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HOW ARE ICT WORKFORCE SPECIALISTS ADJUSTING TO THE RISE OF AI?

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Abstract: *According to Eurostat data, over the last decade, the number of ICT specialists in the EU has increased nearly seven times more than the overall increase in total employment. In terms of gender distribution, the same data indicated that by the end of 2023, the number of men in this field was more than four times higher than that of women in the EU (80.60% vs. 19.40%). Approximately two-thirds of these specialists had completed tertiary education (66.7%). Due to the huge role they have in the current development process, decision-makers have an interest in tracking employment developments for ICT specialists. From this perspective, Romania appears to be facing challenges in the labor market for this sector, with data indicating a trend of decreasing specialists in software development. Essentially, AI has led to increased automation, resulting in projects being executed with smaller budgets and fewer personnel.*

Keywords: *digital challenges, digital transformation, gender balance, ICT specialists, rejuvenation of ICT specialists, tertiary education*

JEL Classification: *O3, Z10, Z13*

1. A Digital Decade - General framework

One of the European Commission's main political priorities for the coming years is to adapt Europe to the grand digital challenges. According to the Digital Decade Communication (European Commission, 2021), the document that "sets out a vision and objectives for a successful digital transformation of Europe by 2030", ICT professionals and digitally skilled citizens are one of the four essential pillars of Europe's digital future. To achieve its goals, the EU target is to reach 20 million ICT specialists employed in the EU, while also focusing on "greater convergence of gender balance in such jobs".

The road is not an easy one. According to Eurostat data, in 2023, **almost 10 million people worked as ICT specialists within the EU 27 borders**, as follows:

- 2.1 million people in Germany, that means approximately 21.5% of the total population employed in the EU 27 as ICT specialists;
- 1.3 million in France, that means approximately 13.8% of the total population employed in the EU 27 as ICT specialists;
- Almost 1 million in Italy and 0.9 million in Spain, that means approximately 9.9% and 9.6% of the total population employed in the EU 27 as ICT specialists, respectively.

According to Eurostat data, proportion of ICT specialists in total employment, in 2023, in the EU countries was the following:

- Sweden – 457.900 persons employed as ICT specialists (8.7 % of total employment in Sweden);
- Luxembourg – 25.800 persons employed as ICT specialists (8 % of total employment in Luxembourg);
- Finland – 200.700 persons employed as ICT specialists persons employed as ICT specialists (7.6 % of total employment in Finland);
- The Netherlands – 673.700 persons employed as ICT specialists persons employed as ICT specialists (6.9 % of total employment in The Netherlands);
- Estonia – 46.500 persons employed as ICT specialists persons employed as ICT specialists (6.7 % of total employment in Estonia);
- Ireland - 166.700 persons employed as ICT specialists persons employed as ICT specialists (6.2 % of total employment in Ireland);
- Denmark – 176.800 persons employed as ICT specialists persons employed as ICT specialists (5.9 % of total employment in Denmark);
- Belgium – 272.600 persons employed as ICT specialists persons employed as ICT specialists (5.4 % of total employment in Belgium);
- Cyprus - 24.700 persons employed as ICT specialists persons employed as ICT specialists (5.4 % of total employment in Cyprus);
- Austria – 237.400 persons employed as ICT specialists persons employed as ICT specialists (5.3 % of total employment in Austria).

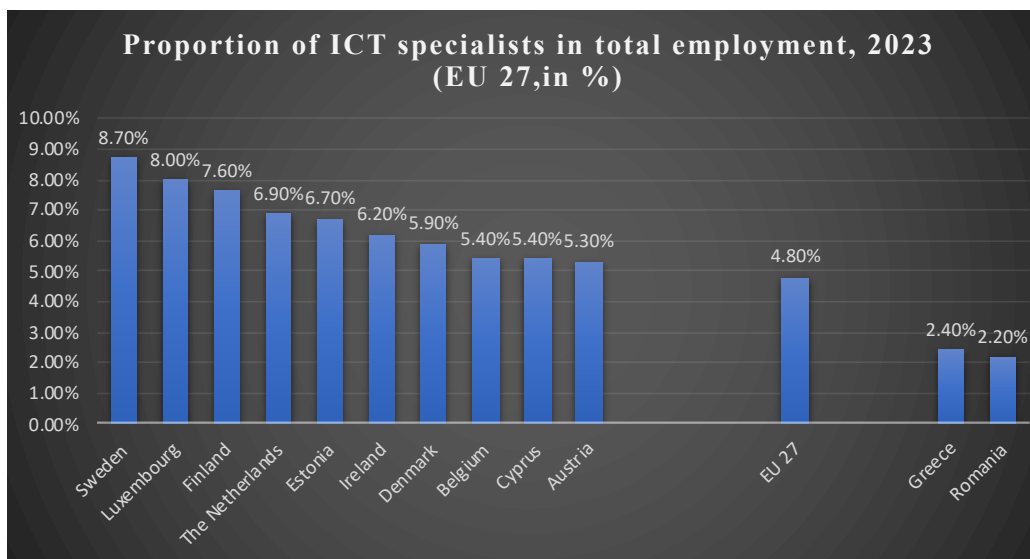


Figure 1. Proportion of ICT specialist's employment 2023 (EU 27, %)

Source: Eurostat (isoc_sks_itspt)

At the other end of the range, according to Eurostat data:

- Greece – 100.500 persons employed as ICT specialists persons employed as ICT specialists (2.4 % of total employment in Greece);
- Romania – 196.200 persons employed as ICT specialists persons employed as ICT specialists (2.2 % of total employment in Romania).

Defined as people who have the ability to develop, operate and maintain ICT systems and for whom ICTs constitute the main part of the job, ICT specialists in Romania seem to be entering a difficult period on the labor market. As Eurostat data shows, after a period of 0.6% growth in the cohort of ICT specialists between 2018-2022 (from 2.2% to 2.8% of total employees), 2023 records for the first time a decrease in the number of ICT specialists in Romania.

2. Number of ICT specialists

During the last nine years, the share of ICT specialists in total employment increased by 1.3 percentage points (pp) from 3.5 % in 2015 to 4.8 % in 2023. An increase in the number of people employed as ICT specialists from 6,551,900 to 9,789,200, which represented a corresponding increase of almost 67%.



Figure 2. ICT specialists, EU 27, 2017-2023
Source: Eurostat (isoc_sks_itspt)

As can be seen from Figure 3, after a slow increase between 2015 and 2019, the number of people employed as ICT specialists showed higher progression rates between 2019 and 2021 by 7.1% and 6.0%. In the last years of the decade, however, the progression slowed down slightly, but still revealed a higher rate than those prevailing at the beginning of the decade by 5.0% between 2021 and 2022 and 4.1% between 2022 and 2023. This general growth trend could reflect the digital transformation affecting the entire European economy, which is also observable in Romania.

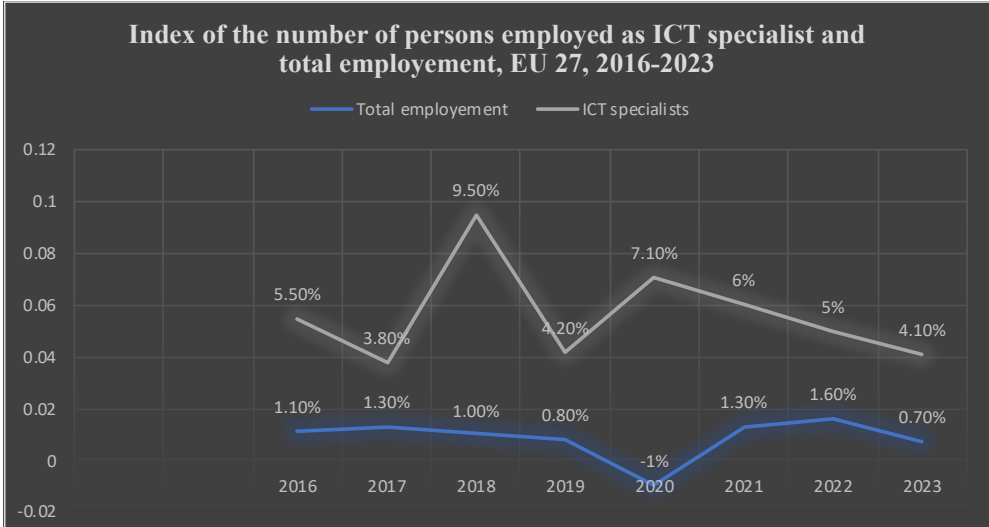


Figure 3. Index of the number of persons employed as ICT specialists and total employment. Source: Eurostat (isoc_sks_itspt)

As can be observed in Figure 4, in 2016-2023 annual rates of change for the number of persons employed as ICT specialists were consistently higher than those recorded for total employment across the EU economy. Whilst the number of ICT specialists in employment increased with an annual average rate of 5,65 % in the last eight years, total employment increased by 0.85 % each year on average. Notable is the 9.5% increase in 2018 (685,860 people employed as ICT specialists). Starting in 2020, the growth trend reversed, although between 2022 and 2023, ICT specialists continued to progress in the total workforce, but at a slower pace well above the growth in total employment.

3. ICT specialists by sex

Generally majority of persons employed as ICT specialists in the EU 27 are men. According to Eurostat data **the share of ICT employment in 2023 was accounted by men - 80.6 %**, practically which was 2.9 pp lower than it had been in 2015. In 2023, the most ICT men specialists were in Czechia (87.6 %), Malta (86.2 %), Italy (84.3%) and Hungary (84.3 %), while share of men ICT specialists **was lower than 75 % in Romania (74.0 %)**, Estonia (73.2 %) and Bulgaria (70.9 %).

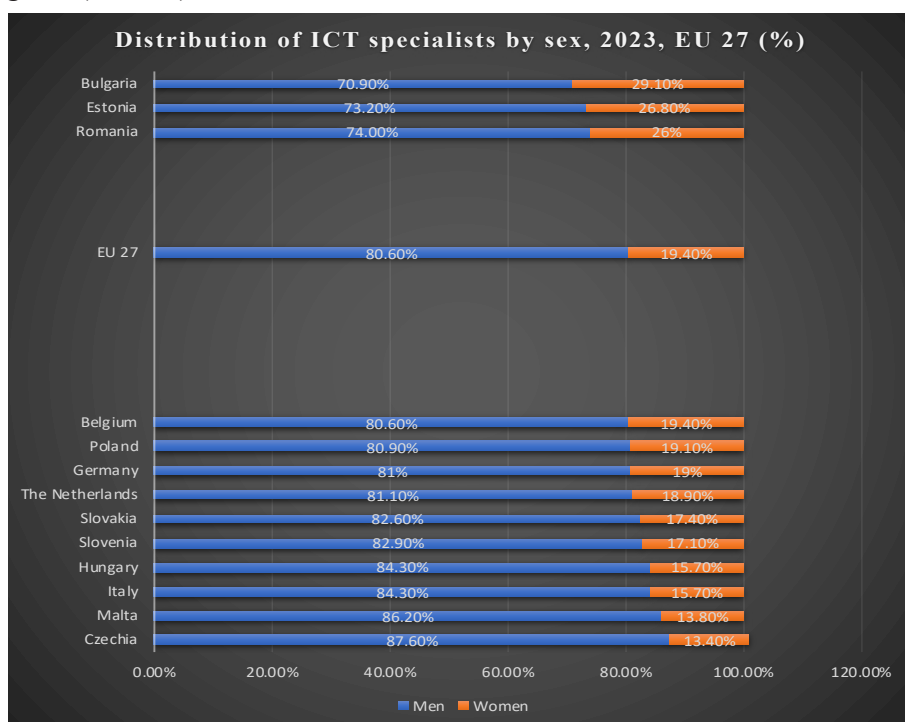


Figure 4. Distribution of ICT specialists by sex, 2023, UE 27 (%)

Source: Eurostat (isoc_sks_itsps)

The highest levels of female employment (more of 100.000 women employed as ICT specialists) were in Germany – 399 600, France - 271 500, Spain - 183 000, Italy - 152 300, Poland - 142 100, The Netherlands - 127 100 and Sweden 104 300.

There were 22 EU Member States where the share of female ICT specialists increased between 2015 and 2023, with very large advances being observed in Luxembourg (from 13.8% to 22.5% with an increase of 8.7 pp), followed by Slovakia (from 11.9% to 17.4% with an increase of 5.5 pp), Poland (from 13.6% to 19.1% with an increase of 5.5 pp), Austria (from 14.3% to 19.5% with an increase of 5.2 pp) and The Netherlands (from 13.9% to 18.9%, with an increase of 5 pp).

Between 2015-2023, the share of female ICT professionals in the EU-27 increased by 2.9 pp, from 15.5% to 19.4%.

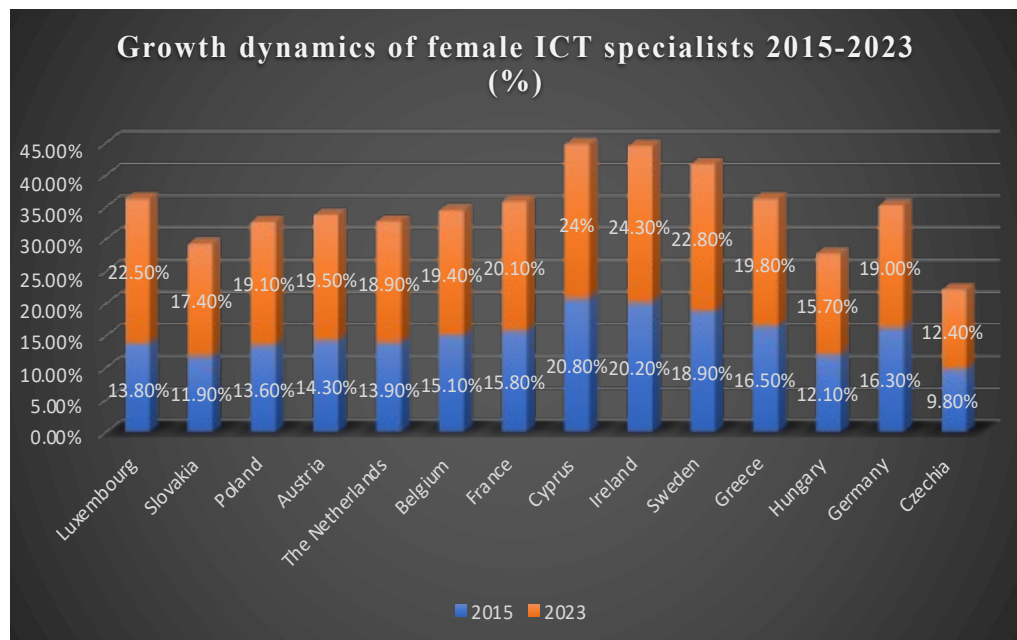


Figure 5. Growth dynamics of female ICT specialists 2015-2023 (%)

Source: Eurostat (isoc_sks_itsps)

It should also be noted that there were five countries where the share of women in the total number of ICT specialists decreased: Latvia (from 28.1% to 24% with a decrease of 4.1% pp), Malta (from 17% to 13.8%, with a decrease of 3.2 pp), **Romania (from 27.3% to 26.0%, with a decrease of 1.3 pp)**,

Bulgaria (from 31% to 29.1%, with a decrease of 0.9 pp) and Lithuania (from 20.4% to 20.0%, with a decrease of 0.4 pp).

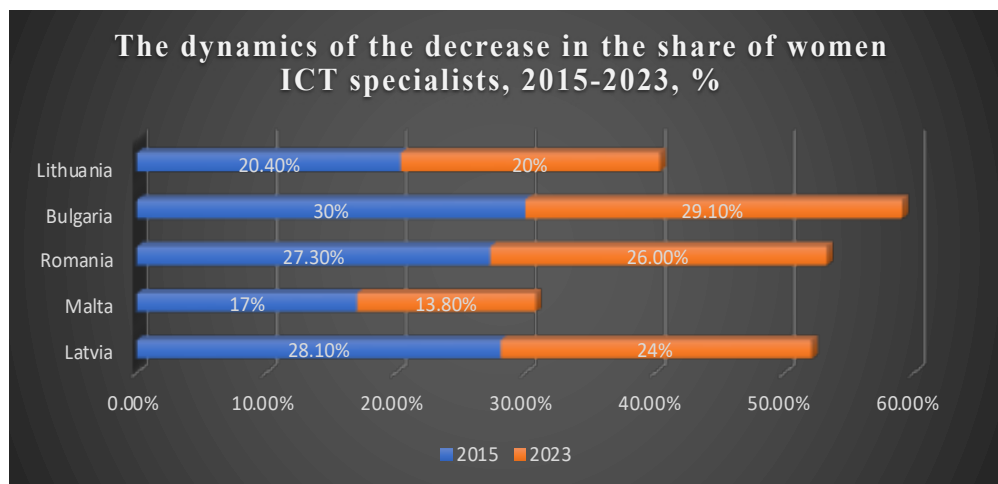


Figure 6. The dynamics of the decrease in the share of women, ICT specialists, 2015-2023 (%). Source: Eurostat (isoc_sks_itps)

4. ICT specialists of EU 27- level of education

As Eurostat data shows in 2023, **two-thirds** (66.7% of those reporting their education level) of all ICT professionals in the EU had completed a tertiary level of education.

Generally the share of ICT specialists with tertiary education has increased between 2015-2023 increasing from 59.8% in 2015 to 66.7% in 2023 (with an increase of 6.6 pp).

The highest levels of increase in the period covering 2015 to 2023 concerning the share of ICT specialists with a tertiary level of educational was in: Sweden (from 52.5% to 66.3% with an increase of 13.8 pp), Portugal (from 52.5 % to 66.2%, with an increase of 13.7 pp), Cyprus (from 73.8% to 87.3%, with an increase of 13.5 pp), Bulgaria (from 65.2% to 76.9%, with an increase of 11.7 pp) and Denmark (from 52% to 62.2%, with an increase of 10.2%).

In 2023 the share of ICT specialists with a tertiary level of educational in **Romania** was **76.2%** with an increase of **6.4 pp** between 2015-2023.

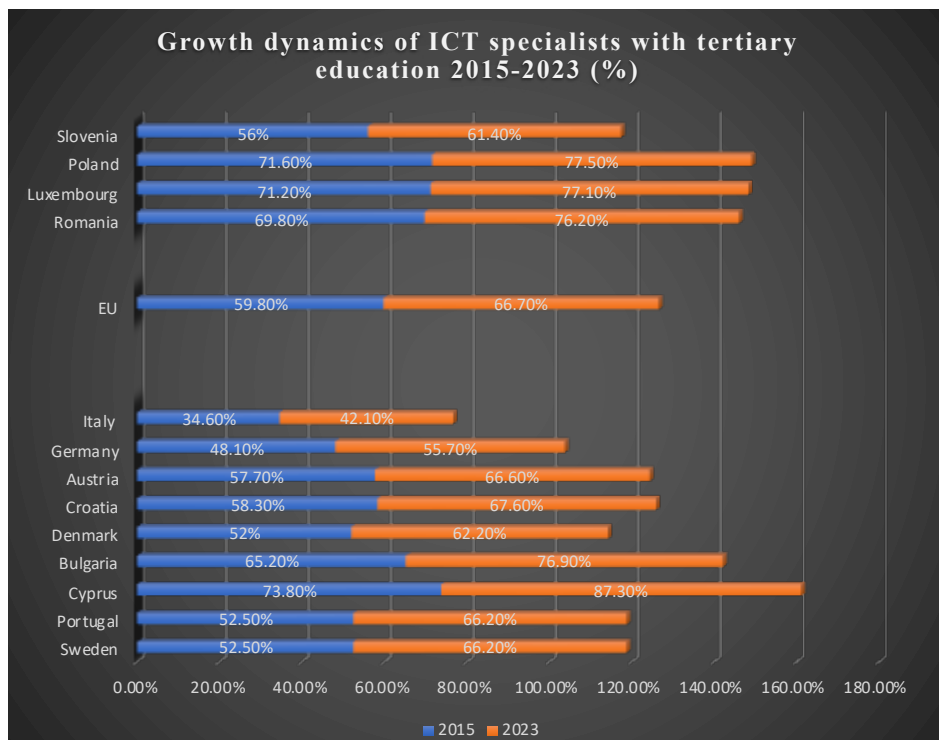


Figure 7. Growth dynamics of ICT specialists with tertiary education, 2015-2023 (%). Source: Eurostat (isoc_sks_itsps)

In 2023, in EU 27 the highest shares of ICT specialists with a tertiary level of educational attainment was in the following countries: **Cyprus** - 84.7%, **Spain** - 83.1%, **Ireland** - 81.7%, **France** - 81.4% and **Belgium** - 81.3%, where more than four out of every five persons had obtained such a level of education in 2023.

5. ICT specialists of EU 27 - age group

Regarding the age distribution of ICT specialists, two age groups are used: people aged 15-34 and 35 and over (limited at 74 years). As Eurostat data shows **62.7 % of all persons employed as ICT specialists in the EU, in 2023, aged 35 years and over**. Compared to 2015, is a decrease with 1% of ICT specialists aged 35 years and over (63.7% in 2015). The largest progression of ICT specialists aged 35 and over, in 2015-2023 period, was in the following countries: **Slovakia** (with a difference of 16.8 pp), **Romania** (with a difference of 10.2 pp), **Bulgaria** (with a difference of 6.7 pp), **Estonia** (with a difference of 6.5 pp), **Slovenia** (with a difference of 6.4 pp) and **Poland** (with a difference of 6.1 pp) (See Figure 8).

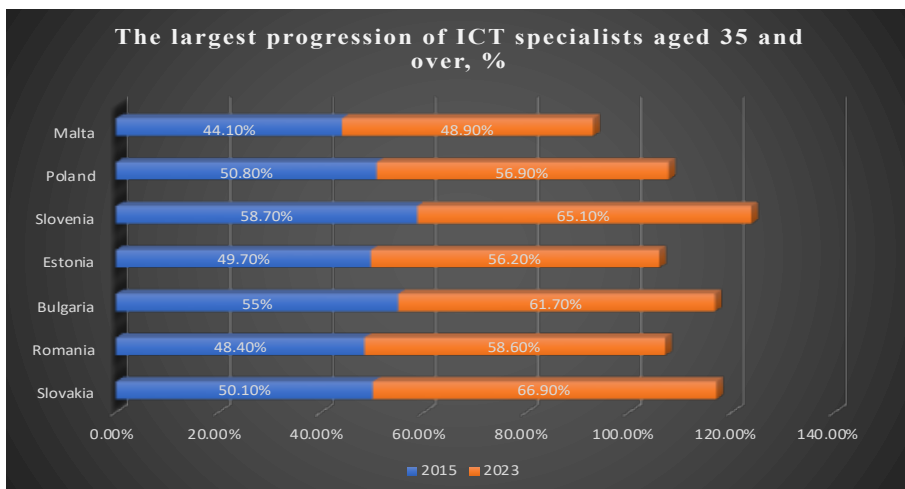


Figure 8. Largest progression of ICT specialists aged 35 and over, (%).
Source: Eurostat (isoc_sks_itsps)

In the same period (2015-2023) was noticed a completely different pattern in **Denmark, The Netherlands, Finland and Sweden (a rejuvenation of ICT specialists)**, with an increase of 9.4 pp, 4.6 pp, 3.1 pp and 3 pp (Figure 9). Another 8 countries (Portugal, Luxembourg, Italy, Germany, Ireland, Spain, Cyprus and Croatia) followed the same pattern, but with smaller differences.

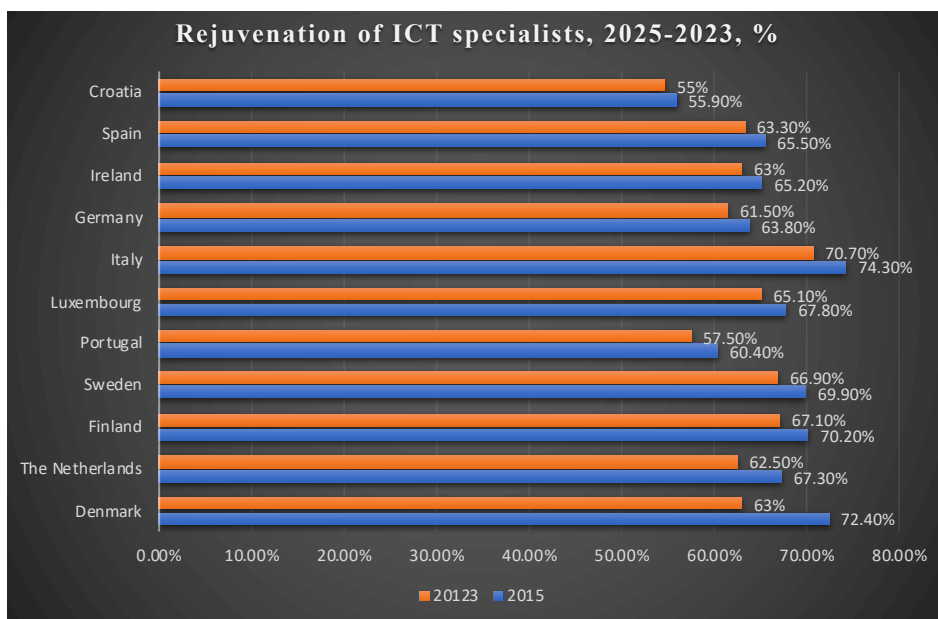


Figure 9. Rejuvenation of ICT specialists, 2015-2023 (%).
Source: Eurostat (isoc_sks_itsps)

6. Conclusions

- Digital technologies will transform the world we live and work in;
- Digital technologies will touch a lot of different aspects of our lives;
- Digital transformation is one of the most important key priorities for the EU;
- The Digital Decade initiative already established the EU targets that will guide digital transformation until 2030;
- According to the Digital Decade Communication (9 March 2021), the document that “sets out a vision and objectives for a successful digital transformation of Europe by 2030”, ICT professionals and digitally skilled citizens are one of the four essential pillars of Europe’s digital future.
- To achieve its goals, the EU target is to reach 20 million ICT specialists employed in the EU, while also focusing on “greater convergence of gender balance in such jobs”;
- In 2023, almost 10 million people worked as ICT specialists within the EU borders;
- During the last nine years, the share of ICT specialists in total employment increased by 1.3 percentage points (pp) from 3.5 % in 2015 to 4.8 % in 2023;
- Generally majority of persons employed as ICT specialists in the EU 27 are men. According to Eurostat data the share of ICT employment in 2023 was accounted by men - 80.6 %;
- Two-thirds (66.7% of those reporting their education level) of all ICT professionals in the EU 27 had completed a tertiary level of education;
- 62.7 % of all persons employed as ICT specialists in the EU 27, in 2023, were with aged 35 years and over;
- In Romania were **196.200 persons employed as ICT specialists’ persons in 2023** (2.2 % of total employment in Romania);
- Even though the share of ICT employment in 2023 was accounted by the men in the EU 27 (80.6%), **the share of male ICT specialists was 74% in Romania**;
- In the last eight years the share of women in the total number of ICT specialists decreased in **Romania (from 27.3% to 26.0%, with a decrease of 1.3 pp)**;
- In 2023 the share of ICT specialists with a tertiary level of educational in **Romania was 76.2% with an increase of 6.4 pp between 2015-2023**.
- Defined as people who have the ability to develop, operate and main-

- tain ICT systems and for whom ICTs constitute the main part of the job, **ICT specialists in Romania seem to be entering a difficult period in the labor market;**
- After a period of 0.6% growth in the cohort of ICT specialists between 2018-2022 (from 2.2% to 2.8% of total employees), **2023 records for the first time a decrease in the number of ICT specialists in Romania.**

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