Guide to ICT Skills Training for Diversity

February 2019

empirica

NEW SKILLS AT WORK
J.P.Morgan

Latest figures on ICT skills gaps and shortages indicate that there is a huge employment potential for any ICT skilled individual in Europe no matter of gender, social and education background, ethnicity etc. Acquiring relevant up-to-date ICT skills and complementary "transversal" skills, can positively impact their chances of finding a way into the labour market. The importance of such skills is underlined by the results of Cedefop's European skills and jobs (ESJ) survey in the EU. Transversal skills were ranked as essential across sectors with the different services sectors (including the ICT sector) ranging highest and between 32.8% and 35.9% of the respondents. The corresponding figures for education and skills levels ranged from 30.5% for medium and 22.4% for low skills jobs.[1]

Demand is outperforming supply from higher and vocational education and training. Starting with a shortage of around 470,000, forecasts indicate that the continuation of current trends is going to result in a gap of 1.2 million skilled ICT workers in Europe in 2020.

Today there is agreement among experts that diversity adds value to the workforce and through that can help improve company performance. At the same time diversity initiatives are often well-meaning but a vast number of these initiatives are focusing on internal workforce rather than recruiting diverse talent.[2] Many training programmes face the difficulty of not reaching and motivating the diverse target groups underrepresented in the ICT labour market for whom these training programmes are designed. Often the individuals from these groups are - for different reasons - quite distant to the education and training system. Many of them have failed in formal education and are faced with the risk of social exclusion. Strategies how best reach these individuals in highest need for employable skills, and best enable these groups to training to reach certain or higher levels of employability are needed. The Good Practice Showcases (GPS) identified and analysed in diversITy have developed and implemented a variety of different types of strategies and approaches closely related to the different contexts and environments they are operating in.

Diversity in the ICT workplace and labour market is a challenge.

The share of women in the ICT workforce in Europe is only 17%. Only around 19% of computer science students are female and this low level of representation persists through higher education and in the workplace.

Given that many in-demand ICT roles are at medium skill level, there are significant opportunities for NEET young people without further education to access them with relatively short technical and soft skills training.

Finally, the average disability employment gap for ICT specialists in Europe is 19.6 percentage points.

From countries where statistical data is available we know that less than 20% of ICT specialists have an ethnic minority background. The figures of foreign-born ICT specialists and those with migrant status are at a similar level.

Practitioners should consider – amongst others – the following key points for the creation of a good inclusive ICT training programme:

- team up with the right partners, specifically from industry as (potential) future employers,
- teach transversal skills in addition to technical ICT skills, design and update programmes together with industry,
- strongly consider linking to vocational education and training (VET) to make best use of a promising pathway to employment with the chance for their students to obtain a universally recognised formal degree,
- closely cooperate with employment agencies and obtain necessary accreditations to be able to secure long-term funding,
- developing and using proven and tested and context related strategies to reach the intended target groups,
- implement mentorship schemes using role models, decide on whether and how certification can add value,
- ensure mentoring programmes are in place since these have proven to be one of the most critical success factors in inclusive ICT training specifically when making use of relatable role models.

Why ICT skills training for a diverse tech workforce?

Based on the observed ICT skills shortages industry and businesses have started to join initiatives aimed at training diverse target groups (e.g. women, youth and disabled people) thereby opening up training and quality employment opportunities to a "non-traditional" workforce.

Several types of skills are needed. Training of up-to-date ICT skills and competences together with complementary "transversal" skills offers best outcomes for a truly diverse workforce to access in-demand ICT jobs. "Ensuring that everyone has the right skills for an increasingly digital and globalised world is essential to promote inclusive labour markets and to spur innovation, productivity and growth".[3]

Our research has revealed that in order to open up inclusive opportunities in ICT training several challenges need to be tackled. Joint efforts are needed to counter the perceptions specifically of

young people that there is not opportunity and future for individuals in the ICT field due to lacking STEM especially mathematics knowledge and that ICT jobs are not stimulating. Starting at an early age already schools need to focus on ensuring improved counselling about ICT career opportunities and education. Finally the way in which ICT is taught and trained needs to be "more applied, incorporating experiential work to ensure students understand the range of opportunities available and the nature of a career in ICT".[4]

For those who either dropped out of the formal education system or constitute a minority group in the ICT labour market, effective and inclusive ICT training programmes could offer promising pathways into the labour market.

Why this practitioner brief?

The present document is addressed to those interested in setting up or scaling inclusive ICT training programmes.

We can observe a strong demand for skilled ICT workers. Offering pathways into the labour market addressed to groups at risk of social exclusion and underrepresented groups in this market addresses a huge untapped potential for closing existing skills gaps and reducing skills shortages.

The work of the diversITy project[5] has revealed that a vast number of activities in this area - ranging from awareness raising to inclusive ICT training programmes - have been set up and are running in many countries. Many organisations struggle to effectively train individuals coming from diverse groups underrepresented in the labour market and placing them into jobs as they are overburdened with the specific requirements of many of the different diverse target groups for whom standard training offers do not work. There is an urgent need for more sustainable inclusive ICT training that address the multi-faceted barriers.

The diversITy project identified a number of successful inclusive ICT training programmes and a range of promising approaches, but the overall picture is one of "too little, too few". Given the size of the challenge, the present initiatives are unlikely to sufficiently address them and therefore not be in a position to drastically change the current situation with respect to lack of diversity in the workforce. The situation with an ICT skills shortage of 477,000 today in the six European countries under review which is likely to increase to 1.2 million in 2020,

difficulties of training programmes in reaching out to different target groups and motivating them to ICT skills training, the rather unstable financial basis of many of the present initiatives constitute some of the major challenges. There is a need for scaling existing programmes and the creation of large and ambitious training schemes, which generate sufficient visibility to reach large shares of diverse groups of people underrepresented in the workforce.

The present document aims at offering some insights and guidance. It is highlighting some major topics and issues for consideration and to watch out in order to become successful in setting up the right partnerships, collaboratively design and deliver inclusive training programmes, offer the right type of mentorship, link these to the formal education and training system and secure sustainable funding.

Diversity in the workforce today

Diversity in the ICT workplace is a challenge. While in general 65% of European employees are women the share of **women in the ICT workforce** is only 16%.[6] The highest shares of women are found in the occupational groups 'Graphic designers', 'Assemblers of electrical and electronic products' (both 35%) and 'IT operations technicians' (24%) – against 14% for programmers/software developers and 10% for ICT directors.[7] The first set of obstacles concerns the image of the ICT sector as male-dominated and hard to penetrate for women. This perception starts to develop at an early age and during education, and is based on a combination of long-held stereotypes, misconceptions on girls' aptitudes and a bias in teaching materials and pedagogy.

The second set of obstacles faced by women concerns a phenomenon usually described in the literature as the 'leaky pipeline'. Besides the fact that ICT is a sector with a low share of female workers, additionally **a great number of women drop out of their ICT careers** for a number of reasons: organisational constraints (segregation into (lower paid) women's jobs and men's jobs), male-dominated environment, lack of role models and poor work-life balance.[8] Despite long standing campaigns from governments, the European Commission and industry there remains a marked gender imbalance in those studying computing. Only around 19% of computer science students are female and this low level of representation persists through higher education and in the workplace.

Such shortcomings in inclusion levels for ICT jobs have changed very little since 2011.[9] Moreover, studies show many young women opting out of STEM subjects whenever possible in their educational pathways[10]. In order to increase the share of women in ICT and boost enrolment it is necessary to increase the number of prospects in each stage of the funnel or to try and improve them by motivating women to continue in the ICT field at each step in their career.

Lastly, there is a double barrier for women in the management positions in the ICT sector. We can observe an already low number of women in management position in general. Their share in senior management positions in the EU28 is at 26.7% in 2018. That, in combination with a low rate of women in the ICT sector, leads to even less women in ICT management positions.

In 2017 the share of **young people of the 20-34 olds not in employment, education or training (NEET)** in the EU28 averages 17.2 %. Female NEETs are rather economically inactive while their male counterparts tend rather to be unemployed. The proportion of NEETs in Europe ranged from 7.8 % in Sweden to 29.5 % in Italy. Germany (11.9%), the UK (13.7%) and Ireland (16.1%) are below whereas Spain, France and Poland rank around or above the European average (17.1% – 20.8%). [11] The same holds true for the share of **early leavers from education and training** (age 18-24) in Europe which is substantial with 12.1 % of young men and 8.9 % of young women in the EU being early leavers from education and training.[12] Finally, the average **disability employment gap** for ICT specialists in Europe is high and at 19.6 percentage points.[13] Re-engaging people from these target groups requires the provision of awareness raising and training programmes which are tailored to the specific needs of the target groups. Action needs to be taken before their status becomes a long-term one. Training programme providers regularly work together with the civil society to bridge the gap between reengagement activities and training provision and at some stage even to the more formal education and training programmes.

From countries where statistical data is available we know that less than 20% of ICT specialists have an **ethnic minority** background. Foreign-born ICT specialists born and those with **migrant** status make up around 20%.[14]
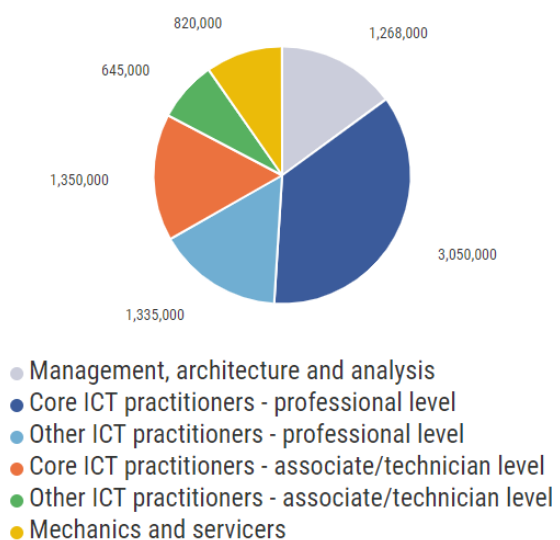
ICT skills and Jobs

The term *Information and Communications Technology* (ICT) *skills and jobs* used in this brief refers to *ICT practitioner and specialist 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 International Standard Classification of Occupations (ISCO) provides a breakdown of ICT specialist skills levels:

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

To each of these levels almost 30 different ICT occupations are allocated.

In 2016, by far the profession with the most workers was core ICT practitioners at professional level. The second biggest group was core ICT practitioners at associate/technician level, followed closely by other ICT practitioners at professional level and the group of management, architecture and analysis. It can be expected that this distribution will not significantly change over the coming years.

ICT workforce in Europe 2016

Source: empirica (2017), based on Eurostat data

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

ICT skills shortages today and in the future

Recent statistics show large shortages in ICT skills supply. Latest figures on ICT skills gaps and shortages indicate that there is a huge employment potential for any ICT skilled individual in Europe. With today's shortage of around 470,000, forecasts indicate that with the continuation of current trends this is going to result in a gap of more than one million skilled ICT workers in Europe in 2020.

A recent study[15] revealed that only 16% of all future vacant jobs were foreseen at the highly qualified positions in ICT management, architecture and analysis. In contrast, 84% of all jobs are for all other ICT professionals. This leaves plentiful room for lower and mid level jobs.

These shortages have the potential to affect future economic growth for Europe and other countries in the world. At the same time it is an area of huge untapped potential for creating a diverse workforce through specific inclusive ICT training programmes and at the same time help closing the skills gap.

Key points and priorities for the creation of an effective inclusive ICT training programme

The identification and assessment of several hundred inclusive ICT training programmes in the seven countries under review (France, Germany, Ireland, Poland, Spain, South Africa, United Kingdom) have revealed several pathways for (supporting) access to the labour market for diverse populations. The 22 Good Practice Showcases (GPS)[16] have shown ways how best to reach those at risk of social exclusion in highest need for employability skills and how to best enable these groups access to training or jobs. Moreover, relevant success factors could be identified which include the importance for experiential and practical training with a strong involvement of businesses and industry, the importance of mentorship and for some the importance and value of certification and quality labelling - as for instance offered through vendor-based training programmes - for (later) labour market integration.

More details on the opportunities, success factors and pathways are provided in the final report "diversITy – Promoting Integration and Diversity in the Digital Labour Market", the seven Country Reports and the additional Policy Brief developed within the diversITy project.[17]

Partnerships for a good preparation, start and financial sustainability

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

Close collaboration with employment agencies is crucial for success and survival of many training providers. Typically this requires **accreditation** as a competent training provider body in order **to be able to invoice training services and placement services to employment agencies and to be able to participate in calls for tenders** issued by employment agencies. JOBLINGE in Germany for instance has obtained this certification. As a consequence it has managed to secure its funding and managed to significantly scale up its operations. Starting at one location 10 years ago, it now operates at 30 locations throughout the country. Others have also recognised this opportunity. For instance ReDI School of Digital Integration has started the certification process to secure its longer-term funding.

Collaborative programme development reaching beyond technical skills training

The importance of cooperation with companies as (potential) future employers: Industry cooperation and partnership is seen as a key success factor specifically for inclusive ICT training programmes. This cooperation needs to be present at all stages and in all phases of the training programme development and delivery. It starts with the **co-creation of the programmes** and the required skills to be taught and how. It continues **with industry partners providing practical work experiences or internships** as part of the training courses. It may end with the offer of an **apprenticeship** which bears

the advantage for the trainee to get the opportunity to obtain a formal degree. In several of the Good Practice Showcases **direct job placements** take place after training completion. For many direct job placement which is implying an immediate income is seen as the preferred option to an apprenticeship. Apprenticeships would have the advantage of a formal and recognised degree but at the expensive of less disposable income in the short-term.

The relevance of complementary "transversal" skills in addition to hard (ICT) skills: Successful inclusive ICT training programmes do not only train technical ICT skills. They also focus on further market relevant skills which reach beyond ICT skills commonly termed "transversal" skills. These include skills for effective interpersonal communication, both formal and informal, teamwork as well as planning skills, time and self management, initiative creativity, flexibility and curiosity but also concern and compassion for others. Our analysis and interviews with decision makers in industry and among training providers have revealed these to be as important as the technical skills.

Successful programme operation requires continuous updating

The need for continuous updating: Not only **inclusive training programmes** but training programmes in general require continuous updating and further development. These will have to be **informed by emerging technologies and new skills areas** such as mobile technologies, cloud computing, big data, IoT (Internet of Things) or skills in specific sectors such as renewable energy technologies in the energy sector of medical device maintenance in the medical sector to name a few. Programmes should be **designed in conjunction with industry and education experts** to ensure that graduates gain both personal and professional skills necessary to progress on completion of their programme. The aim needs to be to assist those currently distant from the workforce or with a knowledge gap through having left school early in gaining the skills and abilities to compete more effectively within the labour market.

Outreach to diverse target groups underrepresented on the labour market depends on context

The Good Practice Showcases (GPS) identified and analysed in diversITy have developed and implemented a variety of different types of strategies and approaches. These should be understood as learning experiences from which to

learn[18]. The following have proven successful but each needs to be closely related applied to the different contexts and environments they have been developed for. Accredited training providers are typically cooperating with **public employment services agencies** which send candidates and finance their training (see above). This allows them to participate in calls for tenders issued by employment agencies and invoice training services and placement services to the employment agencies. Other training providers team up with partner organisations of different type with **access to socially excluded individuals living in the problem districts in cities** to recruit candidates for training. Further examples include the use of a **role model approach** by taking something that already exists – an application, robots, 3D printers – when approaching individuals at risk of exclusion and **integrating game mechanics** into it (gamification) to motivate for participation and engagement. Finally, large inclusive ICT training programmes of large IT firms (Google, Microsoft, Cisco, SAP etc.) are used for the **recruitment of young talent for their own organisations** or those of partner organisations. These are typically large-scale programmes **with a substantial outreach but at the same time rather high entry-level requirements** difficult to be met by many from the diverse target groups under review in the present project.

Permeability of inclusive ICT training and VET to increase chances for sustainable employment

Vocational education and training (VET) as an alternative path towards job and labour market integration: The Good Practice Showcases (GPS) demonstrate the most promising pathways to inclusive ICT skills training, jobs and labour market integration. Pathways with high proximity to vocational education prove to be successful alternatives to traditional higher level pathways. They often lead to lower and mid-skilled ICT position as a first point of entry but usually provide career progression options at later stages. In order to further improve the potential and the opportunities for sustainable labour market entry, inclusive ICT training programme providers could **link and integrate their programmes into traditional education and training systems or offer some permeability into it**. This would allow obtaining a formal and recognised certification and degree and **thereby increasing the chances for sustainable employment even in times of economic crisis** where those without (formal) degree or certificate will lose their jobs first. In the vast majority of countries under review but

also in general the relevance of formal degrees is rated as highly important. In the case of FIT (Ireland) courses are delivered in conjunction with Vocational Education Committees.

Permeability of the formal VET towards inclusive ICT trainings - although seen as important - still is an exception. One way offered in Germany is for the graduates from inclusive ICT training courses to take part in an **"external examination"** at the Chamber of Industry and Commerce. A similar system - Validation des Acquis de l'Experience (VAE) – exists in France[19]. Admission is subject to conditions. A candidate is admitted to the final examination if proof can be furnished that he or she has worked in the occupation in which the examination is to be taken for at least one and a half times the time prescribed as the training period. Making more intensive use of such options where these exist could help to develop this path as a solution option **towards universally recognised degrees from the formal education system**.

Certification as fast track to employment and job (or not)?

Many but not all experts from inclusive ICT training programmes see certification as advantageous and beneficial for the graduates from these programmes. This holds true for programmes awarding well recognised certificates (often from IT vendors) or those from training providers with a good reputation. They see this as an asset and fast track into the labour market. Others argue and warn that these types of certificates cannot and should not replace formal education degrees. Formal degrees are seen as superior, specifically since vendor-based certificates were originally intended as an add-on and only used and mainly trained in further education contexts. However, several cases exist where these have been used as opportunity for first entry into the labour market.

In general the value of certification is undisputed. However, many inclusive ICT training programmes face the problem of lack of recognition of skills and competences trained since they do not offer a recognised certificate awarded to programme participants. A way out of this dilemma could be the use of **alternative certification methods including certification in form of badging (e.g. OpenBadge)** which allows for certifying even small and micro courses and training 'bits'. But the situation in this market is complex and confusing. A number of technology companies have started with these types

of workforce credentialing which students can earn. These started but are no longer limited for participants of MOOCs but include many different types of trainings of varying duration. In the Policy Brief we have recommended the European Commission and / or national governments analysing the market of alternative certification methods, thereby taking care of national peculiarities in each Member State with the view of helping (inclusive) training providers in offering certified courses to their clientele more easily and thereby increasing the employment chances for them. The results should be made available as a 'guide to alternative certification' to training providers inside and outside the formal education and training systems in European countries and regions. Practitioners from inclusive ICT training courses may want to start lobbying for this towards their national governments.

Mentorship is a must!

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

Establishment of (online) cross-organisational and cross-regional mentor networks to cope with high demand for mentors: The small number of people from many under-represented 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. Whether this constitutes an opportunity and can be achieved through cooperating inclusive training providers or only have a chance for implementation when incentivised and established through government funding needs to be seen.

Further information

For further details about our survey results and methodology, you can request access to our full report, forthcoming in 2019. For questions and queries, please contact:

Werner B. Korte: Werner.Korte@empirica.com;
Daniel Schmidtmann: Daniel.Schmidtmann@empirica.com

Disclaimer

[1] Cedefop: Skills Panorama: Importance of transversal skills, 2014

[2] Glenn Llopis: 5 Reasons Diversity And Inclusion Fails, Forbes 16th January 2017

[3] OECD: Skills for a Digital World – Policy Brief on the Future of Work. December 2016.

[4] Cukier, Wendy: Diversity – The Competitive Edge: Implications for the ICT Labour Market. A report submitted to the Information and Communications Technology Council (ICTC), Canada, March 2007

[5] diversITy project website: http://eskills4diversity.com/

[6] Eurostat: Employment statistics 2007-2016: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Employment_statistics#Employment_rates_by_sex.2C_age_and_educational_attainment_level

[7] Eurostat: Employment statistics 2007-2016: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Employment_statistics#Employment_rates_by_sex.2C_age_and_educational_attainment_leve

[8] European Parliament: Women in ICT, July 2012; Eurostat: Graduates in tertiary education, in science, math., computing, engineering, manufacturing, construction, by sex - per 1000 of population aged 20-29 [educ_uoe_grad04] (last update: 12-09-2018): http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=educ_uoe_grad04&lang=en

[9] Eurostat: Graduates in tertiary education, in science, math., computing, engineering, manufacturing, construction, by sex - per 1000 of population aged 20-29 [educ_uoe_grad04] (last update: 12-09-2018): http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=educ_uoe_grad04&lang=en

[10] ICEF Monitor: The enrolment funnel: Better results start with the prospects you already have, 2015; The example of the UK: WISE: From classroom to boardroom – the STEM pipeline: https://www.wisecampaign.org.uk/statistics/from-classroom-to-boardroom-the-stem-pipeline/

[11] Eurostat: Statistics on young people neither in employment nor in education or training (2017): https://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_on_young_people_neither_in_employment_nor_in_education_or_training.

[12] Eurostat Statistics Explained: (2018): Early leavers from education and training: https://ec.europa.eu/eurostat/statistics-explained/index.php/Early_leavers_from_education_and_training

[13] Comparisons are made difficult because of the different definitions being used for measuring disability. The latest data that are comparable across the EU are from 2011.

[14] See BCS (2017) and techUK et al. (2016), London's Digital Future – The Mayoral Tech Manifesto 2016.

[15] Hüsing, T., Korte, W., Dashja, E.: e-Skills in Europe - Trends and Forecasts for the European ICT Professional and Digital Leadership Labour Markets (2015-2020). empirica, 2017

[16] diversITy online repository of Good Practice Showcases: http://eskills4diversity.com/en/best-practices.html

[17] diversITy project website: http://eskills4diversity.com/

[18] For more information and access to Good Practice Showcases for inclusive ICT training see die diversITy online repository at: https://eskills4diversity.com//

[19] Validation des Acquis de l'Experience : http://www.vae.gouv.fr/vous-etes-un-particulier/vous-etes-un-particulier-qu-est-ce-que-la-vae.html