ICT KOŠICE 2022

IT VALLEY
KOŠICE

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Preface

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In Košice IT Valley we have been trying to develop the IT sector in Eastern Slovakia for a long time. The strategic importance of this sector is underlined by the fact that it employs the largest number of people of all other sectors in the region. In order to improve the economic performance of Eastern Slovakia, we decided to map the state of human resources, which represent amounts to the basic pillar of the IT sector. The analysis yielded several important insights and findings. We mention at least a few of them at the outset.

In Eastern Slovakia there is a lack of specialists dealing with automated testing of applications and in general the area of application quality. We can assume that this state of affairs is caused by the efforts of IT companies to acquire, or transform, their experts into positions that have a higher level of attractiveness for selling to foreign markets. These steps then naturally deplete certain other areas, such as the QA segment. In the case of testing, however, it should be noted that this discipline has the potential to be a "gateway" to the IT world for many people who currently find IT distant or even inaccessible from the point of view of their careers.

On the other hand, the global trend, which has brought an increase in demand for experts in the areas of DevOps and Cloud, has long been reflected in our region, and we have been able to respond to this demand quite well. Although the number of specialists in the areas mentioned above is constantly increasing, given the ever-growing need, it is essential to continue to actively support the further development of human capital in the field of Cloud Architecture.

The analysis also describes a shortage of human resources in business and product positions, which unfortunately is a long-term problem. The mismatch between labour market needs and the available workforce has caused recent demand to decline as companies automatically assume there is a shortage and place these positions outside our region. In nearshore companies, key business and product positions are more likely to be held by the customer, one of the reasons for which is undoubtedly the lack of skilled workforce, which makes it impossible to transfer competencies to the region, but also the protection against vendor lock-in.
There is also a clear need to strengthen profiles specialising in software testing and

cyber security. This is an important global specialisation for IT professionals and is only likely to grow in importance over time. It is therefore wise to try to actively support this IT segment also in terms of human resources preparedness. A large part of the entities operate as internal and service organisations, but are unable to respond to some labour market demands.

An interesting finding is that the global trend of extreme demand for data engineers and analysts is not so evident in Eastern Slovakia. It can be assumed that this phenomenon is related, on the one hand, to the lack of expertise of local specialists and, on the other hand, to the absence of a community of experts to bring them together and educate them. The data analytics segment may be an opportunity for further IT development in the region, and it would be advisable to focus on supporting open data projects and initiatives. It is these that can make a significant contribution to the attractiveness of the local ecosystem. We believe that every global trend can be an interesting opportunity for our region. It is therefore crucial to identify these trends correctly and to start responding to them adequately within local capacities.

We were positively surprised by the relatively high representation of women in IT companies, which in Košice is significantly higher than the Slovak or even European average. This is probably due to the selection of the jobs analysed and the size of the companies that participated in the survey.

In order to ensure the sustainability of the ICT sector in Eastern Slovakia, the activities of regional players should aim at building a knowledge economy through supporting the acquisition of technological skills of individuals required by the labour market. Secondly, activities should be directed towards increasing the attractiveness of the region in order to become a destination attractive for product companies, as well as to promote the acquisition of entrepreneurial skills of individuals and thus create suitable conditions for the development of local companies. In our opinion, one of the ways to increase these attributes is to systematically support and develop the startup environment in Eastern Slovakia, while it should be stressed that the acquisition of an entrepreneurial "mindset" should be encouraged from secondary school.

The results of the survey showed that this topic needs to be addressed in a long-term and systematic way. Thanks to the experience gained from this survey, the Košice IT Valley cluster was already working on several improvements at the time of preparing the report, so that it would be able to provide even more useful insights and outputs in the next report.

Summary

Focusing on the information technology sector is a reasonable and affordable option for the development of Eastern Slovakia. However, the established "ecosystem" of a functioning ICT environment needs to be systematically cared for at several levels in order to maintain and continue to grow. The Košice IT Valley Cluster has made a commitment to assist in achieving this important challenge.

The first of the reports is an analysis focused on the state of human resources within the IT segment, as the ICT sector and its development is closely linked to their quality and availability, and at the same time, IT companies operating in the east of Slovakia perceive the lack of qualified workforce as the biggest obstacle to their growth.
The first and necessary step to remedy this is to get as accurate a picture as possible of the situation in the region, using relevant data and knowledge. That is why the cluster conducted its pilot survey in the field of human resources and compiled a questionnaire for IT companies operating in Košice focused on three areas:

- representation and demand for workers in selected jobs,
- technologies used by software engineers,
- representation of women in the ICT sector in Košice.

From the results, it can be concluded that of the eight job roles included in the analysis, software engineers are the largest group. Another large group in Košice are project managers. Conversely, the jobs that are least represented include Scrum Masters, Product Owners and Data Scientists. All results are broken down by company type, as the business models of individual companies significantly influence their structure and demand for specific labour.

In terms of recorded demand for employees, the vast majority were programmers. The second most in-demand group at the time of the survey was QA engineers. However, in terms of the need for a percentage increase in the actual number of the positions analysed, data scientists are at the top of the list, although in absolute numbers this type of specialisation is only at the bottom of the ranking.

The survey also showed that most programmers use the Java programming language at work, and more than a quarter use SQL and Javascript technology. On the other side there are several technologies that are used minimally or not at all. The report also offers insights into the daily usage of Cloud solutions. The relatively high representation of women is also surprising, but as women make up about half of the total workforce in Slovakia, this share is still relatively low in terms of potential.

Introduction

The digital transformation of the economy and society in the last decade has intensified the need for an increase in the skilled workforce. The mismatch between the demand for information and communication technology (ICT) specialists and the available workforce has thus become a noticable trend across Europe.

This trend can also be observed in Slovakia, but especially in the region of eastern Slovakia. In Košice, the region's largest city, the main source of skilled labour is graduates of two universities. Specifically, these are graduates of the Faculty of Electronics and Informatics at the Technical University in Košice and the Faculty of Natural Sciences at the Pavol Jozef Šafárik University in Košice.

The Statistical Office of the Slovak Republic has data on the number of people working in the ICT sector at the district level, but more detailed data is difficult to obtain or does not exist in the necessary granularity. This was one of the reasons why the cluster decided to map the state and needs of the labour market in the region by addressing relevant players, thanks to which it was possible to get a more accurate picture of the state of the ICT sector in Košice.

The aim of this publication is to obtain the most accurate picture of the ICT sector with a focus on companies operating in Košice divided into product and nearshore companies, as well as to map the occupancy of specific job positions and the current demand for workers. We also focused on the use of programming languages and technologies in the region, as well as on the percentage of women ICT specialists in the ICT sector in Košice and a comparison with the situation in Europe and Slovakia.

The report consists of five parts. The first one describes the ICT situation in Europe and Slovakia based on data from the Statistical Office of the Slovak Republic and the Statistical Office of the European Union (Eurostat). The second one contains information about the survey conducted among Košice companies. The third part presents the results of the survey on the distribution of job positions and the demand for ICT specialists. The results on the technologies used and the Cloud can be found in section four. The fifth part provides statistical data on female ICT specialists in Europe and Slovakia obtained from the Statistical Office of the Slovak Republic and Eurostat, as well as the results of the survey conducted in Košice.

1.

ICT EUROPE SLOVAKIA

ICT specialists in Europe and Slovakia in 2021

8,939,700

ICT specialists in EU in 2021

Digital transformation is one of the European Union's main objectives. Eurostat defines ICT specialists as individuals employed in "tasks related to the development, maintenance and operation of ICT systems and where information and communication technologies are a major part of their work".

On 9 March 2021, the European Commission presented the Digital Decade Communication, which sets a vision and targets for a successful digital transformation of Europe by 2030. The Commision proposed a Digital Compass, which sets out concrete targets for achieving the European Union's digital ambitions for a sustainable and prosperous digital future for people and businesses. The goal is to reach 20 million employed ICT professionals in the European Union, taking into account the balance between men a women by 2030 [4].

4.5%

of Europeans work in ICT

4.3%

of Slovaks work in ICT

The number of ICT specialists in Europe has grown by more than 50% in the last 10 years. In 2021, there were more than 8.9 million ICT professionals working in the European Union. More than one fifth, or two million, are ICT professionals working in Germany, 1.2 million in France and 0.8 million ICT professionals work in Italy.

Sweden and Finland are the countries that have long had the highest share of employees in ICT relative to the total number of employees in the country.

110,500

people working in ICT in Slovakia in 2021

In 2021, Sweden and Finland have reached the 8% and 7.4% thresholds respectively, and despite a slight decrease compared to 2020, Sweden has retained its second place.

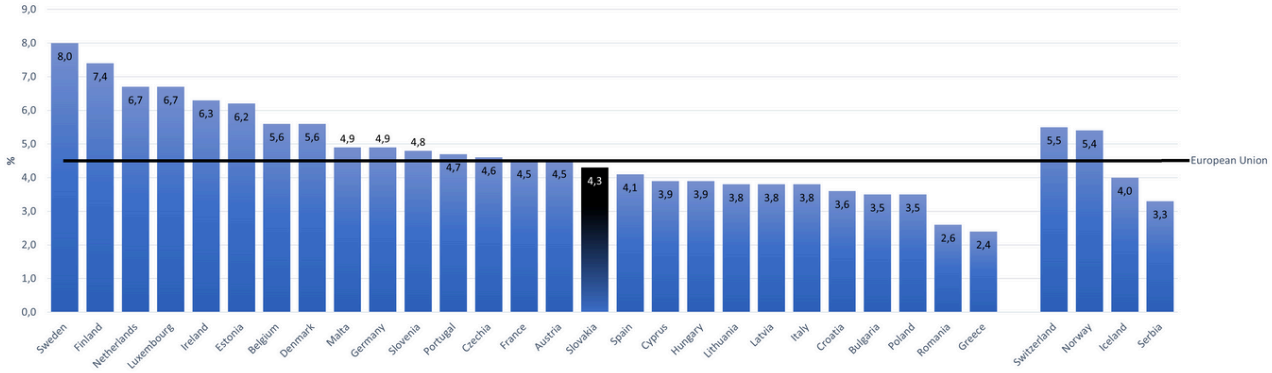
Ireland (6.3%) and the Netherlands (6.7%) joined the countries with an ICT employment share of more than 6% (Estonia: 6.2%, Luxembourg: 6.7%).

In 2021, only Romania (2.6%) and Greece (2.4%) were under 3% of ICT specialists.

The share within the European Union has risen to 4.5% and is achieved by France and Austria.

The Czech Republic increased 4.6% compared to 2020, again above the European average. In Slovakia, the share of ICT specialists in total employment increased year-on-year from 4.2% to 4.3%.

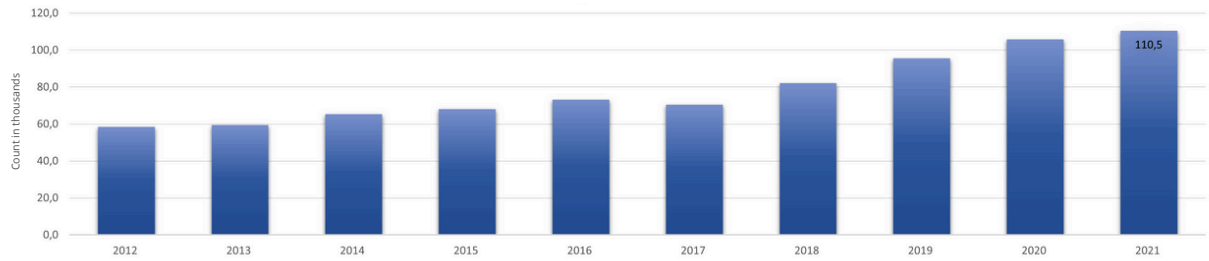
Proportion of ICT specialists in total employment, 2021



Source: Eurostat 2022 [7]

Over the last 10 years, the number of ICT specialists in Slovakia has increased by almost 90%. While in 2012 the ICT sector employed more than 58,000 people, in 2021 they were more than 110,500.

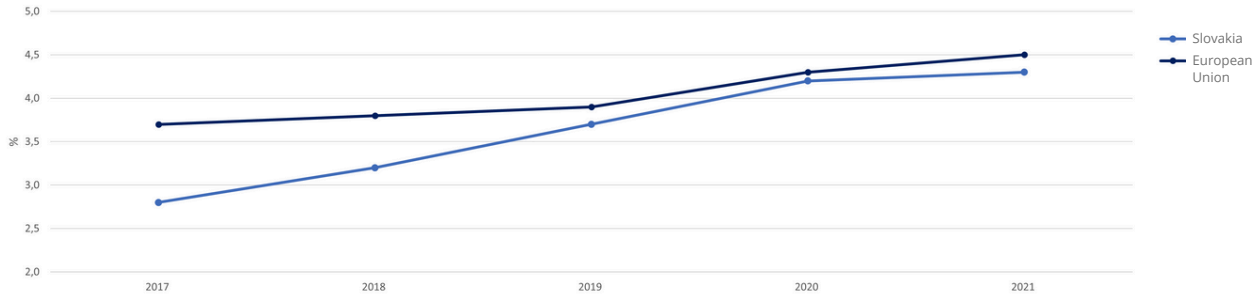
ICT specialists in Slovakia



Source: Eurostat 2022 [7]

The share of people working in the ICT sector in Slovakia is still growing, but it is still below the European Union average. Slovakia was closest to the European average in 2020, when the values differed by 0.1 percentage point. In 2021, this gap has increased again, with Slovakia reaching a level of 4.3%, an increase of approximately 4,700 people [7].

Proportion of ICT specialists



Source: Eurostat 2022 [7]

2. THE SURVEY

2.1 About the survey

3,230
ICT specialists

23
companies

Selection of companies

Through a newsletter or e-mail communication, the Košice IT Valley cluster approached 28 of its member companies to fill in the questionnaire (see Annex 2).
Another 10 companies that are not members of Košice IT Valley were contacted because of their size and the importance of their presence in Košice.

Companies, each with at least 30 employees (i.e. small, medium and large companies), were selected on the basis of their predominant economic activity and their presence in the territory of Košice.

For the purposes of the survey, the participating companies were divided into two groups. The first is called **product** - companies primarily developing their own product and the second will be called **nearshore** for simplicity - companies primarily providing nearshore, offshore and onshore* services to other companies.

Questionnaire return rate and companies involvement

A total of 38 companies were approached to participate in the survey. The return rate of the questionnaire was 60.5%. The survey involved 11 nearshore and 12 product companies. The companies that responded to the questionnaire employ a total of more than 17,000 people, of which more than 7,500 are employed in the ICT sector. Of these employees, 3,230 fell into selected job roles. To give an idea of the sample sizes, 2,569 employees were from nearshore companies and 661 employees were from product companies.

*Nearshore indicates outsourcing to countries in close proximity with similar time zones.
Offshore means outsourcing to distant countries with significant time zone differences.
Onshore refers to outsourcing to service providers based in the same country.

Objectives of the survey

The aim of the survey was to map the situation of the ICT sector in Košice in the following areas:

- employment in selected jobs positions
- demand for employees,
- technology profile,
- women's participation.

2.2 Selected job positions

In the next section we present the results of the survey regarding the distribution of job positions in the ICT sector in Košice. Eurostat keeps a record of ICT specialists and tracks their development under unique ISCO-08 codes [12] and together they make up 24 job groups.

We mapped twelve of these (see Annex n. 3), added two more, as did the authors of [17], and then divided them into eight categories. Below, we offer a list of these categories with the labels that appear in the charts and other possible names of job positions that belong to the category. In the following we will use the term ICT specialists to refer to people working in these jobs.

Business analyst
BA

IT Analyst, system analyst

Data specialist
DATA

data analyst, data scientist, data engineer

Software engineer
DEV

backend developer, fronted developer, software developer, application developer, mobile developer, web developer, software engineer

DevOps specialist
DEVOPS

DevOps, DevOps engineer

Project manager
PM

digital project manager, technical project manager

Product owner
PO

product manager

Tester
QA

QA, Quality Assurance engineer, IT engineer, test automation developer, IT test consultant, test automation engineer

Scrum Master
SCRUM

agile coach

3.

KOŠICE AND ICT SPECIALISTS

3.1 Distribution of job positions

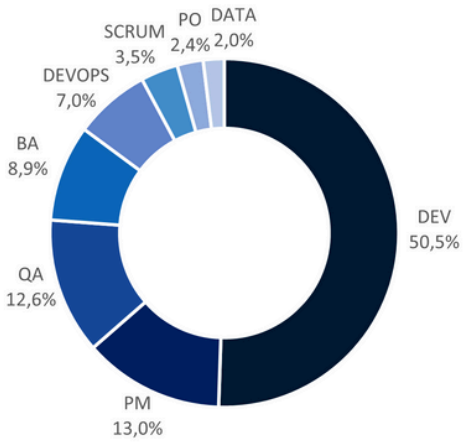
Of the eight groups of job positions mentioned above, the demand for computer programmers is the most visible in general and in Košice in particular. A survey conducted among major companies in Košice shows that programmers account for up to 50.5% of ICT specialists in the Košice ICT sector.

Project managers are the second largest group with 13.0%. The group below 4% includes Scrum Masters (3.5%), Product Owners (2.4%) and Data Specialists (2.0%). Testers make up 12.6%, business analysts 8.9% and DevOps specialists 7.0% of the total number of selected ICT specialists in Košice.

50.5%

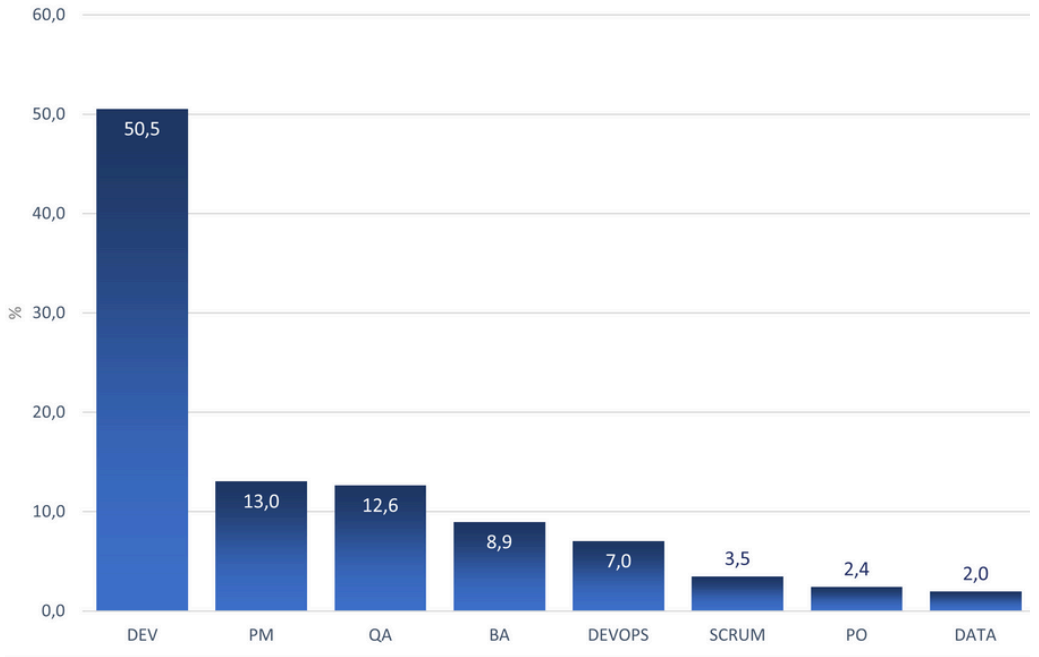
of ICT specialists in Košice are software engineers

ICT specialists in Košice, 2021



Source: Survey Košice IT Valley 2021

ICT specialists in Košice, 2021



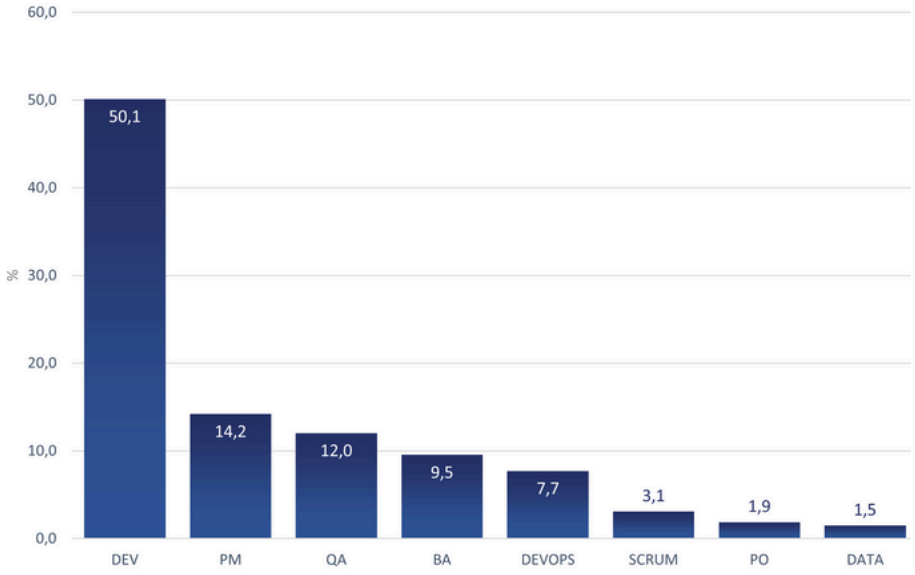
Source: Survey Košice IT Valley 2021

The ideal ratio of job roles also depends on services the company provides. A nearshore company has different needs than a product company and needs more people to manage and run it. The low proportion of Scrum masters and Product owners is not surprising, but the low representation of data experts may be a problem, as these people will be needed in the near future, given the European Union's strategy.

Nearshore and job positions

In nearshore companies, half of the ICT specialists are also computer programmers. The second largest group is project managers (14.2%), followed by testers (12.0%). Scrum masters (3.1%), product owners (1.9%) and data experts (1.5%) have the smallest representation.

ICT specialists nearshore, Košice 2021

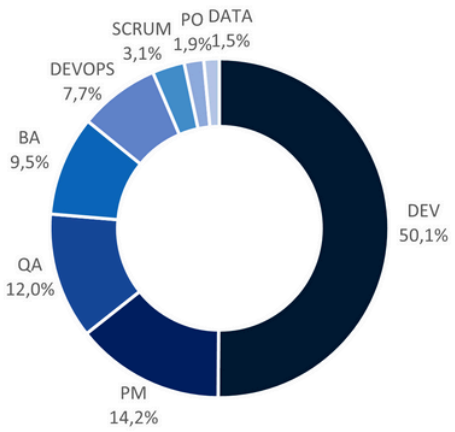


Source: Survey Košice IT Valley 2021

14.2%

project managers, nearshore

ICT specialists nearshore, Košice 2021



Source: Survey Košice IT Valley 2021

Product and job positions

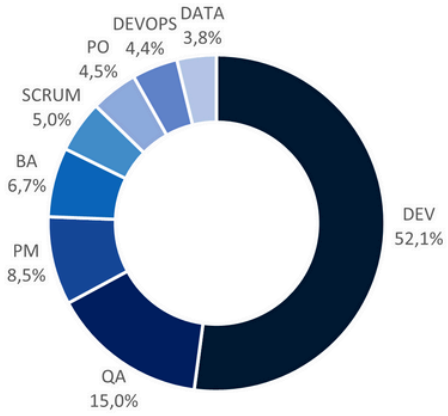
In product companies, programmers account for 52.1% of ICT specialists. The second largest group in this case is not project managers, but testers with a share of 15%.

Project managers are the third largest group, accounting for only 8.5%. The position of DevOps specialists and Scrum masters is also changing in product companies compared to nearshore.

8.5%

project managers, product

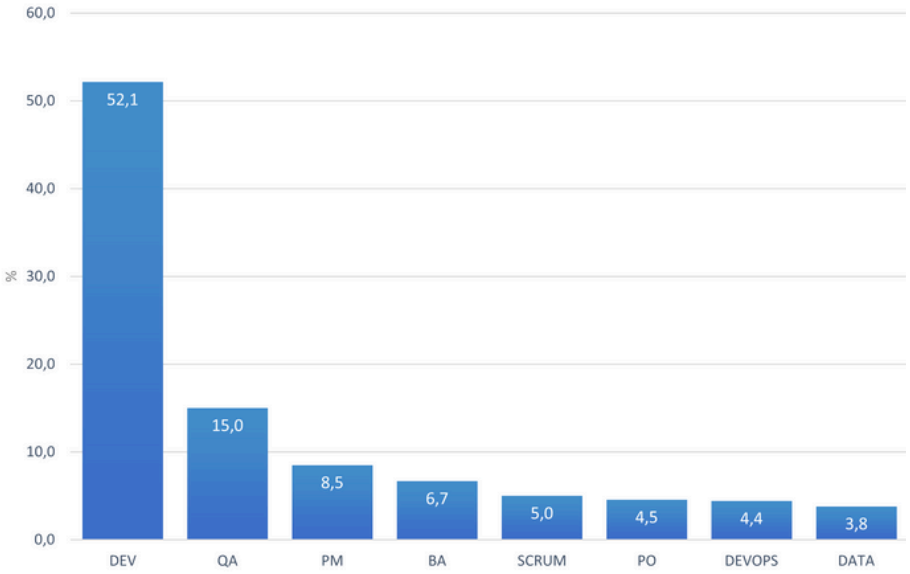
ICT specialists product, Košice 2021



Source: Survey Košice IT Valley 2021

The share of DevOps specialists is significantly lower than in nearshore (7.7%) at 4.4%. Product owners (4.5%) and data specialists (3.8%) are also at the top of the ranking, but with a significantly higher share than in nearshore companies.

ICT specialists product, Košice 2021



Source: Survey Košice IT Valley 2021

3.2 Team roles

The team roles or team jobs in this report include:

- Business Analyst (BA)
- Programmer (DEV)
- DevOps Specialist (DEVOPS)
- Scrum master (Scrum)
- Tester (QA).

The appropriate ratio of roles in a team is difficult to determine in general terms, as it is based on a variety of factors. Each type of company or project requires specific needs in terms of the number and type of ICT specialists working on it.

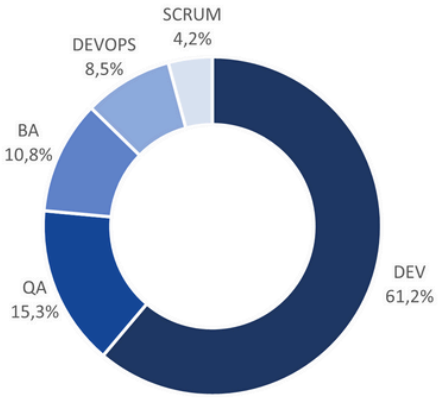
However, some suggestions and recommendations for appropriate team distribution with respect to specific roles can be found [2, 9, 10, 11, 13]. For the purposes of this report, given the companies involved, we have chosen the ratio as a pattern for the appropriate distribution of these team roles **DEV:QA:BA:DEVOPS:SCRUM** equal to **3:2:1:1:1:1**. We can thus see at least approximately how the shares of employees in these roles differ from the chosen sample distribution.

The distribution of team roles in Košice differs significantly from the model. This is especially true in the percentage of software engineers, who represent up to 61.2% of this group of job positions, instead of the exemplary 50%.

DevOps specialists and business analysts hover around the 10% figure, almost as in the pattern. Scrum masters at 4.2% and testers at 15.3% differ the most from the pattern.

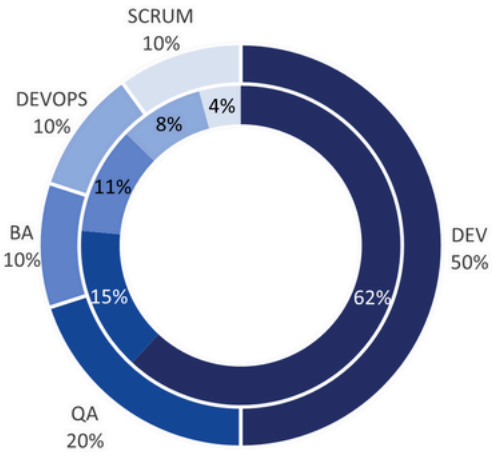
BA
DEV
DEVOPS
SCRUM
QA

Team roles, Košice 2021



Source: Survey Košice IT Valley 2021

Comparison to exemplar distribution



Source: Survey Košice IT Valley 2021

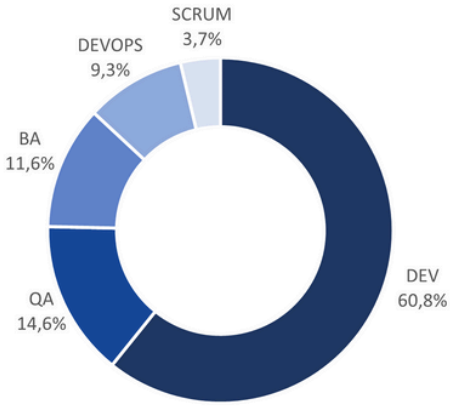
Team roles in nearshore and product

If we compare the team roles of nearshore and product companies, we can observe differences. While software engineers have a similarly large representation in both groups, more than 60%, other job positions differ. Testers do not reach 20% in either group and with 18% they make up a higher proportion in the product. Business analysts exceed the benchmark with 11.6% in nearshore.

DevOps specialists and Scrum masters have a different order and their shares within team roles differ significantly. In nearshore, DevOps specialists have a 9.3% representation and in product it is 5.3%. Scrum masters, on the other hand, have a higher proportion of team roles in the product with a value of 6.0%.

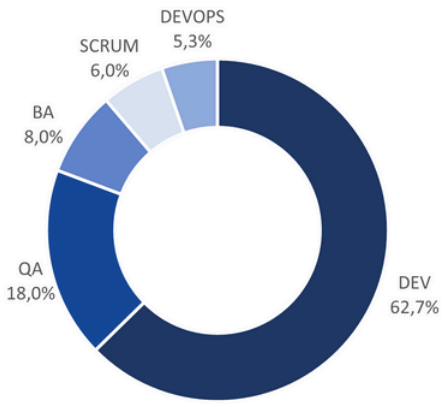
As the demand for ICT specialists is still significantly higher than the supply, job positions with lower representation need to be filled in order to bring the ratio closer to a more balanced distribution of team roles.

Team roles, nearshore



Source: Survey Košice IT Valley 2021

Team roles, product



Source: Survey Košice IT Valley 2021

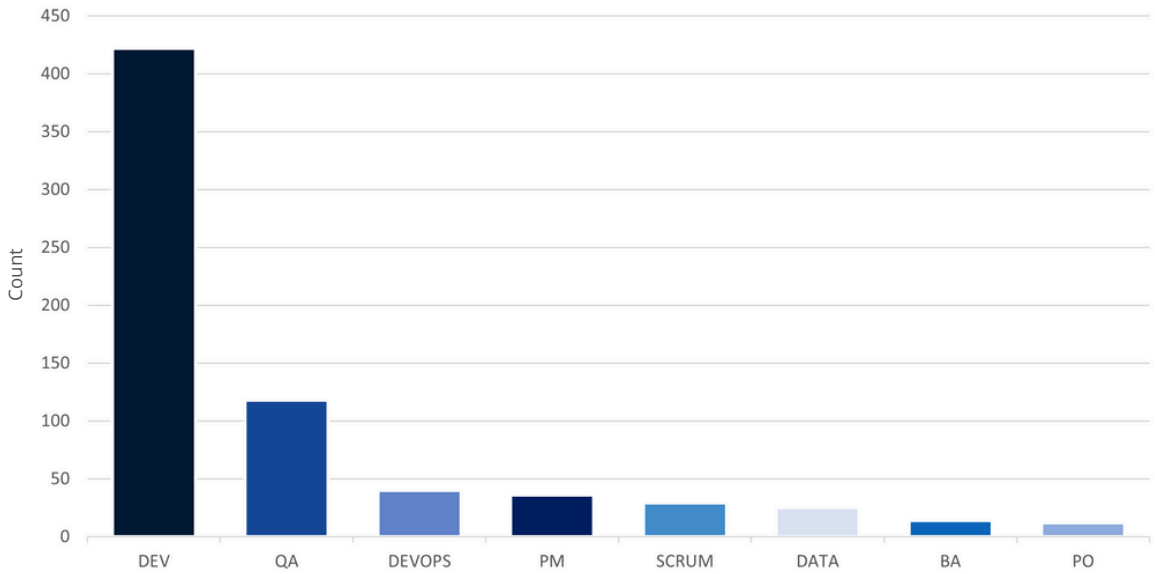
3.3 Demand for ICT specialists

In 2021, the ICT industry employed almost 10,000 people in the entire Košice region [14] and the city of Košice is the second largest city in Slovakia where IT companies operate. There are approximately 1,200 companies and organizations operating in the information technology sector registered in the city [8], while approximately 200 companies are monitored in more detail in the Košice IT Valley. In recent years, the attractiveness of the region has been growing, which is confirmed by the arrival of new IT companies that have decided to expand their operations in this region.

The increased demand caused by the arrival of new companies multiplies the urgent need to increase professional capacity in the sector. Based on the reports on the activities of the Technical University in Košice [15] and the Pavol Jozef Šafárik University in Košice [16], in 2021, 800 students successfully graduated from the 1st, 2nd and 3rd level of higher education at the Faculty of Electronics and Informatics of TUKE and 296 students successfully graduated from the Faculty of Natural Sciences of UPJŠ in the year 2021. As these graduates are the main source of skilled labour.

In the questionnaire, we also asked companies about the current demand for employees, or how many open job positions are ready to be filled immediately. The following charts show the demand and the need for more job positions in the last quarter of 2021. Currently, with the arrival of new companies in Košice, there are more open job positions and some are already filled, but it still gives us some picture of the demand in Košice ICT.

Demand for ICT specialists, Košice, 4th quarter, 2021

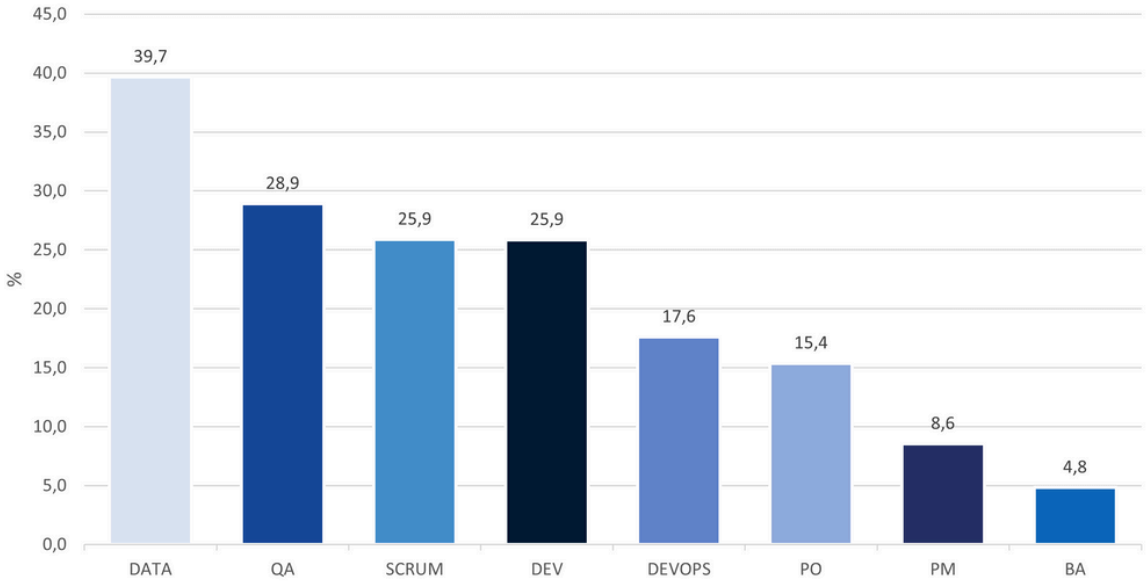


Source: Survey Košice IT Valley 2021

At the time of completing the questionnaire, there were more than 700 job positions open and needed to be filled by these ICT specialists in the participating companies. Not surprisingly, computer programmers are the most in-demand group, with more than 70% of job offers going to them. Testers were the second most in-demand job position, albeit with a significantly lower number of open positions. In each of the other job positions, fewer than fifty posts needed to be filled. Business analysts and product owners finished in last place.

When we look at the need to fill job positions in terms other than absolute numbers, the situation looks somewhat different. For companies to thrive, it is important for them to have enough workforce.

The need for increase in current capacities in percentage, Košice, 4th quarter, 2021



Source: Survey Košice IT Valley 2021

the number of data experts needs to be increased by almost

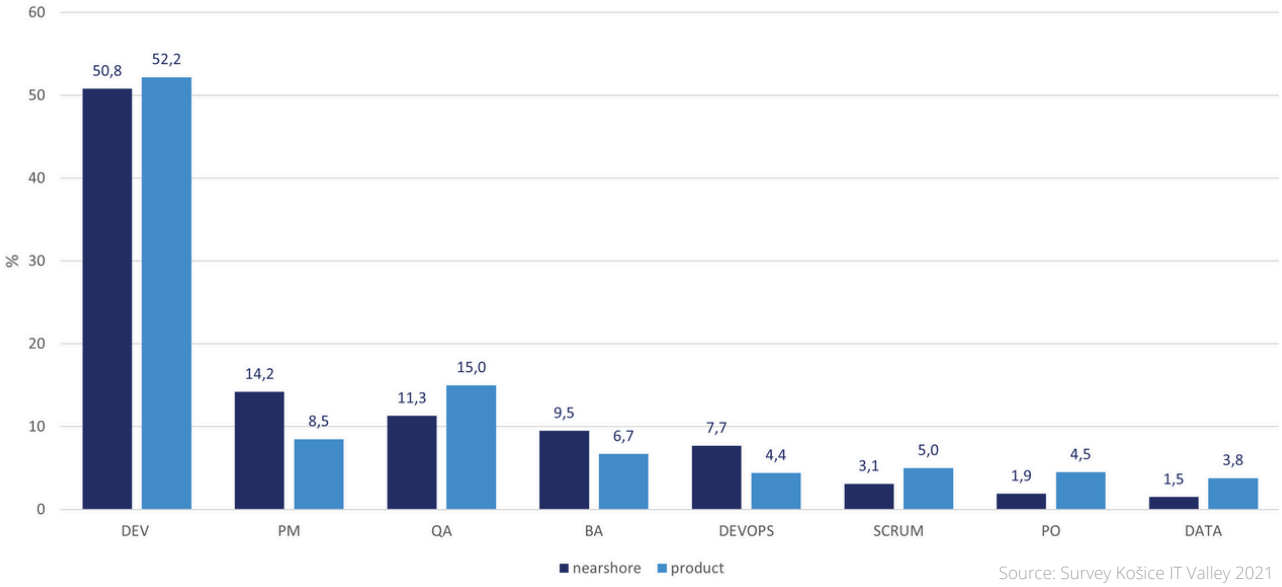
40%

There is also a need to ensure that some job positions are not vacant for long periods of time due to the absence of the necessary ICT specialist and that the level of shortage or impact for all positions is below a certain reasonable level. The challenge is to ensure that the unmet demand for one or more types of specialists does not disrupt the company's operations in Košice, as there is a risk that companies will decide to relocate a lucrative part of their activities to other locations due to the lack of available skilled labour.

The graphs expressing the demand and need for more ICT specialists show that although in absolute numbers programmers are the most in demand, overall, based on the data from the analysed companies, the current number of data specialists in Košice needs to be increased by 39.7%, testers by 28.9% and scrum masters and computer programmers by 25.9%. Below the 20 percent need are DevOps specialists (17.6%), product owners (15.4%), project managers (8.6%) and by 4.8% ICT in Košice need to increase the number of business analysts.

In the following chart we recall how the distribution of eight groups of job positions in Košice looks like by company type.

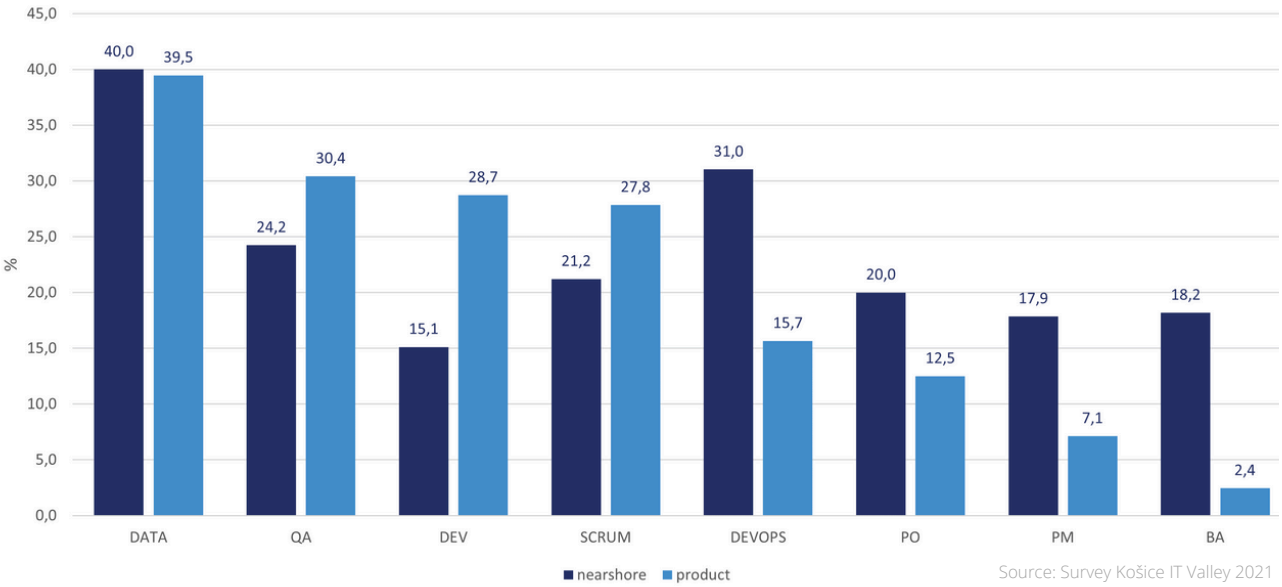
ICT specialists, Košice, 2021



Source: Survey Košice IT Valley 2021

Let's look at the problem of demand for ICT specialists from the perspective of the need to increase current capacities also by type of company.

The need to increase the current capacities in percentages, Košice, 4th quarter, 2021

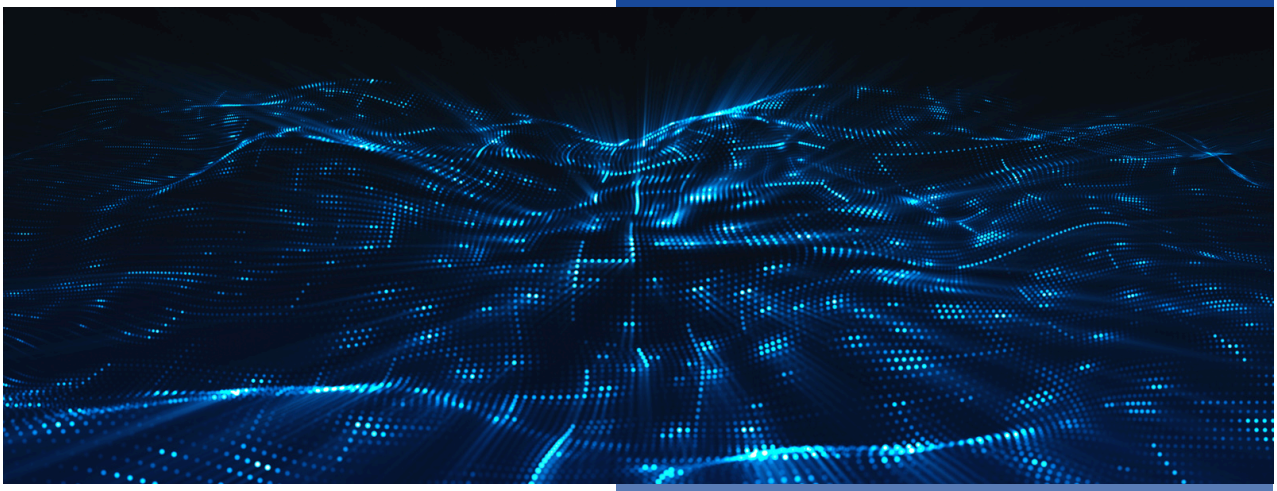


Source: Survey Košice IT Valley 2021

The need for an increase in the number of ICT specialists, given the current situation, varies by type of company in all positions except data specialists. The largest difference, up to 15.8 percentage points, is recorded in the demand for business analysts, with demand being greater in nearshore companies. There is also a significant difference between companies with a difference of 10 to 16 percentage points in the demand for software engineers, which is higher in product companies, and the demand for DevOps specialists and project managers is higher in nearshore companies.

The smallest difference is observed for the aforementioned data professionals with a difference of 0.5 percentage points. The need for an increase in the current status differs for the other job positions by less than 8 percentage points each.

4. TECHNOLOGIES



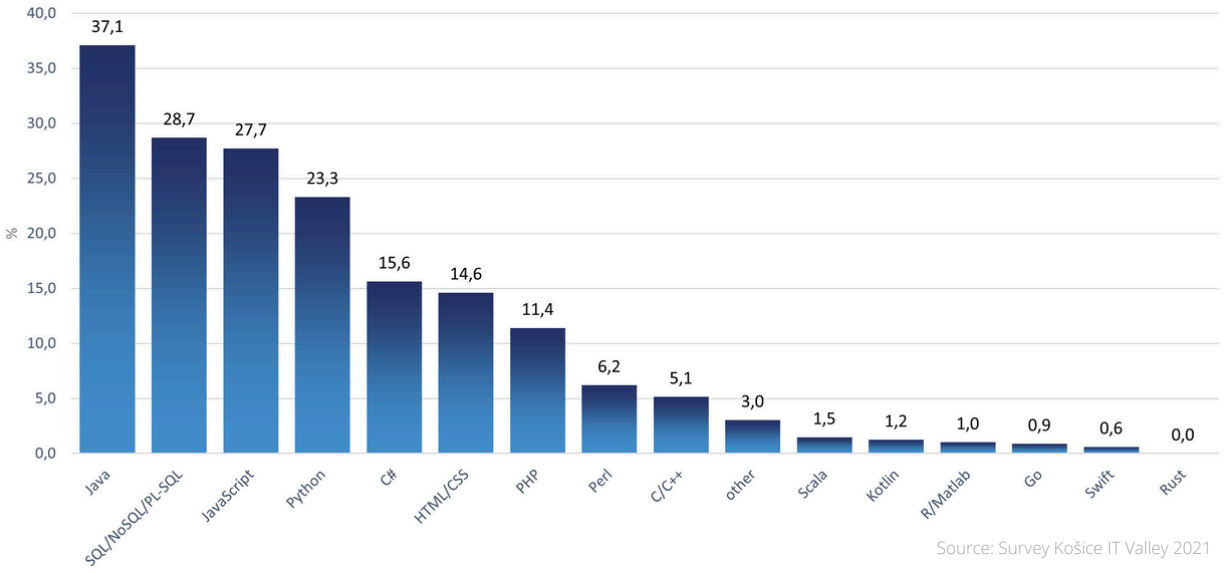
4.1 Technologies used in Košice

37.1%
software developers in Košice used Java in 2021

The third question in the questionnaire was related to programming languages and technologies. Participating companies were asked to indicate, for each technology, the number of programmers who use specific programming language or technology in their work.

It should be noted that a single programmer can and usually does use more than one programming language or technology, and for this reason the sum of the above values in percentages exceeds 100.

Technologies, Košice 2021



Source: Survey Košice IT Valley 2021

In Košice, the Java programming language is mainly used. Therefore, it is no surprise that it ranks first in the ranking. The number of programmers working with this language is as high as 37.1% and exceeds other languages and technologies. However, the difference is not as significant as we expected before the survey.

The most used technologies by more than 20% of programmers in Košice, include SQL (NoSQL, PL/SQL with 28.7%), Javascript (27.7%) and Python with 23.3%.

The 'other' category includes all other programming languages and technologies not mentioned. The largest group in it is ABAP. The least used languages in Košice ICT are Scala (1.5%), Kotlin (1.2%), R/MATLAB (1.0%), Go (0.9%) and Swift (0.6%) with a usage below 2% and the use of Rust was not recorded at all.

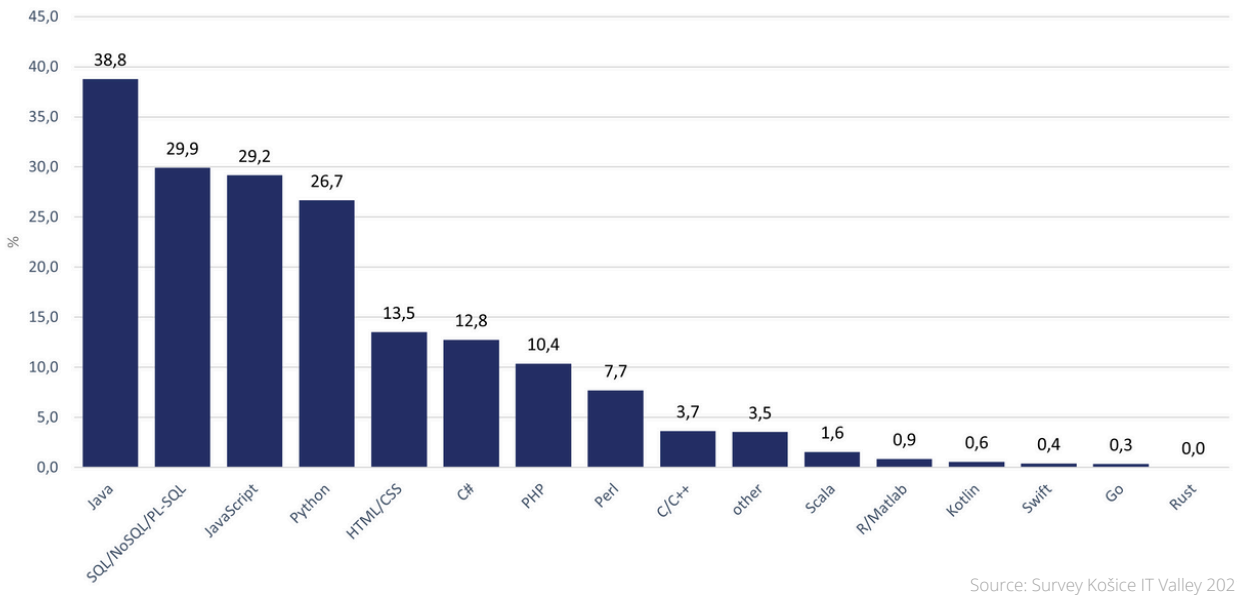
The distribution of technologies is better than we expected, but the question is whether the programming languages in the second half of the ranking are so little used because of company preferences or whether programmers proficient in these technologies are not available.

Nearshore and technologies

In the overall arrangement in the nearshore we can observe three groups. Java is also in first place with 38.8%. Over 25% of programmers use SQL (NoSQL, PL/SQL, 29.9%), Javascript (29.2%), and Python (26.7%) in their work. This group of technologies is visibly more widely used than the others.

The middle group consists of HTML/CSS (13.5%), C# (12.8%), PHP (10.4%), Perl (7.7%), C/C++ 3.7%, and 3.5% of programmers belong to the other category.
Scala (1.6%), R/Mathlab (0.9%), Kotlin (0.6%), Swift (0.4%) and Go (0.3%) are also below 2%.

Technologies - nearshore, Košice 2021



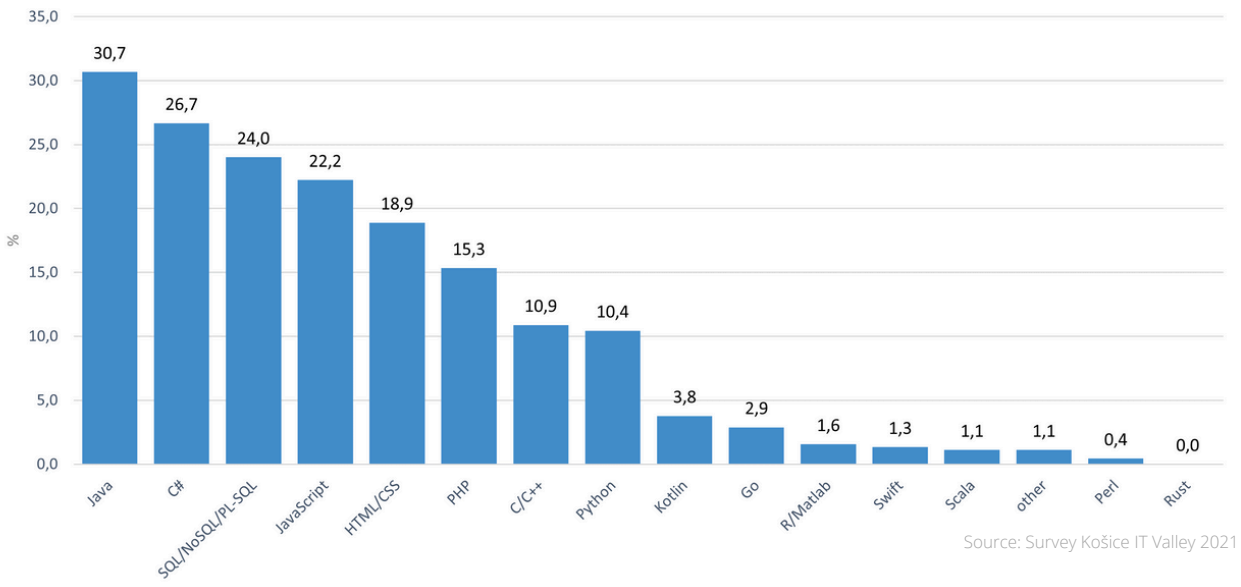
Source: Survey Košice IT Valley 2021

Product and technologies

Also in product companies, Java comes first, but here with a much lower value. 30.7% of programmers in product companies use this programming language at work. The arrangement of other technologies differs from that of the nearshore. There is a significant difference with C#. While it is worth 15.6% in the overall ranking and is used by 12.8% of ICT professionals in nearshore companies, it reaches 26.7% in the product.

A language that is significantly less used than in nearshore and overall in Košice is Python. Only 10.4% of ICT programmers in these companies use it. The group of technologies that are used below 10% is almost the same as in the nearshore, but the arrangement is different and with a higher percentage of use.

Technologies - product, Košice 2021



Source: Survey Košice IT Valley 2021

4.2 Using the Cloud

For about 20 years, Cloud technologies have helped to streamline ICT systems, innovate and introduce new products. In recent years, there has been a trend in Slovakia to move to the Cloud. The pandemic has accelerated the process of transition to the Cloud, but Slovak companies are still lagging behind Europe in the use of the Cloud (41%, [6]).

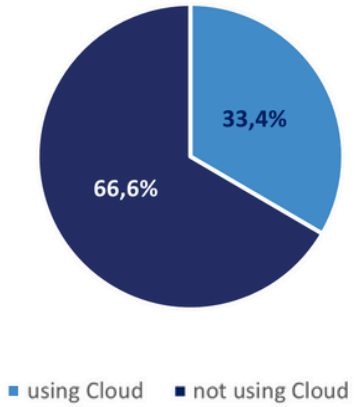
According to available data, only 36% of companies use Cloud solutions, which is 10% more than in the previous year. The European Commission has unveiled targets for Europe's successful digital transformation by 2030, which includes a vision where 75% of companies use Cloud solutions.

Cloud usage in IT companies is understandably higher. In Europe, 76% of companies whose focus is information and telecommunication use the Cloud, while in Slovakia it is only 59% [5].

As far as companies operating in Košice are concerned, all companies that participated in the survey and provided this information use the Cloud. Two companies did not comment on this issue, but given the nature of their business, we can assume that they use the Cloud.

However, not all employees work with it on a daily basis. Of all employees included in the survey, only 33.4% of ICT professionals working in these companies come into contact with the Cloud on a daily basis.

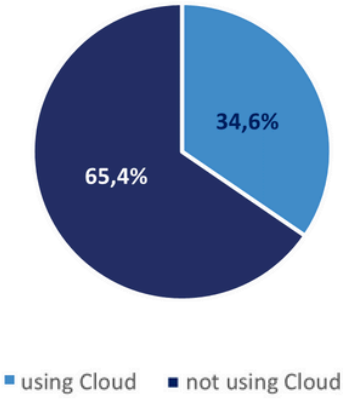
Daily Cloud usage by employees, Košice 2021



Source: Survey Košice IT Valley 2021

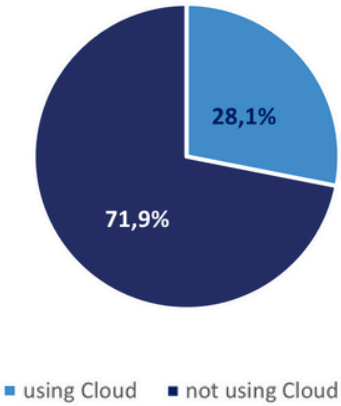
When we look at the data on Cloud usage by company type, the survey shows that nearshore companies are working with the Cloud slightly more than product companies. While 28.1% of ICT professionals use the Cloud in the product, 34.6% use it in the nearshore.

Daily Cloud usage by employees - nearshore, Košice 2021



Source: Survey Košice IT Valley 2021

Daily Cloud usage by employees - product, Košice 2021



Source: Survey Košice IT Valley 2021

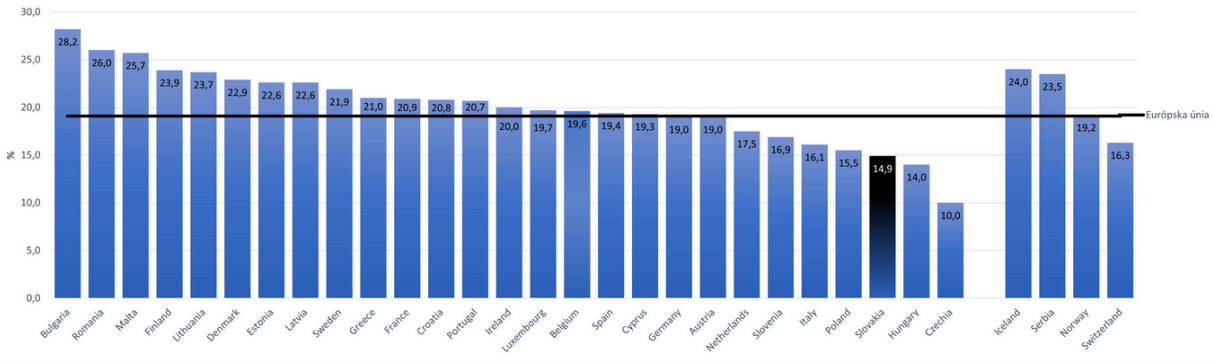
5.

WOMEN IN ICT

5.1 Female ICT specialists in Europe and Slovakia

In 2021, there were more than 7.2 million men working in the ICT sector, representing 80.9% of the total number of people working in the sector, while there were only 1.7 million (19.1%) women in ICT in Europe. Thus, over the last ten years, the share of women in ICT has increased by only 2.1%.

Proportion of female ICT specialists, Europe



Source: Eurostat 2022 [6]

The only European countries where women make up more than 25% of ICT professionals are Bulgaria, Romania and Malta. The largest increase since 2012 was in Malta, where the proportion increased by up to 15 percentage points, representing an increase of 2.200 women. However, Malta has been working hard since 2016 to increase the number of women working in the ICT sector and to encourage women to stay in the sector [3].

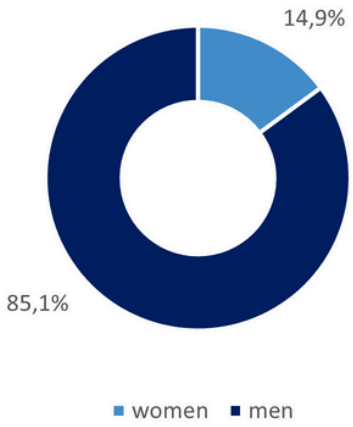
14.9%

proportion of female ICT specialists in Slovakia in 2021

By creating a sex-balanced environment, assigning equally challenging projects to women and men, they give women the opportunity to excel in a field that is perceived as a male domain. They also seek to emphasize access to employment, pay, training and working conditions (see Annex No. 4).

Slovakia is below the European average and together with Hungary and the Czech Republic is at the tail of the ranking. The proportion of women in these countries is less than 15%.

ICT specialists by gender, Slovakia 2021



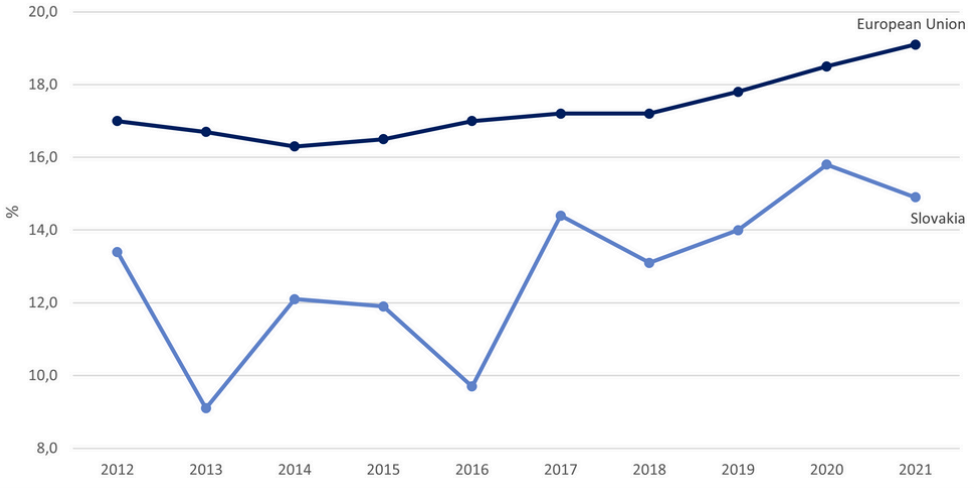
Source: Survey Košice IT Valley 2021

16,500

female ICT specialists in Slovakia in 2021

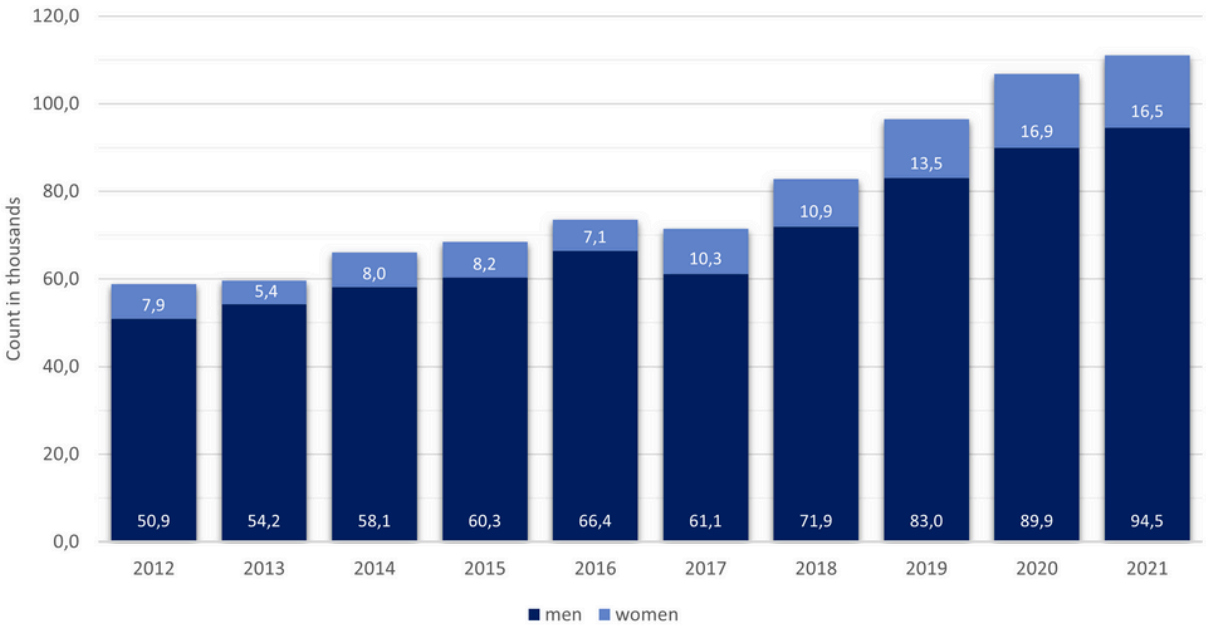
In Slovakia, the number of women has fallen year-on-year by 400. The last decrease occurred in 2016, when approximately 7,100 women worked in ICT. More than 4,500 men were added year-on-year. In 2021, there were 16,500 women in ICT, representing 14.9% of the total number of ICT specialists working in Slovakia, while there were 94,500 men [6]. As for the Košice region, the latest available statistics from 2020 indicate the share of women in the region at 19% [17].

Female ICT specialists



Source: Eurostat 2022 {5]

ICT specialists by gender, Slovakia 2021



Source: Eurostat 2022 [6]

5.2 Women in ICT in Košice

Technical University in Košice and Pavol Jozef Šafárik University in Košice produce hundreds of graduates every year. In 2021, 98 female students successfully graduated from the 1st, 2nd and 3rd degree of higher education at the Faculty of Electronics and Informatics of TUKE and only 171 female students at the Faculty of Science of UPJŠ [1]. Thus, of the total number of graduates, women make up 24.5% - TUKE: 12.3% and UPJŠ: 57,8 %.

26.4%

female ICT specialists in Košice

Since large companies were involved in the survey, the share of female ICT specialists in Košice is well above the Slovak average, which is 14.9% (note: in 2020 it was 15.8%).

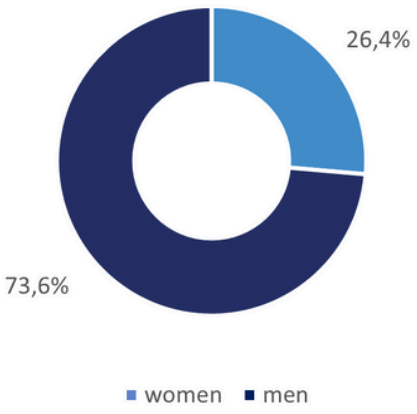
The analysed sample shows that the share of women in selected positions in the companies involved in the survey accounts for 26.4%. Overall, the figure in Košice is probably significantly lower. For comparison, statistics from 2020 indicate the share of women in ICT in the Košice region at 19% [17].

The survey also shows that in Košice the largest groups are female software engineers (34.0%), female project managers (22.3%) and female testers (18.4%). Business analysts among women represent 13% of ICT specialists and Scrum masters less than 6%.

The smallest group of female ICT specialists in Košice are product owners (2.5%), DevOps specialists (2.3%) and only 1.5% work as data specialists.

The percentage of women in each job was also of interest. The distribution of ICT specialists in Košice can also be found in the charts on page 16.

ICT specialists by gender, Košice 2021



Source: Survey Košice IT Valley 2021

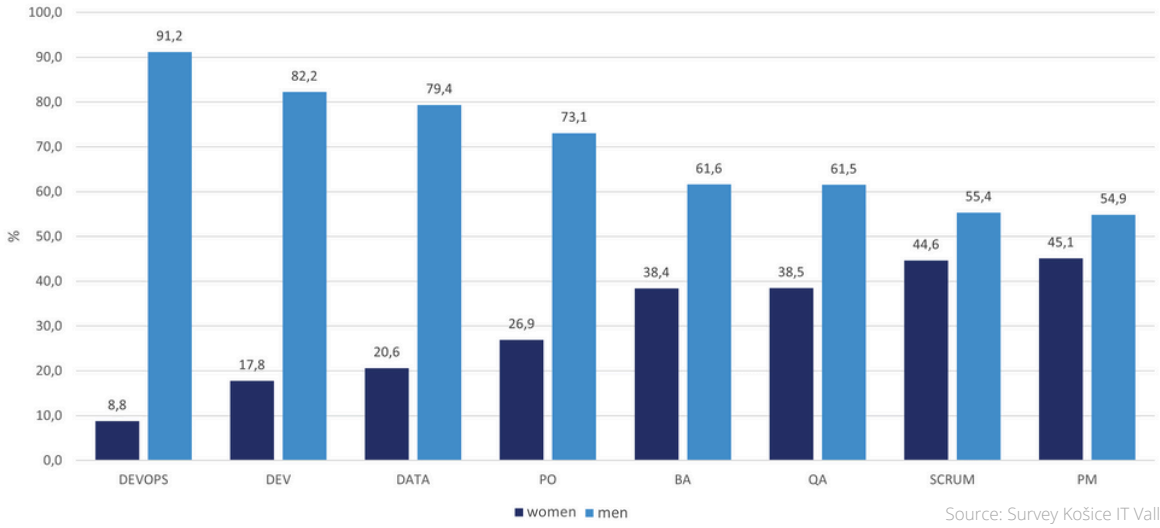
In none of the jobs included in the survey did women make up more than half of the workforce. The smallest share of women was recorded in the DevOps group at only 8.8%.

On the contrary, the highest proportion of women is found among project managers, where women represent 45.1%. Another group where the proportion of women is higher than 40% are Scrum Masters (44.6%). Almost the same proportion of women is among business analysts (38.4%) and testers (38.5%).

34%

of female ICT specialists in Košice are software developers

ICT specialists by job position and gender, Košice 2021

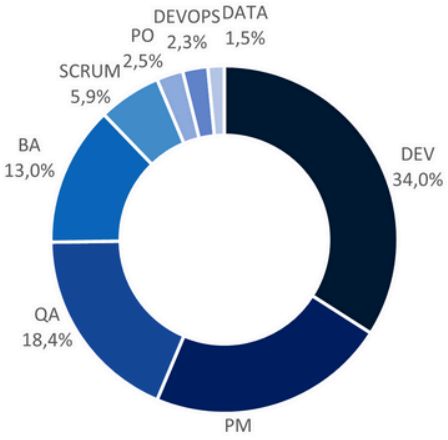


Source: Survey Košice IT Valley 2021

The survey also shows that jobs with a lower proportion of women include software engineers (17.8%), data specialists (20.6%) and product owners (26.9%).

Nevertheless, the percentage of women in these jobs (DEV, DATA, PO) is still higher than the Slovak average (14.9%) and even higher than the European Union average of 18.5%.

Female ICT specialists



Source: Survey Košice IT Valley 2021

GOOD PRACTICE

Examples of good practice

One of the tools that indirectly contribute to increasing the skilled workforce in the region are IT awareness projects. This can also include initiatives aimed at educating different population groups. These activities cannot be underestimated as they contribute significantly to increasing digital skills in the region and act as a strong motivating factor for young people in choosing their profession and career.

Živé IT projekty

Živé IT projekty are a unique educational project of cooperation between universities and industrial practice under the auspices of the Department of Computers and Informatics of the Faculty of Computer Science and Engineering of the Technical University of Košice and the Košice IT Valley Association in a scope and form that is unusual in Slovakia. In Živé IT projekty, students work in teams on real IT projects for four months under the guidance of experts from practice and the university, and the output of the projects is usually a software prototype. The benefit of Živé IT projekty is close contact with practice and business environment. The main idea is to connect students and IT business directly through mentors and customers. The project is an example of how multi-stakeholder cooperation can lead to better prepared students for the labour market.

More information at ***www.kpi.fei.tuke.sk/sk/content/zive-it-projekty***

LAB IT CREATIVITY

The LAB IT Creativity project connects secondary school teachers and students with mentors from IT companies and the Technical University of Košice who work on development projects for their school. The aim of the project is to enthuse students about information and communication technologies, to build a relationship with them and thus help the development of individual grammar schools. The LAB IT Creativity project not only connects companies with secondary schools, but also involves current students of computer science. The cooperation includes professional lectures, mentoring, visits to companies and work on own projects. The project originated from the initiative and cooperation of the Košice Self-Governing Region with Košice IT Valley. Computer and digital literacy is becoming a prerequisite for employment and this need will only increase. The aim of the project is also to foster students' creativity and give space to their ideas, as they can create their own digital products and collaborate with the best practitioners.

More information at ***www.kosiceitvalley.sk***

TabLab project

TabLab focuses on acquiring theoretical and practical skills in virtual reality, audiovisual and audio. TabLab is a space for creativity and ideas, new technologies and innovations, digital skills, learning in an informal environment. Students have the opportunity to gain theoretical and practical, digital skills or mentoring from professionals from Matsuko, Onomatopoje studio and Tabačka Kulturfabrik, as well as to work on their own project and then present it to their classmates and their community. The vision is to build an active community of young innovative creatives - TabLab members with experience in digital technologies in the newly emerging world of virtual reality. It supports young people, gives them the opportunity to learn new technologies, improves their digital skills and increases their employability in the digital field.
More information at ***www.tabacka.sk/projekty/aktualne-projekty/tablab***

Aj Ty v IT

The civic association Aj ty v IT was founded in 2012 with the aim to motivate and support girls and women in the field of information technology. The aim of the association is to build a technologically equal society and to ensure that women are not left on the margins, but become a direct part of the technological future. The association is dedicated to building community and educating girls as young as 8 years old, through high school girls to special career programs designed for adult women, and also works with IT faculties of universities. In 2020, the association was nominated for the prestigious UNESCO Prize for Girls' and Women's Education.
More information at ***www.ajtyvit.sk***

Summer coding camp in Košice

Coding Camp is a five-day free summer IT camp for girls aged 11 to 18 with a passion for information technology. Every year, Ženský algoritmus Civic Association prepares a summer day camp for future female ICT workers. During the camp, girls have the opportunity to find out what is behind UX, HTML or CSS shortcuts, learn the basics of programming in Python and create their own chatbot. Thanks to Code Camp, you can see how enthusiastic young girls can get about information technology.
More information at ***www.zenskyalgoritmus.sk***

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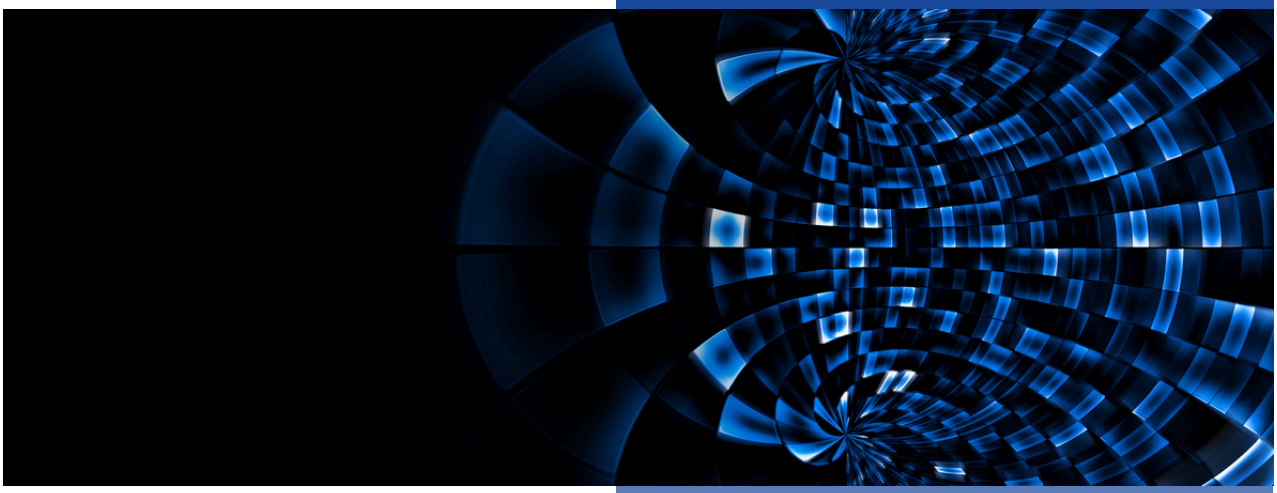
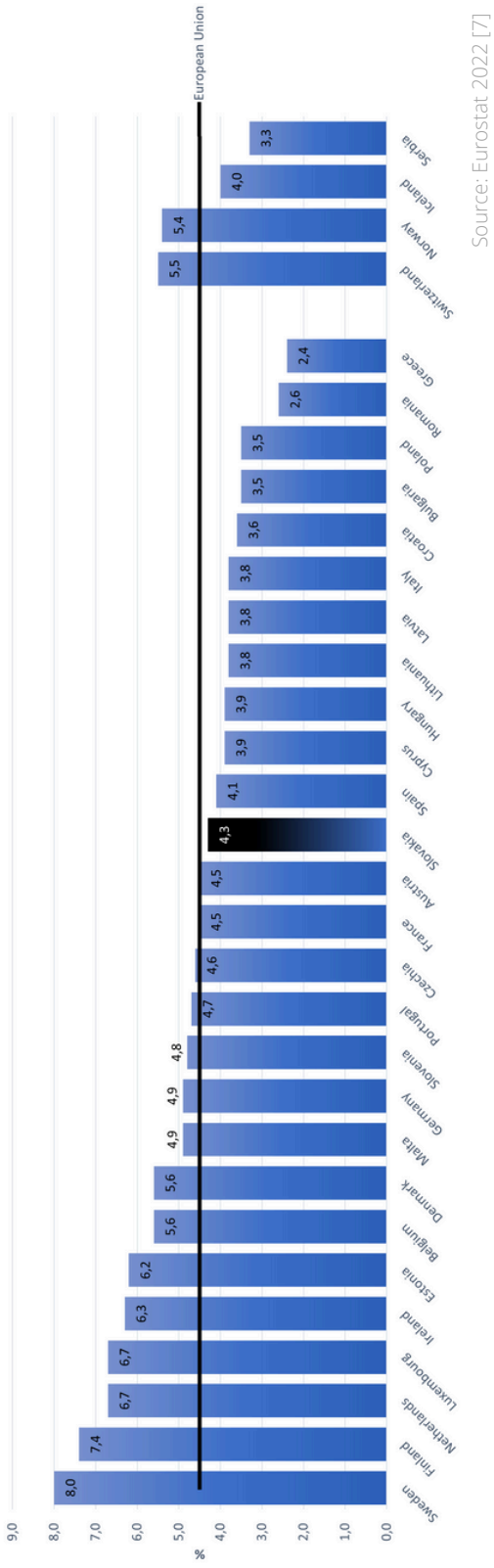
ANNEXES



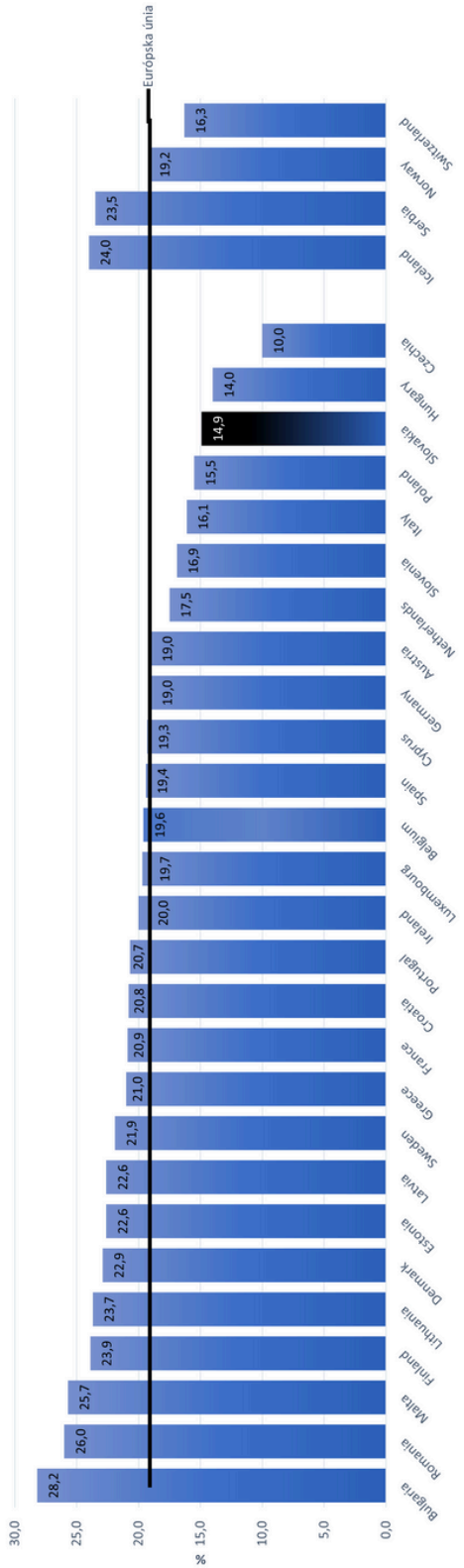
Annex No.1

Proportion of ICT specialists in total employment, 2021



Source: Eurostat 2022 [7]

Proportion of female ICT specialists, 2021



Source: Eurostat 2022 [7]

Annex No.2

Questionnaire

Q1: What kind of roles do you have in your company? How many employees hold those positions (sorted by gender)?

	female	male	total
Developer/Software Engineer			
Tester/Quality Engineer			
DevOps Engineer			
Business Analyst			
Product Owner			
SCRUM Master/Agile Coach			
Project Manager			
Data scientist/Analyst/Engineer			

Q2: How many open positions do you have in your company for these roles?

	sum
Developer/Software Engineer	
Tester/Quality Engineer	
DevOps Engineer	
Business Analyst	
Product Owner	
SCRUM Master/Agile Coach	
Project Manager	
Data scientist/Analyst/Engineer	

Q3: Indicate the number of software engineers who use the programming language listed below (one person may belong to multiple fields)

	sum		sum
JavaScript		Rust	
Python		Perl	
HTML/CSS		Go	
Java		PHP	
Scala		Kotlin	
SQL/NoSQL/PL-SQL		Swift	
C#		R/Matlab	
C/C++		other	

Q4: How many people work with Cloud (AWS/Google Cloud/Azure) on daily basis?

Annex No.3

ICT specialists, according to Eurostat, and selected groups for survey

ISCO code	Occupation
1330	**ICT Service managers**
2152	Electronic engineers
2153	**Telecommunication engineers**
2166	Graphic and multimedia designers
2356	**Information technology trainers**
2434	**ICT sales professionals**
2511	**Systems analysts**
2512	**Software developers**
2513	**Web and multimedia developers**
2514	**Application programmers**
2519	**Software and multimedia developers and analysts not elsewhere classified**
2521	**Database designers and administrators**
2522	Systems administrators
2523	Computer network specialists
2529	**Database and network professionals not elsewhere classified**
3114	Electronics engineering technicians
3511	ICT operations technicians
3512	ICT user support technicians
3513	Computer network and systems technicians
3514	**Web technicians**
3521	Broadcasting and audio-visual technicians
3522	Telecommunications engineering technicians
7421	Electronics mechanics and servicers
7422	ICT installers and servicers

Added groups

ISCO code	Occupation
1223	Research and development managers
2151	Electrical engineers and energy specialists

Annex No.4

Recommendations to support women in ICT (Malta[3])

Computer clubs for girls

Not everyone may agree with this concept, as it may give the impression that girls are treated differently from boys. However, given that the number of girls in the ICT sector is very low, this initiative simply increases girls' participation.

Computer clubs are also useful in providing some information to girls about cyberbullying or the risk of online predators. Studies claim that girls are more likely to be cyberbullied than boys.

Sex balanced environment

Teams with a balanced subset of both men and women attract more women because they give the impression that the organisation is impartial and open. In addition, this structure attracts women because they perceive such a corporate environment as more female-friendly.

Equal opportunities

Let's encourage women in IT by giving women and men equal responsibility. The same goes for big, interesting and important projects. It is not unusual that the best projects are given by men to men.

Policy to keep women in employment

Initiating programmes to help women stay in the workforce when they have children, such as flexible working hours, teleworking, or a programme that allows women to stay in touch with the organisation during parental leave. These opportunities should be available not only for mothers but also for fathers.

Equal pay

Equal pay is very often taken for granted. However, we still find many organisations that have a sex pay gap. Discrimination in pay for whatever reason is one of the main reasons why people change jobs.

Editorial

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Notes