship-based training suffers from a severe image problem. Employer associations have frequently complained that the current system is ill

⁵⁰ See <http://starther.org>, <https://paris.girlsintech.org>, <http://www.pionnieres.paris>

⁵¹ Etude Syntec numérique and OPIEC (2016), p. 60

⁵² CCNum (2013) 'Citizens of a Digital Society', p. 60

adapted to their needs although they partly finance it through a special payroll tax.⁵³

In early 2018, a reform of the system was outlined by the French government. One of the objectives is to give employers (in co-operation with unions) control over the definition of qualifications and the design of training measures. The details of the reform are being agreed on in dialogue with key stakeholders. Some experts have argued that the reform fails to address key problems of the current system, such as the lack of incentives to make companies create more training schemes for digital skills.⁵⁴

Even if the reform measures turn out to achieve their direct objectives, experience from other countries that have embarked on comparable reforms, e.g. the U.K., suggest that considerable efforts will be required to promote apprenticeships to young learners. This will need to include convincing key influencers such as parents, teachers, as well as the wider public that apprenticeships in the digital domain present a high-quality option towards a career in ICT.

Offer more mentorship

Mentoring programmes have been discussed previously as a training approach in experiential learning. There is, in addition, the possibility of mentorship programmes for students and trainees during their education, specifically for women and people from minority groups. Mentors can play an important role as role models who help question traditional gender roles; they can demonstrate career opportunities for groups currently underrepresented in the ICT workforce; and they can provide practical, tried-and-tested ways how to address obstacles in day-to-day training. Moreover, mentors provide network contacts that can make all the difference once the time has come to apply for a job.

Many mentorship programmes make use of seasoned employees who volunteer for the role based on an intrinsic interest in advancing progress in the diversity area. However, the small number of people from many underrepresented groups in the workplace means that findings mentors in-house – for example, successful employees with a disability – can pose a challenge. For this purpose, innovative models may

need to be developed, such as cross-organisational and cross-regional mentor networks, possibly operating online only, for which employers can apply.

A campaign for mentorships could also go some way to address the demand for a change in attitudes among recruiters. As some experts have observed, “recruiters must be convinced to step outside the institutional framework of diplomas and trainings, and agree to employ individuals whose paths in life have provided them with personal skills that would be useful to businesses.”⁵⁵ Engagement of companies in mentorship programmes could help create awareness of candidates who do not come with the credentials usually considered necessary for a given vacancy.

Career guidance

Traditionally there has been lack of awareness of available non-academic education pathways in France. There is also very limited knowledge about careers in ICT among young girls and women but also to their parents. Young people in general seem to struggle to identify the different sectors and their professions and often confine themselves to the professions known to their circle of relatives and friends or to the most well-known professions in society.⁵⁶ Moreover, a 2016 study based on an interview survey with young women found predominantly negative perceptions about the quality of advice received from guidance counsellors at schools.⁵⁷

Much effort is therefore required to provide effective career advice about careers in ICT and the pathways available to access them. Given the current bias towards third-level education, the role of career guidance must be to improve the attractiveness of apprenticeships and other non-academic ICT training. For this, it needs to reduce the stereotypes and prejudices among young people and their main influencers such as parents and teachers. Many young persons from groups at risk of social exclusion are ill advised to embark university education. These people need support to make well-informed and sustainable educational choices that match their capabilities and preferences.

⁵³ ReferNet France (2014) ‘Apprenticeship-type schemes and structured work-based learning programmes: France’

⁵⁴ Sigere (2017)

⁵⁵ CCNum (2013), p. 59

⁵⁶ Etude Syntec numérique and OPIIEC (2016)

⁵⁷ Etude Syntec numérique and OPIIEC (2016) ‘Attractivité de s métiers du numérique et de l’ingénierie pour les publics féminins en France’, p. 22 (own translation)

Those involved in employment and integration efforts must be given a better understanding of digital professions and the skills needed for them. Actions must target all actors in the career guidance and counselling networks: Pôle Emploi, les Missions locales, consulting actors in Professional Evolution, Fongecif, as well as guidance counsellors, teachers, and the other main stakeholders.

The French career guidance service (CEP) is currently being overhauled with the aim to offer both employed and unemployed persons support for personal career transitions and suitable training. The reform is linked to the introduction of the personal training account (CPF), launched in 2015. Stakeholders concerned about inclusive ICT training should strive to ensure that their priorities are reflected in the new career guidance structures and processes that are currently being established.

Unlock dormant potential within companies to invest in inclusive training

Most stakeholders agree that companies in France and elsewhere need to invest more resources in training current and future employees to stay on top of developments in the fast-moving ICT domain. This opens up the question whether there are innovative ways how to make it more attractive to employers to divest resources into training.

One way to engage companies to invest into diversity is to appeal to economic success of diverse companies and raise awareness for the business case for inclusion and diversity. “While social justice typically is the initial impetus behind these efforts, companies have increasingly begun to regard inclusion and diversity as a source of competitive advantage, and specifically as a key enabler of growth.”⁵⁸

⁵⁸ <https://www.mckinsey.com/business-functions/organization/our-insights/delivering-through-diversity>

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Appendices

Appendix A: Definitions and methodology

Appendix A.1: Methodology for baseline projection of ICT skills gap

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

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

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

Minimum lateral entry inflow is the calculatory structural gap that remains when the number of domestic graduates (as defined in minimum supply) is subtracted from the need for new labour market entries (expansion and replacement).

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

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

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

Demand 2025	1,382,000
Minus incumbent jobs 2016	- 906,000
Plus cumulative replacement 2017-2025	+ 249,000
Jobs potential	725,000

Appendix A.2: Yearly breakdown for baseline projection of ICT skills gap

(in '000s)	2017	2018	2019	2020	2021	2022	2023	2024	2025
Demand (linear trend)	994	1,043	1,091	1,140	1,188	1,237	1,285	1,334	1,382
Minimum supply (incumbents minus exits plus domestic graduates)	904	901	899	896	894	891	889	886	884
Supply in a scenario with constant lateral entries	955	1,003	1,052	1,100	1,149	1,197	1,246	1,294	1,343
Shortage without lateral entries	91	142	193	244	295	346	397	448	498
Shortage with constant lateral entries ("everything stays the same")	40	40	40	40	40	40	40	40	40

Source: empirica (2017)

Appendix B: Definition of ICT occupations according to ISCO

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

Eurostat: ICT specialists according to ISCO	
Management, architecture & analysis	
133 ICT Service managers	
2511 Systems analysts	
Core ICT practitioners – professional level	
2512 Software developers	
2513 Web and multimedia developers	
2514 Application programmers	
2519 Software and multimedia developers and analysts not elsewhere classified	
2521 Database designers and administrators	
2522 Systems administrators	
2523 Computer network professionals	
2529 Database and network professionals n.e.c.	
Other ICT practitioners – professional level	
2152 Electronic engineers	
2153 Telecommunication engineers	
2166 Graphic and multimedia designers	
2356 Information technology trainers	
2434 ICT sales professionals	
Core ICT practitioners – associate / technician level	
3511 ICT operations technicians	
3512 ICT user support technicians	
3513 Computer network and systems technicians	
3514 Web technicians	
Other ICT practitioners – associate / technician level	
3114 Electronics engineering technicians	
3521 Broadcasting and audio-visual technicians	
3522 Telecommunications engineering technicians	
7421 Electronics mechanics and servicers	

Appendix C: Workforce Diversity Indicators

Indicator	Definition/Source
Long-term unemployment rate	Share of persons unemployed for 12 months or more in the total number of active persons in the labour market. Source: Eurostat [une_ltu_a], data from 2016.
Young people not in employment, education or training (15-24 years) – NEET	Percentage of the population in age group 15-24 years who is not employed and not involved in further education or training. Source: Eurostat [edat_lfse_20], data from 2016.
Youth unemployment	Number of persons under 25 years who are unemployed, as share of the total number of young people in the labour market. Source: Eurostat [une_rt_a], data from 2016.
Employment rate of older workers (55-64 years)	Number of persons in age group 55-64 years who worked at least one hour for pay or profit during the reference week or were temporarily absent from such work, as share of the labour force in that age group. Source: Eurostat [lfsi_emp_a], data from 2016.
Age employment rate gap (15-64 vs. 55-64 years) in p.p.	Difference in percentage points between the employment rates of persons in age group 15-64 to age group 55-64 years. A positive figure denotes that the employment rate for older persons is lower than for the entire workforce. Source: Own calculation from Eurostat [lfsi_emp_a], data from 2016.
Gender employment rate gap (15-64 years) in p.p.	Difference in percentage points between the employment rate (15 to 64 years) for women and the rate for men. A positive figure denotes that the employment rate for women is lower than for men. Source: Own calculation from Eurostat [lfsa_ergaed], data from 2016.
Non-natives born outside the EU, as share of total population	Total population born outside of the EU (borders as of 2016) on January 1. Source: Eurostat [migr_pop3ctb], data from 2016.
Non-native employment rate gap, in p.p.	Difference in percentage points between the employment rate (15 to 64 years) for population born outside of the EU (borders as of 2016) and the rate for the population born in the reporting country. A positive figure denotes that the employment rate for persons born outside of the EU is lower than for those born in the reporting country. Source: Own calculation from Eurostat [lfsa_ergaed], data from 2016.
Disability employment gap, 2011, in p.p.	Difference in percentage points between the employment rate (15 to 64 years) of persons reporting difficulties in performing basic activities, and the rate for persons reporting no such difficulties. Difficulties can relate to seeing, hearing, walking, and communicating, and must have lasted or be expected to last for six months or more. A positive gap figure denotes that the employment rate for persons facing difficulties in basic activities is lower than for those without. Source: Own calculation from Eurostat [hlth_dlm010], data from 2011 (latest available).
Disability unemployment gap, 2011 in p.p.	Difference in percentage points between the unemployment rate of persons reporting difficulties in performing basic activities, and the rate for persons reporting no such difficulties. Difficulties can relate to seeing, hearing, walking, and communicating, and must have lasted or be expected to last for six months or more. A positive gap figure denotes that the unemployment rate for persons facing difficulties in basic activities is higher than for those without. Source: Own calculation from Eurostat [hlth_dlm030], data from 2011 (latest available).

Appendix D: Survey Methodology

Research framework and survey design

The analysis and findings of this report are a result of extensive desk research and two surveys carried out with ICT skills training providers and employers across the target countries. The approach to select and benchmark good practice showcases of ICT training programmes was based on a four-step process

illustrated below. The research findings were further analysed and strengthened via expert workshops. Three expert workshops were held in Spain (Madrid), Germany (Berlin) and United Kingdom (London) and attended by a panel of experts from academia, policy, the non-profit sector and businesses.

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

Step 3: Identification of Good Practice Showcases	Step 4: Evaluation of Good Practice Showcases
<p>The selection of good practice showcases from the shortlisted programmes was based on the following framework, with each case given a score from 1 (low) to 3 (high):</p> <ol style="list-style-type: none"> 1 Relevance: To what extent is the programme relevant in terms of creating a diverse skilled workforce responding to demands in the labour market? 2 Transparency: To what extent is it possible to have access to information about the programme? 3 Effectiveness: How effective is the programme in providing participants with the ICT knowledge and skills, in line with current demands in the labour market? 4 Efficiency: How efficiently has the programme been implemented? 5 Impact: What were the effects of the programme on the target groups involved? 6 Sustainability: To what extent are the achieved benefits from the programme sustainable? 	<p>The main objective of the final phase of analysis was to further evaluate and benchmark the 22 good practice showcases against a set of defined criteria (evaluation criteria), to identify best practice elements and lessons learnt. The evaluation and assessment of best practice ICT skills training programmes was carried out making use of a qualitative survey of key stakeholders. This consisted of in-depth interviews (with decision makers from the selected best practice programmes and selected employers) and a SWOT analysis to help address and understand issues relevant and factors influencing the success of training measures from different perspectives.</p>

Employer survey

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

Target group: 12 HR key decision makers in mainly large organisations from Spain, the United Kingdom, Germany, France, Belgium, the Netherlands, Poland and South Africa, several of which global players.

Objectives: to gather **insights about experiences and expectations related to (inclusive) training programmes**. The primary objective was to find out whether the current ICT training(s) are attractive and making use of these would equip participants with the in-demand ICT skill sets and **would qualify them for further consideration by employers**. The interview results served as an input for the policy recommendations developed in the course of the project to inform policy development on the European and national level, and provide practical recommendations to non-profit organisations and training providers.

Structure of interviews:

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

Timing: October – November 2017

Appendix E: Good practice showcases

Appendix E.1 Simplon.co

A SOCIAL ENTERPRISE OFFERING FREE OF CHARGE TRAINING PROGRAMMES IN THE DIGITAL SECTOR

Target group

- NEETs youths
- Women
- Jobseekers at risk of long-term unemployment
- People from rural/remote areas
- Refugees
- Seniors
- People with disabilities

Main activities

Simplon.co operates 34 schools that offer training programmes primarily aimed at unemployed job-seekers, 30% of whom should be women. The programmes, which include Web developer and Java developer, provide certified qualification that seeks to be optimally tailored to current needs on the labour market. Most of courses last 6.5 months and do not require any prior technical expertise – ICT beginners are accepted. Applicants, however, need to bring strong motivation, a general interest in the digital domain, and an open attitude towards working in teams.

Simplon.co's innovative educational approach is based on learning by doing, learning by teaching, reverse mentoring and peer education to develop long-term professional and social skills. The training taxonomy most prominently featured is experiential learning. It focuses on coding and programming, with modules that are continuously adapted to the rapid change in the digital sector. It also puts much emphasis on developing soft skills such as curiosity, creativity, self-learning, leadership and self-esteem.

Simplon.co regularly publishes reports on the social impact of its programme on its website. As of May 2018 2,056 people have completed one of the training courses, 691 are currently in training, 77% successfully completed the programme (78% employed, 16% freelancers, auto-entrepreneurs or business creators, 22% continued in education/ internship).

Simplon.co is one of the training providers which are paid by government bodies (Pôle Emploi, OPCA, Regions) for training people excluded from the labour

market, with the objective of easing their reinsertion and professional development.

The Simplon Foundation is the additional philanthropic arm of Simplon.co. The Foundation is dedicated to the promotion of digital learning initiatives for disadvantaged people and to the battle against the digital fracture in today's society. It carries out general interest programmes targeting very specific groups or territories, for which funding is obtained from private foundations, corporate donors and via crowdfunding.







Industry input

Initially developed in Montreuil, Simplon.co's networks of schools counts today 34 active schools throughout France, Belgium and Lebanon. Simplon.co works in tight collaboration with local enterprises which are involved at each stage:

- Before opening a new school, Simplon.co carries out a market research to understand local needs, according to which trainings is then adapted;
- Enterprises are invited to participate in the selection of trainees;
- Reverse mentoring is used, which means that trainees are asked to deliver workshops on specific topics to the employees of partner companies;
- A dedicated team at Simplon.co works on placing students after successful completion of the training;
- Some Simplon.co training offers are designed as dual programmes: Participants spent part of their week in a work placement and the other in the classroom. In the other training programmes, internships are an integral part.

Simplon.co receives funding from several public bodies, industry associations and private sector donors. The list currently includes La Caisse des Dépôts et Consignations, Société d'Investissement de France Active, Amundi, Phitrust Partenaires Europe, Aviva Impact Investing France / Le Comptoir de l'innovation (INCO), Esfin Gestion (Groupe Crédit Coopératif) and Mirova (Groupe Natixis).

The initiative is included in a network of training programmes that have received a label from Grande Ecole du Numérique, a French Government Initiative.

Impact		
		
2056 people completed training until 2018	34 active schools throughout France, Belgium and Lebanon	16% of the learners inspired to start own ventures
		
691 learners are currently in training Currently, 35% are women . The Goal: 50% by 2019	22% of the learners continued in further education/internship	78% of learners were recruited after completing the course

Lessons learnt

Simplon.co's experience demonstrates the usefulness of an approach that builds on diversification of sources of revenue. Today Simplon.co derives revenue from:

- Training programmes provided on behalf of government bodies;
- Services provided to enterprises, such as training programmes for their own staff, workshops, events organisation) – under the brand Simplon Corp;
- Services offered on the market, such as website design and mobile app development – under the brand Simplon Prod
- Partnerships with local employers of ICT specialists – partners pay a lump-sum or an annual fee to have access to candidates for job vacancies as well as the pedagogical toolbox and the Simplon.co network.

It has proven successful to have a very strong social focus when selecting investors, trainees, employees, and other participants, without losing sight of the necessities of private sector employers.

For the immediate future, Simplon.co has set the goal of further lowering the share of public grants in order to ensure long-term sustainability. It also wants to double the number of programme participants within the next three years, from 1,000 to 2,000 people trained per year. This is also expected to contribute to lowering the cost per trainee, further strengthening long-term sustainability.

Appendix E.2 Web@cadémie

WEB@CADÉMIE FOCUSES ON FREE EDUCATION OF YOUNG PEOPLE AGED 18 TO 25. IT MAINLY TARGETS UNDERPRIVILEGED HIGH SCHOOL DROPOUTS WITH AN INTEREST IN COMPUTER SCIENCE.

Target group

- 18-25-year-old underprivileged high school dropouts who are interested in computer sciences;
- Young women.

Main activities

Web@académie was founded in 2010 by ZUPdeCO, a French charitable NGO whose mission is to help students from disadvantaged backgrounds achieve academic success, in partnership with private computer science college Epitech. Web@cadémie programmes are offered in Paris, Nancy, Strasbourg and Lyon on the premises of Epitech colleges.

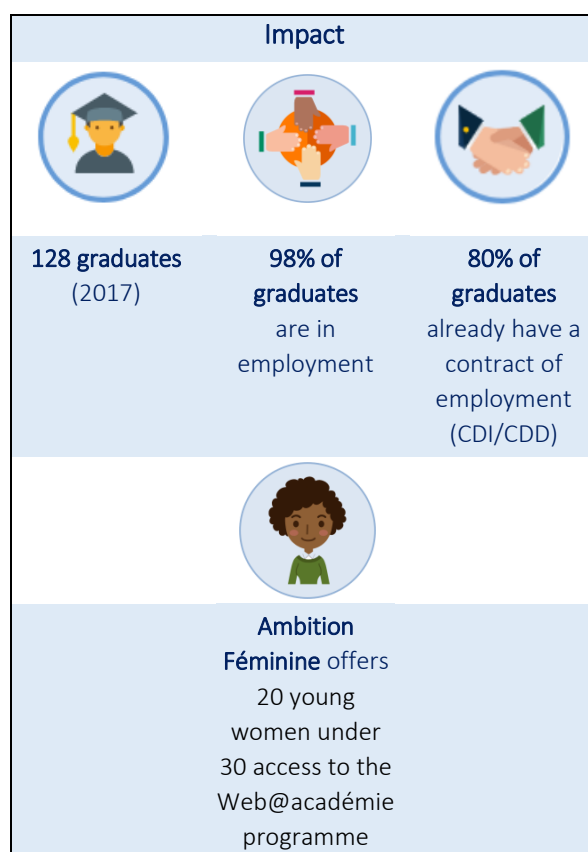
Web@académie is a free of charge school for young people between the age of 18 and 25, especially dropouts who left school without a *baccalaureate*. Any such person is eligible for signing up for the programme in web development. The 2-year training programme is comprised of 12 months of training at a Epitech technology campus, followed by a second year in which classroom training alternates with periods of internship in an enterprise. The latter allows them to to deepen their skills and apply the knowledge acquired in a real-life business environment.

The training programme is divided into four semesters where the students learn about the following subjects: HTML5/CSS3 (less), Javascript (jQuery, node.js, backbone.js), PHP (cakePHP, Zend, Symfony), Appcelerator Titanium, etc., project management, functional specifications, CDC, UX, AI, written expression etc.

The content of the training programme is designed by Epitech, a private computer science college. The pedagogical approach is fully based on project-based learning, starting from the idea that the technology sector needs experts who not only have strong scientific and technical skills but also the ability to constantly learn about new technologies and concepts, rather than professionals who are trained to use a specific technology or having gained certifications only in certain restrictive fields. Projects brings together several students with specific goals to

achieve, and make extensive use of peer based group learning.

Successful participants receive the Certificate of Integrator and Web Developer from Epitech. Of the graduates who have completed the programme so far, 98% are already in employment, 80% of whom with a standard (temporary or permanent) employee contract (CDD/CDI). 99% of all programme participants report to be very satisfied with the experience.



Web@cadémie is particularly committed to address the low share of women working in the ICT domain. It has set itself a target of at least 80% female participants. In 2016 the Female Ambition ("Ambition féminine") course was launched in co-operation with ICT multinational Microsoft. It offers 20 young women under 30 access to the Web@académie programme. The application process for Ambition féminine consists of a "Pool" phase, an intensive 3-weeks phase in which applicants get to know the basics of the ICT domain and why it offers great opportunities also for women.

Industry input

The school receives funding from the government and from several private sector enterprises, such as Microsoft, Fondation Orange, HP and SAP. It has

received a label and seed funding from the Grande École du Numérique, a government initiative promoting inclusive ICT training.

Apart from being the main sponsor, Microsoft also provides essential, non-financial support: Every Web@académie is being mentored by a Microsoft employee. Partner companies also arrange for other ways in which ICT experts share their knowledge with programme participants. Some grant scholarships to talented students so they can complete their studies at Web@cadémie.

Lessons learnt

Collaboration with Epitech, a computer science college which is well-regarded for its innovative pedagogical approach and its links within the ICT industry, enables Web@académie to offer learners a training programme which is highly likely to result in employment after completion of the course.

Epitech uses of a pedagogical philosophy which has frequently been praised by recruiters in the ICT industry. The training programme fully acknowledges that recruiters in this domain nowadays require good

overall knowledge, openness to other cultures and a broad understanding of contemporary issues in addition to technical know-how. Over the last 15 years, Epitech has built up a network of companies from the ICT and related sectors with which it has entered into customised partnerships. These companies are keen to participate in the training of their future employees and target profiles that are best suited to their needs. Web@académie can fully benefit from these well-established links.

For the purpose of attracting young women to Web@cadémie, the founders felt it would help to introduce an additional brand. “Ambition féminine” is being heavily promoted in order to attract the attention of young women who have not as yet felt any inclination to work in the ICT domain.

Based on its success so far, Web@cadémie plans to establish educational programmes in 8 more cities across France by 2019, benefiting more than 1,000 students.

Appendix E.3 École 42

ÉCOLE 42 SEEKS TO FIND AND ATTRACT TALENTED YOUNG PEOPLE IN THE ICT AREA REGARDLESS OF THEIR SOCIAL OR SCHOOL BACKGROUND, AND PROVIDES THEM WITH ICT TRAINING TAILORED TO THE THE NEEDS OF THE LABOUR MARKET

Target group

- Young people (from 18 to 30 years old)
- Almost 40% of students do not have a high school degree
- 20% of learners are NEETs
- Minimum 10 % of students are from socially and economically deprived areas (“Quartier Prioritaire de la Ville”)

Main activities

École 42 provides ICT specialist education to young people in preparation for digital jobs in the ICT sector or in one of the other sectors undergoing digital transformation. The programme is free of charge. While the overall goal is to increase the number of workers with advanced ICT skills on the French labour market, École 42 takes special pride in being accessible to every young person interested in ICT, regardless of their school background.

At École 42 selection of candidates takes place based purely on merit. It is done by means of an online logic test to qualify for entry, followed by a four-week intensive computer-programming course called piscine (swimming pool). The selection process requires extensive preparation, which can be a barrier for populations with low educational attainment and/or distant from the labour market. Only the most motivated candidates succeed. Each year, École 42 receives around 70,000 applications. The 3,000 who perform best in the online game are selected for the piscine, of whom 900 are included in the final selection. Applications are accepted at three cut-off points per year (July, August, and September).







Learners take about three years to complete their training at École 42. The school does not have any teachers or lectures. Instead, training is based on a system of self-education via peer-to-peer and project-based learning. This means that learning is organised around projects proposed by the pedagogic team, with the central point being the intranet dashboard. The dashboard displays a map of current projects for which contributors are sought. Some projects are solo projects, many 2-person projects, and some larger

group projects. Students acquire the skills for carrying out projects by self-learning using third-party content available on the Internet, and by helping each other. This requires a lot of discipline and will often present a challenge to learners from disadvantaged backgrounds.

Instead of marks, learners receive points for each project experience, according to which they are assigned to a level – reaching level 20 means they have graduated. A rule of thumb, learners should obtain seven levels per year. As every participant can go at their own pace, however, some people take more than three years to graduate.

Feedback on performance does not come from tutors, but from peers: once a project is submitted, 3-5 peers are automatically assigned as candidates for giving feedback, for which they receive credit points. The programme does not issue any diploma or degree. École 42 offers its students a range of opportunities for professional integration, including projects carried out for companies and internships.

Since 2013, 3500 students have enrolled in École 42, nearly 900 each year. Out of these 900 students, 600 launch their career before completing the curriculum, a result of the excellent career opportunities as well as the many links between the school and the industry. All students so far have been successful in finding a job immediately after completing the training. The school’s own online job platform lists at least two offers for each student enrolled.

Impact		
		
5,442 students enrolled since 2013	100% of learners get a job	900 students enrolled each year
		
More than 1,000 students with NEET	More than 500 students come from socially	Student drop-out rate in the first two years

background enrolled since 2013	depressed areas (since 2013)	it at around 30%
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Industry input

École 42 was founded in 2013 by Xavier Niel, French billionaire and founder of the telecommunication company Illiad, together with Nicolas Sadirac, Florian Bucher and Kwame Yamgnane, three former managers at French private ICT training college Epitech. The school is fully funded from the personal wealth of Xavier Niel.

École 42 seeks its curriculum to be closely tailored to the needs of employers, for which the close links of its founders within the ICT industry are essential. The school publishes a list of the ICT skills that are currently demanded on the labour market on its website. The curriculum is continuously updated to reflect these skills, which means that the programme answers directly to labour market demands. The feedback received from companies who employ former École 42 students confirms that the skills provided are in line with what is needed.

Industry is also engaged in École 42 through offering internships and submitting suggestions for projects to be carried out to address real-world challenges in partner companies. For example, French car manufacturer PSA has asked students to imagine how self-driving cars will change our lives.

Lessons learnt

The success of École 42 demonstrates that there is a need for alternatives to both public and private universities. The former are often criticised by employers as not producing the kind of skills needed by business, while the latter only accept learners with strong qualifications and are inaccessible to many due to the fees they charge.

École 42 has proven to be accessible for everybody regardless of gender, socio-economic background and success at formal education, as long as they can demonstrate that they have exceptional cognitive skills and strong motivation. École 42 is offering students who have very limited financial means support in the form of a loan guarantees of €15,000. After realising that finding the money for accommodation is a great problem for some students, founder Xavier Niel decided to add a student hostel to the Paris campus.

The school has had limited success so far in attracting a higher share of women. Fewer than 10% of students are women. École 42 is trying to change this by inviting secondary-school girls to spend time during their summer vacation on its premises and give them the chance to talk with students.

Based on the success of École 42 in France, it has expanded to other countries. A college was opened in Silicon Valley, USA, in summer 2016. In other countries, École 42 has not set up own campuses but provided access to the school's curriculum to training providers who ascribe to the philosophy of free tuition and no prior academic requirements, and demonstrate they are able to raise enough money to educate more than 150 kids. Based on its success, École 42 has created a franchise model and expanded in France (le 101, <https://www.le-101.fr/>), Belgium (19, <https://www.s19.be>), the Netherlands (Codam, <https://www.codam.nl/>), South Africa (WeThinkCode, <https://www.wethinkcode.co.za/>), Ukraine (UNIT, <https://unit.ua/en/>), Russia (21, <https://21-school.ru/en>) and Morocco (1337, <https://1337.ma/>).

Running costs for École 42 in Paris are about €7 million a year. The current plan of founder and funder Xavier Niel is that he will pay for the school for 10 years, after which he hopes somebody else will take over, maybe a former École 42 student turned rich businessperson.

Appendix E.4 WebForce 3

INTENSIVE, 3.5-MONTHS ICT TRAINING FOR JOBSEEKERS WHO NEED A FAST TRACK INTO EMPLOYMENT, INCLUDING NEET YOUTHS

Target group

- Jobseekers
- Freelancers / entrepreneurs
- Senior jobseekers who want to retrain to gain employment in the digital sectors

Main activities

WebForce 3 is an intensive training programme in web development, conceived to be accessible for everyone, with special attention to jobseekers who did not continue education after graduating from high school. The WebForce 3 non-profit arm is called PassW. The main aim is to equip learners with exactly those skills that will allow them to find a job as fast as possible. Web developer is currently one of the jobs in highest demand on the labour market.

Applicants should have some basic knowledge in computer science and well developed cognitive skills. In the application process, they are required to complete two online questionnaires testing their digital skills and ability for logical reasoning. These are considered a precondition for participants to be able to learn how to code. The training programme is offered at market rates, but costs can be totally or partially covered by supporting programmes available to people at risk of unemployment, such as Pôle Emploi, or a student loan. About 85% of participants so far have been jobseekers who were able to obtain financial support from the public employment service. Learners who are not entitled to government support can benefit from WebForce 3's partnership with banks such as Caisse d'Épargne, which offer a micro-credit solution.

Designed by Web professionals, the WebForce 3 programme is based on a proven method conceived to allow fast and sustainable assimilation of all the main techniques that are essential to web development.

The training takes 3.5 months, during which students absolve 490 hours in class education and about 15 days of group projects. Training takes place on the campus of one of the many training providers WebForce 3 collaborates with, which cover most of the territory of France. Classroom lectures are delivered by ICT specialists whose day job is in web development. In addition, learners spend time learning online every day.




For the latter purpose, a dedicated Learning Management System (LMS) called WF3 is used. It offers auto-evaluation and a training space for every student, as well as access to a professional network to find job opportunities. The LMS is equipped with a specific adaptive learning algorithm. It plays a key role in WebForce 3's core vision of "learning throughout life".

Participants receive continuous support from mentors who are part of the WebForce 3 team. These are also instrumental in establishing links to employers who might be interested in work placements or employment once the programme has been completed.

WebForce 3 is accredited by the government to deliver three certifications, for "Front-end developer", "Back-end developer" and "Full-stack developer for web & mobile".

Between 2014 and 2016, approximately 800 participants (from 18 to 45 years old) have started a WebForce 3 course. 98% of the participants have completed the intensive training course, and 95% walked away with a certification. In 2017, WebForce 3 network of schools trained approximately 1,000 participants. The plan for the years 2018 to 2020 and is to reach at least 1,500 per year.

The success of WebForce 3 is also evident by the fact that based on its approach and infrastructure a number of third-party training programmes also listed by Grande École du Numérique have already been launched. These include CCI Formation Eure (Epaignes, Louviers, Evreux and other cities) and MA6TVACODER by LePoleS (Les Ecoles du Web dans les Quartiers)⁵⁹.

Impact		
		
1,800 people completed the training	98% have completed the full training course	95% have obtained certification

⁵⁹ <https://eskills4diversity.com/map.html>



Industry input

WebForce 3 is continuously collaborating with several companies, not only to get a closer understanding of the ICT skills mostly required in the labour market, but also to establish partnerships that open up opportunities for successful participants to gain practical experience through hands-on practice.

Further development of the curriculum is carried out in close partnership with industry. For instance, the new Symphony@WebForce3 curriculum launched in September 2017 was co-designed with SensioLabs, the editor of the Symphony framework.

WebForce 3 is the combination of an NGO (association WebForce 3-Pass W) and a business start-up. The start-up is currently led by its founders (Alain Assouline, Sylviane Peretz, Olivier Brécard, Nicolas Chagny) who hold 75% of the shares, while the remaining shares are held by a French seed investment fund, Impact Partenaires. The organisation is currently exploring the option of raising additional funds in order to expand operations both in terms of the range of training programmes offered and development of an international network of colleges.

Lessons learnt

WebForce 3 had to spend considerable effort on convincing as many companies as possible, as well as other stakeholders such as public employment services, of the validity of its approach: that it is

possible for people from a broad range of very diverse backgrounds, including those with few formal qualifications, to learn in only three months how to code professionally.

WebForce 3 also realised that it had to pay specific attention to ensure that its courses are not targeted for an elite of engineers but truly accessible to a wide scope of people as long as they come with strong motivation, especially university dropouts and other jobseekers who face challenges making use of traditional education offers.

The programme works with a blended-learning model consisting of a carefully designed mix of in-class lessons and online learning. The former is for interacting in a diverse group of learners and working jointly on solutions for problems; time spent online is mainly for self-learning and evaluating one's progress. Much effort went into designing the LMS so that it optimally supports each participant's learning path. This would not have been possible using an off-the-shelf LMS.

To make sure WebForce 3 keeps in full sync with developments on the labour market, the initiative is currently in the process of launching additional courses in emerging fields such as data analysis, augmented reality, web security and IoT (smart houses/cities). Moreover, courses have been added in September 2017 that specifically address the demand for lifelong learning programmes targeting people already working in the sector.

Identification of good professionals who are willing to spend some of their time teaching and to develop a strong collaboration with them poses a continuous challenge.



NEW SKILLS AT WORK
J.P.Morgan