WP2 - Labour Market Analysis

March 2023

Project: 101087270— FEMME FORWARD — ERASMUS-EDU-2022-PI-FORWARD

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01.
Executive summary

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Executive Summary

All participating countries have experienced an increase in the size of the IT sector for several years. In the IT sector, the cloud industry in particular is experiencing strong demand all over Europe. The demand for ICT specialists has been steadily increasing over the last few years and for some countries it has become very difficult to meet this demand, often due to training issues: currently **Europe is experiencing a shortage of around one million digital experts.**

53% of enterprises trying to recruit ICT specialists report difficulties in getting qualified people and only **19.1%** of ICT specialists in Europe are women; if the diversity within these sectors varies from country to country, it remains very low everywhere. It is essential to encourage more women to participate in the digital economy.

We decided to focus our research on the study of **cloud computing as it highly in demand in the participating countries and offers a larger scope for job prospects.** Whereas AI - which is also experiencing high demand - is well catered for in terms of projects and training, this is not the case for cloud computing. Furthermore, AWS who is specialized in on-demand cloud computing services, is a member of the Femme Forward consortium and will be able to support in terms of pedagogical material.

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02.
Introduction

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Background & Objectives

This study is conducted in order to enable the Femme Forward consortium to deliver trainings adapted to the occupational profiles needs and to the skills gaps in the labour market.

The goal of this study is to **highlight global and country-specific factors that represent a barrier to a wider participation of women in tech.**

We will **analyse labour market needs for ICT* specialists in participating countries** such as :

- vacancies;
- time necessary for companies to fill vacant positions;
- most in demand specialists;
- most in demand skills;
- women in tech participation (such as STEM graduates, percentage of women employed in tech, women participation in start-up ecosystem) *and main pain points* (such as gender bias, lack of support, etc.) in participating countries.
-

*ICT specialists are defined as persons who have the ability to develop, operate and maintain ICT systems and for whom ICTs constitute the main part of their job (OECD, 2004).

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Scope

- What is the demand for ICT specialists in participating countries of the European Union?
- What is the level of women's participation in the tech industry in these countries?
- What are the main pain points that represent a barrier to a wider participation of women in tech?
- What is the level of women’s participation in start-ups ecosystems in these countries and what can be a barrier to a wider participation ?

Targeted geographical area : participating countries in the Femme Forward project Belgium, Germany, Greece, Spain, Romania, Italy, Cyprus, France

Targeted group : Femme Forward beneficiaries : Women *with a specific focus on vulnerable groups*

Timeframe : Data as up to date as possible (from 2018 to today)

Field : all sectors

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Methodology

The market analysis will be conducted by collecting and analysing data in order to understand the market's needs for skills and training.

→ The information presented in this analysis may vary by country due to data availability and accessibility.

For more detailed information on sources, see the bibliography at the end of this document

Data sources : online sources, data from partners :

European Commission

Eurostat

HR company (Manpower/Randstad (partner)

Data from institute (Statista)

International Trade Administration

Consulting firm (McKinsey)

World Bank

AWS

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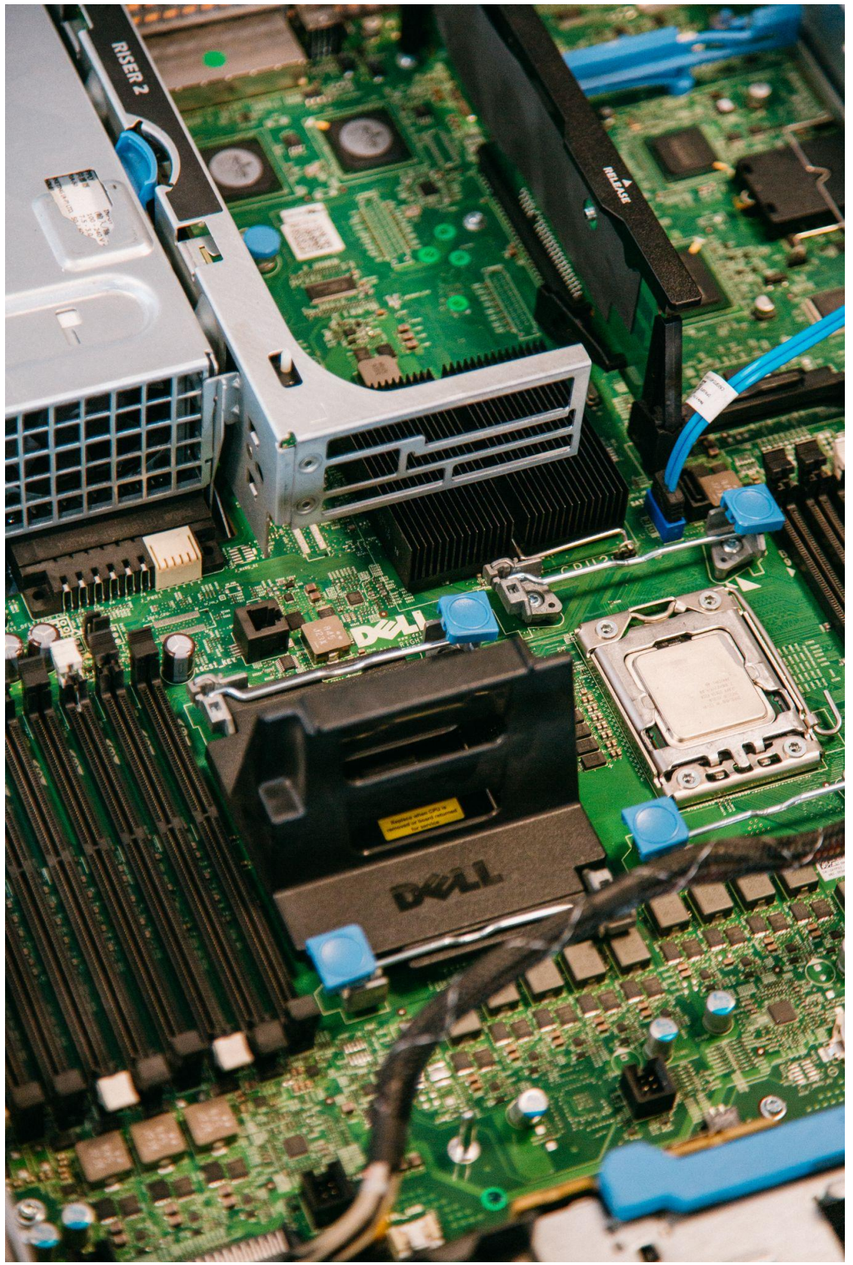
03. EU Market needs ICT specialists



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The Top 10 In-Demand Skill Clusters

1. **Artificial intelligence & machine learning (AI/ML)**
2. **Cloud computing**
3. **Big data**
4. Business intelligence & data visualization (BI/DV)
5. User interface & user experience (UI/UX)
6. Mobile app development
7. Cybersecurity
8. Customer service
9. Sales & business development (BD)
10. Financial management/budgeting & accounting

Out of the top 10 in-demand skill clusters, **artificial intelligence and machine learning; cloud computing and big data are the highest priorities for organizations** across various major sectors (financial services, tech, healthcare, retail), based on recent technology adoption and digital transformation trends.

On average, **cloud computing roles have the highest job vacancy ratios of all skill clusters** listed here on a market-by-market basis (17.3%) according to the Randstad study. This indicates an extremely high split between talent available across all the markets in comparison to local demand.

Source : Randstad sourceright : global in-demand skills report 2022
26 markets researched
the Americas (5) : Argentina, Brazil, Canada, Mexico, the U.S. Asia-Pacific (7) : Australia, China, Hong Kong SAR, India, Japan, Malaysia, Singapore. Europe (14) : Czech Republic, France, Germany, Hungary, Italy, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, the U.K.

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Cloud Computing Market Size in Europe from 2016 to 2027 by Segment

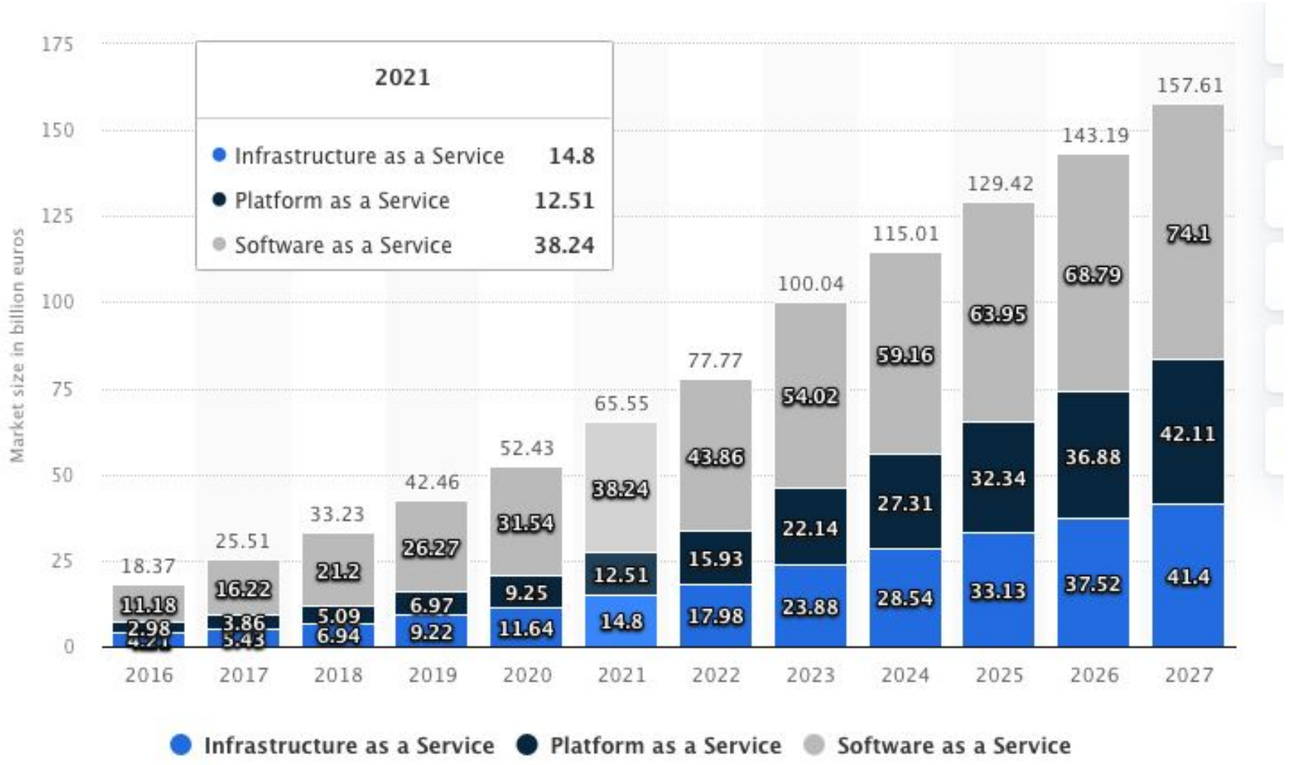
In Europe, the revenue in the Public Cloud industry is estimated to increase to 157.6 billion EUR until 2027.

According to the definition used by statista, Public Cloud revenue includes revenues generated by the three cloud computing service models of Infrastructure as a Service, Platform as a Service, and Software as a Service.

These services are offered by third-party service providers who deliver computing resources such as servers and storage capabilities, developing tools and frameworks as well as business applications to customers via the internet. These services are remotely managed, enabled, and distributed by third-party, large-scale data centers.

Market values represent revenues paid to primary vendors and include spending by consumers (B2C), enterprises (B2B) as well as governments (B2G).

In comparison to a private cloud, a public cloud offers its services not only to individual organizations, but to many other users via the public internet. Public cloud allows for scalability and resource sharing that would not otherwise be possible for a single organization to achieve.



(in billion EUR)

Source : Statista

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Trends and Perspectives of Cloud Industry Technology

Organizations are seeking to optimize their use of cloud resources: **multi-cloud and hybrid cloud* environments are becoming more popular**. As we have seen the **public cloud industry is expected to reach 157.6 billion EUR by 2027.**

Edge computing which is an optimization method used in cloud computing that involves processing data at the edge of the network, is expected to grow, indeed more and more devices are connected to the Internet of Things (IoT) and require real-time data processing and analysis. According to a report by MarketsandMarkets, the **edge computing market is expected to grow from $3.6 billion in 2020 to $15.7 billion by 2025**. Also, **serverless computing** which is a cloud solution used in organisation for customer services, is expected to grow **from $4.3 billion in 2020 to $14.4 billion by 2025** to respond to the organisations needs for cost-effective and scalable cloud computing solutions. Edge computing and serverless computing increasing market are two example of the **increasing demand for cloud solutions**, but we can also highlight the fact that the **cloud technology industry is becoming an important enabler for AI and ML**, as cloud providers offer scalable and cost-effective platforms for training and deploying machine learning models.

*Hybrid cloud is a type of cloud computing that combines a private cloud (local infrastructure) with a public cloud (computing services offered by third-party providers over the public Internet). Multi-cloud computing refers to the use of multiple cloud services from more than one cloud provider (including private and public clouds), in a heterogeneous environment. (Source: Microsoft - Presentation of hybrid and multi cloud)

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Continued Need for ICT Specialists in a Growing EU Market

The digitalisation of virtually all sectors of economic activity is providing unique opportunities for economic growth and for a greater inclusion of women in the labour market. **The need for STEM and ICT skills is growing in all sectors, from healthcare to manufacturing**, opening up new employment options for everybody.

Indeed, the **number of ICT specialists in the EU has grown rapidly**, increasing by **50.5%** from 2012 to 2021, which is almost **8 times** as high as the increase for total employment.
Currently, ICT specialists make up **4.5%** of the total workforce in the EU, and **64.5%** of them have completed tertiary level education.
Despite the increase in numbers, Europe is still facing a tech talent gap of **1.4 million to 3.9 million** people by 2027, according to McKinsey analysis, and over **half of companies seeking to recruit ICT specialists** report **difficulties in finding qualified candidates**.

The 'Digital Compass' has set the target that the **EU should have 20 million employed ICT specialists, with convergence between women and men, by 2030.**

Sources :
Eurostat
European Commission. (2020). Women in Digital: The Time is Now! Retrieved from
European Institute for Gender Equality (EIGE) - Women in the ICT sector
European Commission: Women in Digital Scoreboard 2021

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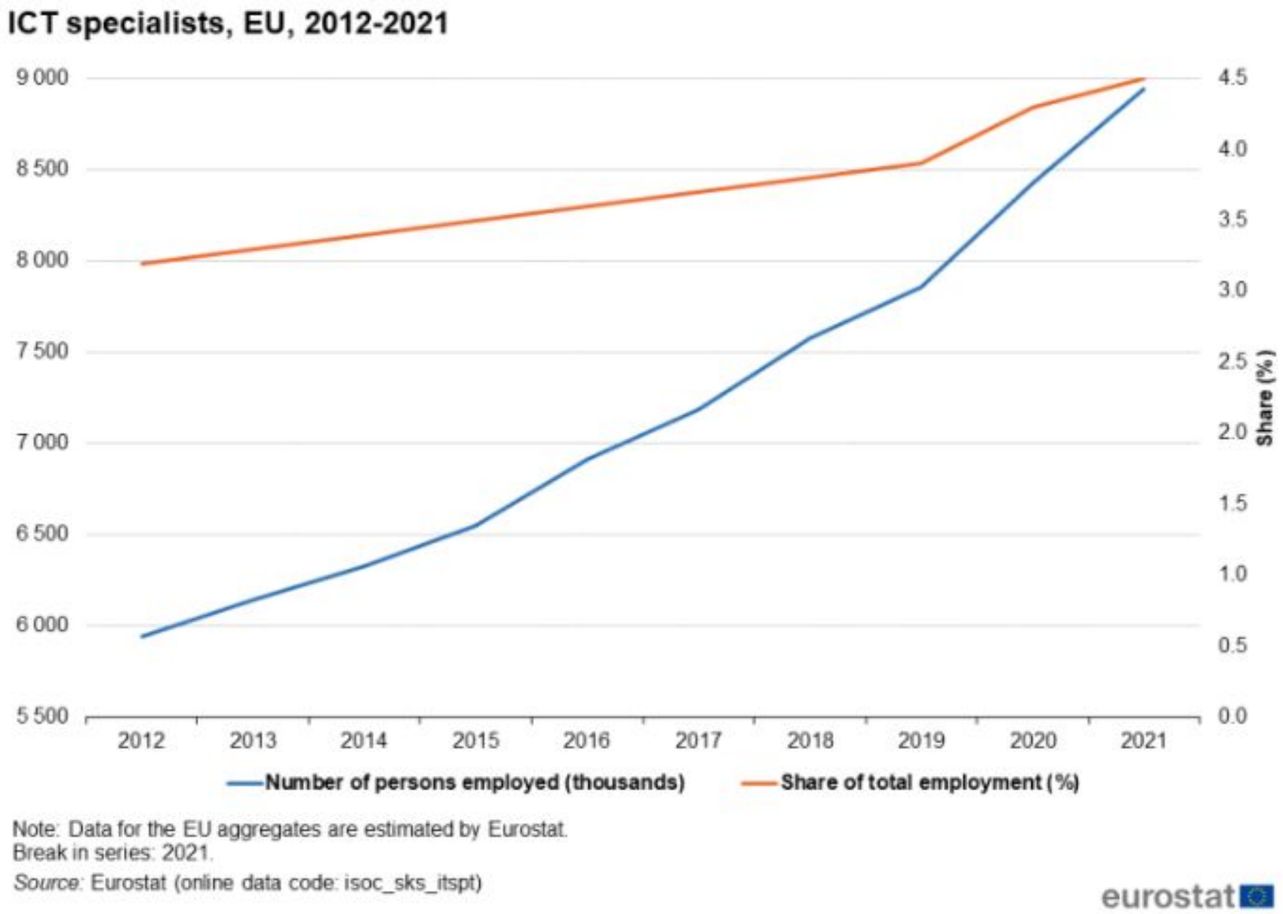
Continued Need for ICT Specialists in a Growing EU Market

The **share of ICT specialists in total employment** increased by 1.3 percentage points from 3.2 % in 2012 to **4.5 % in 2021**



Source : Eurostat - ICT Specialists in Employment

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Cloud Computing Addressing High Demand and Talent Shortages Across Major Sectors in Europe

Given recent technology adoption and digital transformation trends, organizations across various major sectors are prioritizing artificial **intelligence and machine learning, cloud computing, and big data as the top three in-demand skill clusters**.
Cloud computing stands out as one of the highest priority for organizations, with the highest job vacancy ratios. There is a significant split between available talent and demand. Indeed, according to a report by Gartner, the **european cloud industry is facing a shortage of skilled workers to meet the growing demand for cloud services**.
By 2025, 51% of IT spending in application software, infrastructure software, business process services and system infrastructure markets will have shifted to the public cloud (41% in 2022). Almost **two-third** (65.9%) of spending on application software **will be directed toward cloud technologies in 2025** (57.7% in 2022).
Cloud computing is also very useful for AI and ML applications, it **has become an essential part of AI and ML development and deployment** for scalability, cost effectiveness, cloud offers AI and ML services, helping teams to work together.

Therefore, we will be concentrating our efforts on the study of cloud computing as it highly in demand and **offers a larger scope for job prospects** furthermore AWS who is specialized in on-demand cloud computing services is a member of the Femme Forward consortium.

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04. Although the EU has a high demand for ICT specialists, women are still poorly represented

Copyright : Thomas Chené pour l'APEC

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Distribution of Persons Employed as ICT Specialists by Sex in 2021 in Participating Countries

In 2021, **19.1%** of **women** were **employed as ICT** specialists in the **EU**.

In 2021, on average of **19,7%** of **women** were employed as ICT specialists in **participating countries**

	Distribution by gender	
Countries	**Male**	**Female**
Belgium	80.4	19.6
Germany	81.0	19.0
Greece	78.7	21.3
France	79.1	20.9
Italy	83.9	16.1
Cyprus	80.6	19.4
Spain	80.6	19.4
Romania	74.0	26.0

Source : Eurostat - Distribution of persons employed as ICT specialists by sex, education attainment level and age, 2012 and 2021 (%)

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The European Tech Industry is Experiencing an Important Gender Gap

Despite efforts to promote diversity, the gender gap in STEM and particularly in ICT positions remains an important issue in Europe. Only **1 in 3 STEM graduates is a woman**, and women make up only **17% of ICT specialists**, **earning** almost **20% less than men**.

The industry currently has only **22% of tech roles occupied by women**, indicating that there is still much work to be done to achieve gender parity in the industry.

Women in tech roles are underrepresented in key areas, particularly in DevOps/cloud and compute/operations roles. These roles are likely to have high demand and impact in the future. **The gender gap in tech roles is also lower than that of tech companies overall**, which is likely to worsen in the future. Addressing this gap is crucial to creating a more diverse and inclusive workforce in tech.

Source :
European Commission. (2020). Women in Digital: The Time is Now! Retrieved from
McKinsey - Women in tech: The best bet to solve Europe's talent shortage

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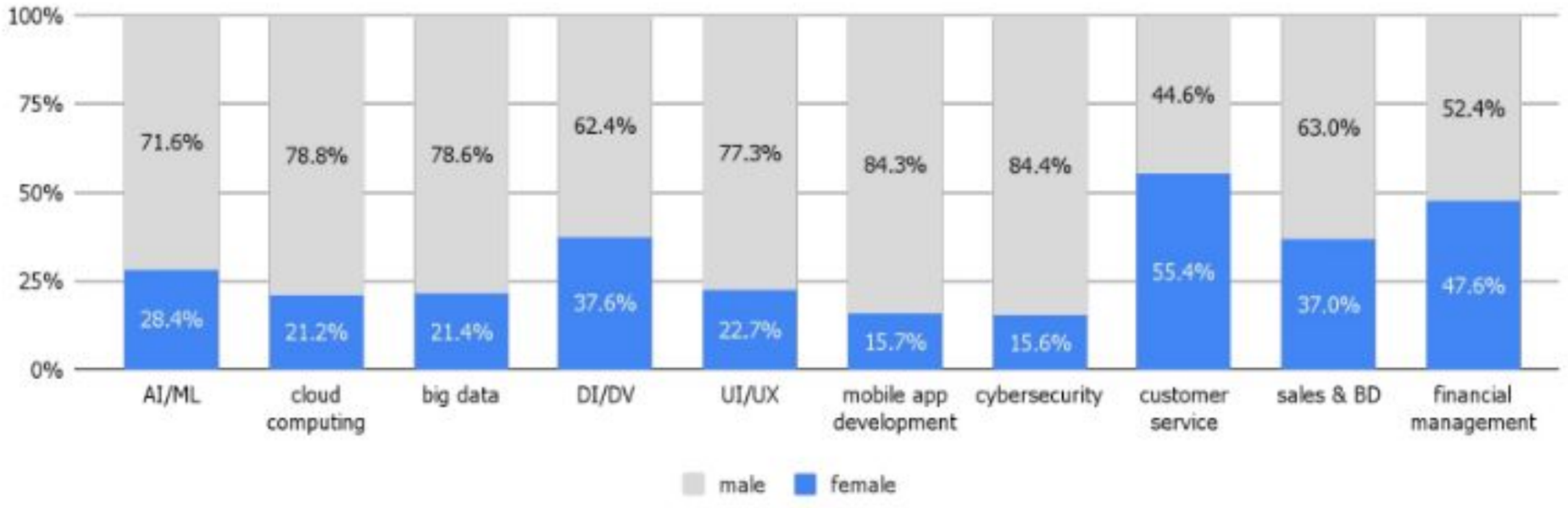
Women are Underrepresented in Cloud Computing

According to the Randstad Sourceright Intelligence, gender diversity among individuals with high-demand tech skills remains unbalanced: on average, **76% of individuals employed in this sector identify as male**. This data highlights not only the need for greater efforts to increase gender diversity in the tech industry as a whole, but particularly in technical jobs with the lowest representation of women. Indeed, women are underrepresented in the tech sector, but within this sector they are underrepresented in technical jobs with only **21% of the workforce being a women in the cloud computing area.**



Source : Randstad sourceright : global in-demand skills report 2022

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Gender Disparities in STEM Education and Careers

Globally, women are increasingly obtaining degrees in science, technology, engineering, and mathematics (STEM) fields, with women now accounting for 53% of STEM university graduates worldwide, according to a 2019 publication by S. Sirimanne in the World Economic Forum.

In 2019 in the European Union, the representation of women in STEM fields is behind the global average (53%), with only **34% of STEM graduates being women** (Girls Go Circular 2022).
The under-representation of women is particularly pronounced in **information and communication technology (ICT)** fields, where only **19% of specialists are female**.

According to McKinsey report, women's graduation rate in STEM disciplines is declining, and the share of women in tech roles is expected to decline to 21% by 2027. Only **23% of women STEM majors end up in tech roles** (44% of men) and the **share of women in the workforce is lowest in the tech roles that are growing fastest, such as DevOps and cloud**.
There are 2 major drop off points for women in European tech, one after secondary education and one at work entrance.
Two main reasons for these drop-offs : secondary-school girls get significantly less teacher, parental, and peer support than boys do for pursuing STEM careers and some research suggests that girls are told that they aren't good at STEM, often communicated in subtle but debilitating behaviors.

This drop-off has the potential to create a self-fulfilling downward cycle.

Source :
McKinsey Digital Women in tech: The best bet to solve Europe's talent shortage
European Student Think Tank - Women in STEM in the European Union – Facts and Figures
SiWorld Economic Forum - How can we STEM the tide of women graduates leaving science?
Girls Go Circular

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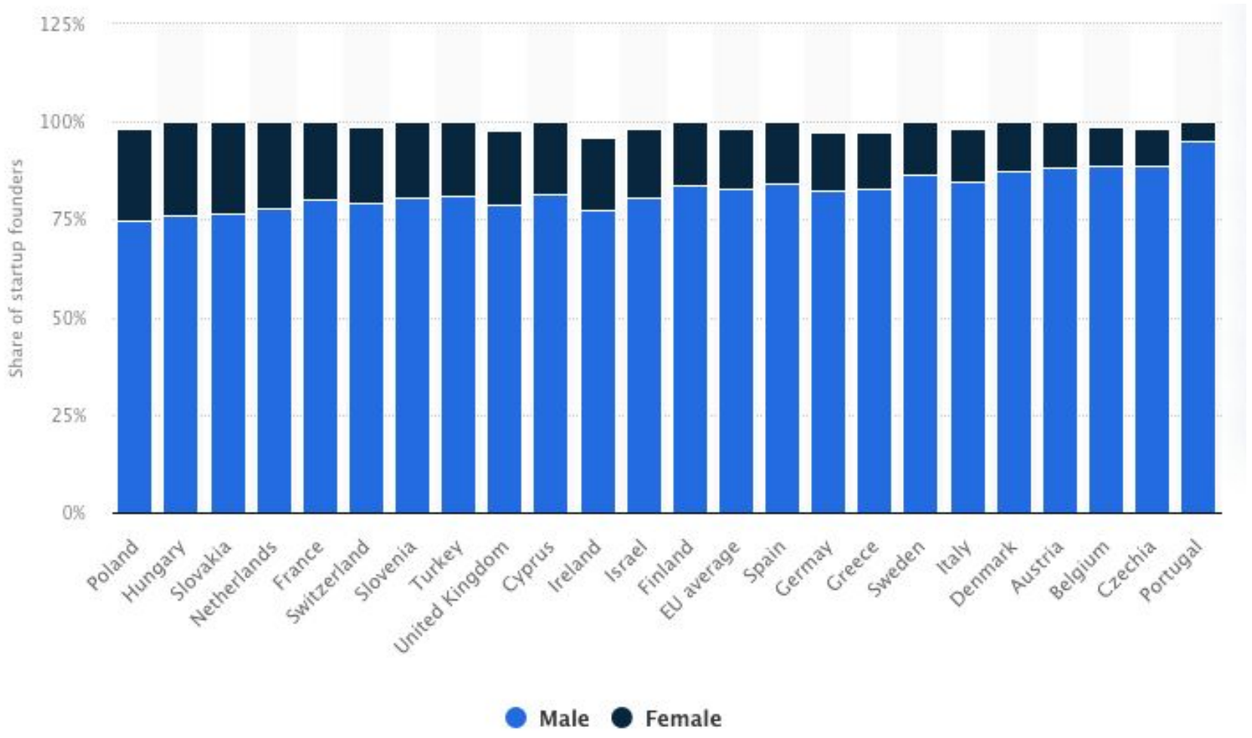
Gender Distribution of Startup Founders in Selected European Countries

The share of **women entrepreneurs doesn't exceed 25%** in the selected countries



November 2018

Source : Statista - Gender distribution of startup founders in selected European countries in 2018

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Women Entrepreneurs in Europe: Barriers to Achieve Gender Parity and Drive Innovation

More than half of the total European population are women: 67.3% are employed, 34.4% are self-employed and **31% work as entrepreneurs** (European Institute of Innovation and Technology, n.d.). Furthermore, only **21% of start-ups in the European Union are female start-ups**.

There has been a strong increase (of 64%) in female startups since 2010 (from 13% to 21%). But, despite the improvements, European entrepreneurial culture remains heavily **male-dominated**.
Funding, work-life balance, networks and mentors, role models are some factors that are contributing to the low number of women entrepreneurs in Europe, they influence and reinforce each other. For example the gender bias in investment decisions can be highlighted by the fact that **93% of capital invested in European companies goes to all-male founding teams.**
Even though studies show that female-led startups are more likely to succeed than all-male startups, there is very slow growth in the percentage of female entrepreneurs in the digital sector : **only 19% of European ICT entrepreneurs being female.**

Source : European Commission. (2020). Women in Digital: The Time is Now! Retrieved from
McKinsey - Women in tech: The best bet to solve Europe's talent shortage
EU-japan Centre for industrial cooperation - Women Entrepreneurship in EU and Japan 2022

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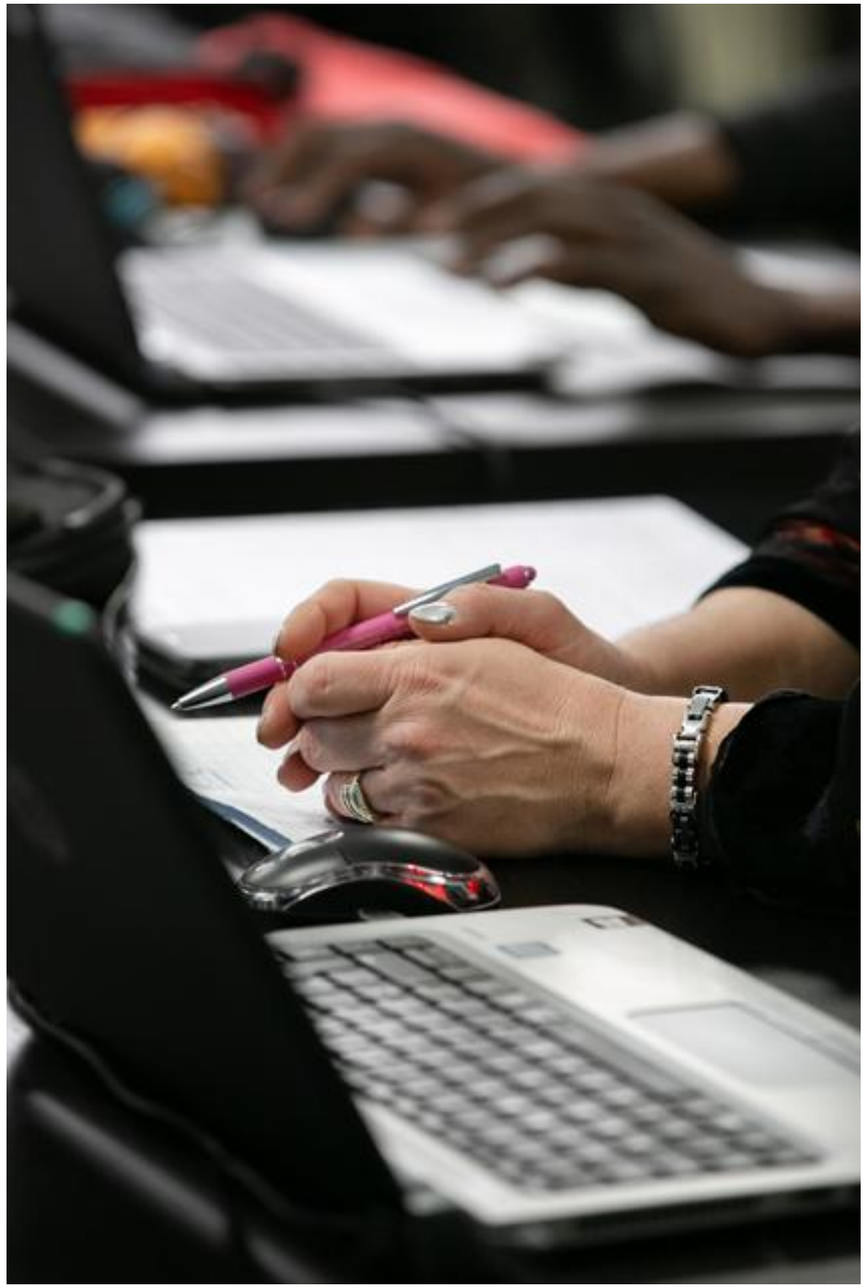
Participating Countries are Facing Challenges and Opportunities for Tech Jobs but Women Remain Underrepresented in Tech Markets



Copyright : Patrick Lazic

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Romania - Unemployment

The total labour force in Romania represents **8,3 million persons**

5,2%

→ Total **unemployment rate**

42%

→ **Women in the labour force**

6,1%

→ **Women unemployment**

*using the definition provided by the International Labour Organization

** In 2021

Source : WorldBank

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Romania - A Rapidly Growing IT Market with Opportunities for Growth

According to the International Trade Administration (ITA), **the Romanian market for software and IT services is growing rapidly**, it is expected to have a significant impact on the country's GDP in the near future: its digital economy could be worth €52 billion by 2030 (McKinsey).

Revenue in IT services in Romania is expected to have an annual growth rate (Compound Annual Growth Rate (CAGR) 2023-2027) of **8.40%** by 2027.

The entire digital economy is estimated at €14.8 billion shared between digital commerce (€9.8 billion) expenditures on ICT (€3.5 billion) and offline spending of €1.6 billion on digital products such as computers, smartphones, IT infrastructure, and **cloud technology**

The IT&C sector in Romania also has a **significant opportunity for growth** through the European Recovery and Resilience Facility and the Romania's National Recovery and Resilience Plan, which prioritize green and **digital transitions**. The plan includes **IT&C in all six of its pillars, with two of them specifically focused on digital transformation in Romanian society**.

Source:
International Trade Administration - Romania - Country Commercial Guide
McKinsey Digital - Digital Challengers on the next frontier: Perspective on Romania

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Romania- The IT&C sector in Romania has a Significant Opportunity for Growth

European Recovery and Resilience Facility and the Romania's National Recovery and Resilience Plan

The plan includes IT&C in all six of its pillars. Romania's Recovery and Resilience Plan has the objective to address most of the country's digital shortcomings, contributing **€5.97 billion** to **digital objectives**.

The most significant contribution is under component 7 called **Digital transformation**, although all components can be related to digital. From this component we can highlight four priorities: **public services digitalization, digital skills, secure and resilient digital infrastructures, digital transformation of SMEs**.

The main component of second pillar is **Governmental Cloud** and digital public systems with a budget of **around €2 billion**. Within this component some reforms concern : Governmental Cloud, and skilling/up-skilling/re-skilling for 30 000 civil servants and 100 000 citizens at 65 organizations that will improve their cyber security.

The adoption of the government cloud will raise significant deployment investments and related services update. Additionally, a call for 'grant support for digital skills' to upskill/reskill employees in firms is part of this component.

Source: European commission Digital Economy and Society Index (DESI) 2022

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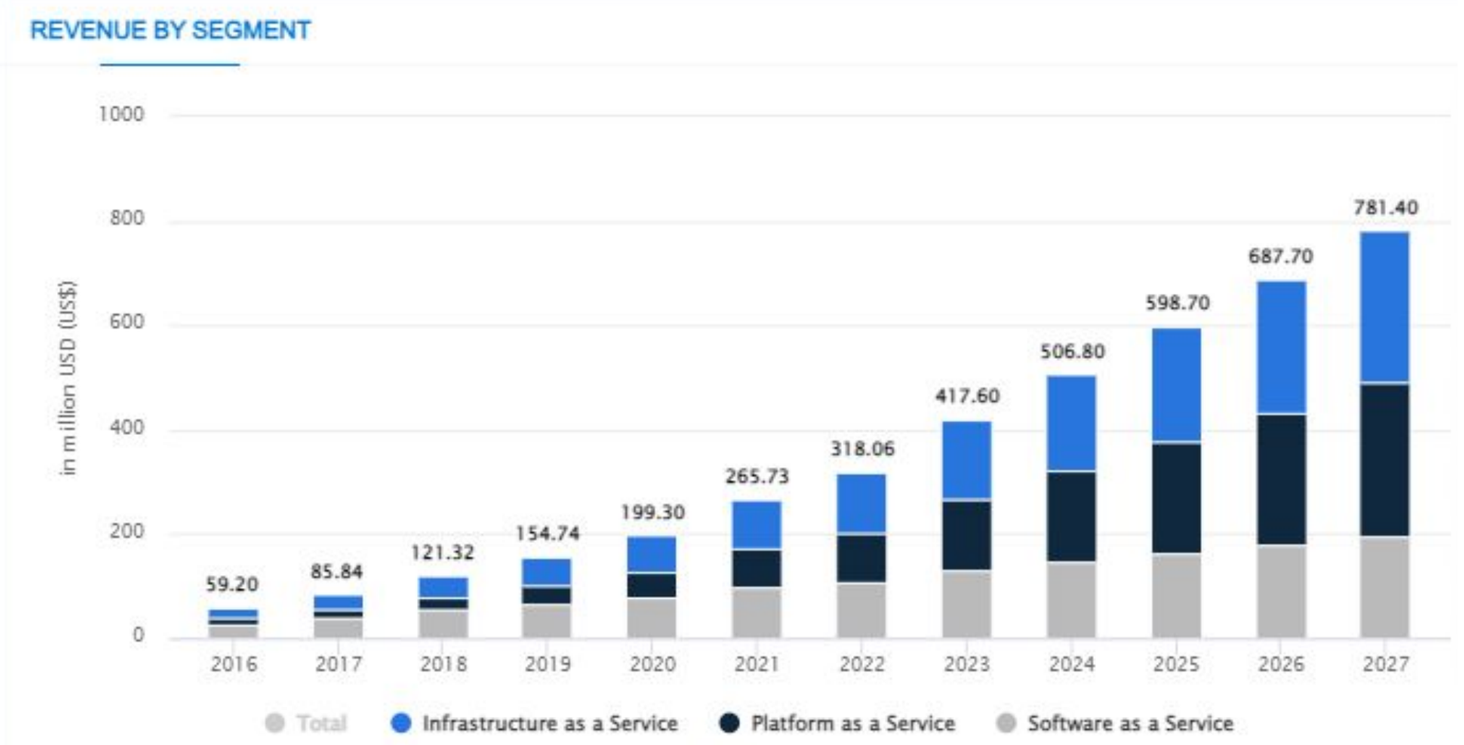
Romania - Growth of the Public Cloud Revenue

Public Cloud revenue in Romania **has been increasing since 2016** and is expected to reach $781.4 million in 2027.*

*Find on diapositive 11 the definition of Public Cloud.



Source: Statista

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Romania - The Need for ICT specialist in Romania is an Opportunity for Women

The IT sector in Romania is growing and is expected to grow more in the years to come. As the IT sector, the cloud industry is experiencing and will experience strong investments, yet the job vacancy rate in Romania's cloud computing industry is high with a rate of **30%**. This job vacancy rate by Randstad is expressed as the percentage of jobs requiring cloud computing skills that are likely going unfilled in each of the 26 markets researched, based on talent supply and demand data. (The higher the JVR percentage, the more competitive the market is perceived to be).

Although, according to Randstad's global in demand skills report, Romania is one of the most gender diverse country in cloud computing talent with 43% of women. However, there are still challenges in terms of education, trainings and labour market barriers as in Romania, **24%** of **ICT graduates are female,** and **less than 1% of women who have a degree in Romania, have a degree in STEM-related disciplines** and of these, only **1 of 1000 actually get a job directly related to STEM**, according to Radu Szekely, Secretary of State and Ministry of Education in 2021.

The patriarchal culture in Romania can influence women's career choices and discourage them from pursuing **technical professions**. Women have fewer opportunities to connect with role models and mentors in the cloud sector. Rural areas of Romania may have limited technology infrastructure, which can make it more difficult for women to access the skills and resources needed to work in the cloud. The job vacancy rate could be reduced by addressing the barriers that women with STEM degrees face in employment there is great opportunity and needs for the ICT sector especially in cloud.

Source: Randstad sourceright : global in-demand skills report 2022
Romanian Diversity Chamber of Commerce - The absence of women in STEM in Romania is a missed opportunity

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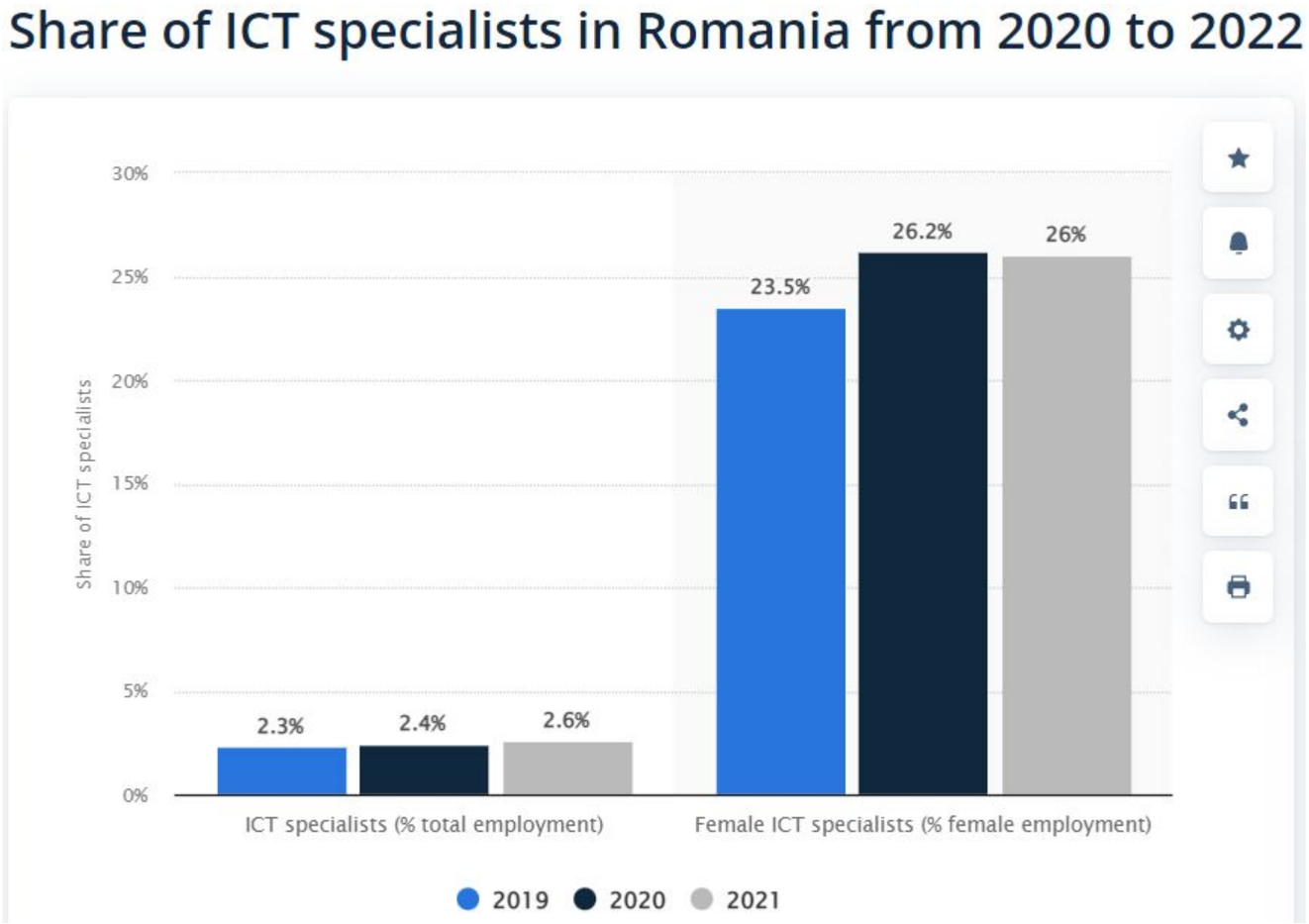
Romania - Share of ICT Specialists by Gender

In 2021, the share of ICT specialists had increased over the past 3 years in Romania but **the share of female ICT specialists had slightly decreased in the last year**.

In 2021 Romania counted **26% of women ICT specialist**, in the EU it was 19.1%.



Source: Statista - Share of ICT Specialist in Romania 2020-2022

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Belgium - Unemployment

The total labour force in Belgium represents **5,2 million people**

6,3%

→ Total **unemployment rate**

46,8%

→ **Women in the labour force**

6,5%

→ **Women unemployment**

*using the definition provided by the International Labour Organization

** In 2021

Source : WorldBank

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Belgium - A Growing IT Market with Opportunities for Growth

Belgium's total ICT market size in 2019 was assessed at around €14 billion, employing 70,000 people. Belgian companies are going through the digital transformation: revenue in IT sector is expected to show an annual growth rate of **6.55%**, resulting in a market volume of around €10.91bn by 2027.

Belgium ranks 6th in the EU in integration of digital technology, with the country's companies showing a high uptake of digital technology within their operations and Belgium has a strong will to develop ICT and is pursuing a "Digital Belgium" Agenda that includes plans for faster connectivity, next generation mobile data, and digital skills.

The number of enterprises using cloud which perform well above the EU average (13 percentage points).
According to the international trade administration, **cloud securing service is part of the most important asset in the belgian ICT service sector**, (with unified security management and software, consulting services and eCommerce enabling turnkey solutions.).

Source : Manpower - Baromètre des perspectives d'emploi Q3 2022
International Trade Administration - Belgium - Country Commercial Guide
Deloitte - Episode 2 - In high demand: more women with a degree in STEM An interview with Françoise Chombar
Manpower - Employment outlook survey

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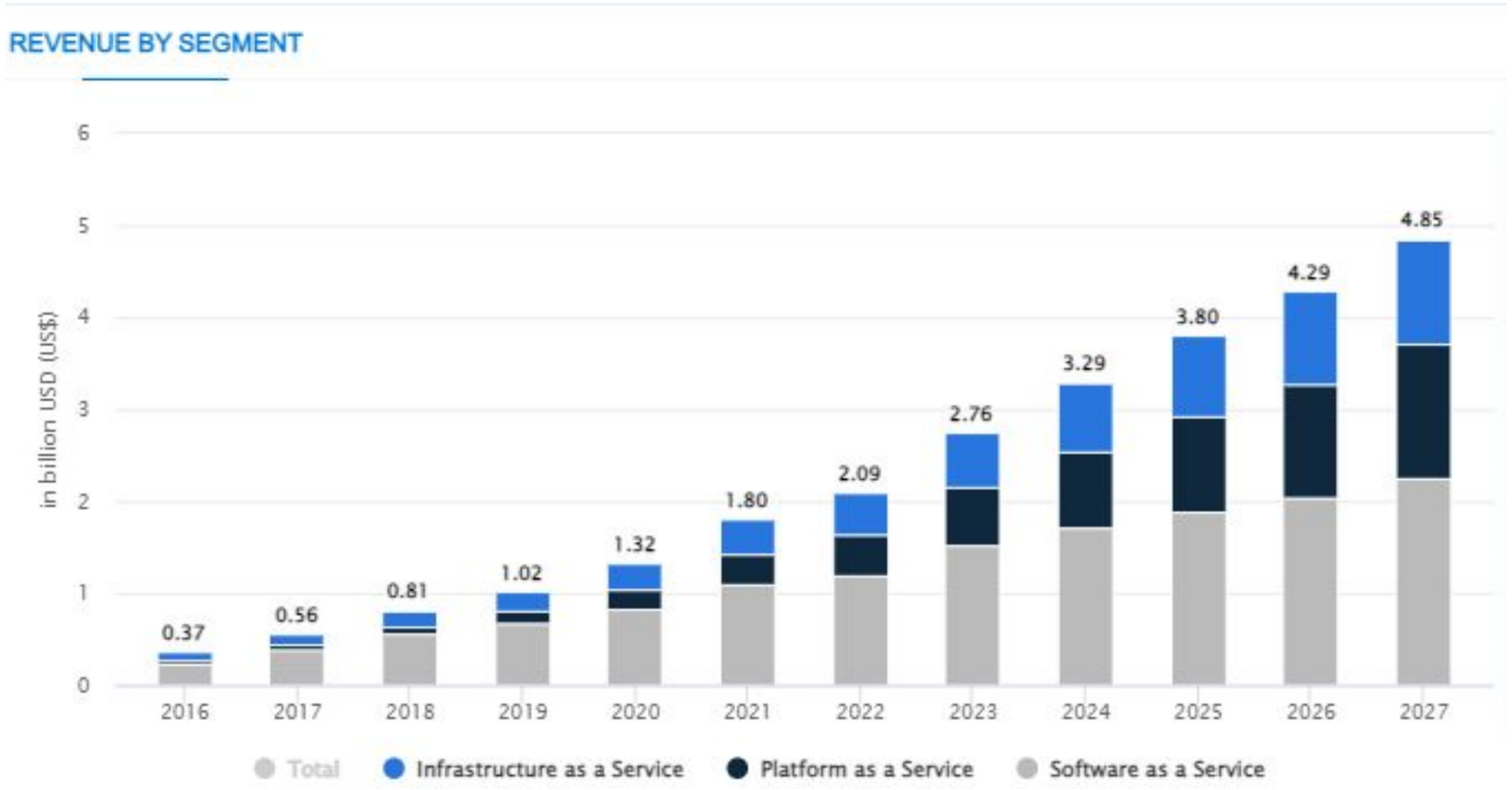
Belgium - Growth of the Public Cloud Revenue

Public Cloud revenue in Belgium has been increasing since 2016 and is expected to keep growing and reach **$4.85 billion in 2027**

*Find on diapositive 11 the definition of Public Cloud.



Source: Statista

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Belgium - Growing Demand for ICT Specialists and the Need for More STEM Graduates

According to a survey by Manpower in 10 industry sectors, employers in **in the IT, Technology, Telecommunications, Communications & Media sector** anticipated adding new jobs by **47%** the end of September 2022.

But, in Belgium **IT and digital profiles have become the most sought-after profiles**. Indeed, **86%** of **employers surveyed in this sector experiencing recruitment difficulties**, and digital functions were also cited as the most difficult profiles to find by all employers, all sectors included.

In 2019 in 2019 ICT specialist were 102.013 according to Statista. A collective effort is needed to reach **the EU-level Digital Decade target of having at least 20 million employed ICT specialists by 2030**. And this is important for Belgium to be able to reach the other Digital Decade **target of 75% of companies using cloud, AI and big data by 2030.**

According to the ITA Belgium's ICT labor supply is seriously lagging, it has a low output of graduates in STEM disciplines. Although the number of STEM tertiary graduates grew by 1.3pps between 2015 and 2018, **Belgium still ranked 25th in the EU in 2018**. Shortages of qualified ICT experts in these fields could become a major barrier to growth and innovation in Belgium.

Source: Manpower - Baromètre des perspectives d'emploi Q3 2022
International Trade Administration - Belgium - Country Commercial Guide
Deloitte - Episode 2 - In high demand: more women with a degree in STEM An interview with Françoise Chombar
Manpower - Employment outlook survey

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Belgium - Lack of ICT Specialists in Belgium: an Opportunity for Women

Of the Belgians who obtain a higher degree in STEM (Science, Technology, Engineering and Mathematics) only **22%** are women (in Europe 34% of STEM graduate are women).

In 2018 according to a report by the Organisation for Economic Cooperation and Development (OECD), less than 7% of new ICT students in higher education in Belgium were female.

Belgium struggles to increase the number of women ICT specialists needed to fill the vacancies in the sector.

The **lack of ICT specialists clearly remains a weak point for Belgium, which has the highest share of companies reporting that they find it hard to fill vacancies for ICT jobs in the EU**. Further action is necessary to promote ICT studies among students in general and women in particular.

Source: Digital Economy and Society Index (DESI) 2022

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Belgium - Women Entrepreneurs

According to OECD, in 2017, 13.1% of the active population was self-employed in Belgium, slightly less than the EU average for that year (13.9%). The highest rates were found among men and seniors while they were lower among women and youngs. In 2019, only **30% of entrepreneurs** in Belgium were women.

Many initiatives were launch to encourage women to found a startup in belgium:

- In the Brussels-Capital region, Hub.brussels – (the regional economic development agency) – is coordinating an ecosystem of partners to develop actions dedicated to increase the number of women in entrepreneurship, particularly tech companies.
- The Brussels-Capital Region also set up the Women in Tech platform, which is dedicated to supporting women in technology and innovation.
- To encourage women and increase their visibility in entrepreneurship, awards and contests include the Women Awards for Female Entrepreneurs in Belgium.

But there is still a need to support for women who want to create their own businesses as the rate of female entrepreneur remains low they need to have opportunities for they need supportive and encouraging ecosystems.

Source:
Stabel - Independent entrepreneurs.
International Trade Administration - Belgium - Country Commercial Guide
OECD - Inclusive Entrepreneurship Policies: Country Assessment Notes Belgium, 2018

Co-funded by the European Union

Italy- Unemployment

The total labour force in Italy represents **25 million people**

9,8%

→ Total **unemployment rate**

42,5%

→ **Women in the labour force**

10,6%

→ **Women unemployment**

*using the definition provided by the International Labour Organization

** In 2021

Source : WorldBank

Co-funded by the European Union

Italy - A Growing IT Market with Opportunities for Growth

The estimated annual average growth of the ICT sector in Italy is 2% expected for the period 2022 to 2023 (ITA 2022).

Digital transformation is a priority for Italian companies and government. The outlook for 2022 is positive: **almost half of the large Italian companies and SMEs will increase their ICT budget**, with **investments in innovation expected to grow by more than 4%.**

The digital transformation in italy continues to drive **spending in particular in cloud computing**, (with also mobility, social business, big data, and analytics, artificial intelligence, virtual and augmented reality (VR/ AR), robotics, the Internet of Things (IoT), and blockchain). Indeed the **cloud for public administration is experiencing strong ICT investments** and between 2015 and 2021, the market value of cloud services considerably grew.

Italy IT sector also has a great opportunity to keep growing with the Digital in Italy's Recovery and Resilience Plan (PNRR).

Source: International Trade Administration - Italy - Country Commercial Guide

Co-funded by the European Union

Italy - A Growing IT Market with Opportunities for Growth

Digital in Italy's Recovery and Resilience Plan (PNRR)

The Italian Recovery and Resilience Plan is the **EU's largest, with an amount of €191.5 billion** and **25.1%** of it (i.e. €48 billion) **is devoted to the digital transition**.

In the context of the first payment request, Italy has achieved 51 milestones and targets. A number of them were related to measures in the area of digital, such as: **the reform 'Cloud First and Interoperability', including the new Cloud Strategy and legislative amendments introducing incentives and obligations for cloud adoption by public administrations**; the reform of ICT procurement, streamlining and accelerating the procurement process for ICT services and assets;

In September 2021, Italy published the 'Strategia Cloud Italia', which sets out the path for public administrations, including local ones, to move to the cloud. **The target is the migration to the cloud of 75% of Italian public administrations by 2026.**

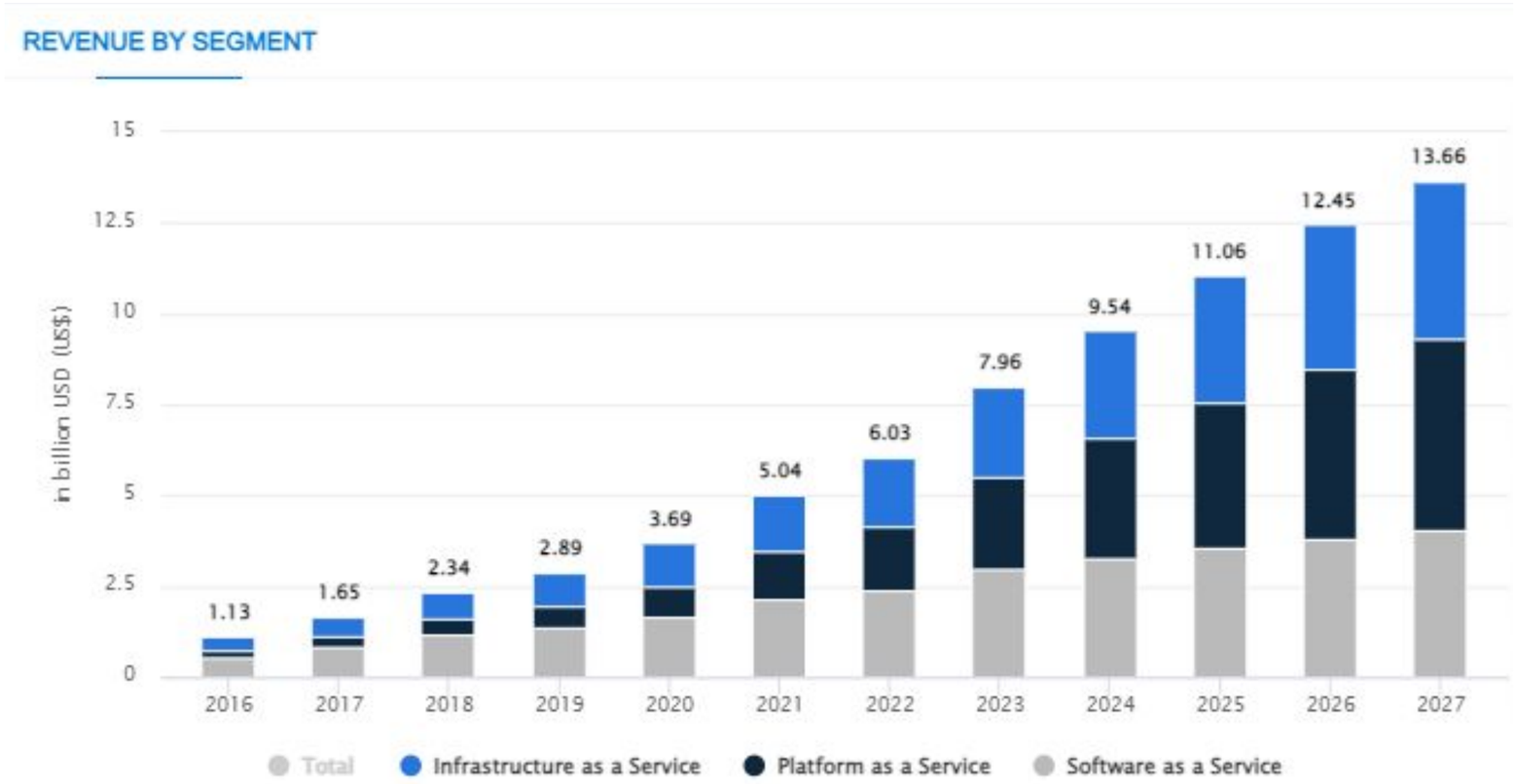
Source: European Commission - Italy in the Digital Economy and Society Index

Co-funded by the European Union

Italy - Growth of Public Cloud Revenue

Public Cloud revenue in Italy has been increasing since 2016 and is expected to keep growing and reach **$13.66 billion in 2027**

*Find on diapositive 11 the definition of Public Cloud.



Source: Statista

Co-funded by the European Union

Italy - Challenges and Opportunities for ICT Specialists

As the IT sector, **the cloud industry is experiencing and will experience strong investments** yet the job vacancy rate in Italy's cloud computing industry is high with a rate of **9%** (Randstad). Indeed, throughout Italy, **49.2% of the jobs on offer remain unfilled in the sectors of IT and communications services** this shows the lack of balance between the need of ICT specialists and the job market offer. Furthemore, according to the European Commission, **IT**, physics and chemical specialists with a rate of **33%** is one of the professional groups within which it is very difficult to find candidates in Italy.

Most Italian small and medium enterprises (60%) have at least a basic level of digital intensity and, in particular, **the use of cloud services recorded a significant growth** according to the DESI.

For 2022-2026, some 40 000 ICT technicians will be recruited mainly by the IT and telecommunications industry, together with mathematics and computer science specialists (30 000).

Co-funded by the European Union

Italy - Women's Underrepresentation in Italy's ICT Industry

Between 2011 and 2016, in Italy, Information and Communication Technology (ICT) specialists have increased by 0.3%, representing 2.6% (584,800) of total workers. While on the one hand this may seem positive, on the other hand it must be considered that the European average is much higher, standing at around 3.7% and with a growth of 0.7% compared to 2011.

In 2021, the female unemployment rate in Italy was 10.6%, one of the highest among the principal European countries.

In Italy only **16,1% of ICT specialists are women this is the lowest rate in all participating country.**
Women represent only **15,6% of STEM employed** in 2021. Furthermore the gender pay gap in Italy is significant in all sectors.

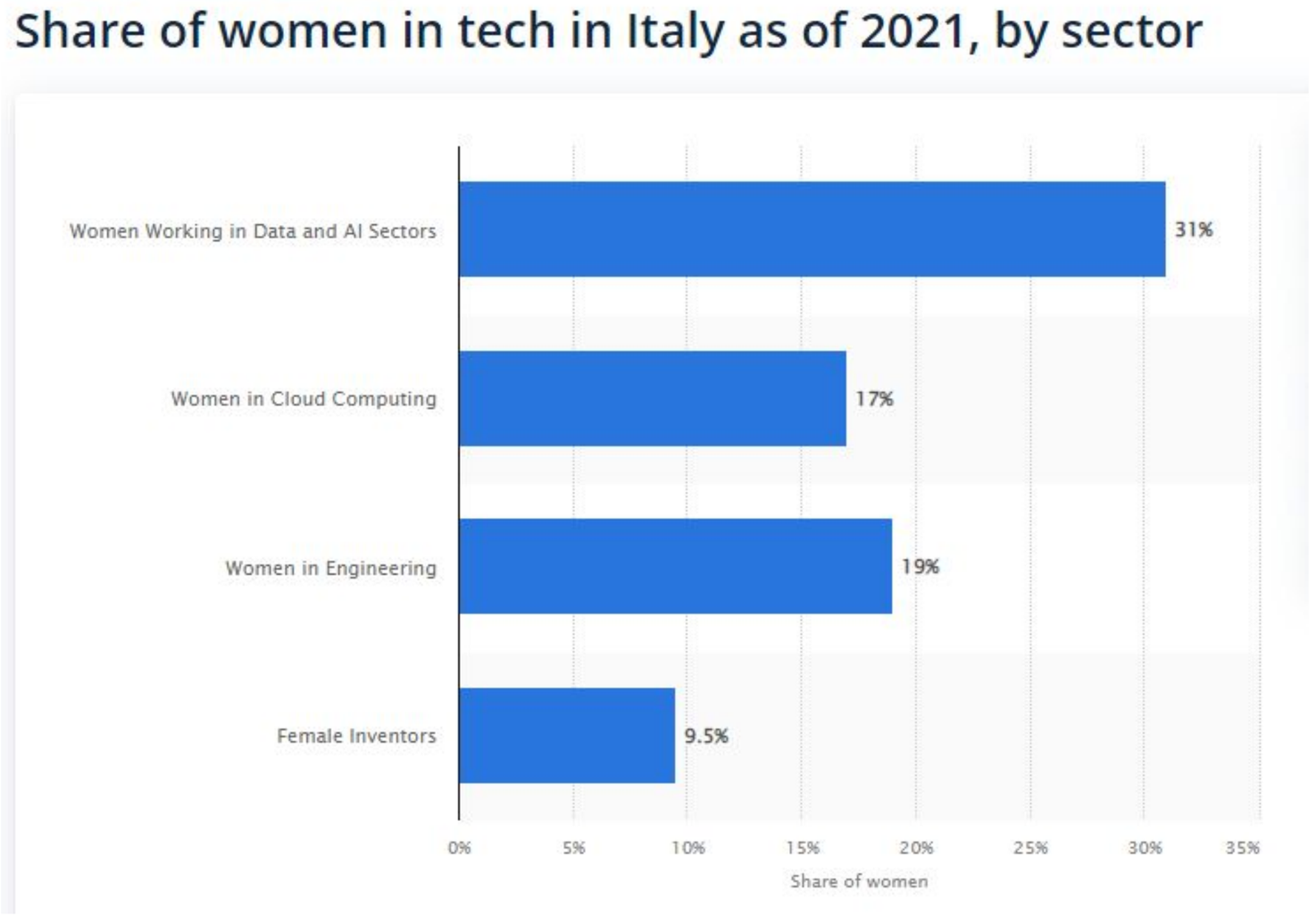
In 2020, fewer than 40% of Italian workers in ICT-related jobs held a university education, compared to 66% for the EU as a whole

Source: Itsolution - ICT Specialist, a booming profession throughout the EU. Italy in the last places

Co-funded by the European Union

Italy - Share of Women in Tech in Italy, by sector

In 2021, only 31% share of women are working in Data and AI sectors, followed by **17% in Cloud computing** when we know that 49.2% of the jobs on offer remain unfilled in the sectors of IT and communications services



source : Statista - Share of women in tech in Italy as of 2021, by sector

Co-funded by the European Union

Italy - Women Entrepreneurs

According to Statista data, in 2022 the number of female owners of individual enterprises registered at the Italian Chambers of Commerce was equal to 829 thousand.

According to a study **Italy rank the first lowest in the EU by number of women thinking they can access the funds necessary to start a business**, men are 2.3 times more likely to think that they can access start up funds.

According to the world bank in 2019 in Italy:

- **15,3%** female were at the top management of a company;
- **24%** of company with female participation in ownership;
- **11,5%** firm with majority female ownership;

In 2018, the self-employment rate for Italian women was 15% (22% for men).

According to the OECD Gender Portal, In Italy, **only 12% of women** (19% of men) get some **training on entrepreneurship**, there is a broad offer of programmes to train and fund women entrepreneurs but these programmes are limited and fragmented so more needs to be done to address the gender inequality in entrepreneurship in Italy

Source : Statista - Number of female owners of individual enterprises registered at the Italian Chambers of Commerce in Italy from 2000 to 2020
Research - Investing in women: what women-led businesses in Italy and the UK need
Eurostat

Co-funded by the European Union

Cyprus - Unemployment

The total labour force in Cyprus represents **655 000 people**

6,1%

→ Total **unemployment rate**

45,3%

→ **Women in the labour force**

7,1%

→ **Women unemployment**

*using the definition provided by the International Labour Organization

** In 2021

Source : WorldBank

Co-funded by the European Union

Cyprus - Digital Transformation in Cypriot Businesses: Challenges and Opportunities

According by a survey undertaken by more than 500 businesses in Cyprus:
• 96% believe that digital transformation is vital to their future survival.
• However, 20% of the businesses surveyed do not fully understand what digital transformation is.
• 89% of businesses surveyed believe that the digital era will open up new opportunities for them.
• 92% of businesses surveyed believe that upskilling/reskilling of their personnel towards the digital era is imperative, **but 62% find the implementation of training to be a challenge.**

In 2023, it is expected that Cypriot businesses will increase their investments in communication and internal team coordination and customer management software.
Overall, the survey suggests that while most businesses in Cyprus recognize the importance of digital transformation for their survival, many are not yet fully prepared for the transition. **Training staff and enhancing digital capabilities is a high priority for businesses, but many face challenges in implementing the necessary training**. Despite this, a significant number of businesses are already utilizing digital technologies to some extent. In the coming year, it is expected that Cypriot businesses will increase their investments in digital tools for communication, team coordination, and customer management.

Source :Digital Cyprus Survey

Co-funded by the European Union

Cyprus - Promoting Digital Transformation in Cyprus: Efforts in Public and Private Sectors

Cyprus is currently trying to improve its ICT sector to promote digital transformation both in the public and private sectors.

In the public sector the the Deputy Ministry of Research, Innovation, and Digital Policy (DMRIDP) plans to define and implement a new cloud computing policy for government systems and IT services.

To help and encourage the development of start-ups and innovative projects, a large portion of the EU Resilience and Recovery Fund available to Cyprus will be used to implement digital transformation projects.

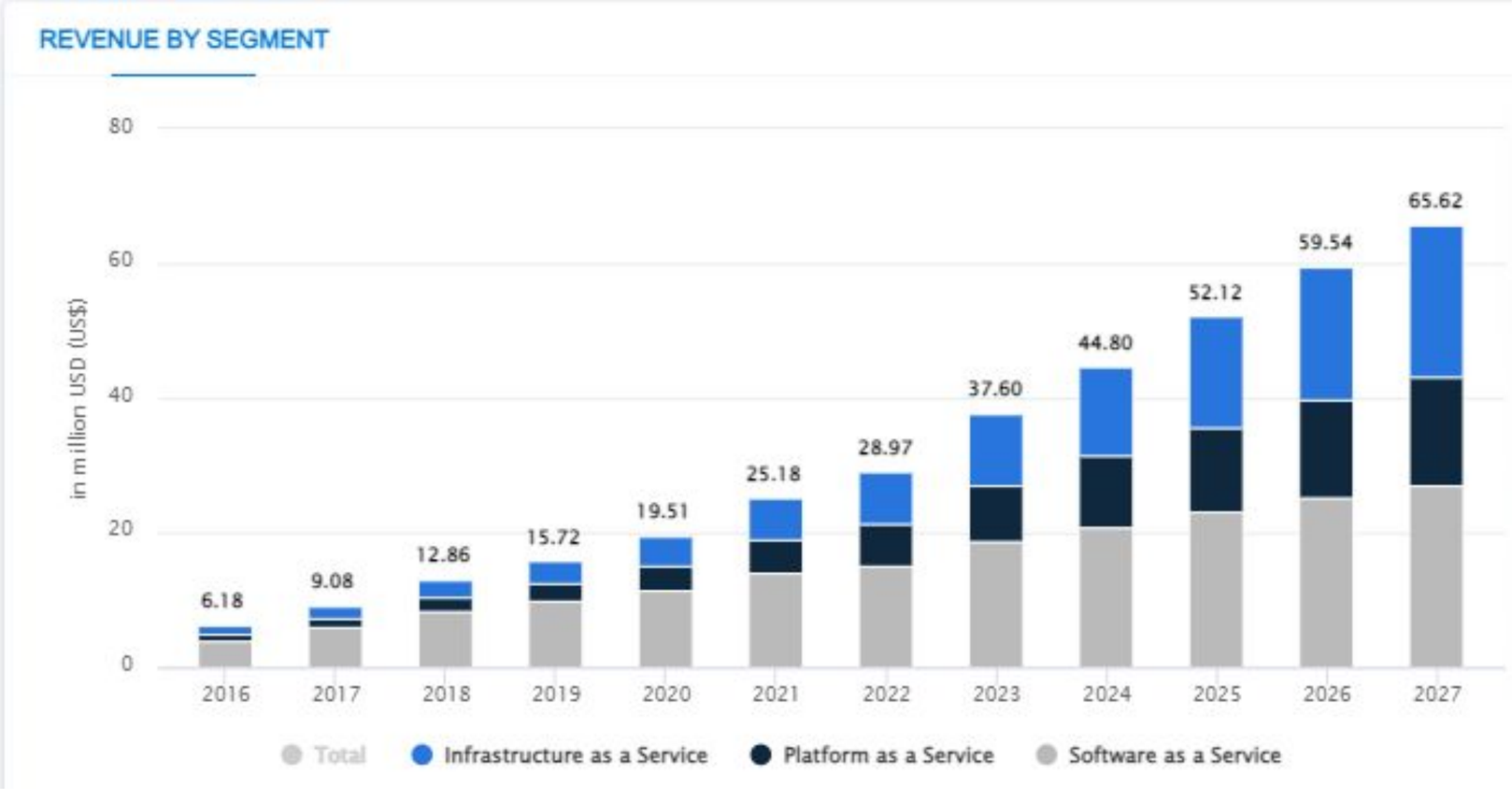
If the shift to cloud in Cyprus is still retarted by data governance and regulatory compliance concerns, private cloud is gaining ground among large companies, even among those that state they must deal with serious security concerns and strict regulations. These large companies tend to deploy private or hybrid cloud environments to migrate existing systems or to expand/enhance systems.

Infrastructure, platform, and software public cloud adoption is also gaining acceptance among companies of all sizes

Source : Cyprus Computer Society - Cyprus ICT 2020 Analysis and 2021-2023 Forecast

Cyprus - Growth of Public Cloud Revenue

Public Cloud revenue in Belgium has been increasing since 2016 and is expected to keep growing and reach **$65.62 million in 2027**

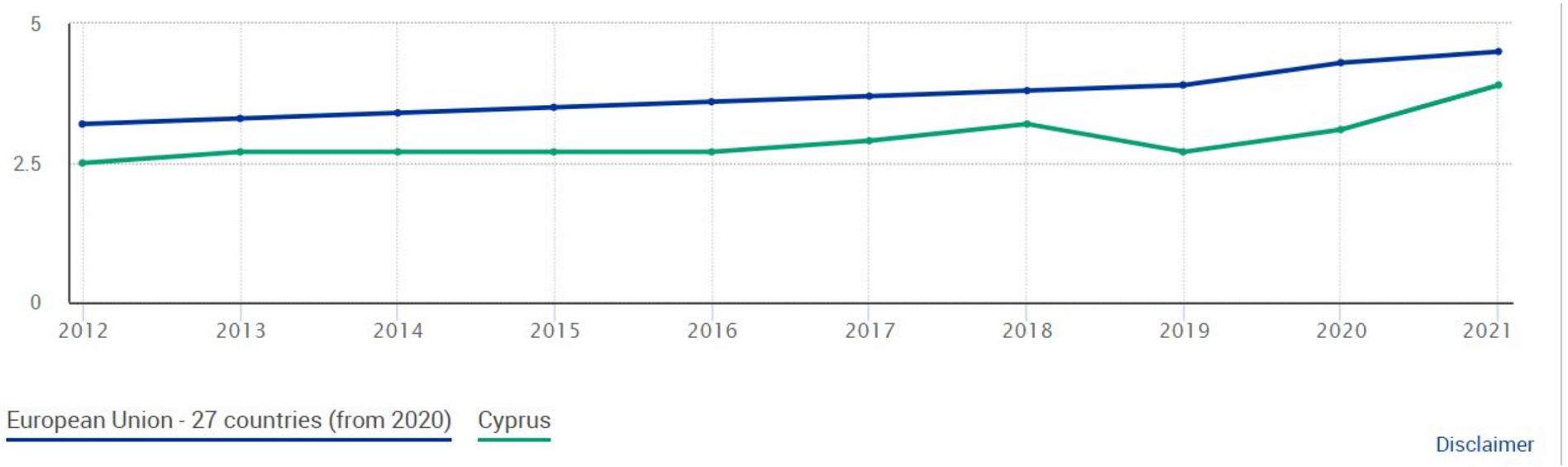


Source: Statista

Co-funded by the European Union

Cyprus - Need for ICT Specialists

Since 2019 the number of ICT specialists in Cyprus has been increasing, from 2.7% of the total employment to 3.9% in 2021



Source: Eurostat - Employed ICT Specialists

Co-funded by the European Union

Cyprus - Gender Imbalance in STEM Fields in Cyprus: The Need for Greater Diversity and Inclusion

In Cyprus, STEM fields are often viewed as masculine, and teachers or parents often underestimate girls' math or technology abilities, starting as early as preschool this is one of the reason of why there is **7 times more men (27%) than women (4%) working in Science, Technology, Engineering and Mathematics (STEM) occupations**

Because fewer women study and work in STEM, these fields tend to perpetuate inflexible, exclusionary, male dominated cultures that are not supportive of or attractive to women and minorities.

To address this issue, firms need to encourage the diversity women have to offer and promote their participation.

Source : Deloitte Cyprus - She.Can.STEM Program Developing the future generation of female leaders in STEM

Co-funded by the European Union

Cyprus - Women Entrepreneurs

The 55 start-ups currently active in Cyprus employ mainly of 2-5 people, have an average operation time of 3.5 years and with limited participation of women according to study conducted by the Center for Entrepreneurship of the University of Cyprus: in cypriot startup the team formation is predominately male with only **17% of the startups having either a female founder or a cofounder**.

A study released in the framework of Cyprus Island-wide Entrepreneurship Ecosystem Analysis Report indicate that **societal pressure & fear of failing was reported to be a greater challenge for female entrepreneurs when starting a business.** Low participation of women in this survey shows the low rates amongst female entrepreneurs in Cyprus.

Cyprus needs more events, trainings, and other initiatives focused specifically on promoting and developing female entrepreneurship. More female entrepreneurs should also share their stories and serve as mentors to encourage a new wave of women in the field and help to reduce the perception of societal pressure.

Source
https://www.startuphubcyprus.cy/_files/ugd/222b3f_eb1478b1189243008b98195a6850bbe1.pdf
https://cyprusinno.com/wp-content/uploads/2017/01/CyInnoReport2020.pdf

Co-funded by the European Union

Germany - Unemployment

The total labour force in Germany represents **44 million persons**

3,5%

→ Total **unemployment rate**

47,2%

→ **Women in the labour force**

3,2%

→ **Women unemployment**

*using the definition provided by the International Labour Organization

** In 2021

Source : WorldBank

Co-funded by the European Union

Germany - Germany's ICT industry: A significant economic driving force and government priority

Germany has one of the largest ICT markets in the world and the single largest software market in Europe with 95,808 IT companies. Indeed technology sector is one of the most important economic branches in Germany, the IT industry is a major economic driving force and it is growing steadily.

By being a significative sector in Germany, ICT is also a priority sector for the German government. The Digital Agenda of the Federal Ministry for Economic Affairs and Climate Action focuses on digital infrastructure, digital economy, digital workplaces, innovative public administration, digital environments in society, education, research, science, culture and media, security, protection and confidence for society and business.

In Germany in 2022, 28% legal units had cloud computing services and one in three german entreprises used cloud computing solutions in 2020.

Source : International Trade Administration - Germany - Country Commercial Guide
Federal Statistical Office of Germany - ICT in enterprises, ICT sector

Co-funded by the European Union

Germany - German Enterprises Prioritize Digital Transformation and Cloud Investments

In the current economic situation, German enterprises are concerned primarily with Resource Optimization, IT Modernization and New Markets as their business priorities. Their response in terms of actions includes accelerate plans for digital transformation, **increase cloud investments**, and reduction in staffing levels or hours in ranking order by number of mentions in our survey of business decision makers.

The top three actions undertaken by companies in Germany due to the current economic conditions are:

- Accelerate plans for digital transformation (24%),
- **Increase cloud investments (23%)**,
- Reduction in staffing levels or hours (20%).

These are followed by Postpone cloud projects or investments (12%), and Increase staff training in cloud skills (11%).

To achieve their digital transformation aims and cope with current challenges, organisations need talent skilled in Network and Information Security and Customer Management (each reported "urgent" by 19%): followed by Data Storage, Management & Compliance (12%), **Cloud Computing: Technology (11%)**, Virtual Collaboration (10%), and IT Operations and Automation (10%).

In 2020, one third (33%) of the enterprises in Germany with 10 or more persons employed bought IT services via cloud computing. The Federal Statistical Office (Destatis) reports that this was a marked increase of 11 percentage points compared with 2018

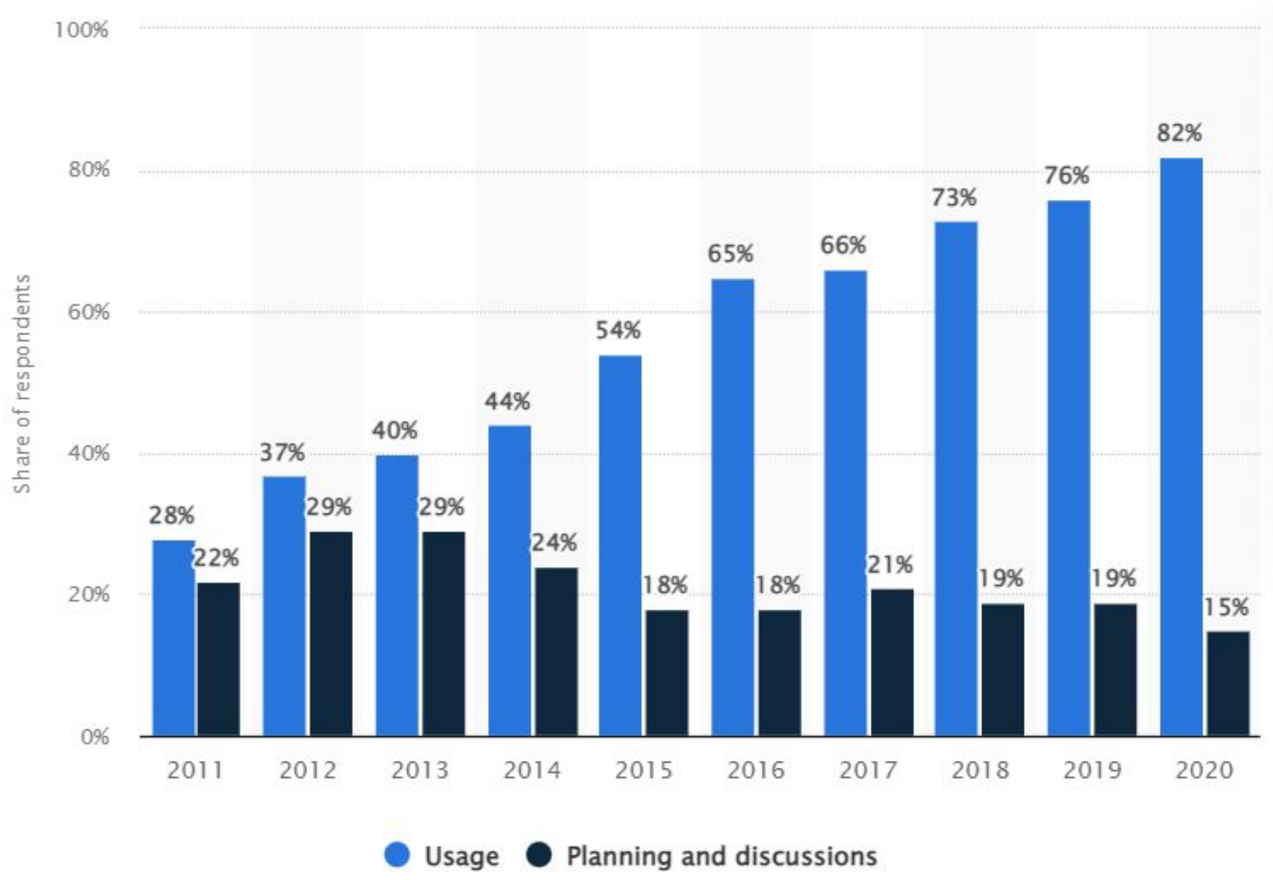
According to this employer it skills survey there is clearly a need and a will of companies to invest in cloud industry.

Source : Amazon Web Services - Employer IT Skills Survey 2020
Federal Statistical Office of Germany - ICT in enterprises, ICT sector

Co-funded by the European Union

Germany - Usage of Cloud Computing in Companies in Germany from 2011 to 2020

The use of cloud computing has increased over the past years. **82% of companies were using cloud computing solutions in 2020**



Source: Statista - Usage of cloud computing in companies in Germany from 2011 to 2022

Source : Statista

Co-funded by the European Union

Germany - Shortage of ICT Specialists

With 1.3 million skilled workers at the end of 2022, the IT sector is also the second-biggest industrial employer. Increasing digitisation generates new jobs every year, but many posts remain vacant due to the shortage of skilled workers. IT professions are becoming more and more differentiated and new job profiles are also always emerging The shortage of IT professionals is high in Germany : **there are currently 82,000 job vacancies for IT specialists in Germany.**

.Three out of ten companies in all sectors (29%) with at least one open IT job are looking for programmers. This is followed by project managers (17%), application managers (13%), quality managers (9 %) and security experts (8%).

Germany's job vacancy rate in cloud is **33%** (it is the percentage of jobs requiring cloud computing skills that are likely going unfilled in each of the 26 markets researched, based on talent supply and demand data. The higher the JVR percentage, the more competitive the market is perceived to be).

More than three fourths of businesses searching for IT experts in 2021 had problems filling vacancies.

There is a 68% gap between training actions and training needs in organization in Germany according to a report from alertify and according to an analysis by the Boston Consulting Group, there will be a shortage of millions of workers in Germany's IT industry, schools and healthcare by 2030.

Source: International Labour Organization - Skills shortages and labour migration in the field of information and communication technology in Canada, China, Germany and Singapore
Federal Statistical Office of Germany - Filling IT vacancies increasingly difficult for businesses

Co-funded by the European Union

Germany - Women are Underrepresented in Tech: an Opportunity to Fill the Tech Gap

→ The proportion of **women in the IT sector** in Germany is **17.5 %**

→ The proportion of **women studying computer science** in Germany is **22%.**

If women in STEM in germany are more represented than in other country with nearly 35% of students in STEM courses at German higher education institutions during the first semester of the academic year 2021 (Germany's Federal Statistical Office) **the share remains really unbalanced between men and women**.

Indeed, women are underrepresented in in the tech field, according to research by students at the Berlin School of Business and Innovation, **the proportion of female speakers at German tech events in 2019 was 29%**. One of the consequences can be that while "IT specialist – application development" is one of the most sought-after apprenticeships among boys, **no IT apprenticeship makes it into the top 10 among girls**.

Women in tech job can be an opportunity for germany to fill the current gap in tech positions.

Co-funded by the European Union

Germany - Women Entrepreneurs

In Germany, **17,7% of startup entrepreneurs are woman** (2021 German Startup Monitor).
38,2% of those **setting up a new business are woman**, however, **42.1% of these companies are sideline businesses** (2021 KfW Startup Monitor, tables and methods volume)

According to the Female Founders Monitor 2022 **female team are only represented by 12,3% the ICT sector**, according to the OECD German women entrepreneurs work predominantly in the services sector.

All women-led start-ups in Germany have an 18% lower chance of acquiring investor funds after their foundation. In the third round of financing, the probability of success is even 90% (Boston Consulting Group study)
According to the Female Founders Monitor 2022 **female team are only represented by 12,3% the ICT sector**, according to the OECD German women entrepreneurs work predominantly in the services sector.

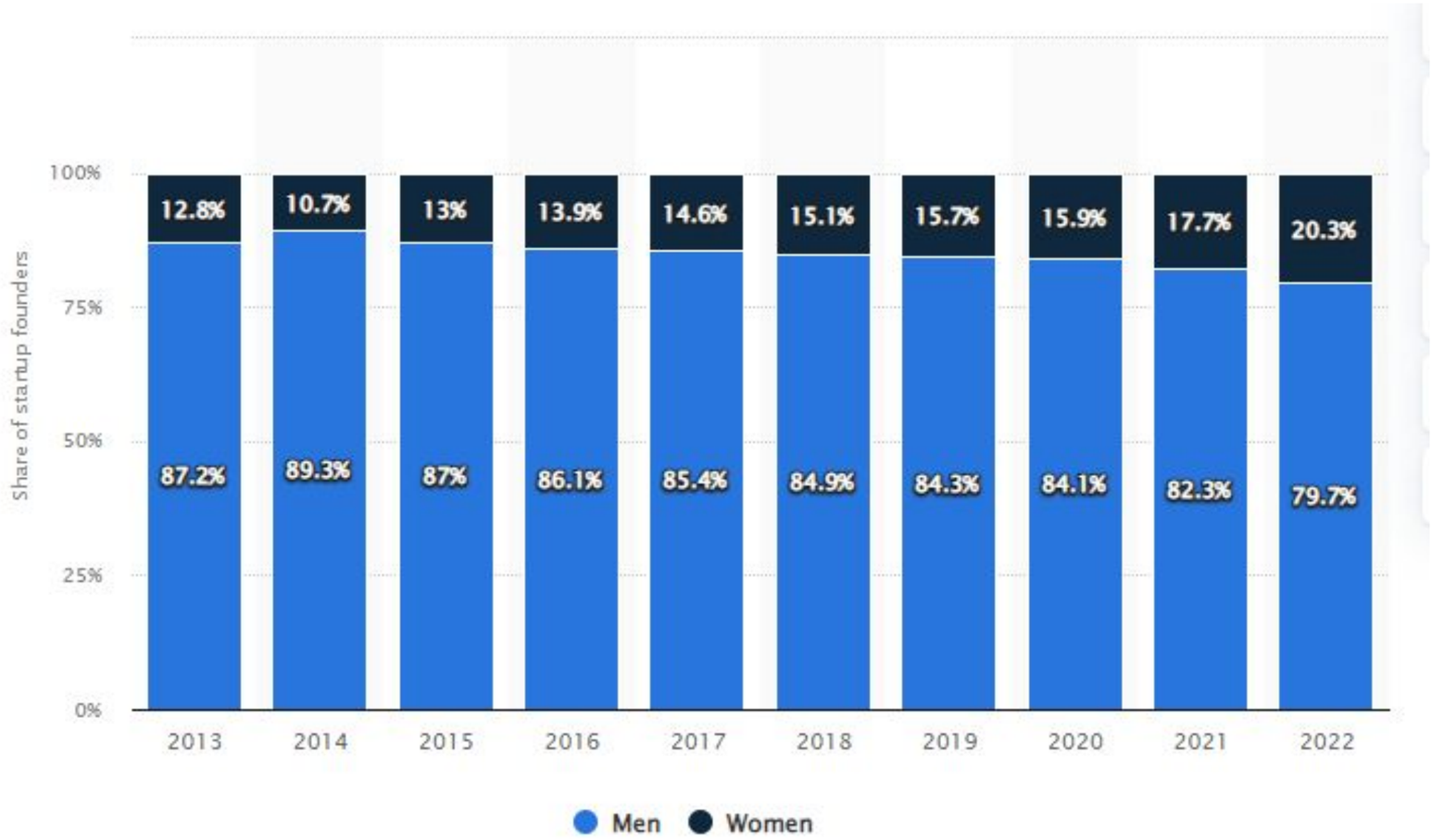
For women the barriers to enter the startup sector and to gain access to capital are incredibly high: 33.1% of female-led companies say they prefer business angels as investors, but only 7.7% have been able to obtain this source of funding so far – the situation is similar when it comes to venture capital

Source: German Indian Startup Exchange Program - Women Entrepreneurship - Making it in Germany
2022 Female Founders Monitor
OECD - Women entrepreneurship Key findings: Germany
Federal Ministry for Economic Affairs and Climate Action - Women in economy

Co-funded by the European Union

Germany - Startup Founders in Germany from 2013 to 2022 by Gender

Even if since 2015 the share of startup founders by gender has been increasing positively for women, **the highest percentage of female founders, 20.3%, was recorded in 2022** which is still no sufficient.



Source: Statista - Startup founders in Germany from 2013 to 2022, by gender

Co-funded by the European Union

France - Unemployment

The total labour force in France represents **31 million people**

8,1%

→ Total **unemployment rate**

48,7%

→ **Women in the labour force**

8%

→ **Women unemployment**

*using the definition provided by the International Labour Organization

** In 2021

Source : WorldBank

Co-funded by the European Union

France - Growth of Cloud Infrastructures in France

Currently, **40%** is the growth of cloud infrastructures in 2020.
According to a survey survey of more than 200 business leaders in France with more than 200 million euros in revenue **58%** of executives say their company has adopted the cloud in most or all business functions in France.

France's increased focus on digital technology, and AI, cyber security, robots, and healthcare IT are considerably driven the industry.
Additionally, the increased need for digital technologies and initiatives, digitalization, scalable IT infrastructure, the widespread use of the 5G network, and the growing penetration of technology giants are all boosting the market's growth.

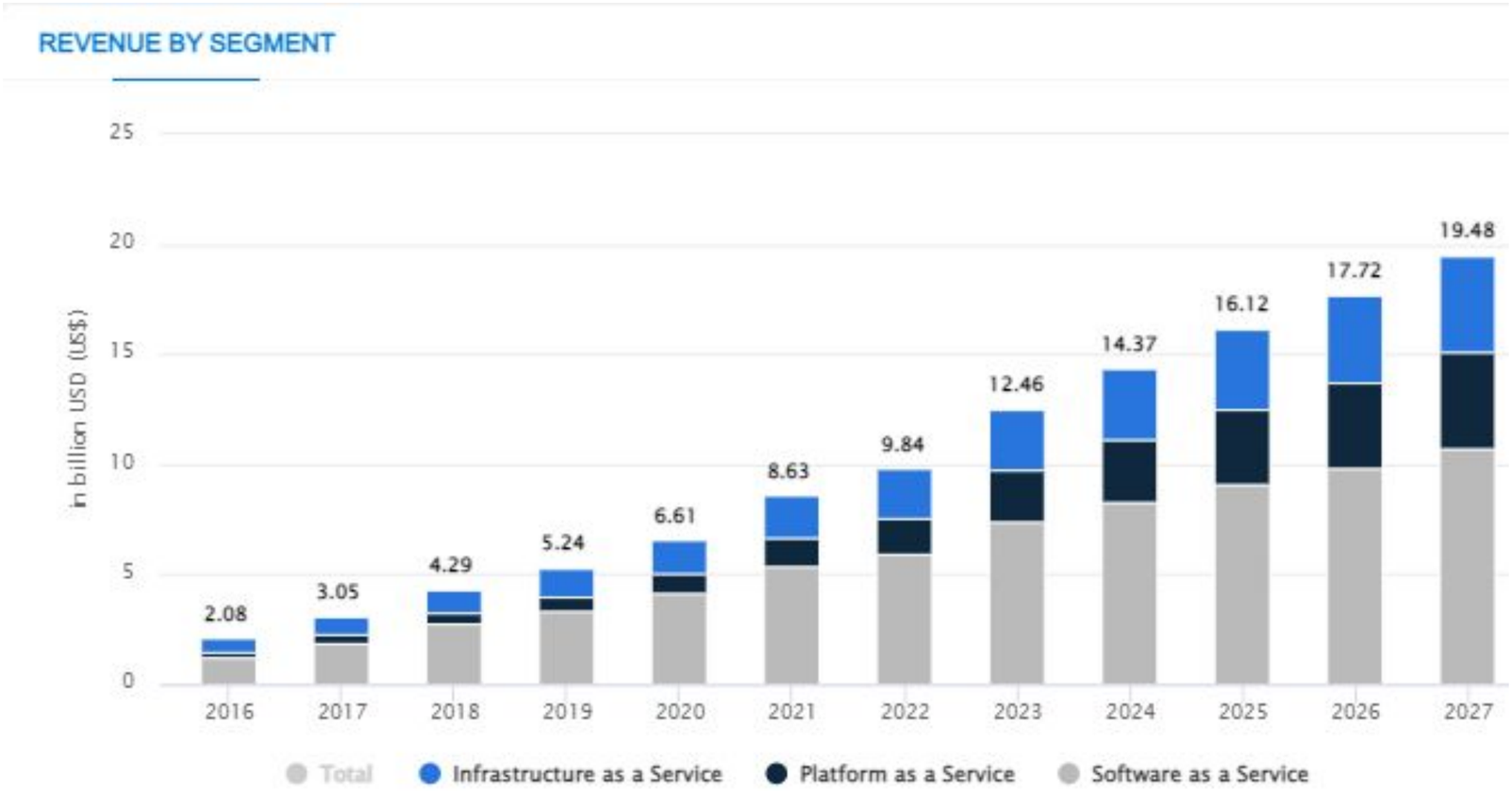
Various advanced technologies like blockchain, artificial intelligence, big data, machine learning, **cloud computing**, the internet of things, robotic process automation, cybersecurity, and augmented/virtual reality are significantly assisting in achieving France's businesses IT strategies in a post covid context.

Source:
Grande Ecole du Numérique
PWC - 94% des entreprises françaises éprouvent des difficultés à créer de la valeur grâce au cloud

Co-funded by the European Union

France - Revenue of the Public Cloud

Public Cloud revenue in France has been increasing since 2016 and is expected to keep growing and reach **$19.48 billion in 2027**



Source: Statista

Co-funded by the European Union

France - Digital Sector Faces High Demand for Cloud Computing

In France, in digital, Security, network, cloud and Telecom is the family that represents the largest number of job offers - along with the management/leadership family- **with 24% of all vacancies in the digital sector (19993** job offer at the beginning of 2023).

In cloud especially, France has a high vacancy rate according to Randstad with **11%** (the percentage of jobs requiring cloud computing skills that are likely going unfilled in each of the 26 markets researched, based on talent supply and demand data. The higher the JVR percentage, the more competitive the market is perceived to be).
In France, The professions that make up this sector have become "must-haves" in all companies because IT has become more complex become with time and any information system requires mastery of security, cloud and telecom aspects.

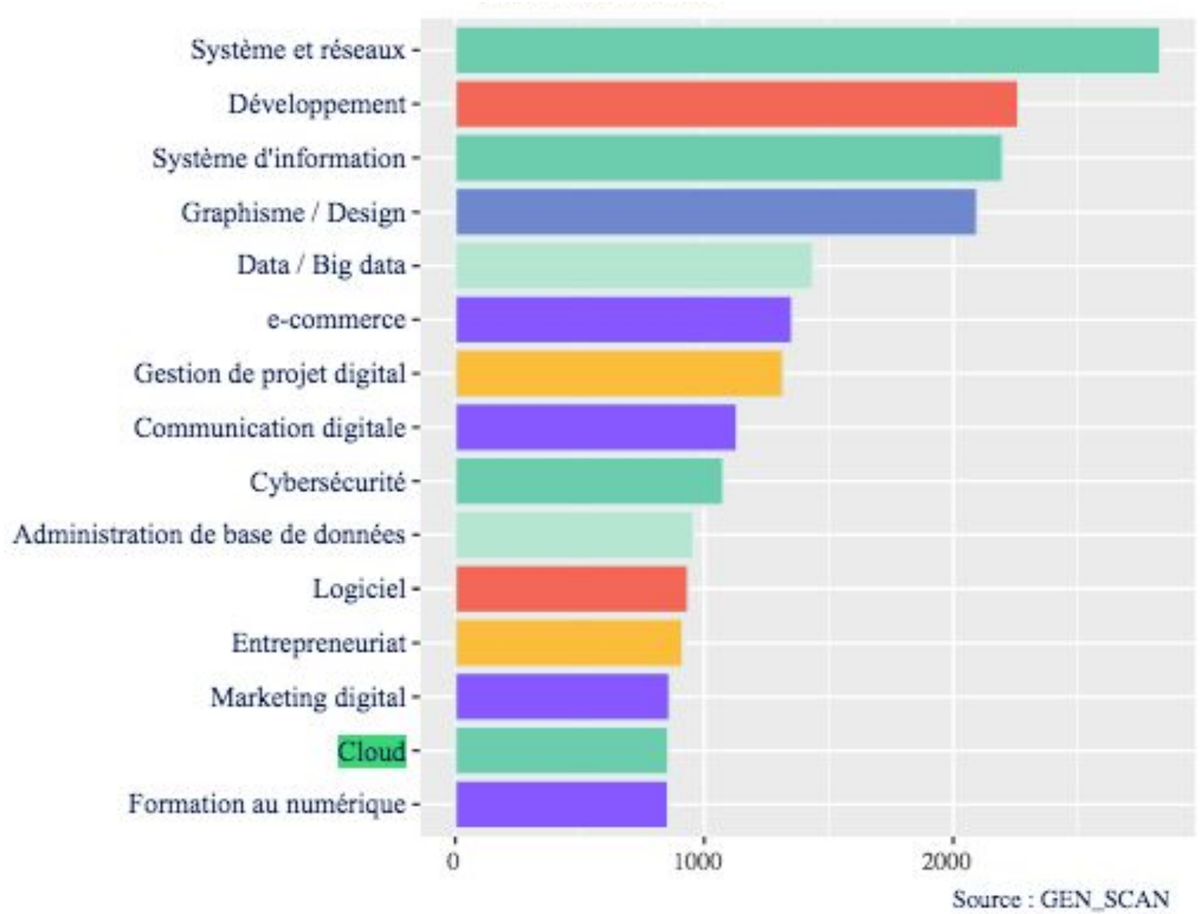
Source: Grande Ecole du Numérique

Co-funded by the European Union

France - Lack of Training in Cloud

In addition to needing of specialists we can see here that France offers less training on the cloud than for other domain with **less than 1000 trainings on January 1st 2023**

Distribution of training by profession
on january 1st 2023



Source : grande école du numérique "chiffre clés de l'emploi et la formation au numérique en france

Co-funded by the European Union

France - Low Representation of Women in French Digital Sector

→ **Women represents only 20,9% of tech job in france**

While 57% of all higher education graduates are women, only **25%** have graduated in the digital sector, and **13% of these graduates work in the digital sector.**

According to a survey conducted in 2021 by the computer science school Epitech and Ipsos, **only 33% of girls are encouraged by their parents to go into digital professions**, compared to 61% of boys, making parents are the main prescribers in terms of orientation.

But even if the employment and student in STEM rate are still low, there are more female digital graduates - their numbers grew by **33%** between 2013 and 2019. And the available positions in digital are growing (+35% between 2011 and 2019), we talk of a labor shortage. This highlight an issue that needs to be addressed towards the integration of women in digital jobs.

in France, parity in the digital sector would generate 10% more GDP by 2025 according to a McKinsey study.

Source : GEN - Les chiffres clés sur les femmes et la tech
GlobalContact - GenderScan

Co-funded by the European Union

Greece - Unemployment

The total labour force in Greece represents **4,6 million people**

14,8%

→ Total **unemployment rate**

44,1%

→ **Women in the labour force**

18,8%

→ **Women unemployment**

*using the definition provided by the International Labour Organization

** In 2021

Source : WorldBank

Co-funded by the European Union

Greece - Digital Transformation in Greece: Investment and Growth Opportunities

According to the ITA, the value of the ICT market in Greece in 2021 was $7.203 billion showing an increase of 3.5% over 2020.

The international health crisis accelerated Greece digital transformation by moving many public services online (Greece was one of the first nations to have a digital vaccination certification and vaccine appointment platform). **The government il really committed to invest in the Digital Transformation of the country and bring its standards up to the highest European level.**

In 2020 Microsoft invested into the country (plans for data centers) and other major investments were announced by leading tech companies such as IBM, Digital Reality, Amazon, and CISCO, those firms are leaders in providing cloud, database systems, applications infrastructure and software systems, communication systems, developer tools, business analytics, enterprise management and cybersecurity solutions, in both the public and private sectors.

Other serious investments are expected in Greece, which are essential for the digital transformation of the country, including among others, the upgrade and expansion of existing networks and the next-generation broadband infrastructure implementation. In addition, the advent of 5G technology is expected.

Source : International Trade Administration - Greece Country Commercial Guide
Microsoft - Achieving more together 30 years of Microsoft Greece

Co-funded by the European Union

Greece - Digital Transformation in Greece:

In Greece on the adoption of advanced digital technologies: 13% of enterprises in Greece use big data, broadly in line with the EU average (14%), **but they score well below the EU average on the use of cloud which** why this is one of the component of the greece RPR. Indeed Greece is undergoing a digital transformation through a multifaceted plan to digitize the country by 2025.

Greece's RRP

The Greek government has allocated a budget of EUR 375 million to support the digital transformation of SMEs through the provision of various technologies and services, such as e-payment, e-sales, and e-invoicing applications, digital advertising tools, teleworking systems, business analytics, digital upskilling, AI, IoT, cybersecurity systems, **and cloud infrastructures and services.**

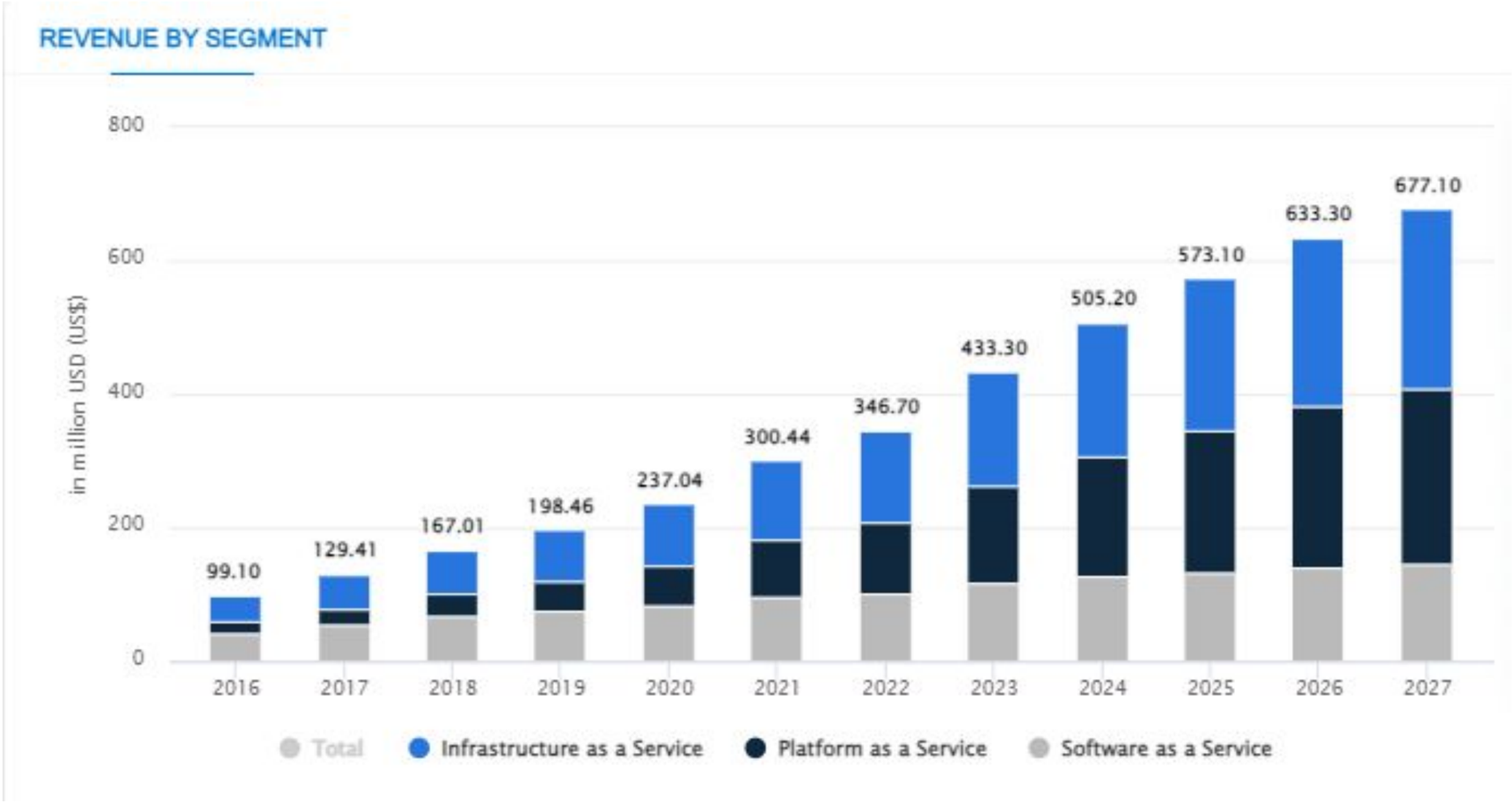
The RRF Loan Facility will also incentivize private investment in transformative sectors of the economy to support the digital transformation of SMEs. Additionally, the government plans to launch reforms and investments to deliver the National Cybersecurity Strategy in 2022, with a budget of EUR 32 million to improve cybersecurity in the public sector and **strengthen security in the Government Cloud (G-Cloud)** critical infrastructure. Another key project involves the **development of a cloud platform to fulfill the digitalization needs of both industry and the public sector.** The "G-Cloud Next Generation" project, with a budget of EUR 24 million, has been approved for Cohesion Fund support under the EPAnEK operational programme to support the G-cloud central computing infrastructure of the public administration's General Secretariat of Information Systems (GSIS).

Source : European Commission - Women in Digital Scoreboard 2021
European Commission - Greece in the Digital Economy and Society Index

Co-funded by the European Union

Greece - Growth of Public Cloud Revenue

Public Cloud revenue in Greece has been increasing since 2016 and is expected to keep growing and reach **$677.10 milion in 2027**



Source: Statista

Co-funded by the European Union

Greece - Digital Skills Gap in Greece: Challenges and Opportunities

Although digital skills are required in many jobs and have become transversal skills, the percentage of adults lacking basic computer skills is high in Greece. The country still needs to develop high level digital skills for ICT professionals in all industry sectors, yet since 2019 the number of ICT specialists is slowly increasing.

Source: Statista

Co-funded by the European Union

Greece - Gender Inequality in Digital Skills and Employment in Greece

In 2019 regarding Internet skills, 68% of women are regular Internet users (versus 71% of men); 27% of women have never used the Internet (23% of men); (Women in Digital Scoreboard, 2019). Furthermore, **44% of women have at least basic digital skills** (versus 49% of men); and **20% have above digital skills (versus 23% of men)**;

a**nd 50% have at least basic software skills (versus 55% of men**).

In Greece, gender inequalities start appearing even at the lower secondary education, where less female students than male students engage in coding/programming activities, and this trend continues in upper secondary education since 85 % of female students never or almost never engage in coding/programming in comparison to only 66 % of male students (European Commission, 2019)

According to Women in Digital Scoreboard (2019), **0.4% of total employees are women ICT specialists** (versus 2.5% men)

While in Greece basic internet skills is needed in the population so the gap between women and men with basic digital knowledge is not so big, in comparaison the gap is widening in the working world with **among Greek scientists and engineers in high-technology sectors, there are 21% women** (versus 79% men).

European Commission - Women in Digital Scoreboard 2021

Co-funded by the European Union

Spain - Unemployment

The total labour force in Spain represents **23.4 million people**

14,8%

→ Total **unemployment rate**

47,1%

→ **Women in the labour force**

16,7%

→ **Women unemployment**

*using the definition provided by the International Labour Organization

** In 2021

Source : WorldBank

Co-funded by the European Union

Spain - Spain's Push for Digital Transformation

Spain adopted in 2020 the **Digital Spain 2025** to promote the digital transformation of the country through digital connectivity, strengthened cybersecurity, digitalization of public administrations and incorporation of artificial intelligence technologies.

The ICT sector has taken advantage of the digital transformation push, enabled by the EU recovery funds during the international health crisis.

In Spain the cybersecurity demand is strong, with companies adapting to telework, **cloud adoption** and increased threat of ransomware attacks. **Over the past years companies kept choosing to move to cloud solutions and the trend has continued to grow in 2021.**

The Spanish Government Recovery, Transformation, and Resilience Plan, announced on April 30th, 2021, for the period 2021-2023, outlines the roadmap for the modernization of the Spanish economy, the recovery of economic growth and job creation, and responds to the challenges of the next decade.

Digital transformation and cloud adoption is driving investment in data centers in Spain. **Major technology companies that have announced commitments in the last two years to open cloud computing centers in the country**.

source International Trade Administration - Country Commercial Guide

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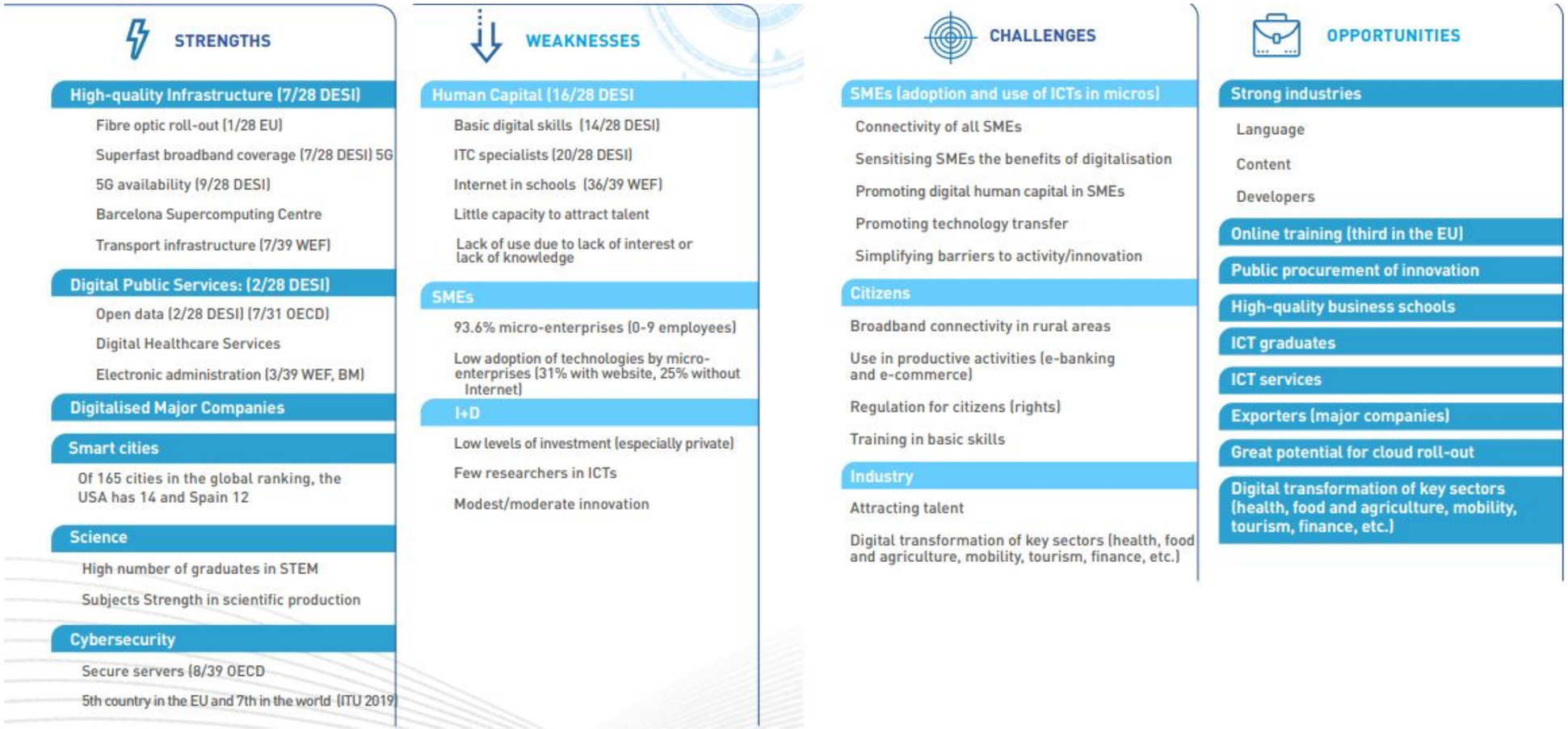
Spain - SWOT Analysis of the State of Spain Digital Transformation

We can see from this SWOT analysis from the Digital Spain 2025 that one of the weakness of the sector in Spain in Human capital with a poor rank on the DESI index. At the same time there is an opportunity for cloud solution as is mention a great potential for cloud roll out.



source:: Digital Spain 2025

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Spain - Opportunities and Challenges Ahead for Spain's Digital Transformation

Spain is showing great opportunities in term of digital with its Spain Digital 2025 agenda of measures, reforms and investments, for the digital transformation of the country.

According to Digital Spain 2025, the country has a digital infrastructure network which is among the best in the world, leading companies in key sectors (health, food and agriculture, mobility, tourism, finance), however, **progress has been more limited in the area of digitalisation** especially for SMEs **and improving the population's digital skills.**

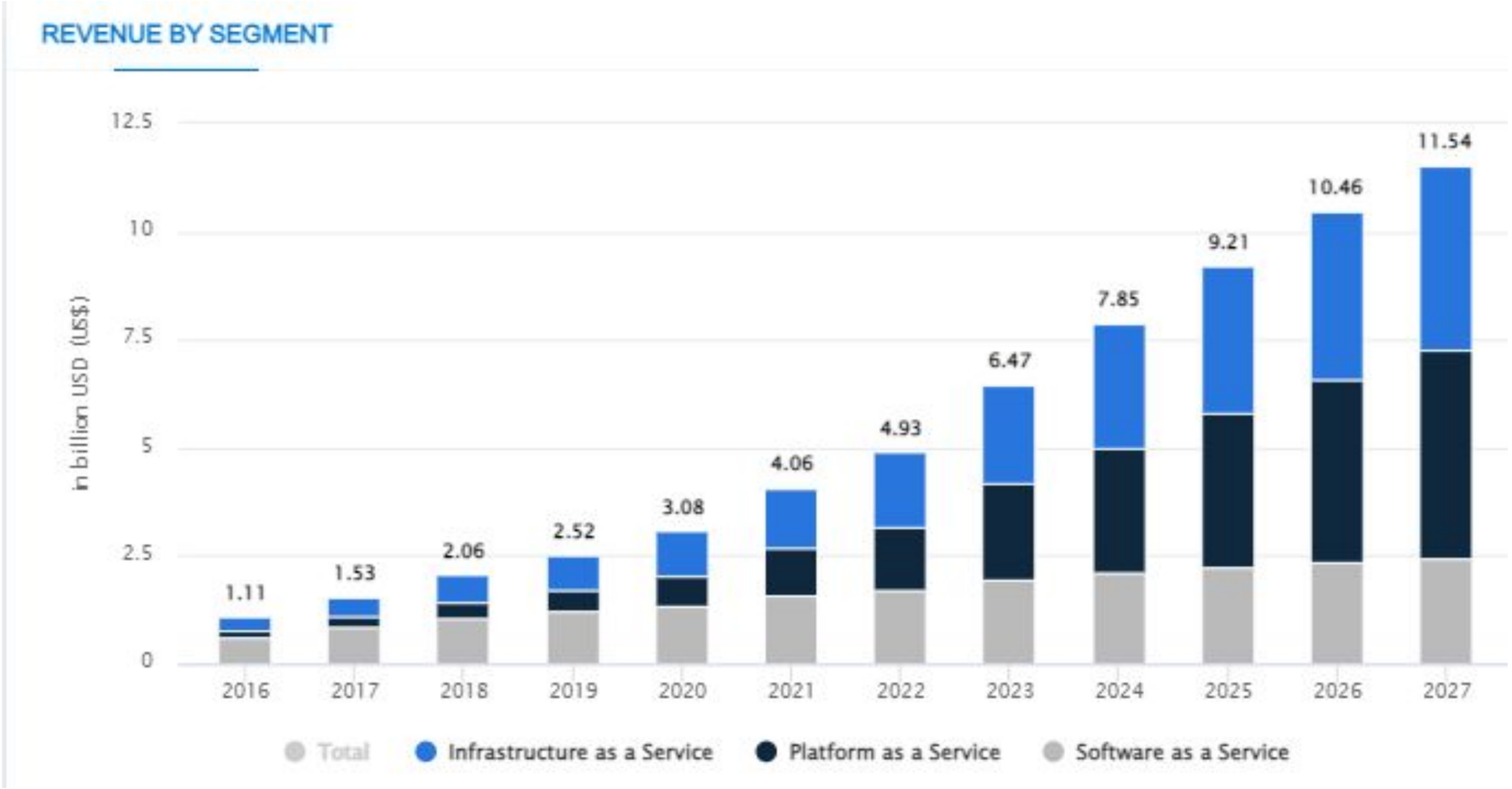
One of the objective of Digital Spain 2025 is to modernise the instruments for supporting digital entrepreneurship: that includes developing solutions based on artificial intelligence and other **enabling digital technologies such as cloud computing**, language and image technologies, the Internet of things, distributed ledger technologies, cybersecurity, and big data and analytics.

Also, the European Commission, with the “European Strategy for Data”, has launched the European Cloud Federation initiative, with the aim of coordinating and combining the local initiatives of the Member States (such as GAIA-X and the Nordic and Baltic initiatives). Spain is expected to play an active role in forming part of the shared spaces of the European Cloud Federation and in promoting an Iberian space, along with Portugal, which will give power to the development of advanced data computing technologies with the aim of becoming a hub for connectivity and, consequently, a **potential data infrastructure concentration point.**

source: Digital Spain 2025

Spain - Growth of Public Cloud Revenue

Public Cloud revenue in Spain has been increasing since 2016 and is expected to keep growing and reach **$11.54 billion in 2028**



Source: Statista

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Spain - Gender Gap in Spain's STEM Field: Low Participation of Women in ICT and Digital Technologies

In Spain, only **16% of professionals in the STEM field are women**, just 0.7% adolescent females show interest in studying a degree related to digital technologies (7% of men)

In 2019 even if the share of ICT specialists in total employment and the share of ICT graduates increased over the last decade in Spain, but only 4% of all graduates and women are still a minority among them (25% in Engineering and 13% in Computing). Despite women being the majority (55%) of university students, they are still a minority among **ICT specialists (16%) and those employed in ICT services (29%), as well as in high and cutting edge technology services (32%).** And only 15.6% of Spanish startups were founded by women.

The share of female ICT specialists remains stagnant at a mere 1.1% of total female employment (EU Average: 1.4%)

Even if all Spanish indicators show **progress of the ICT sector and digital economies,** there is a **stagnation of the participation of women in ICT** while, women show increasing employment rates.

source:: Digital Spain 2025
La Caixa Foundation - The STEM field is failing to attract female talent
Research Article - Women working in ICT: situation and possibilities of progress in Catalonia and Spain

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06.

The participation of Women Represents an Opportunity for Countries to Respond to the ICT Specialist Need

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Women are facing similar barriers to entry the ICT market, addressing them is an opportunity both for women and companies

Globally, women have the same problems and needs whether it be in the choice of professional orientation, training, career or the creation of a company in the tech industry. Here are some of the barriers:

- **Unconscious bias and stereotypical attitudes** in schools, universities, and the workplace discourage women from pursuing STEM careers.
- These attitudes are perpetuated through a **lack of female role models** in STEM fields, leading to self-doubt, and a lack of motivation to pursue careers in these areas.
- The lack of diversity in STEM fields can also make it more **difficult for women to network and find mentors**, further perpetuating the gender gap.
- The persistent **wage gap** in STEM fields and the **difficulty balancing work and family** can also discourage women from entering or staying in STEM careers.

Especially in the tech area and according to a EIGE study it is harmful stereotypes and a lack of digital-confidence on the part of women that are the greatest barriers to gender equality in ICT. These are some of the biggest reasons behind the slow pace of change in the number of women entering tech professions. Addressing this issues can help increase the number of women in tech roles. As we have seen, women are underrepresented in tech. The sector has been constantly evolving in recent years and therefore in perpetual demand for new profiles. Many companies in the participating countries have difficulties recruiting profiles corresponding to the market needs. Many studies prove that diversity is an asset for companies, betting on women is an opportunity first to diversify the tech sector but also, to meet market needs.

According to McKinsey, potentially close the tech talent gap could make GDP increase by €260 billion to €600 billion.

Source : McKinsey - Women in tech: The best bet to solve Europe's talent shortage
European Institute for Gender Equality (EIGE) - Women in the ICT sector

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07.
Recommandations

Copyright : Welcome to the Jungle

Recommendations

As the research in this analysis has shown, though there are some differences between women's involvement in the ICT sector, and of the development of the cloud sector within Europe, the differences are small. **Women in the participating countries generally face the same barriers to entry into the digital labor market**, with different intensities of complexity depending on the country. With that in mind, the recommendations made by this analysis are general, and mainly applicable to all piloting scenarios. This will contribute to a pedagogical curriculum, training setup and even training materials that are stable from one country to another.

That said, there will of course be differences - some quite major - between training scenarios. These differences are however much more to do with the context within which the training provider works (legal framework, type of organisation, habitual beneficiaries etc.) rather than the context of women in Tech within their country. Two such examples :

Sourcing of women for cohorts This is one of the main concerns for training providers, which we of course work on as a consortium, but remains specific to each training provider. For example, some countries have very centralised systems for sourcing trainees, meaning training providers need more of a B2B approach. An example of this would be in France, where relationships with the local pôle emploi (employment centres) are key to sourcing all trainees, including women. Contrary to this, in Spain for example, a B2C approach is much more powerful, communicating directly with potential trainees via social media for example. Training providers within the consortium should therefore first of all maintain their existing practices for attracting trainees.

In person / online cohorts. Here again, training partners should provide the type of training that best suits their current practices, needs and expertise. The curriculum and training materials should reflect this potentiality for online or onsite training.

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General Recommendations

These are the general recommendations that can be made for each of the consortium partners.

Curriculum and alignment with job market/country: the consortium will work on curriculums on highly demanded skills in the job market. Cloud computing skills are in demand in all countries and projections show that they will continue to be in demand in the coming years as the majority of enterprises in participating countries are moving or have moved to cloud solutions and are in continuous demand for cloud experts. Each partner will adapt its program to the specificities that may exist in its labor market and will focus on technical cloud experts skills.

Soft skills: if the number of women in ICT studies is low, the entry into the labor market is even lower, the consortium, in addition to technical skills, must work on soft skills to give all the keys to women to meet the expectations of the labor market in their countries and lead to a job.

Women role models/Networking/involvement of companies: the consortium will be able to provide mentoring program, including members and business partners, and networking and community events allowing community members to support each other. The consortium will also organize visits from corporates: masterclasses, mock interviews, testimonials, and receive use cases from corporates for the trainees to work in a professional context. Finally the consortium will establish a link from the beginning with different corporates to have a job placement strategy.

Promote ICT as a career option for women in our communication: the unconscious gender bias makes it sometimes difficult for women to project themselves in the tech industry, our communication during the project will focus on highlighting ICT as a possible career for women with communication channels dedicated to the project and targeting women.

adapted environment remote/only women?

Inclusion in an international consortium to address together common challenges?

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08.
Conclusion

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Conclusion

This study highlights the **underrepresentation of women in the tech industry** in participating countries in education, employment and startup ecosystems. Barriers to a wider participation of women in these fields are in general similar from one country to another and the main pain points are **unconscious gender bias, lack of support, and a shortage of STEM graduates**.
Although in some of the participating countries women are relatively better represented in the ICT sector, there is still a huge gap in each participating country in terms of women's access to technical professions in the sector.

Cloud computing is one of the most in demand skills in participating countries and will remain so for the years to come. There is a clear need for ICT specialists in all partner countries, increasing the participation of women in technology could help **address the skills shortage in the sector,** but it could also lead to more **innovation and diverse perspectives** in technology. We have therefore decided to focus our training on the cloud sector.

This study will help the consortium to adapt the programs of the Femme Forward project to the possible specificities of the market in each country.

Further research could focus on highlighting the challenges and opportunities related to educating and supporting **women already involved in the STEM or ICT sector to increase their participation in ICT-related technical roles.**

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09.
References

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Europe & EU

Randstad sourceright : global in-demand skills report 2022
MarketsandMarkets - Cloud Computing in Industrial IoT: Market for Cloud support of IIoT by Software, Platforms, Infrastructure (SaaS, PaaS, and IaaS) including Centralized Cloud Edge Computing for Devices and Things 2022 - 2027
Microsoft - Presentation of hybrid and multi cloud
Eurostat
European Commission. (2020). Women in Digital: The Time is Now! Retrieved from
European Institute for Gender Equality (EIGE) - Women in the ICT sector
European Commission: Women in Digital Scoreboard 2021
Eurostat - ICT Specialists in Employment
Eurostat - Distribution of persons employed as ICT specialists by sex, education attainment level and age, 2012 and 2021 (%)
European Commission. (2020). Women in Digital: The Time is Now! Retrieved from
McKinsey - Women in tech: The best bet to solve Europe's talent shortage
European Student Think Tank - Women in STEM in the European Union – Facts and Figures
SiWorld Economic Forum - How can we STEM the tide of women graduates leaving science?
Girls Go Circular
Statista - Gender distribution of startup founders in selected European countries in 2018
European Commission. (2020). Women in Digital: The Time is Now! Retrieved from
McKinsey - Women in tech: The best bet to solve Europe's talent shortage
EU-japan Centre for industrial cooperation - Women Entrepreneurship in EU and Japan 2022
European Commission. (2020). Women in Digital: The Time is Now! Retrieved from
EU-japan Centre for industrial cooperation - Women Entrepreneurship in EU and Japan 2022
WorldBank data on unemployment.

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Romania

International Trade Administration - Romania - Country Commercial Guide
McKinsey Digital - Digital Challengers on the next frontier: Perspective on Romania
Public Cloud Revenue Source: Statista
European commission Digital Economy and Society Index (DESI) 2022
Randstad sourceright : global in-demand skills report 2022
Romanian Diversity Chamber of Commerce - The absence of women in STEM in Romania is a missed opportunity
Statista - Share of ICT Specialist in Romania 2020-2022
Grande Ecole du Numérique
PWC - 94% des entreprises françaises éprouvent des difficultés à créer de la valeur grâce au cloud
grande école du numérique “chiffre clés de l’emploi et la formation au numérique en france
GEN - Les chiffres clés sur les femmes et la tech
GlobalContact - GenderScan

Belgium

Manpower - Baromètre des perspectives d'emploi Q3 2022
International Trade Administration - Belgium - Country Commercial Guide
Deloitte - Episode 2 - In high demand: more women with a degree in STEM An interview with Françoise Chombar
Manpower - Employment outlook survey
Digital Economy and Society Index (DESI) 2022
Stabel - Independent entrepreneurs.
International Trade Administration - Belgium - Country Commercial Guide
OECD - Inclusive Entrepreneurship Policies: Country Assessment Notes Belgium, 2018

Co-funded by
the European Union

Italy

International Trade Administration - Italy - Country Commercial Guide
European Commission - Italy in the Digital Economy and Society Index

Itsolution - ICT Specialist, a booming profession throughout the EU. Italy in the last places
tatista - Share of women in tech in Italy as of 2021, by sector
tatista - Number of female owners of individual enterprises registered at the Italian Chambers of Commerce in Italy from 2000 to 2020
Research - Investing in women: what women-led businesses in Italy and the UK need
Eurostat

Cyprus

Digital Cyprus Survey
Cyprus Computer Society - Cyprus ICT 2020 Analysis and 2021-2023 Forecast
Eurostat - Employed ICT Specialists
Deloitte Cyprus - She.Can.STEM Program Developing the future generation of female leaders in STEM

Greece

International Trade Administration - Greece Country Commercial Guide
Microsoft - Achieving more together 30 years of Microsoft Greece
European Commission - Women in Digital Scoreboard 2021
European Commission - Greece in the Digital Economy and Society Index

Spain

International Trade Administration - Country Commercial Guide
Digital Spain 2025
La Caixa Foundation - The STEM field is failing to attract female talent
Research Article - Women working in ICT: situation and possibilities of progress in Catalonia and Spain

Co-funded by the European Union

Germany

International Trade Administration - Germany - Country Commercial Guide
Federal Statistical Office of Germany - ICT in enterprises, ICT sector
Amazon Web Services - Employer IT Skills Survey 2020
Statista - Usage of cloud computing in companies in Germany from 2011 to 2022
International Labour Organization - Skills shortages and labour migration in the field of information and communication technology in Canada, China, Germany and Singapore
Federal Statistical Office of Germany - Filling IT vacancies increasingly difficult for businesses
German Indian Startup Exchange Program - Women Entrepreneurship - Making it in Germany
2022 Female Founders Monitor
OECD - Women entrepreneurship Key findings: Germany
Federal Ministry for Economic Affairs and Climate Action - Women in economy
Statista - Startup founders in Germany from 2013 to 2022, by gender

France

Grande Ecole du Numérique
PWC - 94% des entreprises françaises éprouvent des difficultés à créer de la valeur grâce au cloud
grande école du numérique “chiffre clés de l’emploi et la formation au numérique en france
GEN - Les chiffres clés sur les femmes et la tech
GlobalContact - GenderScan

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Femme Forward projet website https://femmeforward.eu/

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