EIGE
European Institute for Gender Equality

Women and men in ICT: a chance for better work–life balance

Research note

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Foreword

Faster economic growth, a wider pool of talented professionals and happier employees. This can be the future of the information and communications technology (ICT) sector if we manage to eradicate the prevailing gender divides. The first step is to break the gender stereotypes.

Only 17 % of the 8 million ICT specialists in the European Union are women. The absence of women is strongly connected to the perception of ICT jobs as a playground for men. Women tend to ignore this field even at an early age, and only a few choose male-dominated tech studies. If we cannot break these stereotypes the EU will keep wasting potential talent.

This study shows that ICT jobs actually offer rather favourable working conditions to both women and men. Working hours are often more flexible and employees have more autonomy in adjusting them to their needs. Not to mention that women working in ICT are better paid overall and the pay gap between women and men is smaller than in many other fields. These less-well-known factors could increase women's interest in choosing a career in ICT.

However, there are also a few worrying trends. The statistics show that women in tech jobs are more educated than men, but still end up in lower positions, implying different 'rules of the game' for women and men. Another challenge is the need for continuous upscaling of skills, which is a prerequisite for a successful career in this sector. This can be difficult for women, who still tend to take the lion's share of household and care responsibilities and therefore do not have time to engage in training outside of office hours. The equal sharing of home responsibilities would play a key role in giving women equal chances in their careers. The intense environment may also be a reason why many women working in ICT postpone having children to a later age than in other sectors.

It is not only about women though. In order to keep up with workplace expectations, men tend to respond by working long hours, which is not good for either them or their families. Effective work–life balance policies would therefore benefit both women and men.

It is of crucial importance that ICT jobs are able to tap into women's potential. This would give a healthy boost to the economy of the European Union and increase its competitiveness. This report shows a few important areas to address. Work–life balance is one of the key elements that need to be put in place, in line with the proposed EU directive on work–life balance for parents and carers. The other hurdle is in our attitudes. We have to encourage our children to make their career choices with an open mind and not be guided by stereotypes.

This research note is part of EIGE's work on monitoring the EU's progress towards gender equality and supporting the presidencies of the Council of the European Union. I would like to thank all the institutions and experts who contributed, particularly the Bulgarian government, the Commission's Directorate-General for Justice and Consumers and its High Level Group on Gender Mainstreaming, the European Foundation for the Improvement of Living and Working Conditions (Eurofound) and, especially, EIGE's staff. We are confident that this report, its findings and its recommendations offer solid and useful evidence to address women's participation in ICT jobs now and in the future.

Virginija Langbakk
Director, European Institute for Gender Equality (EIGE)

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Country abbreviations

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom
EU-28	28 EU Member States

Introduction

Introduction

Rapid technological advancements and digitalisation are transforming the world of work and how we live our day-to-day lives. There is an increasing demand for digital skills and higher qualifications across a wide variety of sectors. Information and communications technology (ICT) specialists are in particularly high demand, with employment growth more than eight times higher than the average employment growth in the EU (Eurostat, 2017c). Recent forecasts predict a shortage of more than 500 000 ICT specialists by 2020 (Korte et al., 2017). However, only around 17 % of the almost 8 million ICT specialists are women, and the number of women graduating from ICT studies has been decreasing over the last decade (EIGE, 2017c).

The vast under-representation of women in ICT shows a waste of highly qualified human resources and has larger implications for the wider economy. In particular, it threatens the EU's innovative and economic potential in the future and contradicts the EU's highest political priority of smart, sustainable and inclusive growth. It is estimated by EIGE that attracting more women to the science, technology, engineering and mathematics (STEM) sector would lead to economic growth, with more jobs (up to 1.2 million by 2050) and increased gross domestic product over the long term (up to EUR 820 billion by 2050) (EIGE, 2017a).

Gender segregation in the labour market is a well-known reality in Europe today. It narrows the life choices, education and employment options of women and men and determines the status and prestige of their jobs. Segregation drives the gender pay gap, further reinforces gender stereotypes and perpetuates unequal gender-power relations and gender hierarchy in the public and private spheres (EIGE, 2017c).

Following the request by the Bulgarian Presidency of the Council of the European Union (2018), the overall objective of this research note is to deepen the understanding of the major enabling and hindering factors for a more balanced uptake of ICT jobs by women and men. The European Commission recently proposed a package of measures on work–life balance, with particular focus on paternity/parental/carer's leave and flexible working arrangements (European Commission, 2017b). In its 'EU action plan 2017-2019 — Tackling the gender pay gap' (European Commission, 2017c), the European Commission also committed to supporting practices that tackle stereotypes, which emerge early on in education and professional life and lead to differences in the employment and working conditions of women and men. This research note seeks to provide an important contribution to the EU-level commitments to combat occupational segregation and to better comprehend and design relevant policy measures to enhance work–life balance.

First, the research note will provide an overview of women's and men's employment in ICT jobs across the EU, exploring the current situation, recent trends and the defining moments in the course of a person's life, along with other characteristics of women and men in ICT professions. Among the major factors underlying women's low representation across ICT jobs, this note will also review the gender divide in the aspirations of teenagers for ICT careers.

Second, the note will explore gender divisions across the various attributes of ICT jobs. In particular, the focus will be on work–life balance-related aspects of ICT jobs. For example, working-time arrangements that are relevant for work–life balance will be explored, along with employees' own satisfaction with working conditions. Furthermore, relevant gender gaps across different occupational groups will be highlighted so as to better comprehend differences and similarities in the working conditions of a field dominated by men (ICT) compared to one dominated by women (healthcare). Selected national approaches to reducing gender segregation and enhancing working conditions relevant to work–life balance will also be discussed.

1. EU policy framework

1. EU policy framework

Gender equality is a crucial component affecting not only the everyday lives and well-being of women and men, but also the growth and competitiveness of the EU economy. Gender stereotypes and structural obstacles that prevent women and men from making genuine choices in education and employment pose a real social and economic threat. They weaken the economy by making the labour market less competitive and making it harder for companies to find highly qualified professionals in growing sectors, such as information and technology. Gender inequality also weakens the trust of people in states and institutions to deliver fair, equitable and stronger societies.

In 2017 the European Commission presented a White Paper on the future of Europe, which marked a starting point for debates on the future of the European Union. The paper calls for strengthening a social Europe with high social standards, strong individual and collective social rights and more equitable social outcomes. The interinstitutional proclamation on a European Pillar of Social Rights provides a new opportunity for the EU to design and implement sustainable and effective policies that would benefit all — women and men. It is recognised that, to a large extent, the social challenges Europe is facing today are a result of relatively modest economic growth, which is rooted in untapped potential in terms of participation in employment and productivity (European Commission, 2017a). The European Pillar of Social Rights sets out an agenda for better-performing economies and more equitable societies, and reconfirms the EU's commitment to foster gender equality in all areas, including participation in the labour market, terms and conditions of employment, career progression and equal pay for work of equal value.

At policy level, the Europe 2020 strategy is the EU's main strategic document for growth and jobs for the current decade. The strategy sets out the headline target of 75 % employment for women and men aged 20-64. This implies reinforcing education and training for women, particularly in sectors where they are under-represented. The evidence of persistent skills shortages in the ICT sector in spite of high unemployment levels in many Member States shows that there is a vast pool of untapped potential, especially among women, as well as a waste of resources and a lack of investment in human capital.

A wide range of other EU policy initiatives, such as the digital agenda for Europe (2010), the grand coalition for digital jobs (2013), the EU skills panorama (2014), the recently updated digital single market strategy and the new skills agenda for Europe (2016) address the Commission's highest political priority, 'a new boost for jobs, growth and investment'. The shortage of ICT specialists and the vast under-representation of women in this fast growing sector are well documented. The new skills agenda for Europe acknowledges that tackling the skills deficit will require significant policy efforts and systemic reforms in education and training. It also seeks to ensure that people have the right skills throughout their lives, not only to improve their prospects in the labour market, but also to enable them to fulfil their potential as confident and active citizens.

In education and training, through the 2015 joint report of the Council and the Commission on progress in the implementation of the education and training 2020 strategy (ET 2020), the Commission and the Member States set new priorities for 2020 that include tackling the gender gap in education and promoting more gender-balanced choices in education. The gender-equality dimension is integrated in the relevant European funding programmes, in particular Erasmus+ and the EU funding programme for education, training, youth and sport.

In the area of gender equality, the European Commission's strategic engagement for gender equality 2016-2019 seeks to: introduce further measures to improve the gender balance in economic sectors and occupations; increase use of the grand coalition for digital jobs to support measures enhancing women's and girls' digital skills; promote women's employment in the ICT sector; and raise awareness of educational and vocational training choices. It also acknowledges the importance of promoting gender equality in all levels and types of education, including in relation to gendered study subject choices and careers, using existing policy cooperation tools and funding instruments as appropriate, in line with the priorities set out in the ET 2020 framework.

Women's disproportionate responsibility for the care of dependent family members and household tasks is a major factor in their under-representation in the labour market and gender segregation in employment. The European Commission recently proposed a package of measures on work–life balance for working parents and carers (European Commission, 2017b) — one of the key deliverables of the European Pillar of Social Rights. The measures aim at promoting organisational cultures that would embrace the work–life balance needs of both women and men in all sectors and occupations and would attract a wider talent pool and a more diversified workforce to companies.

The Commission's communication 'EU action plan 2017-2019 — Tackling the gender pay gap' acknowledges that the gender pay gap has stagnated as a result of pervasive gender segregation in the labour market and that the sectors where women dominate are usually lower paid than those where men are clustered (European Commission, 2017c). The action plan envisages a list of measures to combat segregation in occupations and sectors, to improve respect for the equal-pay principle, to tackle the care penalty and to break the glass ceiling.

The Council, in its recent conclusions on 'Enhanced measures to reduce horizontal segregation in education and employment' (December, 2017), stresses the importance of introducing both girls and boys to ICT and care-related skills starting from an early age, with a particular focus on inspiring more girls to develop and maintain an interest and talent in the digital field and more boys to do the same in care-related fields. The Council calls on the Commission and the Member States to take steps to reduce the gender gap in the ICT sector within the framework of the digital single market strategy and to encourage employers, especially companies involved in the Digital Skills and Jobs Coalition, to put a particular focus on equal career opportunities for women and men and to promote gender equality in their organisations.

A need for active, evidence-guided intervention has been confirmed by the European Parliament resolution of September 2015 on empowering women and girls through education in the EU. Gender stereotypes and sexism are recognised as the greatest obstacles to achieving gender equality, as they affect the self-image and decisions made by girls and boys. Member States are called on to fight these stereotypes through informal and formal education and by encouraging girls and boys to take an equal interest in all subjects. In the report on women's careers in science and universities, and the glass ceiling encountered (2015), the European Parliament urged the Member States to develop effective and attractive curricular and teaching methods for STEM to keep girls engaged in science; to recognise and invest in teachers as drivers of cultural change, with their potential to boost the continuing participation of girls in science at school; and to recognise the potential of quality career guidance and of engaging in training to encourage girls to continue STEM subjects at university.

2. ICT specialists: main characteristics

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2.1. ICT jobs represent an important share of EU employment

The digital world of work is highly diverse and dynamic. In 2014 the top 20 ICT specialist-intensive occupations provided employment to close to 29 million workers in the EU (Hüsing et al., 2015). Among them, about three quarters worked in non-ICT jobs requiring ICT skills and the others were ICT specialists. In 2016 there were about 8.2 million ICT specialists in the EU, representing about 3.7 % of total employment. This marks an increase of more than 1 million ICT specialists over the past 5 years and reflects a continuous move towards the digitalisation of EU economies. In some countries, such as Finland or Sweden, ICT specialists make up more than 6 % of total employment.

In addition to rapid growth, ICT employment is undergoing big changes regarding job profiles, and experiencing vast shortages across a number of core and highly skilled jobs such as software and application developers, database designers and administrators, and network and operations practitioners (Hüsing et al., 2015). Demand for STEM professionals and associate professionals is expected to grow by 8 % between 2013 and 2025, whilst the average growth forecast for all occupations is 3 %. Around 7 million job openings are forecast up to 2025 (European Parliament, 2015). In light of these changes, along with insufficient general supply, ICT specialists are at the top of the EU's skills-shortage list. The situation can largely be attributed to an insufficient number of graduates in ICT study fields, inadequate training programmes and the so-far unsuccessful attraction of women into ICT occupations and studies (Cedefop, 2016; EIGE, 2017c).

To ensure added value for policymaking and wider research regarding ICT jobs, and to coherently highlight underexplored gender aspects of digital economy and digitalisation, this study relies on definitions adopted by Eurostat and the OECD. It focuses on ICT specialists in employment, defined as those able to 'develop, operate and maintain ICT systems and for whom ICTs constitute the main part of their job' (OECD, 2004). The study also explores gender divisions between and within (if possible) the main broad categories of ICT specialists ([1]): (I) ICT managers, professionals and associate professionals (technicians); and (II) other employees primarily involved in the production of ICT goods and services. The first category could be further split into three larger occupational groups: managers, professionals and technicians. The second category of 'other employees' refers to a variety of more distinctive occupations, such as information technology trainers, ICT sales professionals and telecommunication engineers.

The analysis has been done using the EU Labour Force Survey (EU-LFS) and the European Working Conditions Survey (EWCS). The definitions of ICT specialists vary between the two sources due to data limitations, with the EU-LFS allowing analysis of somewhat more limited groups of ICT specialists (see Annex). The analysis is focused on employed people aged 20-64, if not specified differently. As indicated in Table 1, ICT professionals — an occupation typically requiring higher education qualifications — is the largest group of ICT specialists, constituting close to half of all ICT specialists in the EU. Still, in a number of Member States, such as Italy, Spain or Greece, ICT technicians make up the prevalent share of ICT specialists (Figure 1).

Despite an existing statistical definition, distinguishing information on ICT specialists is still highly cumbersome. Secondary data sources typically offer limited gender (relevant) information ([2]). In order to depict a more complete picture of gender equality in the digital world of work, this study draws information from a few complementary information sources, including secondary data (i.e. Eurostat), EU-LFS and EWCS microdata and an existing literature review.

([1]) Subject to microdata limitations, such as possibility of distinguishing ICT specialists (four-digit ICSO code level is required) or available data reliability at the country level.

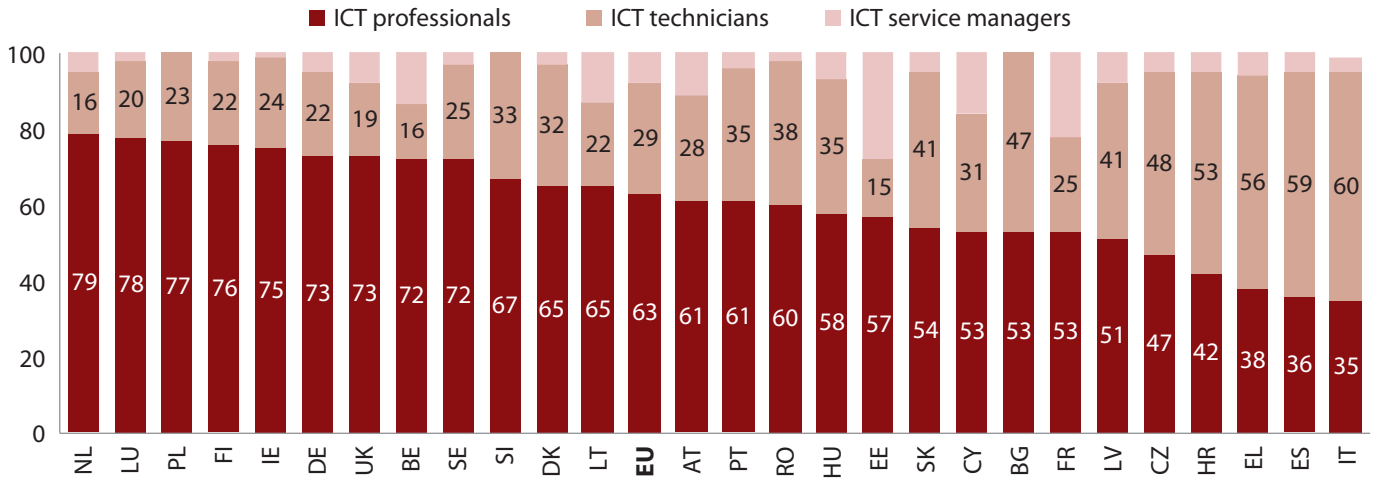
([2]) Microdatabases of the EU-LFS and the EWCS permit sex-disaggregated elaborations, but with constraints, such as due to small sample sizes for some countries. The EU-LFS enables a more detailed breakdown at country level regarding the first category of ICT specialists (professionals, technicians and managers). EWCS data provide statistically reliable information on aspects relevant to work–life balance, but only at the EU level and for an aggregate of all ICT specialists.

Table 1: Categories of ICT specialists in the EU, estimates by data source (20-64, %, 2015-2016)

ICT-specialist categories	Share of total employment		Share of ICT specialists	
	EWCS (2015)	EU-LFS (2016)	EWCS (2015)	EU-LFS (2016)
(I) ICT service managers, professionals and technicians	2.4 %	2.8 %	72.6 %	n/a
			100.0 %	100.0 %
Service managers	0.1 %	0.2 %	*5.5 %*	*7.5 %*
Professionals	1.4 %	1.8 %	*60.0 %*	*63.0 %*
Technicians	0.8 %	0.8 %	*34.5 %*	*29.4 %*
(II) Other employees primarily involved in the production of ICT goods and services	0.9 %	n/a	27.4 %	n/a
Total: ICT specialists	3.3 %	3.7 %*	100.0 %	n/a

Source: EIGE calculation based on EU-LFS 2016 microdata and EWCS 2015 microdata.
Note: EU-LFS microdata enable identification only of group I: ICT managers, professionals and associate professionals (technicians) (ISCO08 codes: 133 ICT service managers, 25 information and communications technology professionals, 35 information and communications technicians); BG, PL, SI: data for code 133 not available; EWCS microdata enable the total category of ICT specialists (groups I and II) to be distinguished; identification of ISCO08 codes at three digits provided by the European Foundation for the Improvement of Living and Working Conditions (Eurofound) upon request; EU for EU-LFS refers to the Member States of the EU, not including Malta; * EU-28, figure provided by Eurostat (isoc_sks_itsp).

Figure 1: Share of ICT service managers, professionals and technicians, by country (20-64, %, 2016)



Source: EIGE calculation based on EU-LFS 2016 microdata.
Note: EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available. Countries sorted in descending order on the basis of the share of ICT professionals.

Throughout the analysis, relevant comparisons are made to another occupational group, such as health professionals, defined as health professionals (ISCO08 code 22) and health associate professionals (ISCO08 code 32). Similar to ICT specialists, the health professions typically require higher educational qualifications (67 % of ICT and 60 % of health professionals have a higher education qualification), but contrary to ICT, health professions are one of the most common professions for women to work in. 75 % of health professionals in the EU are women, as opposed to a mere 17 % women among ICT specialists in 2016 ([3]). This study compares a number of work and individual attributes of ICT specialists and health professionals in order to assess what distinguishes one of the most feminised occupations from ICT jobs in terms of working conditions and opportunities for work–life balance.

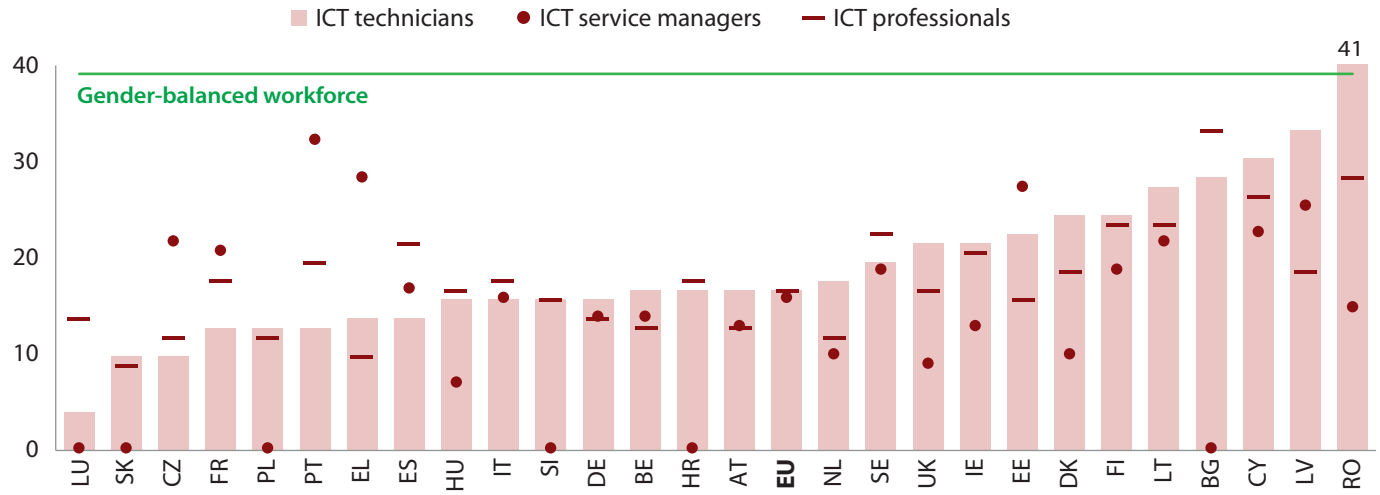
([3]) Calculations on the basis of the EU-LFS (2016), with reference to the 20-64 age group.

2.2. More than eight out of 10 ICT jobs go to men

ICT jobs are predominantly taken by men rather than women, sustaining stark labour-market divisions on the basis of gender. Across different categories of ICT specialists (Figure 2), in 2016, gender balance ([4]) existed only among ICT technicians in Romania (41 %), with the second-best situation noted in Latvia (35 %). The highest share of women among ICT professionals was in Bulgaria (34 %), followed by Romania (29 %). On the opposite end of the scale, the highest gender segregation in the EU, both among ICT professionals and technicians, was in Slovakia (less than 10 % of women).

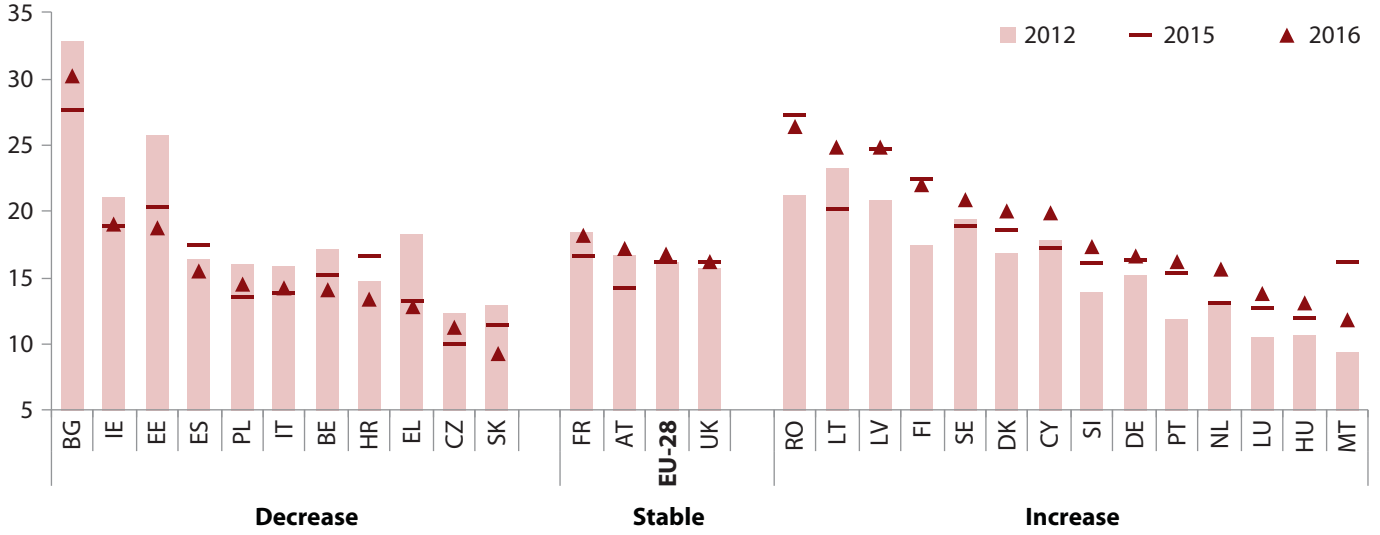
Looking at all the categories of ICT specialists together, only 17 % of them were women in the EU-28 (Figure 3). Despite the general growth of ICT employment, the share of women in ICT jobs in the EU increased marginally (0.5 percentage points (pp))

Figure 2: Share of women among ICT service managers, professionals and technicians, by country (20-64, %, 2016)



Source: EIGE calculation based on EU-LFS 2016 microdata.
Note: EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available. Countries sorted in ascending order on the basis of the share of ICT technicians.

Figure 3: Share of women among ICT specialists, by country (20-64, %, 2012-2016)



Source: EIGE's calculation, based on Eurostat [isoc_sks_itsps].
Note: Countries are grouped on the basis of change from 2012 to 2016; 'stable' refers to a change from – 1 to 1 pp, with due implications on thresholds of 'decrease' and 'increase'; within the group, countries are sorted in descending order on the basis of the situation in 2016.

([4]) A gender-balanced workforce would imply 40 % to 60 % women or men.

since 2012. The situation at Member State level is more diverse. The most notable increases were observed in Romania (5 pp), Finland (4 pp) and Portugal (4 pp), and the largest decreases noted in Estonia (– 7 pp), Greece (– 6 pp) and Slovakia (–4 pp).

Since 2012 a number of opposite country-level trends have been noted across different categories of ICT specialists. For example, in a number of countries the share of women has increased among ICT professionals but decreased among ICT technicians (BG, CZ, HU, LU, UK) (Figure 4). In Greece a large reduction in the share of women was observed in both occupations (a decrease of 11 pp among ICT professionals and of 12 pp among ICT technicians). In Finland and Cyprus the share of women has increased among both ICT professionals and technicians.

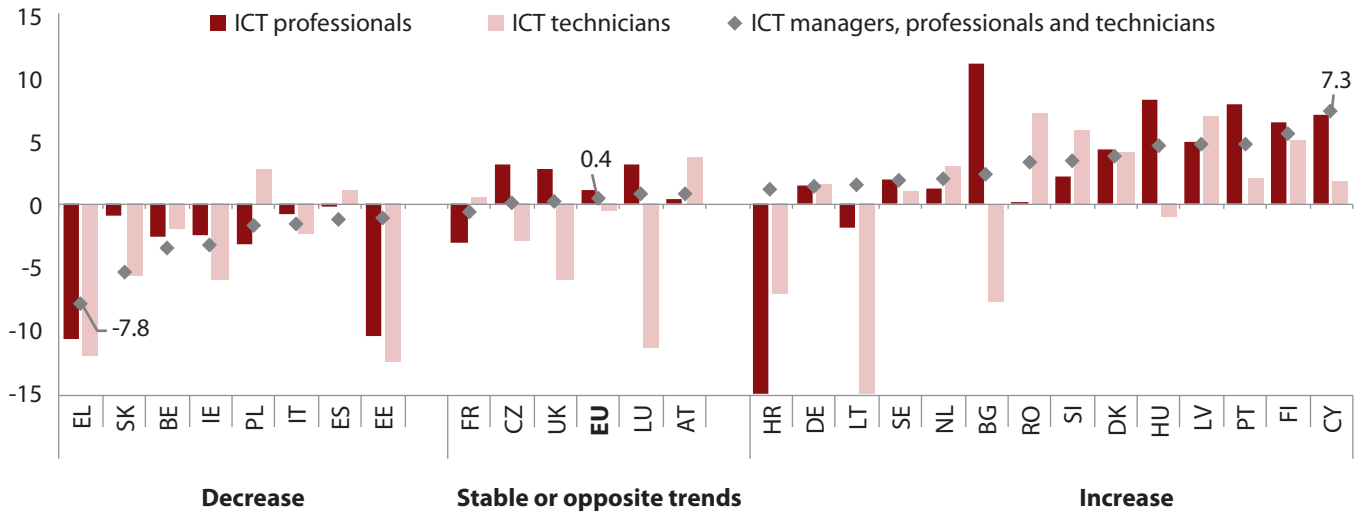
Overall, high gender segregation within ICT jobs surpasses the gender imbalance of many other STEM jobs, and especially those that demand higher qualifications (EIGE, 2017c). For example, women constitute about 25 % of science and engineering professionals in the EU.

2.3. ICT jobs are especially attractive to younger generations, however women still need higher-education qualifications to be in the field

About 67 % of people with ICT jobs in the EU have high educational qualifications, and about 30 % have medium qualifications. This is double the share of people with a higher-education qualification among the rest of the workforce. Across most Member States, women in ICT professions tend to have higher educational attainment than men. Within the EU, 73 % of women and 66 % of men in ICT have high education qualification (Figure 5). The share of women with a higher- education qualification in ICT varies from more than 90 % in Spain, Cyprus, Latvia, Lithuania or Luxembourg to 52 % in Italy. In some Member States the gender gap in the share of highly educated people is as high as 30 pp (LV, PT). In three Member States (BG, DK, RO) the share of men with higher-education qualifications slightly exceeds that of women.

At the EU level, no major gender differences emerge across the age profile of women and men working in ICT jobs, with slightly

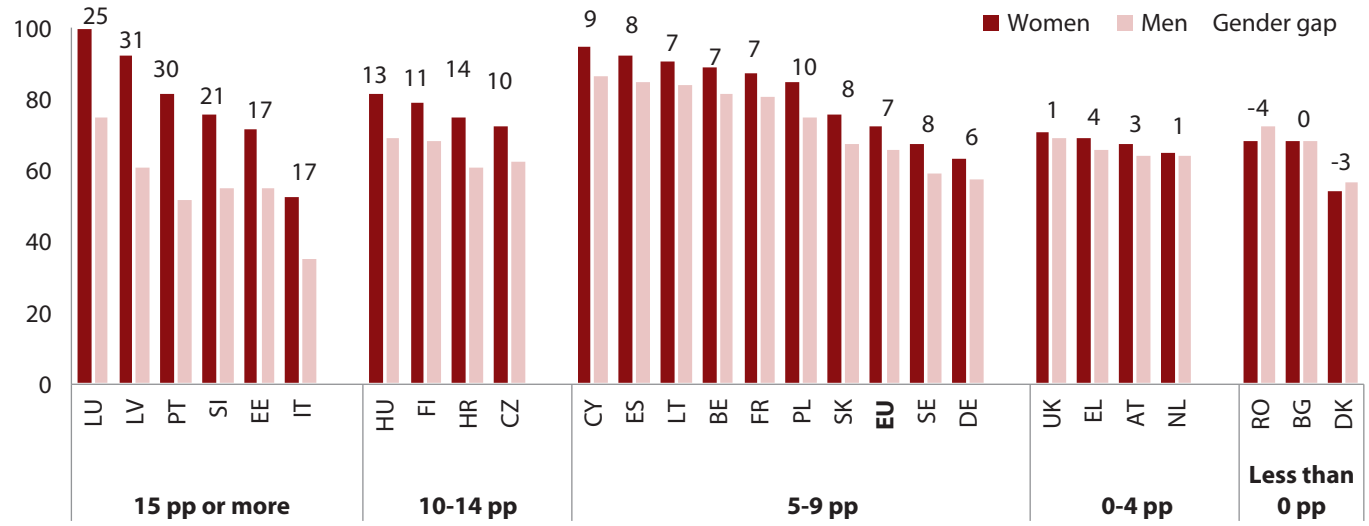
Figure 4: Change (2012-2016) in the share of women across ICT service managers, professionals and technicians, by country (pp)



Source: EIGE calculation based on EU-LFS 2016 microdata.

Note: EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available. Countries sorted in the ascending order on the basis of change (pp) in the share of women from 2012 to 2016.

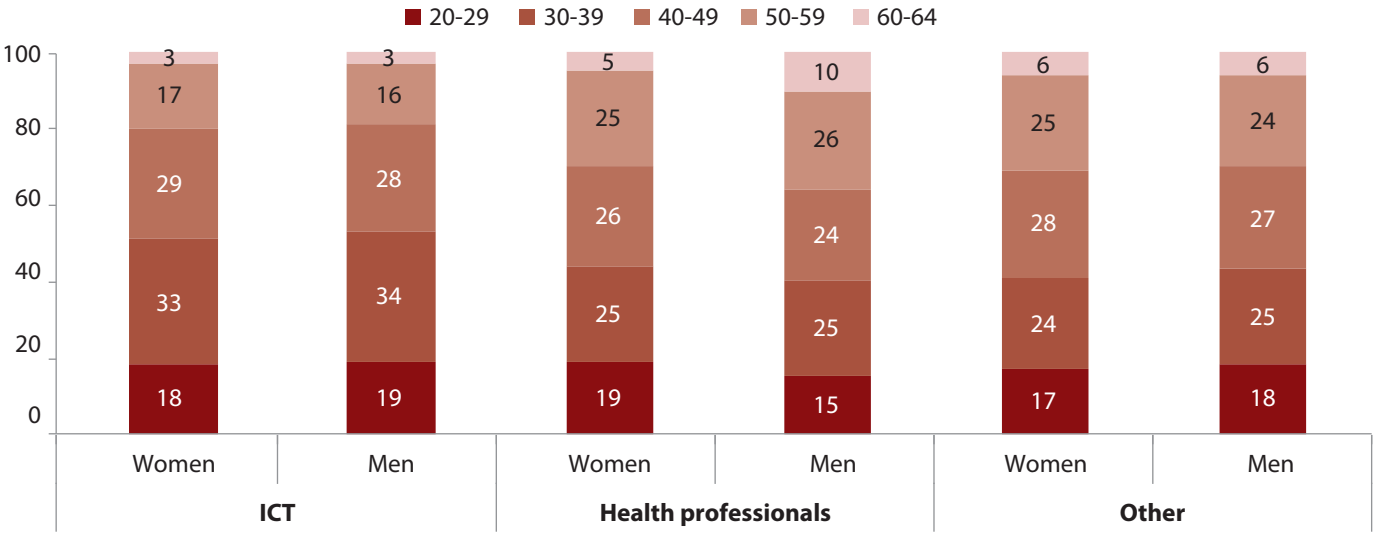
Figure 5: Share of ICT service managers, professionals and technicians with high education qualification and gender gap, by gender (20-64, %, 2016)



Source: EIGE calculation based on EU-LFS 2016 microdata.

Note: High educational attainment is defined including levels 5-8 of ISCED 2011. Countries are grouped on the basis of their gender gap (a positive number points to a higher share of women with high educational qualifications); within the group, countries are sorted in descending order with reference to women. EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available.

Figure 6: Age structure of different occupational groups in the EU, by gender (20-64, %, 2016)



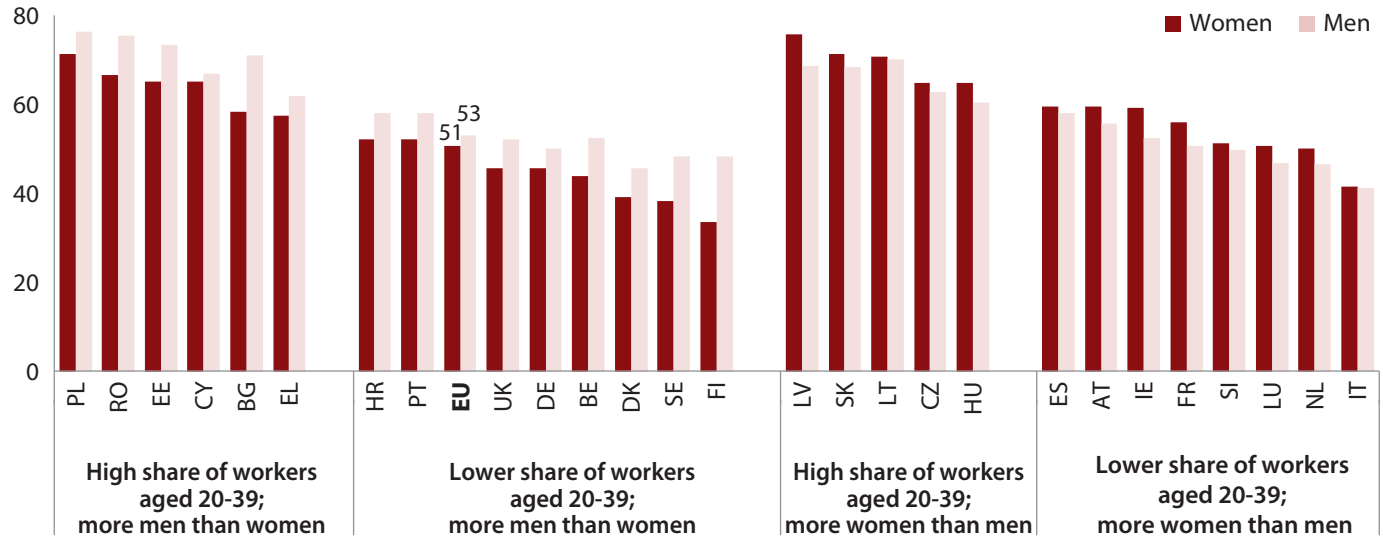
Source: own calculations based on EU-LFS 2016 microdata.

Note: 'ICT' represents the total of ICT service managers, professionals and technicians. EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available.

more than half of them being under 40 years old (Figure 6). This makes an average ICT employee somewhat younger than the rest of the workforce, in which about 40 % of the employees are under 40 years old.

More gender gaps in the age composition among employees in ICT jobs surface at the Member State level, and potentially indicate that in at least part of the EU ICT jobs receive increased attention among younger generations of women (Figure 7). For example, the share of younger women in ICT is bigger than the share of younger men in ICT in Latvia, Slovakia, Lithuania, the Czech Republic and Hungary. In addition, the ICT workforce is relatively young in these countries. Nonetheless, in the other half of the EU Member States the reverse age composition prevails across women and men. For example, the share of younger women (aged 20-39) among women in ICT jobs is lower than

Figure 7: Share of ICT service managers, professionals and technicians, by country and gender (20-39, %, 2016)



Source: EIGE calculation based on EU-LFS 2016 microdata.

Note: 'ICT' represents the total of ICT service managers, professionals and technicians. EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available.

the share of younger men in ICT employment in Poland, Romania, Estonia, Cyprus, Bulgaria and Greece.

Looking at other characteristics, a significant share of people in ICT professions in the EU — 16 % of women and 13 % of men — are foreign born ([5]) (Figure 1). A particularly large share of foreign-born women in ICT jobs is observed in Denmark (17 %), the Netherlands (18 %), Sweden (20 %), Germany (21 %), France (23 %), the United Kingdom (23 %) and Ireland (38 %). The share of foreign-born employees in other occupations is lower, and with slightly higher shares of foreign-born men (13 %) than women (12 %).

2.4. In ICT, gender gaps in caregiving are smaller than in other occupations, but younger generations of women postpone having children

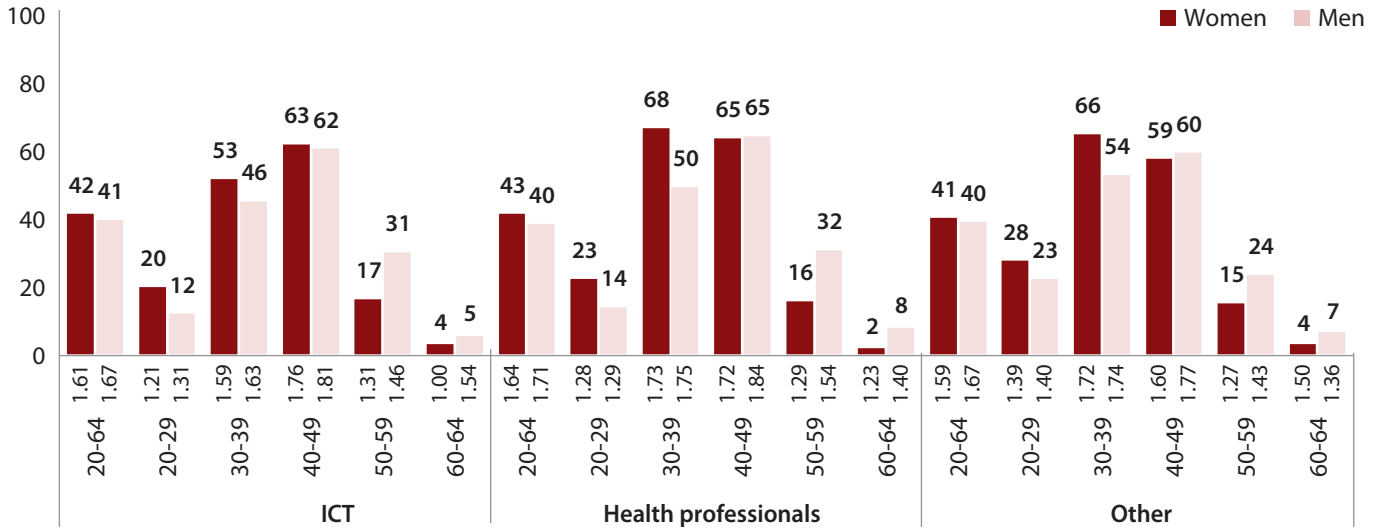
The analysis shows that, overall, 42 % of women and 41 % of men in ICT are living in a couple and have children under 18 years old, which is not very different from the health sector or the rest of the working population. Nonetheless, large differences are noted across generations. Only 53 % of women ICT specialists aged 30-39 have children, compared to 68 % of women health professionals and 66 % of women in other occupations (Figure 8). On the one hand, the latter finding points to a possible postponement of children among women ICT specialists. On the other hand, this might point to a more serious demographic phenomenon if younger generations of women employed in ICT jobs are giving up on having children altogether. Occupational differences in the average number of children are less pronounced among men, though fewer men (46 %) working in ICT have children by age 30-39.

Research has shown that the postponement of parenthood is relatively small among women who pursue careers in fields dominated by women, as here stereotypical attitudes about family roles prevail (Van Bavel, 2010). In contrast, the postponement of parenthood is noted to be much greater among women pursuing careers in fields with steeper earning profiles and high earning potentials (e.g. work fields dominated by men). Although it is not possible to directly draw conclusions regarding the childbearing behaviour and type of occupation or working conditions, there is also some evidence that women in non-standard jobs, such as temporary contracts, may postpone having children (Sutela, 2012). Women, and particularly mothers, in occupations or workplaces where very long or unpredictable hours are common may find these working arrangements incompatible with family commitments, thereby leaving the jobs and thus reinforcing gender segregation (Cha, 2013; Nielson et al., 2004 in Burchell et al., 2014). The presence of children, particularly small children, increases work–life conflict (McGinnity and Russell, 2013), and therefore the need for working conditions that would better support work–life balance. In addition to increasing the flexibility of working arrangements, the services supporting families and employees also need to adjust to non-standard work arrangements.

In line with aforementioned demographic trends, differences regarding family formation and life stages are noted between women in ICT jobs and, for example, women in health profes-

([5]) EIGE calculation based on EU-LFS microdata (2016); foreign born persons are born abroad (not in the country of their current residence), whether in other EU Member States or non-EU countries.

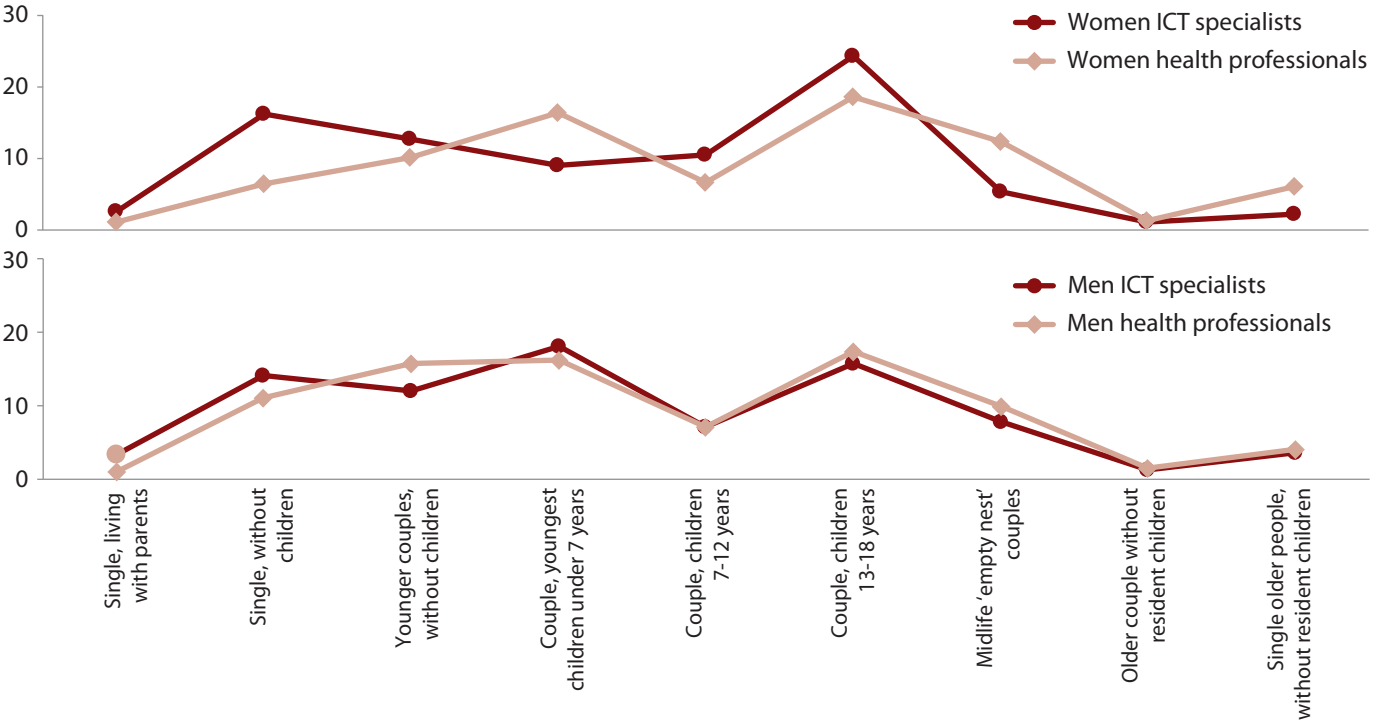
Figure 8: Share of employed people with children (0-17) and the average number of children in the EU, by gender, occupational and age group (20-64, %, 2016)



Source: EIGE calculation based on EU-LFS 2016 microdata.

Note: 'ICT' represents the total of ICT service managers, professionals and technicians. Percentages refer to a share of employees who have children aged 0-17; average number of children is displayed below the horizontal axis and is calculated among those who have children. EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available.

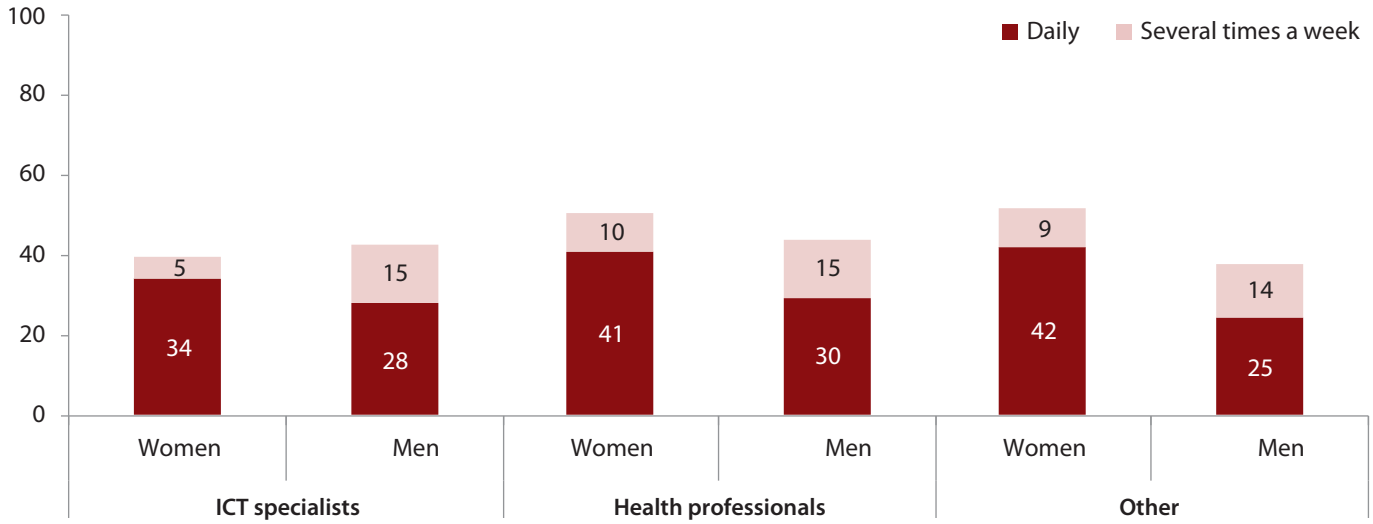
Figure 9: Life stages among ICT specialists and healthcare professionals in the EU-28, by gender (%, 2015)



Source: EIGE calculation based on EWCS 2015 microdata.

Note: Life stages are defined as follows: Single people (18-35 years), living with their parents or relatives; Single people (under 46 years) without children; Younger cohabiting couples (women under 46) without children; Cohabiting couples with youngest children under 7 years; Cohabiting couples with young children between 7 and 12 years; Cohabiting couples with teenage children between 13 and 18 years; Midlife 'empty-nest' couples without resident children; Older cohabiting couples without resident children; Single people (aged 50 years or older) without resident children.

Figure 10: Caring for and/or educating children or grandchildren, by occupation and gender, in the EU-28 (20-64, %, 2015)



Source: EIGE calculation based on EWCS 2015 microdata.

sions (Figure 9). In the 18-35 age group, 17 % of women ICT specialists were single without children, but only 7 % of women health professionals. 45 % of women in ICT jobs and 43 % of women in health professions are living in couples with children (under 18 years old). However, women in ICT have older children than those in health professions. Only 9 % of women ICT specialists were living in couples with children under 7 years old, whereas 17 % of women health professionals did so (Figure 9). Interestingly, occupational differences regarding family formation can only be noted for women and not for men: the profiles of men in ICT and health professions are very similar in terms of where they are in their life stages and there are equal shares of fathers among both of them (41 %).

More women than men are engaged in caring for children on a daily basis across occupations (Figure 10), although this gender gap is smaller among ICT specialists (6 pp) than among health professionals (11 pp) or the rest of the workforce (17 pp). In addition, fewer women in ICT jobs are engaged in daily caring activities in comparison to women in other occupations. This is linked to the abovementioned observations on differences in age composition and number of children between women in different occupations. Men's engagement in caring is steady across different occupations.

As regards other types of caring, 15 % of women and 14 % of men in ICT jobs provide care to elderly people or people with disabilities several times a month, and 1 % of women and men are engaged in this type of caring on daily basis ([6]). The engagement in caring is slightly higher among women and men in health professions.

2.5. Numerous factors explain the low share of women in ICTs

Women were not always absent from the ICT sector. In several countries, the share of women working in the IT sector was much higher in the 1970s and 1980s, especially in the United States (Koput and Gutek, 2010) and France (Collet and Mosconi, 2010) due to the bulk of jobs being low-status and clerical in nature at the time. In the 1990s, with the emergence of the personal-computer industry and the development of the internet, both the status and the nature of ICT jobs changed. Low-skilled data entry and analysis roles were gradually either transferred abroad or automated. With higher status associated with the field, more men entered and advanced in it (ibid.). Gendered representations also changed from the gender-neutral image of the IT technician, and with the rise of the popular figures of the 'geek' or 'hacker' became closely associated with masculinity, exerting control over women, other men and over machines and technologies (Segal, 1993).

The fact that women are now under-represented among ICT specialists is part of a more general trend of gender segregation in the labour market — the concentration of one gender in certain sectors and occupations. Out of the 20 largest occupations in the EU, only five have a gender-balanced workforce, with men dominating fields such as engineering and technology, including ICT, but lacking in others, such as teaching and care work (EIGE, 2017c). There are many explanations why gender segregation persists (see more in EIGE, 2017c), with gender stereotypes, gender divide in digital skills and educational backgrounds, masculine organisational culture or a lack of work–life balance options for parents and carers being among the ones most often cited. For example, Burchell et al. (2014) point out the labour-market impact of women's role as mothers on their

([6]) EIGE calculation based on EWCS 2015 microdata.

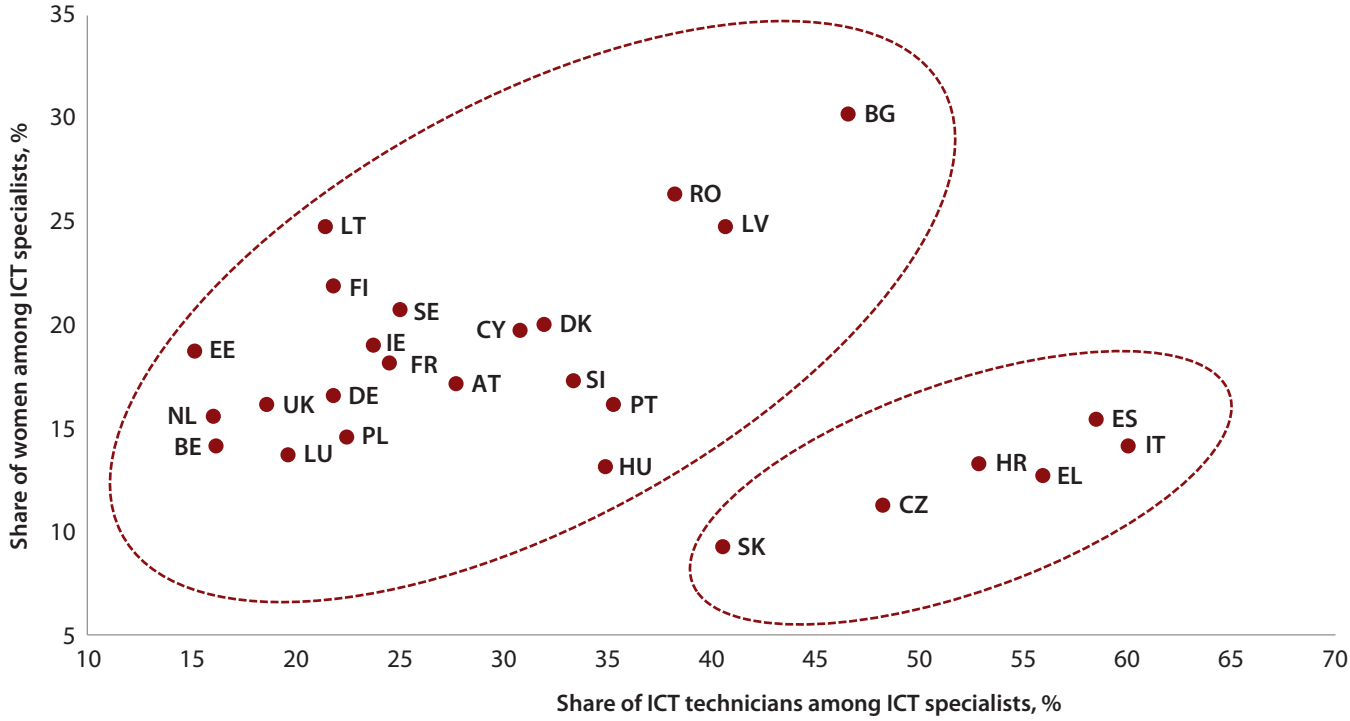
career 'choices' or notions of differences in women's talents and orientations compared to men. The 'choices' of women, however, need to be understood in a societal context, where they are largely conditioned by gender stereotypes, actual employment and childcare possibilities available in the specific cultural and labour-market contexts. In ICT specifically, three main factors are discussed to explain women's low participation in ICT jobs, namely women's relative lack of interest and qualifications in the field, ICT careers favouring men and cultural factors reinforcing the association between the ICT sector and masculinity (Valenduc et al., 2004; Valenduc, 2011).

As shown by EIGE's Gender Equality Index 2017 (EIGE, 2017b), there is still a large gender gap in the division of care and family responsibilities in the EU. This has direct and indirect consequences on women's labour-market outcomes. At the same time, employers' behaviour creates and sustains gender segregation through workplace and recruitment practices that may exclude women or men from certain jobs or tasks that matter for career progression. This discrimination, even if unconscious, may intensify for women and mothers (Correll et al., 2007; Fuegen et al., 2004), particularly in labour markets typically organised around continuous full-time careers (Burchell et al., 2014). One also needs to acknowledge that career paths are often determined by the educational choices made quite early in life. On a declining path, only 17 % of ICT graduates (vocational education and training, and tertiary studies) in the EU were women during the 2013-2015 period (EIGE, 2017c). Such aspects need to be coherently considered by policies tackling occupational gender segregation.

To highlight the role of some of these complex influences, Figure 11 suggests that in many EU Member States the higher share of ICT technicians among ICT specialists tends to be associated with a higher overall share of women in ICT jobs. This potentially points to some degree of vertical gender segregation ([7]) in ICT jobs, as technicians typically require lower qualifications in comparison to professionals or managers. Still, in a number of countries with the very low shares of women in ICT — Slovakia, the Czech Republic, Croatia, Greece, Spain or Italy — the share of technicians among ICT specialists is rather large, but seems not to be as strongly related to the overall share of women in ICT jobs. Such varied associations across countries points to the presence of a large array of influences on high occupational gender segregation.

In addition to the gender gap in educational qualifications, aspirations to work in a certain field start forming at a very

Figure 11: Share of women among ICT specialists and share of ICT technicians among ICT specialists (20-64, %, 2016)

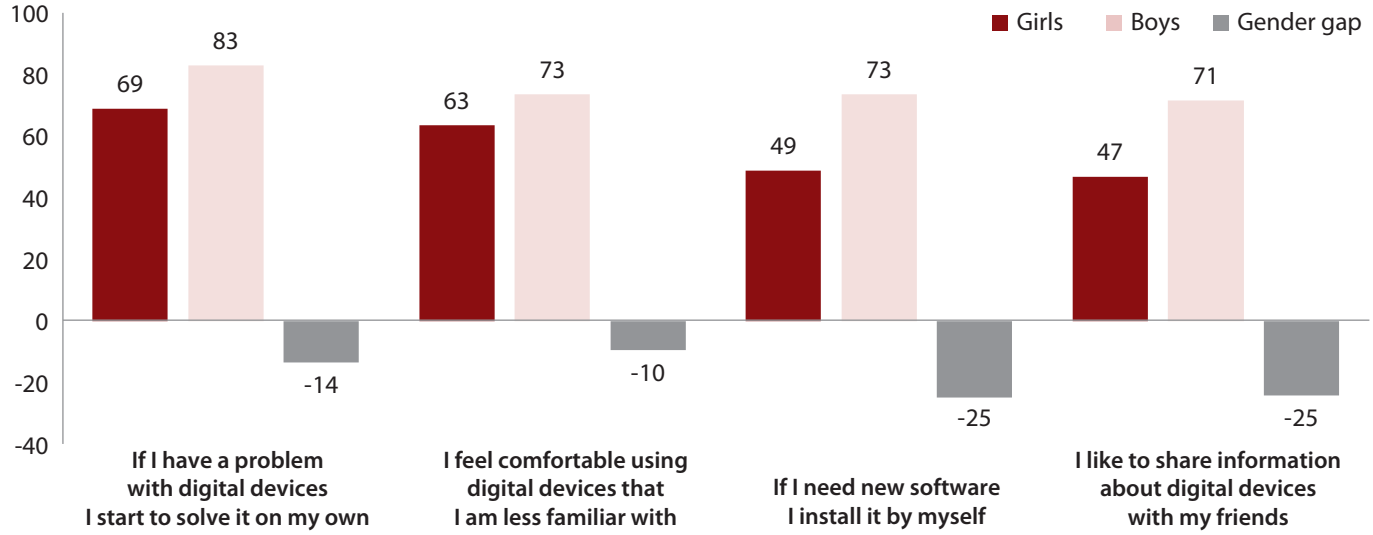


Source: EIGE calculation based on EU-LFS 2016 microdata.

Note: EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available. Share of ICT technicians is estimated in relation to the aggregate of ICT service managers, professionals and technicians.

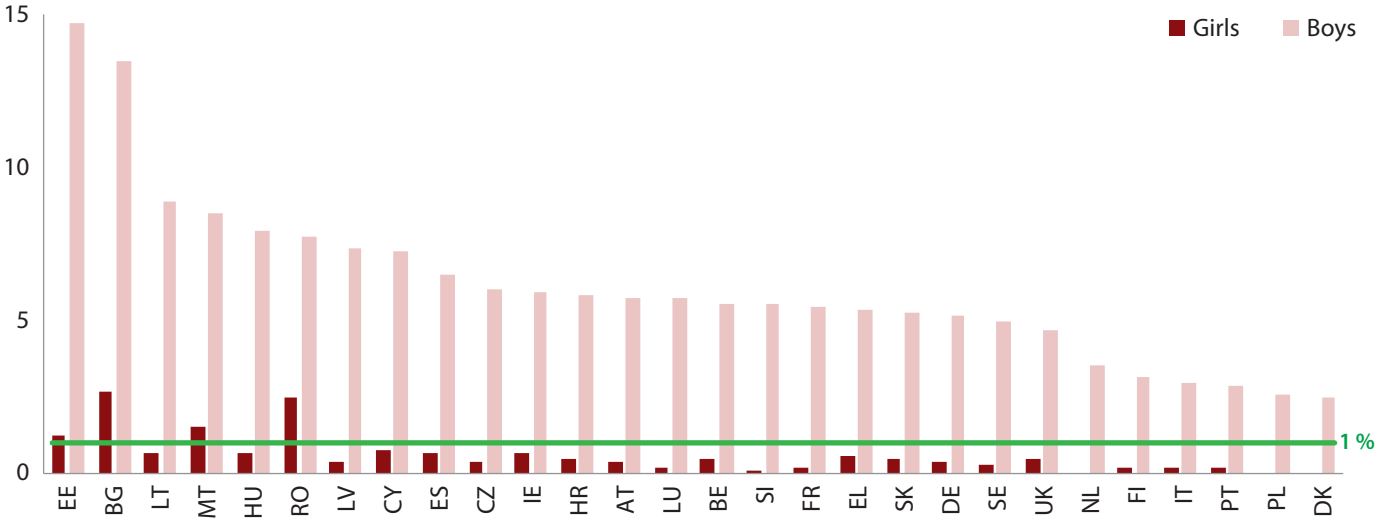
([7]) Vertical segregation refers to the concentration of women or men in different grades, levels of responsibility or positions (see EIGE's Gender Equality Glossary and Thesaurus).

Figure 12: Perceptions of own digital skills in the EU-28, by gender (15-16, %, 2015)



Source: EIGE (2018, forthcoming), *Gender equality and youth: opportunities and risks of digitalisation.*

Figure 13: Share of 15-year-olds expecting to work as ICT professionals at age 30, by country and gender (%, 2015)



Source: OECD (2016), on the basis of the PISA 2015 survey.

early age and are deeply rooted in gendered surroundings. Already in pre-school, girls and boys are exposed to the highly gender-segregated world of work in terms of gender biases in school curricula and a women-dominated educational workforce, which subsequently shapes visions of future careers. By the age of 15 girls and boys already have different levels of confidence and skills to use digital devices and strive for different career pathways. For example, most boys, when having a problem with digital devices, start solving it on their own, or they feel more comfortable than girls in using digital devices they are less familiar with (Figure 12). In line with Unesco (2017) observations, these gaps highlight the need for attention to reduce girls' anxiety and misconceptions about gender-based abilities in technological fields, such as ICT.

Moreover, these gendered attitudes and confidence in relation to ICT as such are also reflected in career aspirations, along with educational choices. In all EU Member States there are large gender differences in how many young people aspire to work as ICT professionals. Between 3 % (DK, PL, PT, IT, FI) and 15 % (EE) of teenage boys are interested in working as ICT professionals at the age of 30. On the other hand, 1 % to 3 % of teenage girls aspire to become ICT professionals in four countries (EE, MT, RO, BG), while in the remaining countries barely any girls have an interest in this occupational pathway (Figure 13).

3. Employment of ICT specialists: gender differences

3. Employment of ICT specialists: gender differences

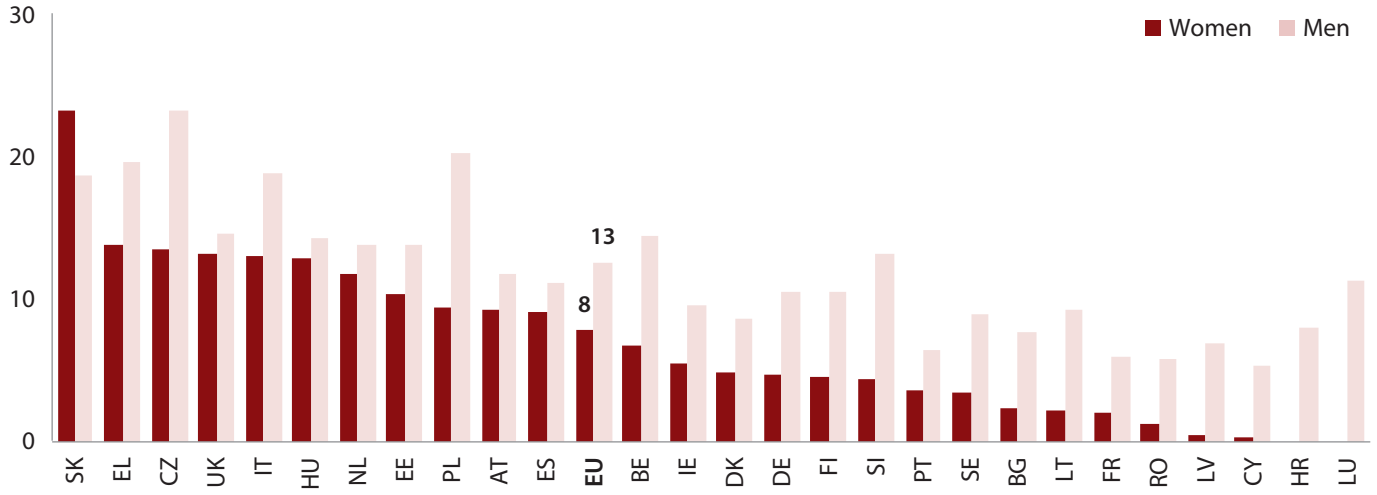
3.1. In ICT women are less likely to be self-employed and tend to work more often with other women

The employment status of people in ICT jobs in the EU is marked by gender differences. More women (92 %) than men (87 %) are employees, which means that the share of self-employed women (8 %) and men (13 %) in ICT is lower in comparison to other occupations, where 10 % of women and 18 % of men are self-employed. The share of self-employment in ICT jobs also varies greatly by country (Figure 14). It could be noted that the high share of self-employment ICT jobs in countries such as the Czech Republic and Slovakia goes along with the lowest share of women ICT specialists in the EU (e.g. Figure 3). This may be linked to the degree of social security and employment protection received if working an under employment contract or in self-employment.

The majority of employees in ICT have permanent job contracts ([8]). Only 8 % of men and 9 % of women in ICT have temporary contracts. Among those with temporary contracts, 61 % of men and 63 % of women have a contract duration of less than 1 year.

ICT specialists tend to work in larger companies in comparison to other employees. 10 % of women and 13 % of men in ICT work in companies with between 1 and 10 employees, whereas 27 % of women and 24 % of men in the rest of economy have jobs in such small companies. Across the Member States there are only a few countries where a larger share of women than men are employed as ICT specialists in small companies, such as Estonia (23 % women and 18 % men), Hungary (19 % women and 15 % men) and Slovakia (13 % women and 11 % men).

Figure 14: Share of self-employment among ICT service managers, professionals and technicians, by country and gender (20-64, %, 2016)

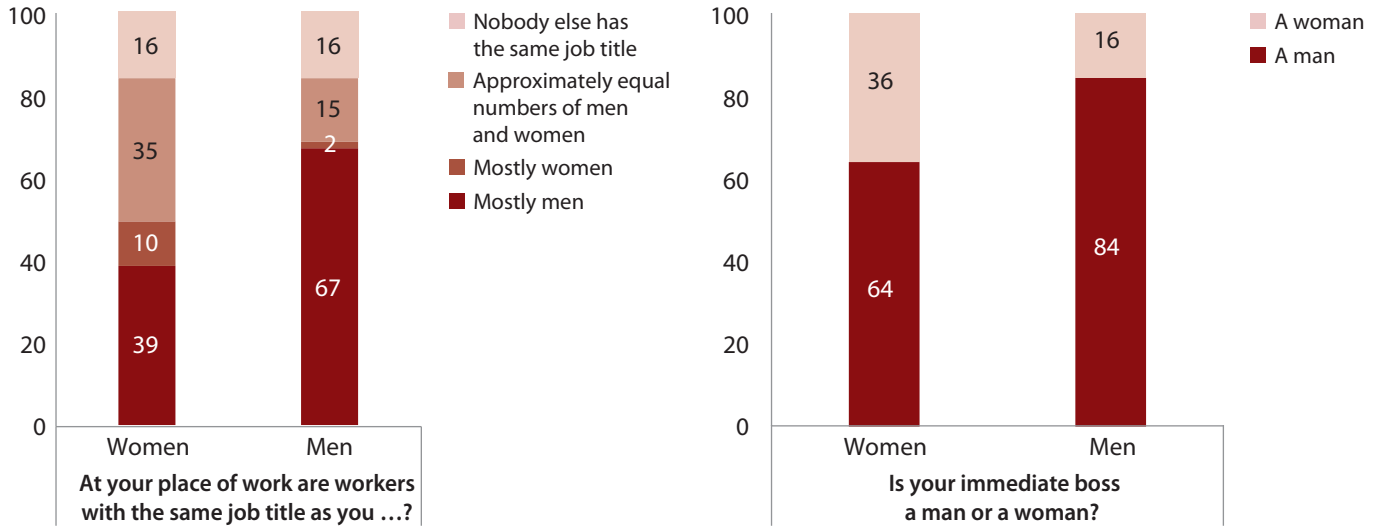


Source: EIGE calculation based on EU-LFS 2016 microdata.

Note: EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available.

([8]) EIGE calculation based on EU-LFS microdata (2016).

Figure 15: Gender composition of ICT specialists' workplaces in the EU-28 (20-64, %, 2015)



Source: EIGE calculation based on EWCS 2015 microdata.

The workplaces in which ICT specialists hold jobs are somewhat different in gender composition for women and men. First, women in ICT more often work under female supervision, despite an overall smaller share of women in the sector. 36 % of women and 16 % of men ICT specialists have a woman as an immediate boss (Figure 15). This may indicate that women are more open to hiring other women when they are also responsible for hiring procedures. It also could indicate that such workplaces are generally more open to having women as employees and women in responsible positions.

Second, women ICT specialists work more often in gender-balanced jobs than men do, as indicated by a high share (35 %) of them having jobs where there are equal numbers of female and male colleagues with the same job title. In comparison, only 15 % of men have jobs in workplaces with approximately equal numbers of men and women with the same job title. Furthermore, two thirds of men (67 %) and 39 % of women have male co-workers within the same function (Figure 15). This may indicate that there are still ICT jobs that are predominantly held by men and that only certain occupations in ICT are more open for women.

Most ICT specialists (82 % of women and men) work in the private sector. This makes ICT employment distinctly different from, for example, health professionals, where 45 % of women and 57 % of men work in the private sector. Even in the rest of the economy, not only is the share of employees (67 % of women and 78 % of men) working in the private sector lower than among ICT specialists, but there is also a visibly higher share of women employed in the public sector (25 %). Across ICT jobs, 12 % of women and men work in the public sector.

3.2. Women tend to have better working-time quality, but work more intensively and are paid less

Compared to health professionals and other employees, ICT specialists have higher job quality across a number of job-quality indexes ([9]) (Figure 16). Women in ICT indicate about equal evaluation with men in two dimensions (physical and social environments). Their working-time quality is also somewhat higher than that of men. In three other dimensions — work intensity, skills and discretion, and prospects — men in ICT jobs fare somewhat better than women. Furthermore, compared to women in health professions, the quality of jobs of women in ICT is better in four aspects — physical environment, social environment, working-time quality, and skills and discretion. Out of all these dimensions, working-time quality is often associated with the strongest effect on work–life balance (Eurofound, 2016).

It is noteworthy that work intensity is higher for women than men, both in ICT and in health professions. Work intensity refers to the level of work demands in the job, for instance working at high speed and under time pressure, but also experiencing emotional demands. No large differences in work-intensity ratings are observed for men across occupations. For women in ICT and in health professions, however, the work is more intense than for other working women.

([9]) The job quality is measured by Eurofound, using six job-quality indexes. On a scale from 0 to 100, the higher score stands for better situation, except for the work intensity where the higher score is less favourable for workers (based on EWCS data EU-28, Eurofound, 2016).

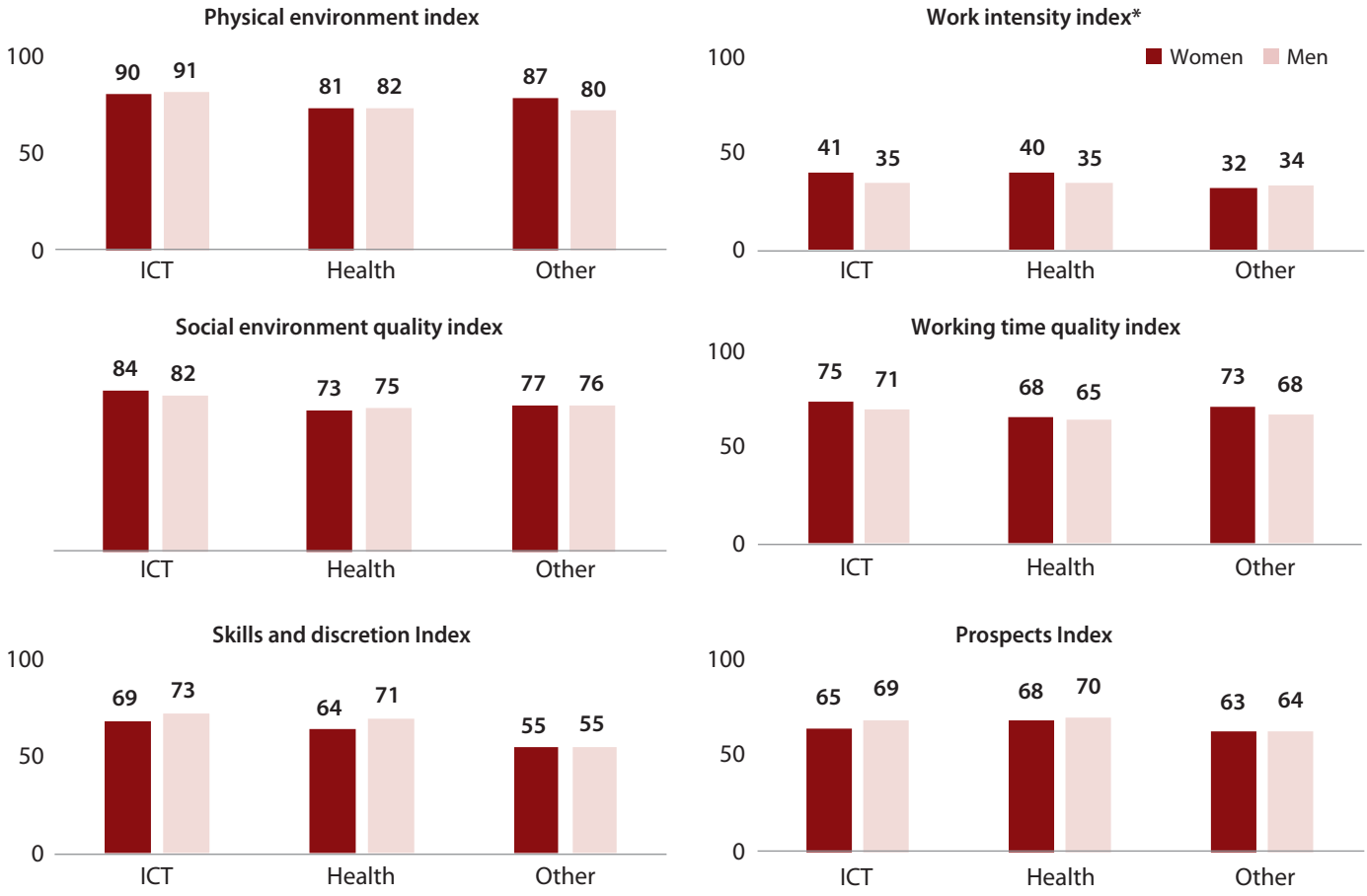
Women in ICT jobs also assess their upskilling ([10]) opportunities and career prospects somewhat lower in comparison to men, which is of particular importance not only to the current attractiveness of the ICT jobs but also to women's future potential of keeping up in digital jobs. Digitalisation and ICT jobs are seen in particular as being accompanied by an increasing need for lifelong learning, however women are at great risk of being left behind, 'because they either can't afford training or because they cannot fit their family duties with the need to work in a flexible workplace and re-train' (UNI, 2017). 41 % of women who are ICT specialists have received training provided or paid for by their employer during the past 12 months, while 50 % of men have had this ([11]).

Further gender gaps emerge when looking into more specific dimensions of working conditions, such as ergonomic conditions, which are among the most common sources of health problems and absences in the workplace (Niu, 2010). For certain risks, such as working in tiring or painful positions, prevalence is higher among men than women, but not in ICT and health professions. About 23 % of men versus 33 % of women ICT specialists work in tiring or painful positions a quarter of the time or more (Figure 17).

ICT specialists are less often exposed to work in emotionally disturbing situations in comparison to health professionals and other employees, although women are at higher risk across all occupations. About 29 % of women versus 22 % of men ICT specialists are exposed to emotionally disturbing situations a quarter or more of the time (Figure 17). This gap may be related to the different job functions of women and men in ICT and could be explored in more detail, not least as it might be attributed to factors that inhibit women's take-up and retention of ICT jobs.

Women earn less than men in ICT (Figure 18), but this gender gap (13 % in monthly earnings) is smaller than among health

Figure 16: Job-quality index scores, by occupational group and gender in the EU-28 (20-64, %, 2015)



Source: EIGE calculation based on EWCS 2015 microdata, based on the methodology of Eurofound (2016).
Note: *The higher the score, the better the result, except for work intensity, which is reversed.

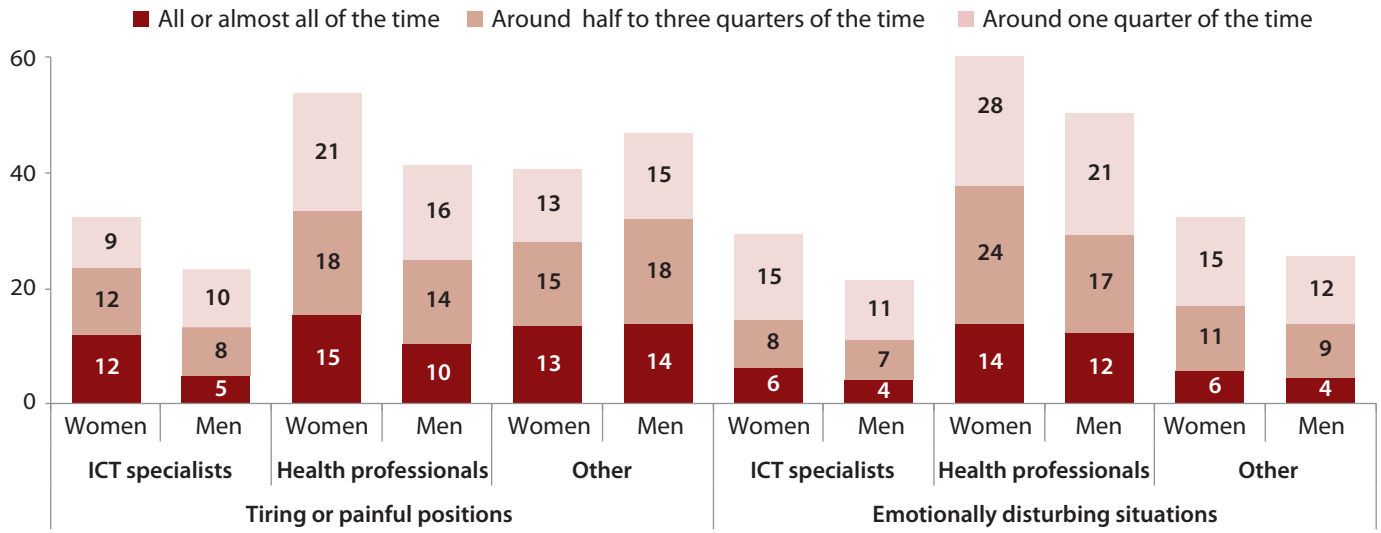
([10]) The skills and discretion index measures skills required on the job and opportunities workers may have to understand and influence the way work is performed, along with the possibilities to develop their job-related skills through training.

([11]) EIGE calculation based on EWCS 2015 microdata.

professionals (26 % in monthly earnings) or other workers (33 % in monthly earnings). More women in ICT receive a higher income (i.e. in the fifth income quintile) than women in health professions or in other occupations. Nevertheless, income inequality is high between women and men ICT specialists. 70 % of men in ICT are in the top two quintiles, whereas 54 % of women in ICT are, with the average monthly income being EUR 2 212 for women and EUR 2 538 for men ([12]).

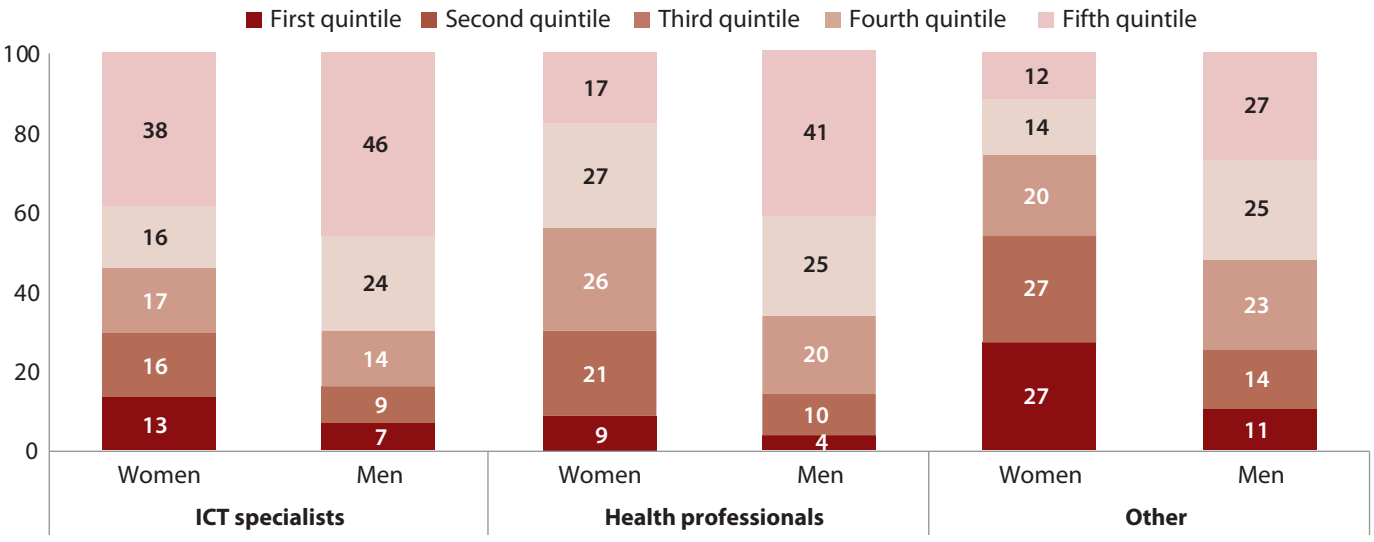
Overall, when assessing subjectively, 89 % of women and 91 % of men who are ICT specialists are satisfied or very satisfied with their working conditions (compared to 84 % of women and 88 % of men in health professions) ([13]).

Figure 17: Selected physical and social environment conditions in the EU-28, by occupational group and gender, (20-64, %, 2015)



Source: EIGE calculation based on EWCS 2015 microdata

Figure 18: Income quintiles in the EU-28, by occupational group and gender (20-64, %, 2015)



Source: EIGE calculation based on EWCS 2015 microdata.

Note: The income quintiles were calculated considering the entire working population within each country.

([12]) EIGE calculation based on EWCS 2015 microdata.
([13]) EIGE calculation based on EWCS 2015 microdata.

4. Working conditions, time and work–life balance

4. Working conditions, time and work–life balance

Overall, work–life balance policies help employers to retain and recruit workers, improve the motivation and productivity of employees, reduce absenteeism and avoid wasting talent (European Commission, 2017b). Work–life balance policies include, for instance, various rights relating to care-related leave and care services, but also working arrangements that would allow employees to find a suitable balance between their work responsibilities and their family and other responsibilities.

Though work–life balance policies have traditionally been viewed as addressing women's needs, they alleviate the struggles of both women and men — even if from different starting points. On the one hand, work–life balance measures aim to address women's under-representation in the labour market and support their career progression while also supporting the balance between work and family life. On the other hand, these policies also support men, who increasingly strive towards a more balanced share of time spent at work and with family. However, workplaces, state policies and society as a whole still have a long way to go to fully acknowledge the fact that reconciliation concerns men and fathers just as much as women and mothers.

Flexible ([14]) or non-standard ([15]) working arrangements are often seen as being key to the reconciliation of work and life. Still, these arrangements may have negative impacts depending on the actual kind of flexibility and employees' control over the working arrangements. Since it is still mostly women whose labour-market decisions are impacted by family formation and the need to reconcile family and work, the negative impacts are predominantly reflected in women's labour-market participation outcomes.

First, the lower overall employment rate of women with children, postponing having children or giving up having a family can partially be seen as an outcome of difficulties in the work–life reconciliation process, which may force people to choose between work and family.

Second, there is some evidence that work–life tensions and gender stereotypes may reinforce occupational gender segregation and therefore limit the career options of women. For instance, research carried out in Sweden's IT-service consultancy firm showed that despite both men and women facing similar tensions between work and family responsibilities, women opted out of roles requiring high degrees of spatial and temporal availability for work in favour of roles more easily combined with family responsibilities, which also were less technical and less valued. Men were mostly opting to work long hours thanks to their partner's greater availability at home (Holth et al., 2017).

Third, the part-time work or other non-standard working arrangements (i.e. varying hours or variable starting and finishing times) may have financial consequences. For instance, the risk of poverty among non-standard workers is much higher when compared to those with permanent and full-time jobs. In addition to lower wages, non-standard workers may have significantly poorer social protection, such as lower pension entitlements, welfare benefits or limited access to services (Spasova et al., 2017). Furthermore, working limited hours not only undermines women's confidence and career development, but also leads to a loss of technological expertise (Holth et al., 2017). Overall, the struggle to balance work and family life explains consistently lower women's employment rates and the higher risk of women's economic dependence, along with, subsequently, the gender pension gap and poverty of women in old age (EIGE, 2016).

There are several working-time arrangements that support work–life balance. Workers are more likely to say their working hours fit in with their family or social commitments outside work if they either have regular, predictable or not too long working hours; can have some flexibility in choosing the start

([14]) Flexible working arrangements allow employees to adjust to unexpected or irregular family or life requirements, such as a child's sickness, doctor's appointments, accidents, etc.

([15]) Non-standard working time can be part-time work, unsocial or non-standard working hours, variable hours or variable starting and finishing times, shift work and other arrangements that may, but may not, be regular and predictable in their nature.

and finish of their working day; can take an hour off for their personal or family needs; or can work from home. At the same time, those who, for example, perform night, shift or weekend work or work at home outside working hours are more likely to say that the balance between their work and private life is poor (McGinnity and Russell, 2015; Eurofound, 2016; Eurofound, 2017c). Overall, flexibility in working hours has to be accompanied by regulations so that it does not lead to increased work intensity and unforeseen spillover from work to home. 'Protection of rights and benefits of those in flexible employment must be safeguarded' (European Parliament, 2016).

McGinnity and Russell (2015) summarise evidence showing that other aspects of working conditions in addition to working-time arrangements also impact work–life balance. For instance, high levels of pressure at work, job insecurity, a lack of job autonomy and job control, and jobs where health and safety are at risk all have a negative effect on perceived work–life balance. Furthermore, there is a strong link between the possibility to take some time off from work at short notice and the perceived fitting of working hours in with care and other commitments, although people working part-time are less 'dependent' on this type of flexibility (Eurofound, 2017b; Eurofound, 2016).

4.1. Women and men in ICT jobs have flexible working-time options

The average amount of weekly working time for women and men in ICT jobs does not differ much, especially when to compared gender gaps observed in other professions. On average, women in ICT jobs work 36.9 ([16]) hours a week, which is longer than women in health professions (34.5 hours) and women in other jobs (33.6 hours). The average number of working hours for men in ICT jobs (39.8 hours per week) is longer than for women, but slightly shorter than men in health professions (40.4 hours per week) and at about the same level as men in other occupations. Overall this means that the small gender gap in the average working hours of ICT specialists is due to women working relatively more than women in other occupations and men working slightly less if compared to the rest of the workforce. The finding is in line with wider research evidence, which shows that women in STEM typically work longer hours than women in other occupations (EIGE, 2017c). Men's average working hours are typically longer than women's in every occupation, but they work even longer hours in occupations dominated by men, such as STEM (EIGE, 2017c). The working hours of men ICT specialists, therefore, point to an interesting research finding that would require a more detailed look, not the least from the gender-equality perspective.

([16]) EIGE calculation based on EU-LFS 2016 microdata. The average hours for women, however, vary a lot, from over 40 hours per week in Hungary, Portugal, Croatia, Cyprus, Greece and Slovakia to 32.2 hours in Netherlands and 33.1 hours in Austria.

Looking into the patterns of working time, the majority of women and men ICT specialists work 31-40 hours per week (72 % of women and 73 % of men), with the standard 40-hour working week somewhat more dominant among men (47 %) than women (42 %). Therefore, standard working hours are more common among ICT women and men when compared to health professionals or other working women and men (Figure 19).

A higher share of men (22 %) than women (13 %) ICT specialists work long hours (more than 40 hours per week), but very long working hours (more than 51 hours per week) are a reality for only 2 % of women and 4 % of men in ICT jobs. This shows that fewer men among ICT specialists work long hours (more than 40 hours) in comparison to men in other occupations (26 %), especially men health professionals (30 %), whereas a similar share of women ICT specialists and women in other occupations work long hours (12 %).

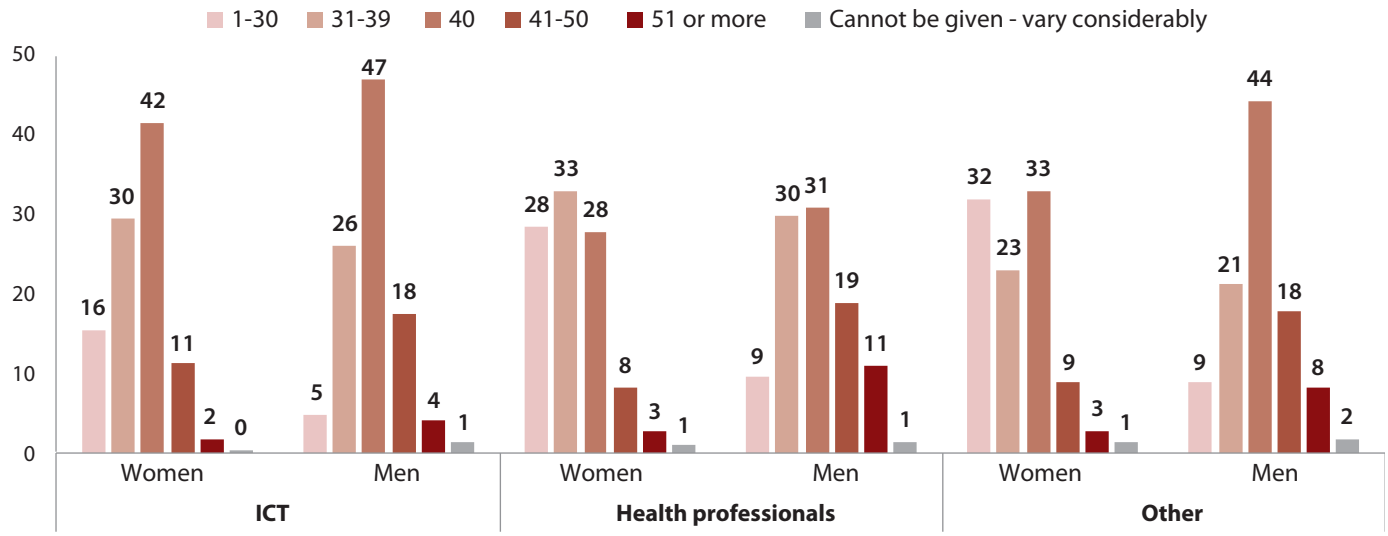
Part-time work may be an option for work–life reconciliation during certain periods of a person's life. This working arrangement is relatively less common among ICT specialists than for the rest of the working population, pointing to generally lower availability or a lower need for it. In ICT 19 % of women and 5 % of men work part-time, compared to 31 % of women and 8 % of men in other occupations. Part-time work is less prevalent among ICT specialists when compared to other working women and men in nearly all Member States (Figure 20). There is very limited information on how long part-time ICT specialists work per week, but based on available information for 10 countries, for women this ranges from 19.7 hours in Ireland to 31.9 in France, which shows that part-time work in different countries means very different working hours ([17]).

Caring responsibilities and other family or personal reasons are also among the most often-cited reasons why women work part-time in ICT. Among women working part-time in ICT, two thirds (64 % in total) do it either because they need to look after children or incapacitated adults (47 %), or because they have other family responsibilities or for personal reasons (17 %) ([18]). Among health professionals, 39 % of women who work part-time do so in order to look after children or incapacitated adults, and 20 % point out other family or personal reasons (59 % in total). For men in ICT and in health, family or childcare-related reasons for working part-time are less common: 23 % of ICT specialists and 22 % of health professionals indicate these reasons.

In addition to the length of working hours, atypical working hours (i.e. evenings, nights, Saturdays or Sundays) are also seen by women and men as an impediment to work–life balance, as they may not match the opening hours of childcare or other services, thus posing extra challenges to those who have children (Eurofound, 2017c). As shown in Figure 21, work during

([17]) EIGE calculation based on EU-LFS 2016 microdata.
([18]) EIGE calculation based on EU-LFS 2016 microdata.

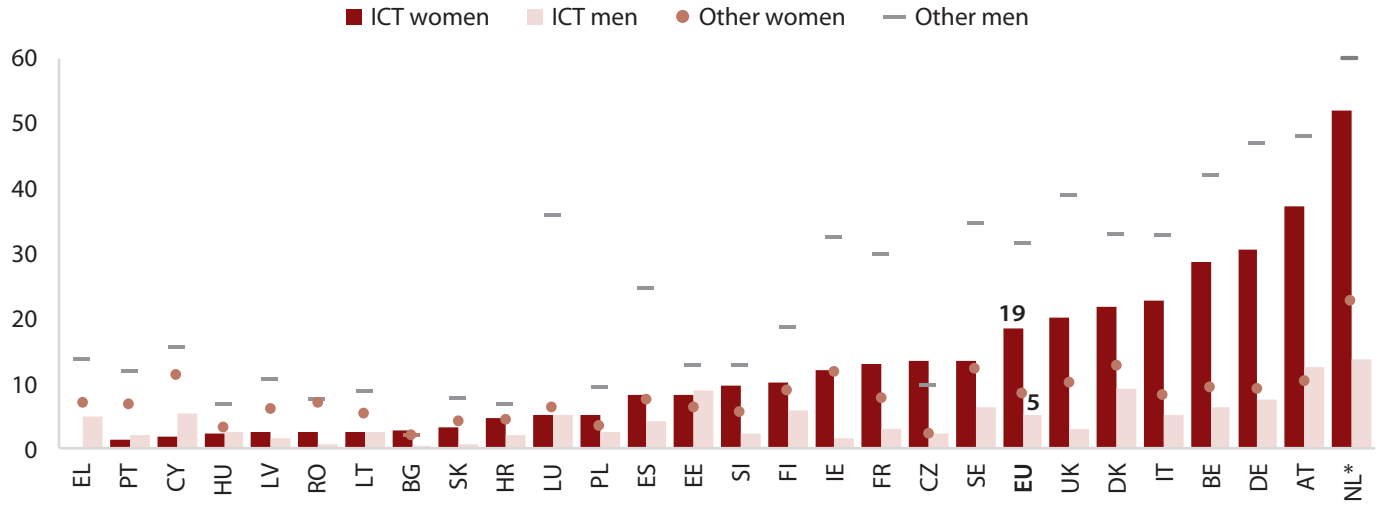
Figure 19: Average weekly working hours in the EU, by occupational group and gender (20-64, %, 2016)



Source: EIGE calculation based on EU-LFS 2016 microdata.

Note: ICT represents the total of ICT service managers, professionals and technicians. EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available.

Figure 20: Share of part-time of ICT (service managers, professionals and technicians) and other employees, by gender and country (20-64, %, 2016)



Source: EIGE calculation based on EU-LFS 2016 microdata.

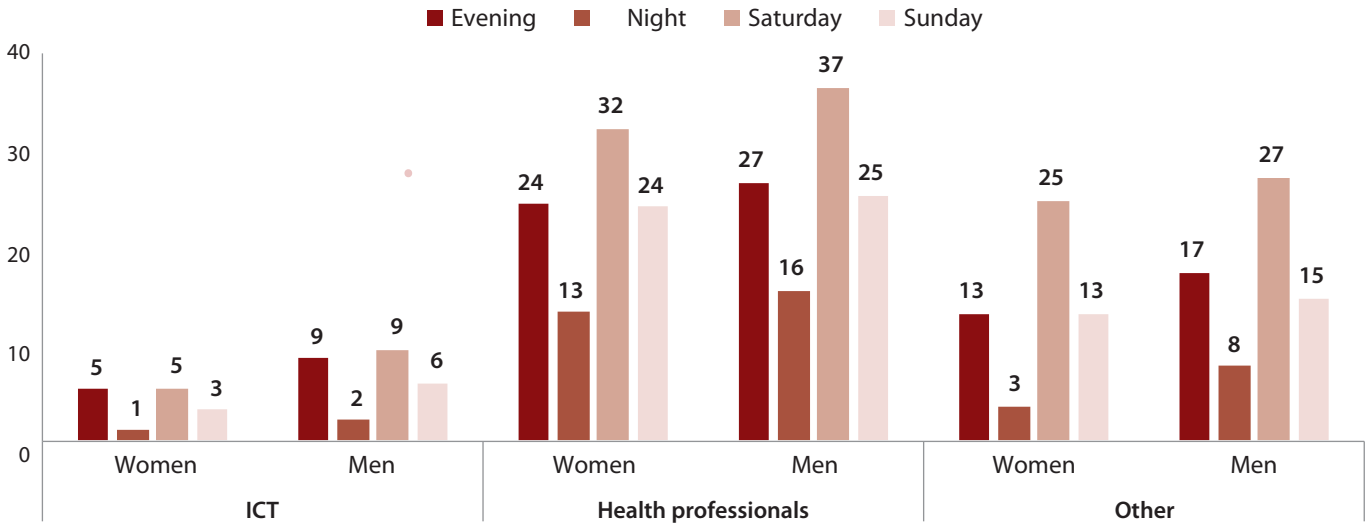
Note: EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available. *For NL the share of women in part-time work among other employees is off the scale of this graph, with the actual level at 76 %.

so-called atypical hours is not as common in ICT compared to healthcare or other jobs, although more men in ICT work during atypical hours than women.

ICT specialists have more day-to-day flexibility and working-time autonomy than health professionals or other employees. First, many more ICT specialists (39 % of women and 38 % of men) compared to other occupations (e.g. 11 % of women and 22 % of men health professionals) are able to arrange to take an hour or two off during working hours in order to take care of personal or family matters [19]. Second, only a third of ICT specialists compared to over half of health professionals and other workers have working hours that are set by the organisation and cannot be changed (Figure 22). Although no gender gaps are observed in ICT specialists' capacity to set their own work-

[19] EIGE calculation based on EWCS 2015 microdata.

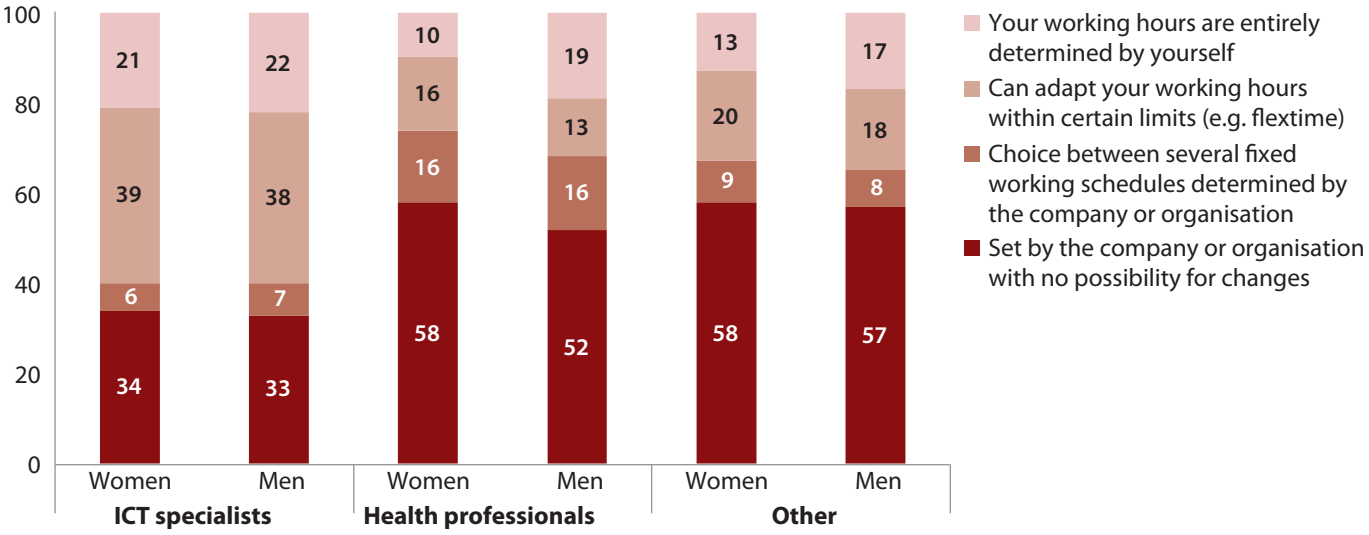
Figure 21: Share of employees who usually work during atypical hours in the EU, by occupational group and gender (20-64, %, 2016)



Source: EIGE calculation based on EU-LFS 2016 microdata.

Note: ICT represents the total of ICT service managers, professionals and technicians. EU refers to the Member States of the EU, not including Malta. BG, PL, SI: data for service managers not available.

Figure 22: Occupational and gender differences in working-time autonomy for employees in the EU-28 (20-64, %, 2015)



Source: EIGE calculation based on EWCS 2015 microdata (Q42: How are your working-time arrangements set?)

ing-time arrangements, the literature shows that women and men may use their autonomy in choosing their working time differently. Women tend to use it to achieve better work–life balance, while men use it to increase their work commitments, thereby actually increasing their work–life conflict (Hofäcker and König, 2013).

Both the number and the flexibility of working hours could be among the reasons behind the lower share of part-time work for women and men in ICT professions. Overall, a relatively low share (13 % of women and 16 % of men) of ICT specialists indicate that their working hours do not fit in with other commitments; twice as many health professionals (23 % of women and 25 % of men) are not satisfied ([20]). This means that a somewhat higher share of men are dissatisfied with their working hours. Previous research has shown that men employees in general, but particularly during the parenting phase, would like to work significantly shorter hours than they actually do (Eurofound, 2017c), which indicates that men want to spend more time with their children and families than they can now.

([20]) EIGE calculation based on EWCS 2015 microdata.

In addition to working time and its flexibility, the place of work is also important. In the EU, 9 % of women and 12 % of men who have ICT jobs work at home daily, 4 % of women and 10 % of men work at home several times a week and 14 % of women and 19 % of men do so less often. Only 46 % of men and 61 % of women in ICT never do their job at home, compared to 87 % of women and 77 % of men in health and 74 % of women and 75 % of men in other professions. Working at home is more common among self-employed ICT specialists ([21]).

4.2. Working-life pressures spill over into private life, particularly for women

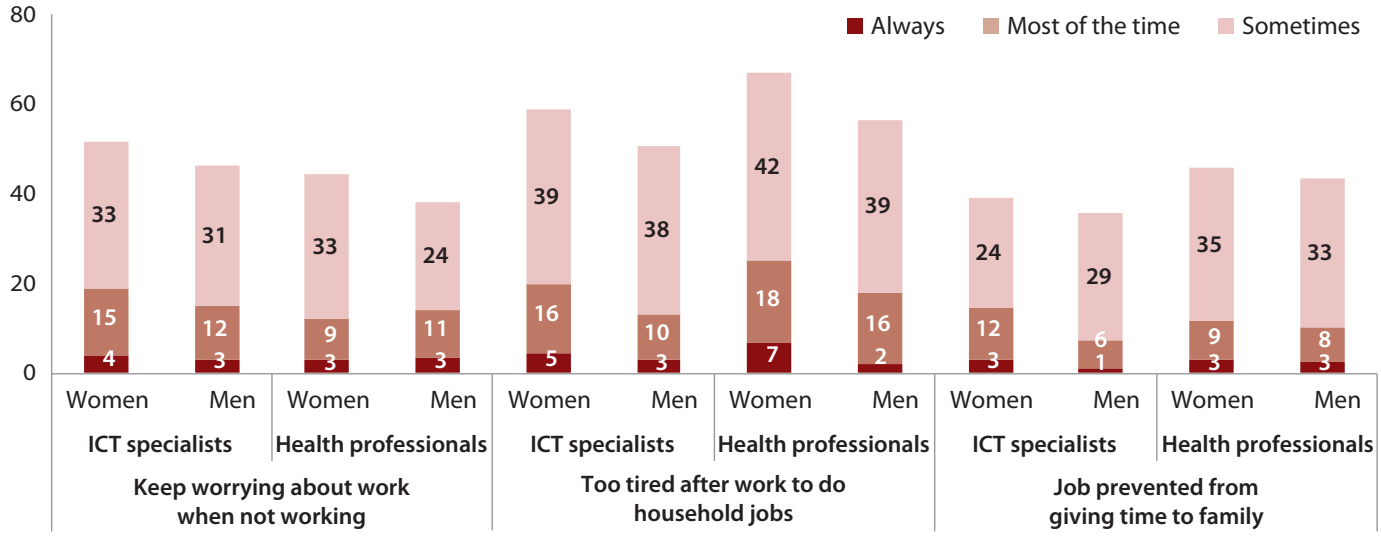
One way of analysing the success of daily work–life reconciliation struggles is to look at the spillover between work and private life. The effects work both ways: family responsibilities may be affecting work and vice versa; work-related stress may have a negative impact on family life. For example, people experience continual worries about work, tiredness or the inability to spend time with family because of work or feel an inability to do their job properly because of pressing family responsibilities, and all this can lead to work–life conflict, with serious impacts on both employees and organisations (Eurofound, 2016).

Work has a significant spillover impact on the personal lives of ICT specialists, but women tend to be more affected and experience, for instance, difficulties in 'disconnecting' from work (Figure 23). About 19 % of women ICT specialists have permanent or regular worries about work even when not working, which is 4 pp higher than men ICT specialists, and even 7 pp higher than women health professionals. Looking into more 'physical' spillover effects, more women than men ICT specialists feel too tired after work to do household jobs, though, on this aspect, the jobs of women healthcare specialists seem to be even more exhausting. Overall in the EU more than twice as many women than men engage daily in cooking and housework for at least 1 hour (EIGE, 2017b).

The existence of significant spillover from work to home is also illustrated by the fact that nearly one third of employees in ICT (27 % of women and 31 % of men) work during their free time several times a month, or even more often. This is more often than the observed spillover for employees in health professions or in other sectors (Figure 24).

The spillover from private life to work is experienced less by women and men than the spillover from work to private life. Nonetheless this finding needs to be interpreted with caution, because it applies only to the working population and does not capture the difficulties of those who are not able to work or cannot find a job due to care responsibilities. Only up to 3 % of women and men in either ICT or healthcare jobs often feel that family responsibilities affect their duties at work to some extent (Figure 25). More women in ICT than in healthcare jobs have occasional difficulties in doing their jobs because of family responsibilities.

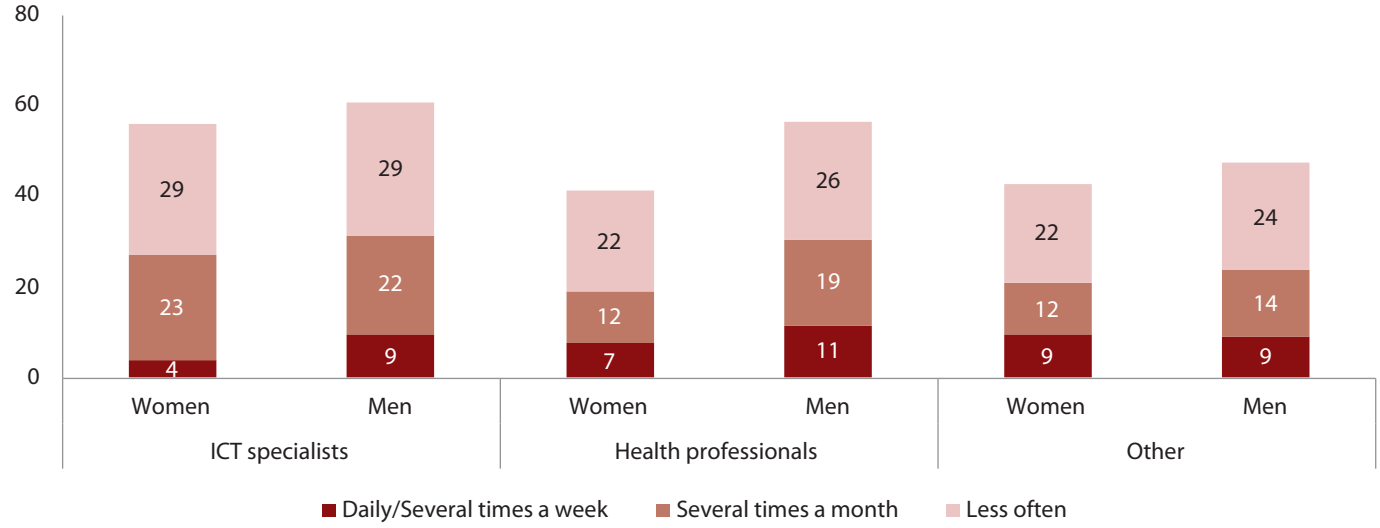
Figure 23: Share of employees perceiving spillover from work to home and family in the EU-28, by occupational group and gender (20-64, %, 2015)



Source: EIGE calculation based on EWCS 2015 microdata (Q45: How often in the last 12 months, have you …?)

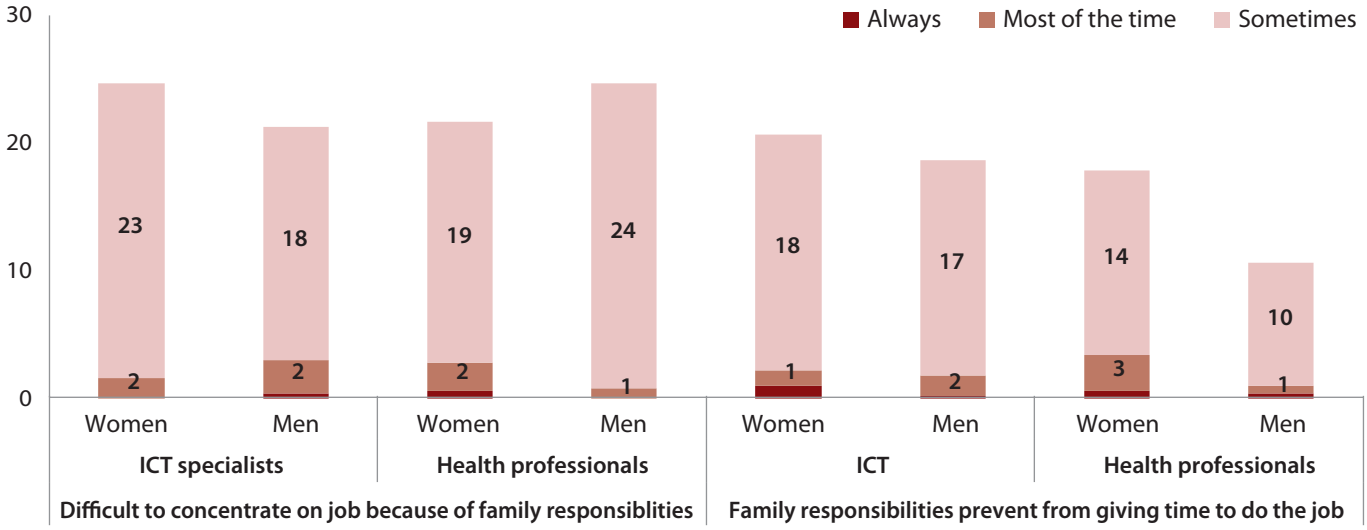
([21]) EIGE calculation based on EWCS 2015 microdata.

Figure 24: Employees' use of free time to meet work demands in the EU-28, by occupational group and gender (20-64, %, 2015)



Source: EIGE calculation based on EWCS 2015 microdata (Q46 Over the last 12 months, how often have you worked in your free time to meet work demands?).

Figure 25: Share of employees perceiving spillover from family to work in the EU-28, by occupational group and gender (20-64, %, 2015)



Source: EIGE calculation based on EWCS 2015 microdata (Q45: How often in the last 12 months, have you felt …?).

5. Examples of initiatives attracting women to ICT jobs and retaining them

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Various examples of public- and private-sector initiatives available at the national, regional, NGO, trade union and workplace levels provide useful insights into policies and strategies used to attract women to ICT jobs and retain them. For example, Morley and Collet (2017) analyse the success of the Norwegian University of Science and Technology's 'Women and computing initiative'. Following the initiative's launch, the share of women students in ICT rose to 38 % from as low as 6 %, and their drop-out rates decreased to similar levels as those for men ICT students. The university attributed the success of the initiative to its holistic nature, in that it went beyond the aim of increasing the number of women among ICT students and ensured that they felt welcome and legitimate.

A number of other successful approaches could be described. Still, without aiming to provide an exhaustive list, this section highlights three different country contexts and selected approaches being implemented there.

Bulgaria has the highest proportion of women in technology in the EU: one third of the country's ICT specialists are women. This can partly be attributed to historical factors, as the government actively encouraged women to enter technical professions, which were deemed prestigious, during the socialist period. The policy began in the 1960s; within three decades the percentage of women engineers increased from 9 % in 1956 to 44 % by the late 1980s. In the 1990s women's representation in technical professions decreased. This was due in part to the post-socialist re-emergence of patriarchal values that positioned men as breadwinners and women as caretakers. After 2000 investment in ICT improved, and some of the biggest multinational companies started to outsource to Bulgaria. ICT is currently a growing sector, with salaries around four times higher than the country average (Basscom, 2016).

Currently, multinational companies and NGOs are dominating efforts to overcome gender stereotypes and further to attract women to ICT and retain them in Bulgaria. For example, the Bulgarian Centre for Women in Technology, an NGO established in 2012, seeks to combat low self-esteem among Bulgarian women in ICT, which they ascribe to internal psychological barriers related to the way women perceive themselves in the men-dominated IT sector. The efforts of multinational companies are to some extent due to the more mature gender-equality legislation and policies developed by companies headquartered in Europe. For example, in 2012 a group of women at the Bulgarian branch of the German software manufacturing company SAP organised their own community that mirrors a global office initiative. This employee-driven effort supports women employees in their career development, such as by connecting them with role models, organising training on leadership skills and giving a workshop on gender awareness that has reached over 200 employees. Additional policies available for all employees include flexible working time and a home-office policy. Women currently make up 35 % of the employees at SAP Bulgaria.

In Germany women make up nearly 17 % of ICT specialists, a share that resembles the EU average but has increased more substantially (by 3 pp) in the last few years. There are a number of long-established NGO-level initiatives in Germany that aim to reduce gender segregation in ICT and STEM. For example, the Kompetenzzentrum Technik-Diversity-Chancengleichheit (Centre of Excellence for Technology, Diversity and Equal Opportunities) ties together nationwide equal-opportunity measures in the fields of education, training, occupations, science and research. Founded in 1999, it has 62 members ranging from the German Federal Employment Agency to universities and research centres, professional associations and private businesses. One of the organisation's most impactful events is Girls' Day, called the world's biggest career-orientation project for female students (Girls' Day in Zahlen). Every year since 2002, the regionally organised events have given girls aged 10-15 insights into male-dominated jobs in technical fields, natural sciences and IT. The initiative reaches 100 000 girls in Germany yearly and has been duplicated in 20 countries. The Kompetenzzentrum (Centre of Excellence) has also put on Boys' Day since 2011 to encourage boys to take up female-dominated professions. Beyond these events the centre undertakes various research projects and offers consulting, benchmarking and training. For example, the Klischee-Frei web portal offers examples of good

practices, fact sheets and gender-sensitive materials regarding careers and study options. This information is aimed at parents, schools and universities, businesses and career counsellors.

The United Kingdom has a similar share of women in ICT jobs (16 %) as in Germany, but no significant improvements have been noticed in the last several years. Still, relatively more women chose ICT studies in the United Kingdom (19 %) than in Germany (14 %), and the share of women graduating from STEM tertiary-level studies is particularly high in the United Kingdom, at 38 % (EIGE, 2017c). A number of interesting approaches are noted to attract women to STEM study and work fields and retain them in the United Kingdom. For example, Business in the Community, a business-led charity with a core membership of over 800 organisations, grants 'the UK's most prestigious workplace awards for gender equality and inclusion' (Business in the Community website). The 2015 winner of the Nationwide Inspiring the Workplace of the Future Award, which recognises a company that inspires female students to go into IT careers, was National Grid, 30 % of whose IT employees are female. The company sponsors computer clubs for 200 girls in 10 schools, and sends female employees to serve as role models and support. Additionally, the online activity Power Up, which aims to break down stereotypes of IT careers, is available to over 6 500 schools and engages 155 000 girls. Furthermore, the company's work-experience week uses a quota system to reserve half of its places for girls. Since these initiatives started the participating schools have seen an increase in the number of girls taking GCSE and A-level ICT. Furthermore, the Equality Challenge Unit, a UK charity that advocates for equality and diversity for staff and students in higher-education institutions, has made a positive impact with its Athena SWAN (Scientific Women's Academic Network) Charter initiative, which recognises higher education and research organisations for their commitment to advancing women's careers in STEM employment. The number of members and award holders dramatically increased after 2011, when it was decided to link silver-level Athena Swan certification as a condition for Department of Health research funding (Times Higher Education, 2013). This example shows how important it is to link private initiatives with political and public-sector support.

6. Conclusions

6. Conclusions

Gender equality in education and in the labour market is a prerequisite for a sustainable society and better-performing economies. At a time of profound digitalisation and the rapid growth of the ICT sector, the EU is facing two major problems: a shortage of ICT specialists and a vast under-representation of women among them. The demand for ICT specialists is particularly high, with a shortage of more than 500 000 ICT specialists in the EU forecast by 2020. While women on average have a higher level of education than men in the EU, only a fraction of women's potential is being used in STEM professions, and especially in ICT (EIGE, 2017c). Of 8 million ICT specialists women make up a mere 17 %. From 2012 to 2016 a minor improvement in women's participation in ICT jobs in the EU was noted. EIGE has estimated that attracting more women to STEM jobs would boost a market in which labour shortages are envisaged (creating up to 1.2 million new jobs by 2050) with a gain of around EUR 820 billion by 2050 (EIGE, 2017a). It would also strengthen the growth and competitiveness of the EU.

Digitalisation has fundamentally changed the way people study and work. ICTs have created new opportunities for education and the labour market and have presented new solutions for more flexible and diverse use of time and space at work. In many aspects ICT jobs generally offer favourable working conditions, especially in terms of quality of work and time arrangements favouring work–life balance. A number of gender gaps regarding working arrangements in ICT jobs have shrunk in comparison to other occupations. For instance, when compared to women in health professions and in other occupations, women in ICT jobs have a better physical and social environment and better working-time quality. Atypical hours, such as working in the evenings, at night and at weekends, are less common in ICT compared to other jobs. Both women and men in ICT have greater autonomy in deciding their working hours, and a majority of them feel that their working hours complement their family or social commitments.

Increasing the number of women in ICT jobs would contribute to reducing the gender pay gap. ICT is one of the highest-paying sectors. On average women in ICT are paid higher than women in other professions, and the gender earning gap of 13 % is smaller among ICT specialists than among health professionals (26 %) or other employees (33 %). Despite being more highly educated than men, women are concentrated in jobs that are lower paid.

Gender segregation in education is a major factor explaining the severe under-representation of women in ICT jobs. In secondary-level education, the achievements in maths and science of boys and girls no longer differ so much. While more women than men graduate from natural sciences, mathematics and statistics at post-secondary level, their share in ICT programmes is growing only marginally (EIGE, 2017c). Aspirations play a major motivational role in choosing an ICT career. By 2016, only in four countries (EE, BG, MT, RO) did from 1 % to 3 % of teenage girls aspire to become ICT professionals at the age of 30. In other countries barely any interest was noted. In contrast, from as low as 3 % to as high as 15 % of teenage boys in the EU aspire to become ICT professionals. This tendency indicates a high probability of increased gender segregation in the future. Therefore, education and career advice free from stereotypes and discrimination is crucial in order to encourage girls in particular to aspire to careers in ICT.

Unequal sharing of caring roles between women and men is a serious impediment for work–life balance. Although gender gaps in caregiving are smaller in ICT than in other occupations, inequality persists. It is expressed in the different length and pattern of working hours between women and men in ICT jobs and the different choices to keep up with work pressures and responsibilities at home. On average, men ICT specialists work longer hours than their female colleagues. Although part-time work is relatively less common among ICT specialists, caring responsibilities and other family or personal reasons are among the most often-cited reasons why women work part-time in ICT. Longer working hours among men lead to a lower uptake of family duties or, conversely, men's more active contribution to family and caring duties is inhibited by longer working hours and higher commitment to work. In addition, more women than men in ICT jobs feel that their job prevents them from

giving time to family always or most of the time. This reflects gender stereotypes and expectations about parenting that set different standards for good mothers and good fathers.

The fast-changing nature of ICT jobs and digital innovations also demand continuous professional development and lifelong learning. The European Pillar of Social Rights emphasises the need to ensure that everyone has lifelong access to quality education and training to acquire updated skills and competences suited to the new structure and demands of the labour market. Men in ICT jobs benefit from training more often than women. Training opportunities are of particular importance to career prospects, which women in ICT jobs perceive to be lower compared to men's perceptions. The current unequal sharing of caring responsibilities, coupled with the need to keep up with rapid technological advances, poses a risk of many women's careers falling behind those of men. Work–life balance policies that encourage an equal sharing of caring and domestic responsibilities are key for improved opportunities for women to upgrade their skills and keep up with digital innovations.

Finally, the life pathways and family formation of ICT specialists require more in-depth research and policy attention, including with regard to work–life balance. On average, ICT specialists are younger than the rest of the workforce. There are some indications that younger generations of women in ICT may postpone having children. Only 53 % of women in ICT aged 30-39 have children, compared to 68 % of women health specialists and 66 % of women in other occupations. Overall this confirms that it is crucial to approach gender segregation and work–life balance issues in a holistic manner, not only from a labour-market perspective, but also by taking into account differences in the working arrangements across occupations, as well as associated family-formation decisions. Participation in the labour market, working conditions and work–life balance feature prominently in the European Pillar of Social Rights. It recognises the vital role of gender equality for the EU's growth, competitiveness and prosperity, and provides a new impetus for gender equality on the way towards a more social Europe.

Annex

Annex

ISCO08 codes used to derive ICT specialists within EWCS and EU-LFS microdata:

		EWCS	EU-LFS
I. ICT managers, professional and associate professionals			
ICT service managers			
133	ICT service managers	X	X
ICT professionals			
25	Information and communications technology professionals	X	X
251	Software and multimedia developers and analysts	X	X
2511	Systems analysts	X	X
2512	Software developers	X	X
2513	Web and multimedia developers	X	X
2514	Application programmers	X	X
2519	Software and multimedia developers and analysts not elsewhere classified	X	X
252	Database specialists and systems administrators	X	X
2521	Database designers and administrators	X	X
2522	Systems administrators	X	X
2523	Computer network professionals	X	X
2529	Database and network professionals not elsewhere classified	X	X
ICT technicians			
35	Information and communications technicians	X	X
351	ICT operations and user support technicians	X	X
3511	ICT operations technicians	X	X
3512	ICT user support technicians	X	X
3513	Computer network and systems technicians	X	X
3514	Web technicians	X	X
352	Communications technicians	X	X
3521	Broadcasting and audiovisual technicians	X	X
3522	Telecommunications engineering technicians	X	X
II. Other unit groups that primarily involve the production of ICT goods and services			
2152	Electronic engineers	X	n/a
2153	Telecommunication engineers	X	n/a
2166	Graphic and multimedia designers	X	n/a
2356	Information technology trainers	X	n/a
2434	ICT sales professionals	X	n/a
3114	Electronics engineering technicians	X	n/a
7421	Electronics mechanics and servicers	X	n/a
7422	ICT installers and servicers	X	n/a

Note: The total number of respondents, on the basis of the aforementioned definition of ICT specialists (aged 20-64), was 1 029 in the EWCS 2015 survey and 42 489 in the EU-LFS 2016 survey.

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