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I. Introduction

The present report is based on a review of gender, technology and education policy, as well as national, regional and global research in the fourteen Southeast European (SEE) countries that are the target of study. Findings are preliminary in nature and aim to stimulate dialogue, sharing of experiences and action to bridge the gender digital divide and increase participation, innovation and leadership by girls and women in strategic, economic sectors—including Science, Technology, Engineering and Mathematics (STEM)—in the region. In that way, the reports seek to promote greater opportunities for financial independence and self-determination of girls and women, progress toward achieving the Sustainable Development Goals, and increased regional and global economic integration for the SEE.

II. Context and background

No matter where she is in the world, a woman is less likely to have access to the Internet and digital technologies. She is more likely to have low or no digital skills, and far less likely to be an IT expert. A woman is also much more unlikely, by a factor of almost 1-in-10, to found a technology-driven enterprise. These conditions reflect a persistent and growing "digital gender divide" which negatively impacts an individual woman's self-determination in the context of our increasingly digitalized society, and also adds up to a loss in innovative and economic potential that is impossible to surmount without comprehensive and sustained effort across several policy domains.

Given its complex geopolitic situation and varying sizes of its economies, Southeastern Europe mirrors global dynamics impacting the gender digital divide. Disparity in economic development and market maturity, including from a digitalization perspective, disproportionately and negatively impacts girls and women. This manifests itself in the form of flagging socio-economic protections which track economic development as relates to education, social welfare and workforce participation. This situation adversely impacts the discussion of "gender and STEM" in the present context, and widens the gender digital divide.

SEE programs that promote digitalization in pursuit of economic development, including those supported by the European Union, prioritize increasing internet access and affordability, supplemented with digital skills and incentive programs to mainstream technological knowhow for the benefit of the economy. Unfortunately, increases in high-speed internet access across Europe, including in SEE, have not guaranteed that women and girls benefit equally from the resulting transformation. Without an intentional effort to mainstream equity policies to address this gender digital divide everywhere, the situation risks worsening.

The present report includes a high-level examination of the gender digital divide in fourteen Southeast European countries, as viewed from the perspective of the so-called Leaky Pipeline, and of policy impacting this phenomenon. It includes preliminary observations and recommendations to tackle the gender digital divide in the region, and seeks to complement parallel research on STEM education in Southeastern Europe.

III. Scope and limitation of the analysis - Gender architecture in STEM

A major challenge in researching the topic of Gender architecture in STEM in Southeast Europe involves defining the subject area. In reviewing gender and STEM issues, the nuances of both terms are considered. The present review addresses gender equity in STEM across the board and, given persistent under-representation in these domains, considers issues specifically impacting girls and women.

The term “STEM”—an acronym for "Science, Technology, Engineering and Mathematics”—has been mainstreamed in the past decade to represent traditionally male-dominated technical study and work domains. Within STEM subjects, however, a disparity of gender representation is observed. Biology and medical studies, for example, have consistently experienced gender equitable participation.[1] In the other extreme, basic Sciences and Physics studies have persistently enjoyed far less uptake among women compared to men. Finally,“Technology” fields —e.g. Computer Science, but also Management Information Systems, and other related domains—have suffered a long-term and intransigent lack of gender balance across studies, workforce participation, and in the startup ecosystem. Along with the growing impact of technology on economic development and in building the Digital Society, the present paper highlights the question of gender balance, and participation of girls and women especially, in technology fields.

Research on this topic in Southeast Europe is impacted by geographic, cultural and linguistic diversity of the region. The challenge of accessing and assessing research content from the various noted domains, especially in the English language, has constrained outcomes. In addition, the large breadth of policy areas requiring consideration also impacted results. The present review is therefore preliminary and to be populated with greater detail as the situation evolves and more information becomes available.

[1] “SHE FIGURES : Gender in Research and Innovation Statistics and Indicators.” *European Commission Directorate-General for Research and Innovation*, 10.2777/06090, Nov. 2021.

IV. Guiding questions in the areas of gender and digital technologies

Consistent with the Leaky Pipeline phenomenon visible across all STEM domains and acute in digital technology fields, the parameters impacting “gender and digital technologies” evolve over an individual lifetime. Early on, study of the propensity of school-aged children to engage with STEM areas demonstrates that by the age of fifteen, a gendered streaming takes place toward so-called “soft sciences" by girls and STEM subjects by boys.[2] Relatively few young women enter Computer Science studies at the college level; fewer graduate with a degree in Technology fields; those who enter the workforce as IT specialists do not remain; and ultimately very few become ICT experts and leaders in academia and industry. The end result is a persistent over-representation of men in the technology workforce, and their predominance as technologists and decision-makers.

The Leaky Pipeline phenomenon urges an assessment of trends, policies and programs that aim to tackle the gender imbalances in STEM domains that are especially evident in Technology fields. From this perspective, it is clear that a comprehensive examination of gender architecture in STEM requires consideration of everything from education to workforce policies, as well as digitalization and gender equity actions. Given the status of Southeast European countries as European Union Member States and candidate member states, an important additional consideration is the impact of both European Union policy priorities as well as development policies that inform action in these areas. Variations in economic development, also impacted by digitalization, create additional challenges both in implementing policies in the noted domains, and in the propensity to monitor and report on actions in these areas.

Guiding questions in investigating the subject of gender and digital technologies include the following:

- What is the economic development and maturity level of the geography in question?
- How mature is gender equality policy, and how well is it mainstreamed in education, workforce and social welfare policies, particularly as concerns STEM fields and Technology/Digitalization especially?
- How gender-inclusive are pathways to digitalization as relates to universal and meaningful access to the internet and digital technologies, affordability, and digital literacy?
- To what extent are education, social welfare and economic policies, especially related STEM domains, framed by “feminist" or “gender equity” considerations in order to ensure that girls and women benefit equally from increased digitalization?
- What actions exist on the ground, led by civil society, industry and public sector organizations to tackle the gender digital divide and fix the Leaky Pipeline, eg. by targeting girls and women as beneficiaries?

[2] “PISA 2018 Results (Volume II): Where all students can succeed." *OECD Publishing, Paris,* https://dx.doi.org/10.1787/5f07c754-en, 2019.

V. Angle of analysis covering gender and digital technologies

Analyzing the topic of gender and digital technologies requires review of the stages of the Leaky Pipeline from the perspective of a policy environment that broadly impacts girls and women as social, economic and political actors. Such analysis considers policy action in the following areas:

- Human rights protections - including political participation and leadership;
- Social welfare and wellbeing - including care, health and related considerations;
- Education - including research and academia, and leadership; and
- Economic Development - including workforce participation, entrepreneurship, innovation and leadership.

The present analysis undertakes a review of human rights and social welfare as these relate to policy on gender equity and women's rights, and thus impact the ability of girls and women to exercise their right to full self-determination, including in education and economic contexts, and free from threat of or actual harm. This latter is a particular concern as digitalization also translates to risk of gender-based violence online, which disproportionately impacts girls and women and has wider implications for their social, economic and political agency.

Further consideration is made for the enablers and obstacles affecting the ability and inclination of an individual woman to specifically participate in STEM domains, and digital technology fields in particular, over the course of her life. The prevailing influences in this context are many and varied, ranging from cultural to economic, with one often reinforcing the other. Absent comprehensive analsysis of the reasons impacting a declining tendency of girls and women to participate in STEM fields across their lifetime, a review of education and economic policy, among other considerations, is undertaken with a view to identifying opportunities to tackle each so-called “leak" in the “pipeline.”

VI. Key policy findings and directions

Five key findings on the topic of "STEM and Gender," with a focus on digital Technology fields, are outlined in the present section. These observations, along with examples from the Southeast European countries in the scope of the present review, are derived from an analysis of available literature and existing data related to gender, education, and economic, social and development policy in the SEE region.

1. Society is becoming increasingly digitalized

The COVID pandemic drove much of daily life online in a rush to sustain economies and protect basic human rights like access to education. Some changes set in motion then now appear irreversible, thereby intensifying a trend begun with the advent of the digital transformation and its hallmarks of mobile telephony, cloud computing and data ubiquity. In this context, a correlation between increasing digitalization of nations and economic development can be made which is exemplified by a push to going online as countries pursue greater integration into the global economy. As the data suggests, greater digitalization delivers greater economic benefits.

SEE What's Notable - 1

*The country of **Cyprus**, which ranks twentieth among EU Member States in digitalization, has improved performance in almost all Digital Economy and Society Index (DESI) dimensions since 2021—including Connectivity, Integration of Digital Technology, and Digital Public Services—with performance now converging on EU averages. Cyprus also achieved the largest increase in the IMD World Digital Competitiveness Ranking in 2020, rising to fortieth from fifty-fourth place.*

*The DESI score of **Croatia,** ranking twenty-first among EU Member States**,** has improved ahead of the rest of the EU, year-on-year, since 2017. This progress reflects strong digitalization initiatives including those embodied in the National Development Strategy 2018-2030 that, aligned with EU objectives, aims to support Croatia's twin digital and green transitions.*

Uneven uptake of digital technologies in the SEE, across Europe and around the world lays bare the realities of a digital divide within communities, among countries and across demographics. These differences were further exposed during the pandemic, exiting which greater emphasis has been placed on improving and institutionalizing digital equity and its facets of access, affordability, digital literacy, and meaningful use of digital technologies.

2. Women are getting left behind

As the digital divide has garnered increased attention so has the gender digital divide, a phenomenon expressed as girls and women around the world being relatively less digitally skilled, and enjoying less access to and meaningful use of digital technologies. As society becomes increasingly digital, this divide places girls and women at a disproportionate disadvantage in their ability to participate in society as full social, economic and political actors. The adverse impact of the gender digital divide on nation-building and sustainable development cannot be understated.

SEE What's Notable - 2

*Less than five percent of young women in higher education in **Moldova** choose STEM studies. Women hold thirty-one percent of jobs in the ICT sector and make up nineteen percent of ICT specialists, on par with the European average of nineteen percent. Women working in the ICT industry in Moldova also face a thirty-three percent wage gap which is the largest across all sectors of the economy.*

*In **Malta**, women make up fourteen percent of university graduates in ICT, and twenty-six percent of ICT specialists in the workforce. As in **Greece** (21%) and **Romania** (26%), this exceeds the EU average. At twenty-eight percent, **Bulgaria** enjoys the highest relative participation of women tech specialists in the workforce in all of Europe, which is also a global benchmark.*

In its most basic form, the gender digital divide manifests itself in early childhood education where teachers—often women and themselves lacking digital and STEM skills—perpetuate stereotypes about women in STEM that children onboard. By middle school, girls begin to "self-select" out of science, math and computer science subjects at the same time boys opt out of so-called "soft" sciences. This period is critical in its long-term impact on study and career decisions for both genders, particularly in school systems where kids decide study directions as early as twelve years old. When this decision is left until later years, the trend can be seen to reverse in girls opting more toward STEM studies the older they are.

Relatively few teen girls pursue Computer Science studies at the university level, which results in less women entering the workforce as technology professionals, academics and entrepreneurs, and even fewer staying the course into leadership roles. This phenomenon illustrates the persistent "leaky pipeline" in STEM. Apparent across all STEM subjects but most acutely reflected in technology fields, i.e. Information and Communication Technologies (ICTs), this reality has a direct and negative bearing on the innovation capacity and economic development opportunities for a geography.

Study of ICTs, Computer Science, and related domains (Programming, Machine Learning/AI, Data Science, Cybersecurity, Cloud Computing, etc.) deserves special treatment since these fields drive digitalization of society and have a cross-cutting effect on all other subject areas, including STEM. As witnessed during COVID-19, digital literacy and access to technology is a necessity for acquiring even basic education, a characteristic more pronounced in advanced studies. Often overlooked in this context is the discussion of digital skills for educators, including family-members, who again are often women whose skill level is a critical consideration in building capacity to ensure digital literacy, including among young people.

3. Policies promoting women in technologies are rare

National policies that specifically target the various leaks in the STEM pipeline from a gender perspective are few and far between. Even fewer programs exist that explicitly promote greater participation of girls and women in digital fields. The transversal impact of digital skills in education—but also in carrying out RD&I and supporting a dynamic workforce across the board—makes the absence of such policy problematic.

Around the world today, a lack of digital skills at all levels manifests itself as a shortage of millions of skilled workers otherwise needed to serve and lead the digital society, including at the policy level. A lack of IT experts is apparent in core technology fields, and in academia and

startup. As a result of the digital transformation impacting all facets of human existence, virtually no industry, sector or organization in the world is unaffected by the digital skills shortage.

SEE What's Notable - 3

***Serbia**, the country that launched the "Girls in ICT Day" initiative at the United Nations in 2010, is a long-time leader in global policy action to close the gender digital divide. Recently, Serbia deployed the Empowerment of Women in ICTs 2019-2020 program aiming to increase STEM studies by girls and young women, train and reskill women to support their participation in the ICT workforce, and improve digital competences for women of all ages.*

*A 2021 report on the Gender Equality Index for the Republic of **Serbia** highlights, among other things, a "femininisation" in the use of the internet in Serbia, which tracks closely with increased education, employment and communication skills among women. Though too early to correlate outcomes with ongoing policy action, a modest increase in participation of female students in ICT domains, from 26% in 2015 to 29% in 2019, was observed.*

*In 2006, **Bosnia and Herzegovina** launched a Gender Action Plan whose objective was to "define strategies and realise program objectives to reach equality of women and men," and included a strategic goal for Information and Communication Technologies.*

A simple answer to the challenge, a way to spur innovation, competitiveness and even leapfrog economies facing similar constraints, is to develop public sector programming that explicitly targets girls and women with digital skills initiatives, including IT expert trainings and apprenticeships. Applying an ecosystem approach, this issue can be mainstreamed in any policy developed at the national, regional and local level which aims to accomplish the following: Increase gender parity in society; support modernizing (STEM) education, including informal education, vocational training and life-long programs; and spur economic development, including digital transformation, workforce participation, and entrepreneurship and RD&I.

4. External factors are important

National policies to increase full participation of all members of society in economic, political and social life dovetail with overarching objectives for international development, including the Sustainable Development Goals. Such work also supports global and regional integration efforts, including European Union membership, a strategic priority for all countries of Southeast Europe. Leveraging EU member and candidate member status is a key benefit for SEE countries that prioritize digitalization as well as full economic, social and political participation of women and girls in society.

The European Union, including some of its individual member states, leads the world in *de facto* uptake of digital infrastructure, digital literacy programs, and in integration of strategic STEM priorities in education, social and economic policy. EU countries also enjoy some of the world's most progressive gender equality policies and programs that promote inclusive and sustainable growth, including through digital transformation. EU funding to deliver similar programs at the national level is an important way for SEE countries to reap the awards of digital transformation. Unilaterally deploying local and national policies with a similar remit, which can also be supported within European funding and programming frameworks, is another.

Development organizations and funding bodies inside and outside the EU are increasingly prioritizing digitalization, along with sustainable and equitable growth policies, for engagement. In this sense, countries that pursue these priorities at home can enjoy a cascading effect from the national, regional and global economic opportunities such priority-setting can engender.

Although the economic case for promoting greater participation of women in STEM fields, especially technology, is clear, a lesser known fact concerns the inverse relationship between economic development and participation of girls and women in STEM. The larger the economy, the less girls and women gravitate toward STEM studies and careers—a trend which holds true for all young people regardless of gender, and which is more pronounced in technology fields. Given its nature, this situation is often characterized as a luxury problem, and despite the implications of the gender divide in STEM on wider society, it risks going unaddressed.

SEE What's Notable - 4

Europe's Path to the Digital Decade Policy Programme 2030 went into force in January 2023, establishing priorities for ***European Member States*** *regarding Skills, Digital Transformation of Businesses, Secure and Sustainable Digital Infrastructures, and Digitalisation of Public Services. Many criteria related to these targets have long been monitored in the European Commission's Digital Economy and Society Index (DESI), including for SEE countries.*

In the Skills category, Digital Decade targets include increasing the number of ICT Specialists in Europe to twenty million by 2030, from a total of nine million today. "Gender convergence" among ICT Specialists is also a key Digital Decade 2030 objective. In a trend that has persisted for over ten years, eighty-one percent of ICT Specialists in the ***EU*** *at present are men.*

The following are Eurostat figures for 2020 workforce participation in ***SEE Countries*** *by male ICT Specialists:*

1) Bulgaria - 71.8%
2) Greece - 72.3%
3) Croatia - 81.9%
4) Cyprus - 81.9%
5) Malta - 89.3%
6) Montenegro - 83.6%
7) North Macedonia - 76.7%
8) Romania - 73.8%
9) Serbia - 75.0%
10) Slovenia - 82.8%
11) Türkiye - 83.2%

The reverse is also true: Like countries, individual men and women recognize the opportunity for economic independence presented by pursuing STEM careers, and technology in particular. This rationale may explain why some European countries, with notable examples in the SEE, enjoy greater participation of girls and women in tech, and in STEM more broadly. Bulgaria and Romania, for example, have the highest relative participation of women in digital fields in the world.

Although these countries do not yet experience gender parity in STEM fields, the ecosystem that delivers such outcomes warrants attention for its contribution toward self-determination for women, sustainable development, and economic opportunity for the country itself. In order to facilitate intentional future policy design and promote replication and scaling of such policies and programs on a regional and global level, an examination of the context that produces these successes is worthwhile.

5. Public and private cooperation is key

In order to enjoy the promise for individuals, communities and societies that inclusive digital transformation, bridging the gender digital divide, and gender parity in STEM fields can provide, full engagement of ecosystem actors in delivering on such a vision is necessary. Leveraging public and private partnerships in a mix that takes advantage of government leadership, private sector knowhow, and civil society engagement is critical.

Public sector leadership is necessary to create a policy framework that supports universal action on economic, education and social objectives that aim to achieve gender parity in STEM and digital fields. Industry actors possess subject-matter expertise to leverage within programs supporting formal and informal STEM education, and in training and apprenticeship programs that skill, re-skill and upskill workers for the digital economy and sustainable growth. Companies also stand the most to gain from harnessing a skilled workforce for economic development.

Civil society organizations bring a unique, often mission-based focus to designing and delivering programs that promote gender parity in strategic STEM fields. Such actors develop innovative approaches to reach unserved and underserved communities, including girls and women and those with intersecting needs, through grassroots STEM programs that are effective and impactful. These programs often push the state-of-the-art and provide key learning opportunities for other ecosystem players. At the same time, absent policy priority-setting and programming to support their work, civil society organizations can struggle with long-term viability.

> ***SEE What's Notable - 5***
>
> *In 2020, **Romania** put forth a Strategic Initiative for Digitization of Education 2021-2027 in order close the digital divide and promote socio-economic inclusion. Coordinated by the Ministry of Education and Research, the initiative focuses on several areas of action which include promoting digital skills through both formal and informal education, and cultivating public-private partnerships with European and international bodies.*
>
> ***Bulgaria** enjoys a rich ecosystem of initiatives leveraging public and private collaboration to increase participation of girls and women in STEM and in the ICT sector. Often under the auspices of the Bulgarian Centre for Women and Technology, grassroots initiatives that take advantage of partnerships between industry, NGOs and the education system in Bulgaria include Rails Girls, Women Who Code and Move It Forward. Similar undertakings are replicated across SEE countries and around the world.*

To address this challenge, policy that explicitly contributes to capacity-building for civil society actors working to close the gender digital divide and gender gap in STEM, while incentivizing complementary action by STEM ecosystem stakeholders, is essential. Such policies should support organizations with delivering practices that have proven successful at increasing participation of girls and women in STEM fields, especially Technology, including those that are:

- *Girl- and women-focused* - Girls and women are the explicit target beneficiaries of the action;
- *Hands-on, result-oriented, and optionally, "for beginners"* - This approach circumvents the narrative and language sometimes negatively associated with STEM fields, and Technology especially, that can marginalize girls and women and play into gender stereotypes surrounding these subjects;

- *Gender-sensitive programming* - Training times, locations, access take into account factors, including socio-economic realities, that disproportionately impact an individual girl's or woman's ability to work or study "outside the home (for money)";
- *Female role model-led* - Workshops, expert panels, training and talks are led and delivered by girl and women peers; and
- *Community-focused* - Within a group of like(-minded) individuals, people find the solidarity and resilience to achieve inroads, often requiring long-term commitment, that can lead to positive social change.

Programs led by civil society to increase gender parity in STEM might take advantage of the noted best practices in the form of girl- and women-targeted trainings and efforts to build and nourish communities of girls and women in STEM and digital fields. Programs to address the gender equality in STEM paradox might specifically promote women role models in STEM via media actions that support alternative narratives, including fictional, consistent with this vision.

SEE What's Notable - 6

Since its launch in 2013, the European Commission's ***Digital Skills and Jobs Coalition for Europe*** *has provided visibility and support for private sector actions promoting digital skills and jobs across Europe, exemplifying a good practice in* ***public-private partnerships*** *that support digital inclusion, including gender equity.*

In a 2022 DSJC pledge reaching fourteen EU countries also including* ***Bulgaria, Croatia, Cyprus, Greece, Romania, Slovenia, and Malta, Microsoft*** *committed to expanding Europe's IT talent pool by offering cybersecurity training targeting underserved communities* ***with a focus on women****, in order to address both the skills and gender gap. This initiative, backed by digital inclusion grants supporting Microsoft's nonprofit partners, had the mission of equipping learners with industry-recognized certifications to facilitate their access to further learning and jobs in the industry.*

**https://digital-skills-jobs.europa.eu/en/inspiration/pledges/expanding-europes-cybersecurity-talent-pool-microsofts-pledge-eu-cybersecurity*

An important facet of *public-private partnerships* is that private sector actors who arguably have the most to gain from a larger, more diverse and better skilled IT workforce, are not always those most likely to deploy long-term digital inclusion programs or divert resources from the bottom line to fund such undertakings. At the same time, these very actors may be incentivized by public sector coordination efforts, visibility towards decision-makers, and other support at the national and regional levels that may reinforce their Environmental, Social and Governance ("ESG") and Corporate Social Responsibility ("CSR") commitments vis-à-vis other stakeholders, including investors. In this context, policy-makers can initiate a "butterfly effect," stimulating positive action by private sector actors which drives corollary response by civil society, ultimately increasing opportunities for girls and women in STEM sectors, and benefiting wider society.

Given the scope of the opportunity, policy to promote greater participation of girls and women in STEM and digital fields, and digital equity more broadly, must span a broad range of issues—from gender equality to "future-proofing" the workforce, to increased funding for women-led enterprises, to gender parity in leadership of all kinds. Specific areas where even small actions can have a magnitude effect, like digital skills trainings for women teachers, may be a valuable starting point. In the larger context of EU membership and accession, European policy can positively inform and support such priority-setting and action.

VII. Conclusion and the way forward

With key involvement of countries in Southeast Europe, significant activity is taking place at the European level that has been successful at bringing myriad ecosystem players together to tackle the gender digital divide and Leaky Pipeline issues in a substantive and meaningful way. Two of the best examples of this are EU Code Week,[3] a grassroots initiative in its tenth year that enjoys coordination from the European Commission and reaches millions of stakeholders annually with digital skills programs. Another such initiative is the Digital Skills and Jobs Coalition for Europe,[4] supported by European Commission funding, which coordinates and monitors voluntary private sector digital skills and jobs commitments across Europe. Although these initiatives do not have "closing the gender digital divide" or "tackling the leaky pipeline" as explicit objectives, they do support, monitor and report on actions that impact these areas.

Since its inception, EU Code Week has recorded a benchmark fifty percent participation by beneficiaries who identify as girls and women. Equally, DSJC has captured and reported on actions within a "Digital for All" pillar that monitors (gender) inclusion commitments related to digital skills and jobs across Europe. Where these initiatives are concerned, outcomes that close the gender digital divide have not necessarily resulted by design, their lasting impact on improving gender parity in STEM is not entirely known, nor is support of the actions specifically ongoing or consistent. As such, these pan-European initiatives reflect challenges in programming to achieve gender parity in STEM, often echoed at the national and grassroots levels, which may be improved with guidelines like the following:

1. *Policies and action should be intentional* - "Increasing gender-parity in STEM, especially Technology," for example, should be an explicit objective of the policies and actions to be undertaken;
2. *Support for private sector initiatives should be sustained and long-term* - The lack of gender parity in STEM is a far-reaching, intransigent challenge that requires long-term, sustained action to overcome, ideally with public sector leadership and resources;
3. *Learnings should be captured, shared, and replicated by design* - In addition to skills development, long-term change comes through community-building that should be nourished and sustained by multitudes of ecosystem actors acquiring and sharing the capacity required to achieve the stated vision;
4. *Outcomes should be defined, measured and reported on* - Targets should be articulated, monitored, and communicated, making use of gender-disaggregated data, and reflecting a continuous improvement focus.

Consistent with this perspective, the present report recommends a holistic approach to tackling the gender digital divide, closing the leaks in the "leaky pipeline," and increasing gender parity in STEM fields, especially Technology. Such an approach requires building and nourishing an ecosystem supportive of this vision, outlining key objectives to be achieved, ramping up capacity among relevant stakeholders, and monitoring and reporting on outcomes on an ongoing basis.

[3] https://codeweek.eu/

[4] https://digital-skills-jobs.europa.eu/en/about/digital-skills-and-jobs-coalition

Recommendations

Issues impacting participation of girls and women in STEM fields are many and varied, spanning the gamut of influences upon an individual woman's ability and inclination toward full self-determination as a social, economic and political actor. The challenge of tackling barriers and promoting enablers to address this issue is therefore equally complex. The present review considers government policy and action across Southeast Europe that encompasses such issues as gender inclusion, women's rights, education, and economic and social justice, while considering their impact on participation of girls and women STEM domains, especially Technology. This review also considers the possible influence of European Union and global development policy on the SEE region where seven countries are EU member states and the remainder EU Candidate members.

Given the breadth of the problem area, the diversity of the SEE region, and the question of content available in the English language, a preliminary review conducted across these topics assessed relevant factors at a high-level. Based on this analysis, the conclusion is drawn that ***Policies*** *to promote gender balance through increased participation of girls and women in STEM fields, and digital Technology domains in particular, must accomplish the following:*

1. *Promote "inclusive digital transformation" as a tenet of all digitalization and economic policy to ensure that no one, especially girls and women, is left behind in digital transformation efforts undertaken.*

SEE policies promoting digitalization, including uptake of emerging technologies like AI and machine learning, must include language that enshrines inclusion, ethical use, protection of privacy and data, and a "no harm" approach to ensure digitalization itself does not replicate or exacerbate biases that harm girls and women, or anyone. At the same time, such policies must also guarantee that benefits derived from digitalization are equally enjoyed among all demographics, genders, races and economic classes, including when this requires additional effort to realize.

Consistent with the Digital Decade for Europe vision of converging gender representation among European ICT experts, SEE domestic and regional policy to increase digitalization must also include supporting actions to bridge the gender digital divide, reaching girls and women with programs to improve affordability, access and meaningful use of digital technologies, and tackling the Leaky Pipeline at every stage. Such programs should also promote digital literacy and digital skills to girls and women, including expert level, and target actors like women teachers, and actions like gender equity in ICT leadership, that play an enabling role in education and workplace ecosystems.

2. *Prioritize the precept of "digital equity for women's economic agency" as a centerpiece of local, national and regional digital and economic policy in order to guarantee priority-setting, resourcing and programming to specifically close the gender digital divide at all stages of the Leaky Pipeline.*

To promote women's participation in the workforce and as as leaders of enterprise in the digital economy, SEE public policy should focus on digital equity for girls and women as an explicit pathway to economic agency for women. To this end, actions should be carried out that aim to increase the pipeline of young women entering Computer Sciences and related study areas at post-secondary level in SEE, including through formal—i.e. bachelor and associate degree—programs uniquely targeting women as beneficiaries. Lifelong learning initiatives, including civil society and industry-led informal technology education, must also be gender-sensitive in remit and address issues impacting an individual woman's ability to re-skill and upskill into STEM fields, especially Technology. Such programs might therefore tackle care issues and

compensate for time outside the home, and a best practice in this direction, for example, could be public-private partnerships that support remunerated IT training and apprenticeship programs for women of all ages.

3. *Address intersecting policy domains including Gender Inclusion, Women's Rights, Education, Economic Development, Social Justice and Wellbeing.*

In order to create an SEE ecosystem that supports economic, social and political agency for girls and women, and thus contributes to gender equity in STEM fields, a robust policy environment must exist that supports basic human rights for girls and women, including as relates to education, social justice, freedom from (threat of) violence, etcetera. Such policies should address gender inclusion and women's and girl's rights as explicit objectives, and also mainstream the interests of women and girls across all other policy areas, including economy, education and social welfare.

4. *Deliver public sector objectives, resourcing, monitoring and data-driven outcomes linked to economic, education and social policy.*

Creating a policy environment in SEE that supports economic, social and political agency for girls and women, with a focus on gender-equitable participation in STEM, requires leadership through goal-setting, budgeting, establishing key performance indicators, and monitoring and reporting on progress toward stated policy objectives over time. At the European level, digitalization indicators are captured in the Digital Economy and Society Index ("DESI"), and are assessed and reported on annually for EU members and candidate member states by the European Commission's Eurostat agency. DESI includes data on indicators linked to EU technology policy and intersecting social and economic factors, also disaggregated by sex and/or gender, including for digital skills, tech sector employment, broadband penetration, and so forth. SEE national policies can build on the DESI framework, enriching it with local specificity related to closing the gender digital divide and the leaky pipeline. This, in turn, can drive sustained EU funding and policy support toward SEE regional and national programming in order to continue moving the needle on these critical priorities.

5. *Engage public and private actors and deliver resources to build capacity among enterprises, schools and civil society actors with support for network-building, and knowledge- and best practice-sharing.*

A holistic approach to driving increased gender parity in STEM domains demands a focus on capacity-building among ecosystem actors who sometimes, lacking public-sector leadership and support, can suffer "churn and burn"—running the course of limited resources and surrendering the mission before an outcome is achieved. Gender equity initiatives led by civil society, frequently chasing too few funds for the multitude of challenges faced, are often the casualties of such circumstances. The number and variety of initiatives of this kind can even be a barometer for the gender equity maturity of the wider context. To support a flourishing, vibrant and gender-equitable STEM ecosystem in SEE then, it is necessary to commit to priority-setting, programming and resourcing which increases the overall number and diversity of programs that support such a vision. This can be achieved via actions that focus on networking and best-practice sharing among ecosystem actors of every kind which traverses local, national, regional geographies.

6. *Tackle social and cultural norms that also impact career and study choices for individual girls and women, and the ecosystems populated by teachers, parents and civic actors who influence these decisions.*

Research by the Geena Davis Institute for Gender and Media[5] suggests that a girl's decision to study STEM may be positively influenced by popular, fictional video drama. Applied to a larger context, increasing digitalization of society itself can thus provide the opportunity and the means to improve the likelihood that girls will choose to study Artificial Intelligence and that women will become entrepreneurs driving the Net-Zero Economy, for example. All this requires is public and private sector support for popular narratives that permit girls and women themselves, and other actors in the ecosystems they share, to envision a reality other than that which girls and women live today. Beyond that, it comes down to individual ingenuity to write, promote and share narratives that reflect this "alternate" reality—where girls and women partake in, lead and enjoy the benefits of the Digital Society in the same measure as men and boys. Our species, the planet and fellow creatures will no doubt be best served by giving women and girls themselves the skills, tools and mission to improve the narrative impacting their role in our increasingly digital society. We will also certainly benefit from better enabling girls and women themselves to deliver on this vision.

Based on the foregoing, *specific **Actions** that may be undertaken to increase participation of girls and women in STEM fields, and digital Technology in particular, include the following:*

1. Deliver ICT curriculum in schools from an early age;
2. Promote digital skills programs toward women teachers;
3. Deliver rewarded paternity leave programs;
4. Promote better and more portrayal of girls and women in media of all kinds - including in STEM and as entrepreneurs and leaders across the board;
5. Deliver a "Bill of Rights" for Women (STEM) Entrepreneurs - to give girls and women economic opportunity utilizing STEM skills regardless of life stage or age.

As a way forward, alignment of SEE countries with the objectives of the European Union Digital Decade 2030 means that greater monitoring, support and accountability for programs to close the gender digital divide in Southeast Europe will be prioritized going forward. In this context, policy-setting and action of the kind suggested will be facilitated, and at the same time, will form a critical component of any successful development strategy undertaken in the region and beyond.

[5] https://seejane.org/research-informs-empowers/

VIII. Annexes

A. Primary Sources

1. Sources

a. Eurostat: Employed ICT specialists by sex [ISOC_SKS_ITSPS$DEFAULTVIEW] - accessed December 15, 2022.

b. Eurostat: Graduates in tertiary education, in science, math., computing, engineering, manufacturing, construction, by sex - per 1000 of population aged 20-29 [EDUC_UOE_GRAD04] - accessed December 15, 2022.

c. Eurostat: Human resources in science and technology (HRST) [TSC00025__custom_4914291] - accessed December 15, 2022.

Description: Human resources in science and technology (HRST) as a share of the active population in the age group 25-64. The data shows the active population in the age group 25-64 that is classified as HRST (i.e. having successfully completed an education at the third level or being employed in science and technology) as a percentage of total active population aged 25-64. HRST are measured mainly using the concepts and definitions laid down in the Canberra Manual, OECD, Paris, 1995.

2. Figures and Tables

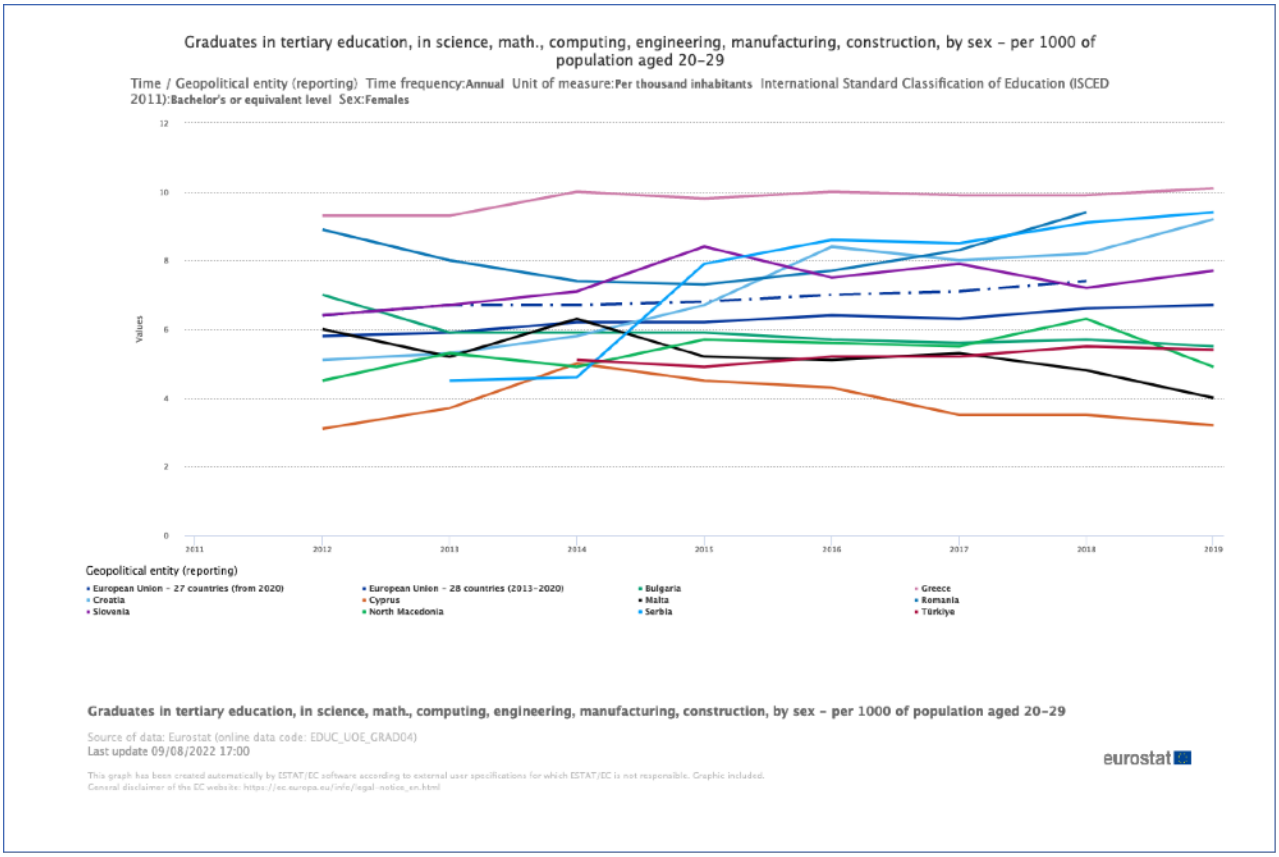

Figure 1: Graduates in tertiary education, in science, math., computing, engineering, manufacturing, construction, by sex - per 1000 of population aged 20-29

Time / Geopolitical entity (reporting)
Time frequency:Annual
Unit of measure: Per thousand inhabitants
International Standard Classification of Education (ISCED 2011): Bachelor's or equivalent level
Sex: Females
Geopolitical entity (reporting): European Union Bulgaria Greece Croatia Cyprus Malta Romania Slovenia North Macedonia Serbia Türkiye
Source of data: Eurostat (online data code: EDUC UOE GRAD04)
Last update 09/08/2022 17:00

Source: Eurostat - Accessed December 15, 2022

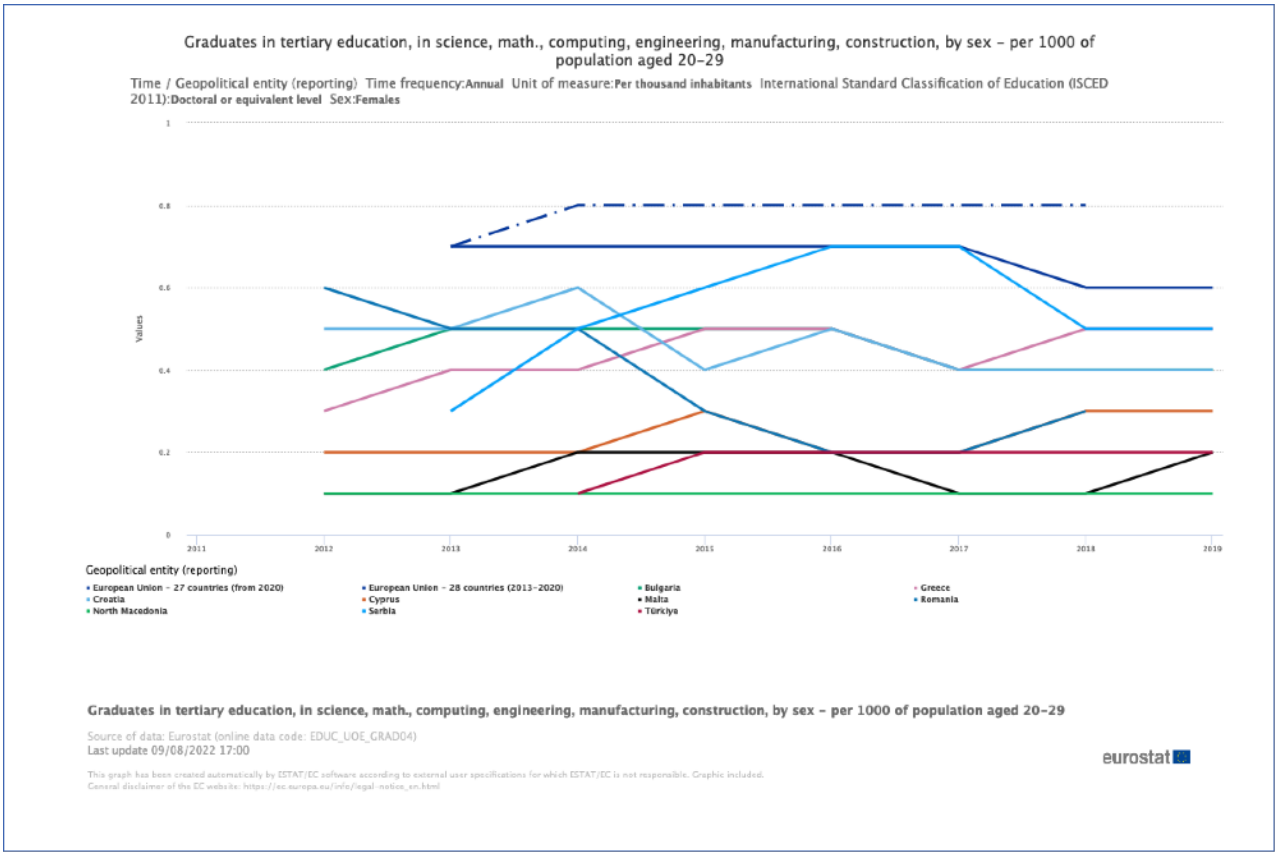

Figure 2: Graduates in tertiary education, in science, math., computing, engineering, manufacturing, construction, by sex - per 1000 of population aged 20-29

Time / Geopolitical entity (reporting)
Time frequency: Annual
Unit of measure: Per thousand inhabitants
International Standard Classification of Education (ISCED 2011): Doctoral or equivalent level
Sex: Females
Geopolitical entity (reporting): European Union Bulgaria Greece Croatia Cyprus Malta Romania Slovenia North Macedonia Serbia Türkiye
Source of data: Eurostat (online data code: EDUC UOE GRAD04)
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Source: Eurostat - Accessed December 15, 2022

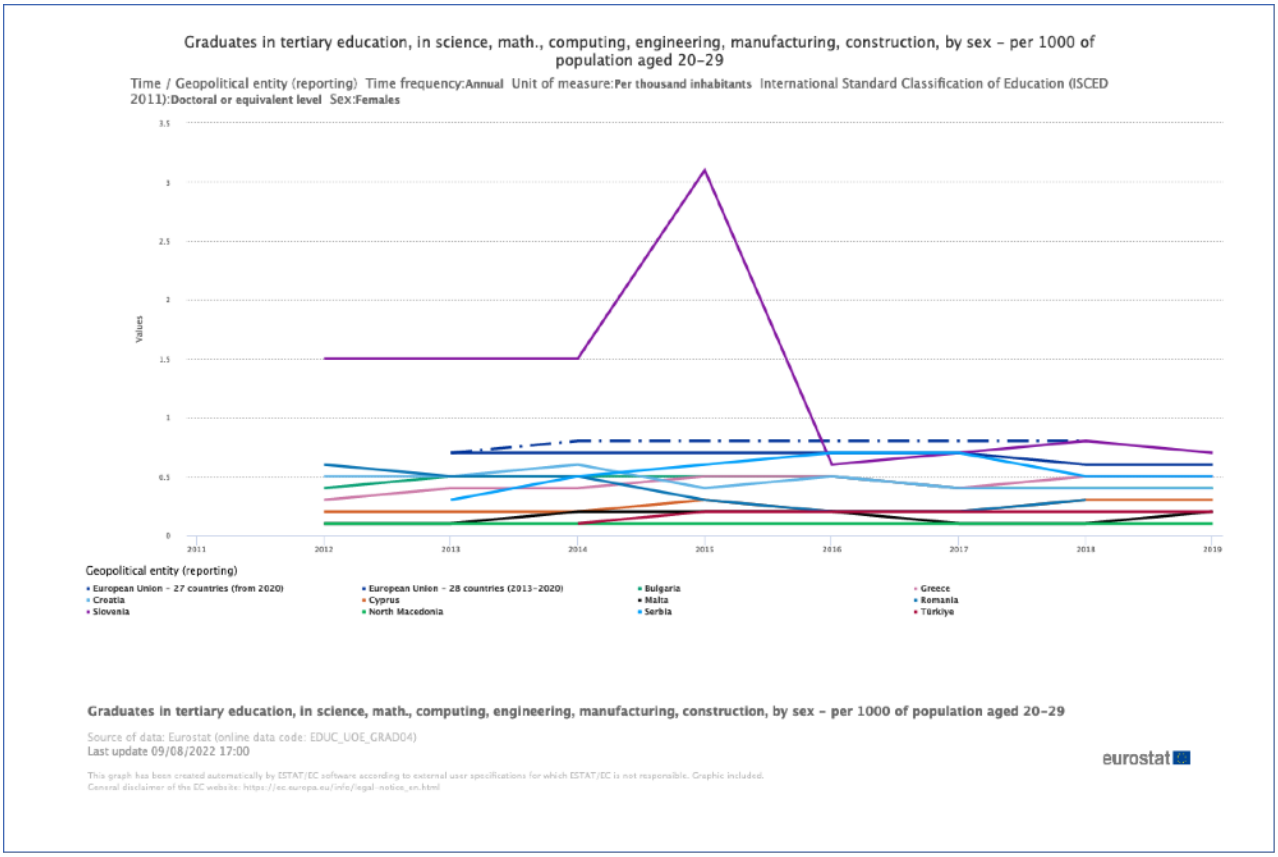

Figure 3: Graduates in tertiary education, in science, math., computing, engineering, manufacturing, construction, by sex - per 1000 of population aged 20-29

Time / Geopolitical entity (reporting)
Time frequency: Annual
Unit of measure: Per thousand inhabitants
International Standard Classification of Education (ISCED 2011): Master's or equivalent level
Sex: Females
Geopolitical entity (reporting): European Union Bulgaria Greece Croatia Cyprus Malta Romania Slovenia North Macedonia Serbia Türkiye
Source of data: Eurostat (online data code: EDUC UOE GRAD04)
Last update 09/08/2022 17:00

Source: Eurostat - Accessed December 15, 2022

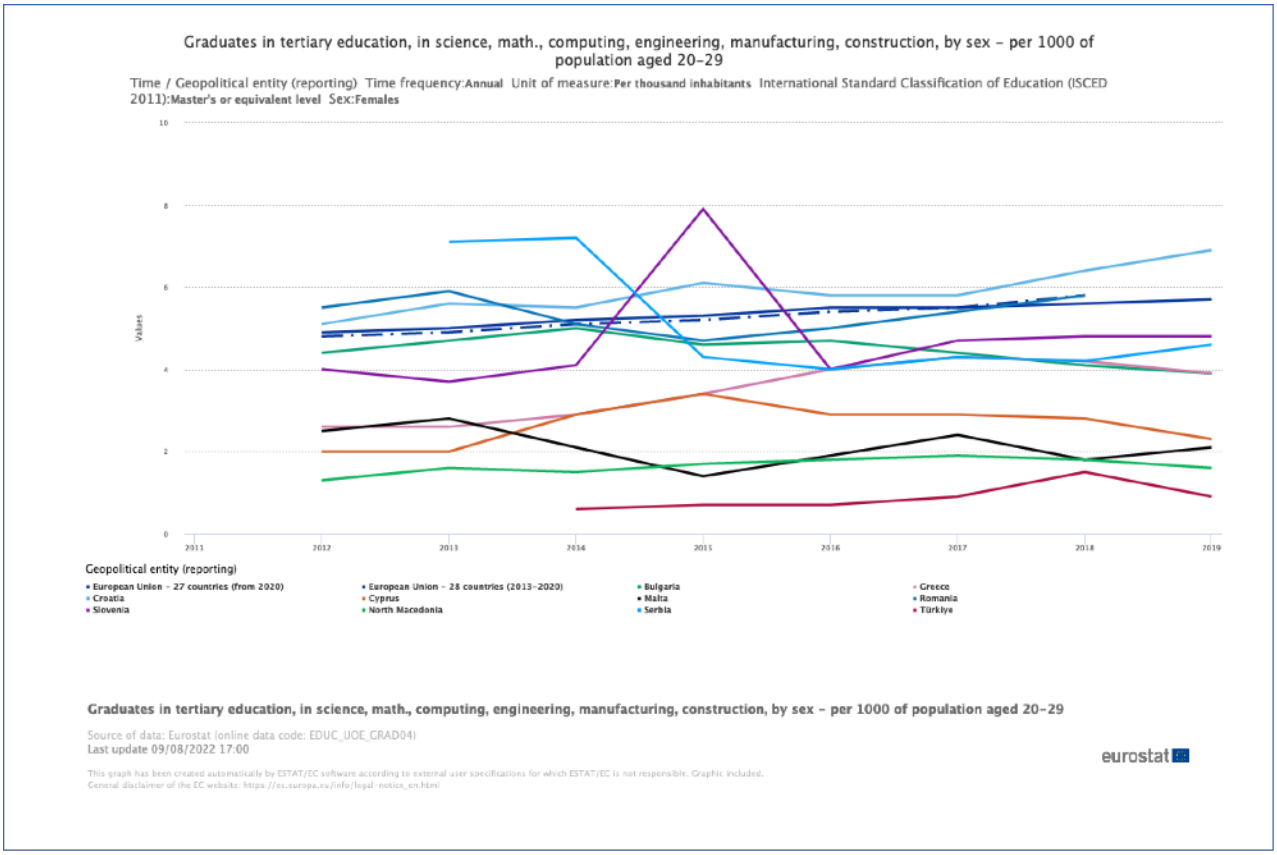

Figure 4: Graduates in tertiary education, in science, math., computing, engineering, manufacturing, construction, by sex - per 1000 of population aged 20-29

Time / Geopolitical entity (reporting)
Time frequency: Annual
Unit of measure: Per thousand inhabitants
International Standard Classification of Education (ISCED 2011): Master's or equivalent level
Sex: Females
Geopolitical entity (reporting): European Union Bulgaria Greece Croatia Cyprus Malta Romania Slovenia North Macedonia Serbia Türkiye
Source of data: Eurostat (online data code: EDUC UOE GRAD04)
Last update 09/08/2022 17:00

Source: Eurostat - Accessed December 15, 2022

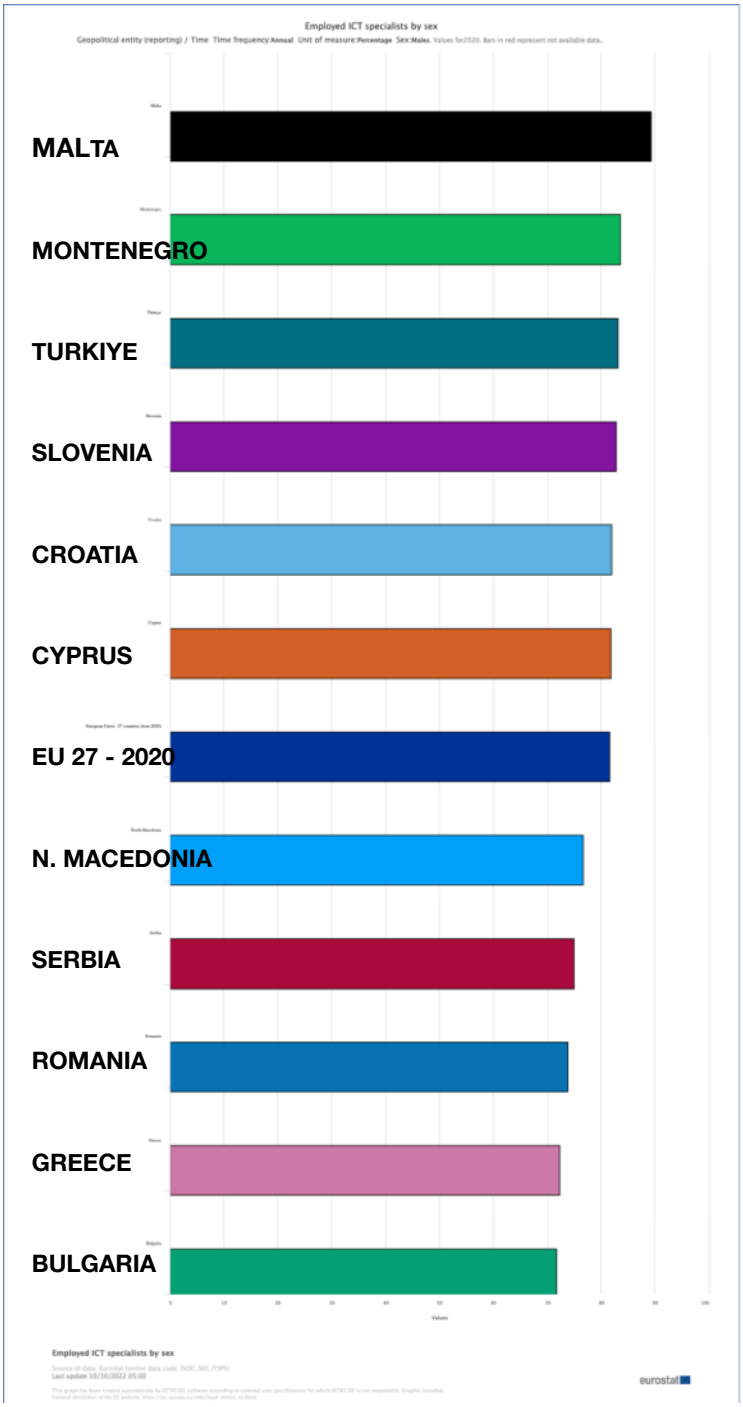

Figure 5: Employed ICT specialists by sex - Males, 2020, EU (country name added)

Geopolitical entity (reporting) / Time
Time frequency:Annual
Unit of measure: Per thousand inhabitants
International Standard Classification of Education (ISCED 2011): Bachelor's or equivalent level
Sex: Males
Values for 2020
Geopolitical entity (reporting): European Union Bulgaria Greece Croatia Cyprus Malta Romania Slovenia Montenegro North Macedonia Serbia Türkiye
Source of data: Eurostat (online data code: EDUC UOE GRAD04)

Source: Eurostat - Accessed December 15, 2022

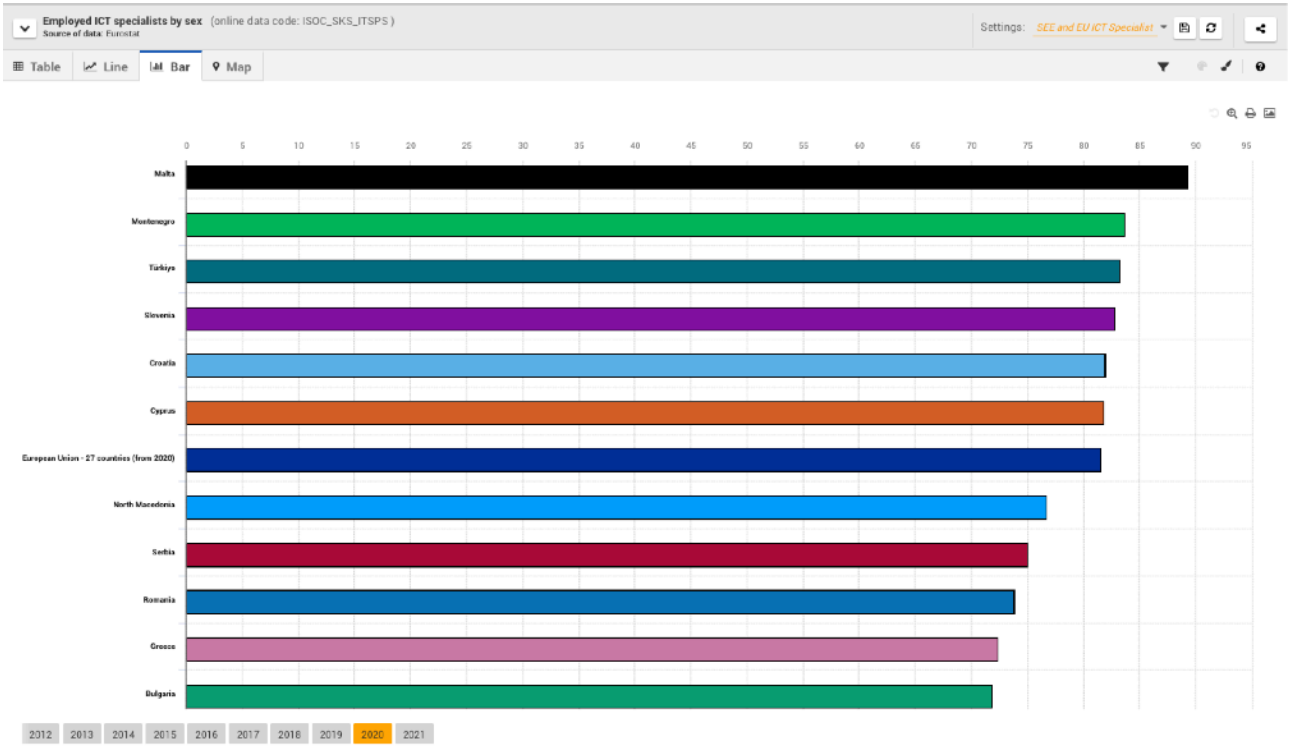

Figure 6: Employed ICT specialists by sex - Males, 2020

Settings: SEE and EU ICT Specialist (online data code: ISOC_SKS_ITSPS)
Geopolitical entity (reporting): European Union Bulgaria Greece Croatia Cyprus Malta Romania Montenegro North Macedonia Serbia Türkiye
European Union - 27 countries (from 2020)

Source: Eurostat - Accessed December 15, 2022

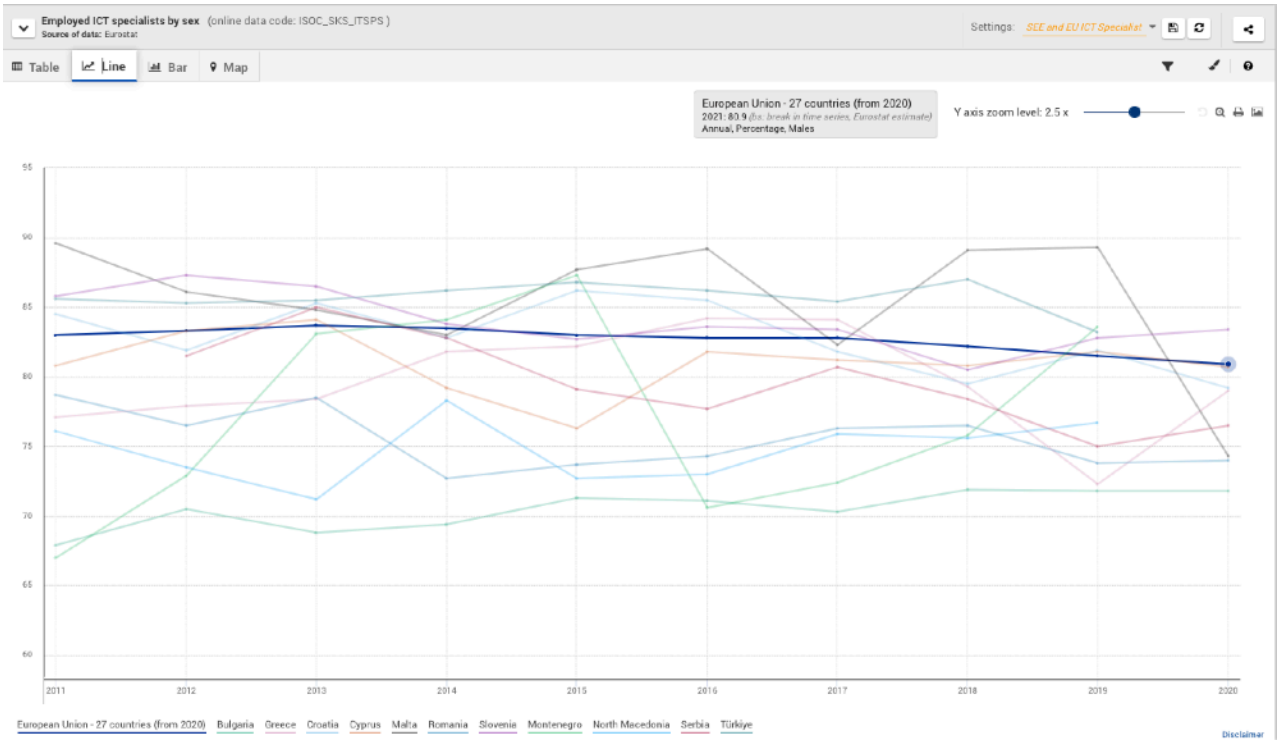

Figure 7: Employed ICT specialists by sex - Male

Settings: SEE and EU ICT Specialist - Employed ICT specialists by sex (online data code: ISOC_SKS_ITSPS)
European Union - 27 countries (from 2020), 2021: 80.9 (bs: break in time series. Eurostat estimate)
Annual. Percentage. Males
Geopolitical entity (reporting): European Union - 2 countries from ZUZ01 Bulgaria Greece Croatia Cyprus Malta Romania Slovenia Montenegro North Macedonia Serbia Türkiye

Source: Eurostat - Accessed December 15, 2022

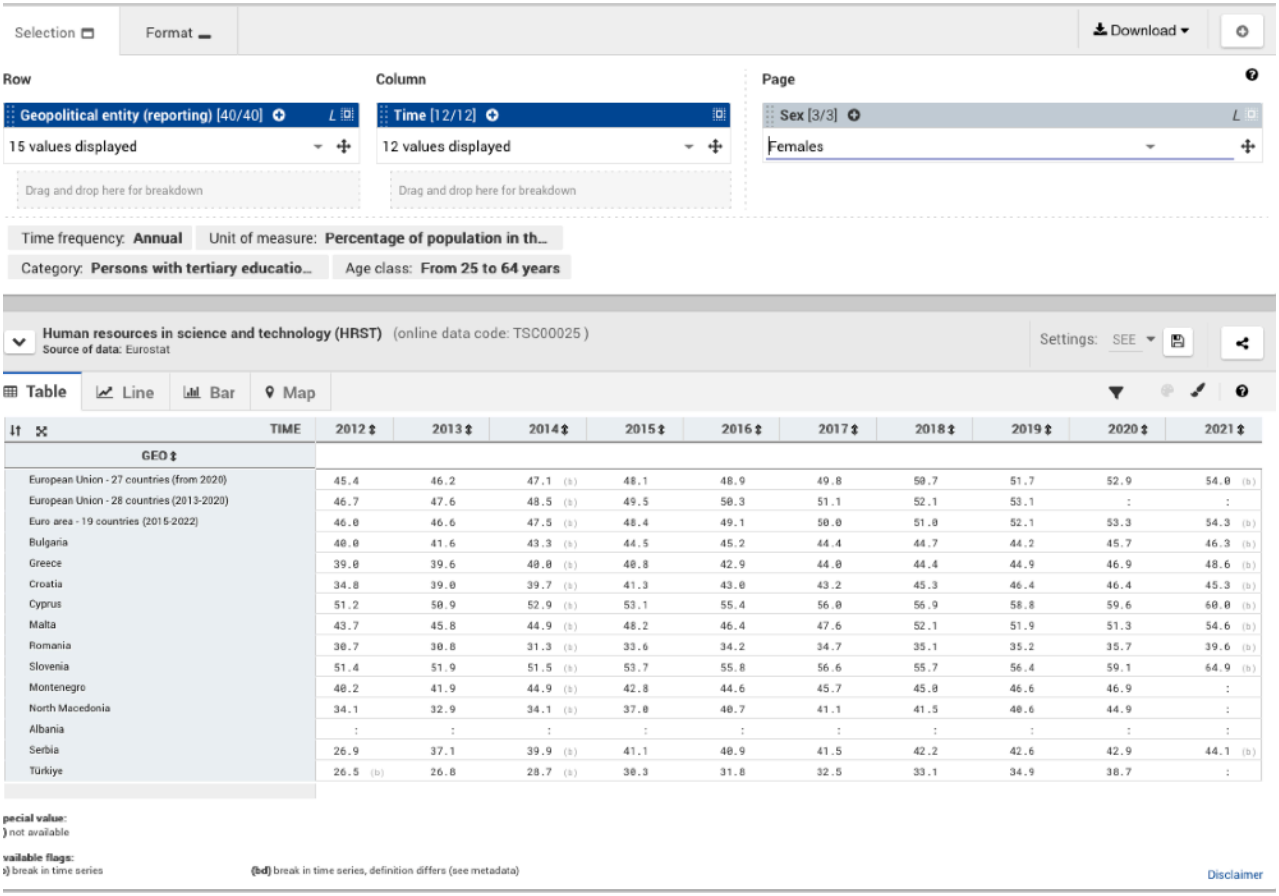

Table 1: Human resources in science and technology (HRST) - Females

Time / Geopolitical entity (reporting)
Time frequency: Annual
Unit of measure: Percentage of population in labour force
Category: Persons with tertiary education (ISCED) and/or employed in science and technology
Age class: From 25 to 64 years
Sex: Females
Geopolitical entity (reporting): European Union Bulgaria Greece Croatia Cyprus Malta Romania Slovenia Montenegro North Macedonia Albania Serbia Türkiye

Source: Eurostat - Accessed December 15, 2022

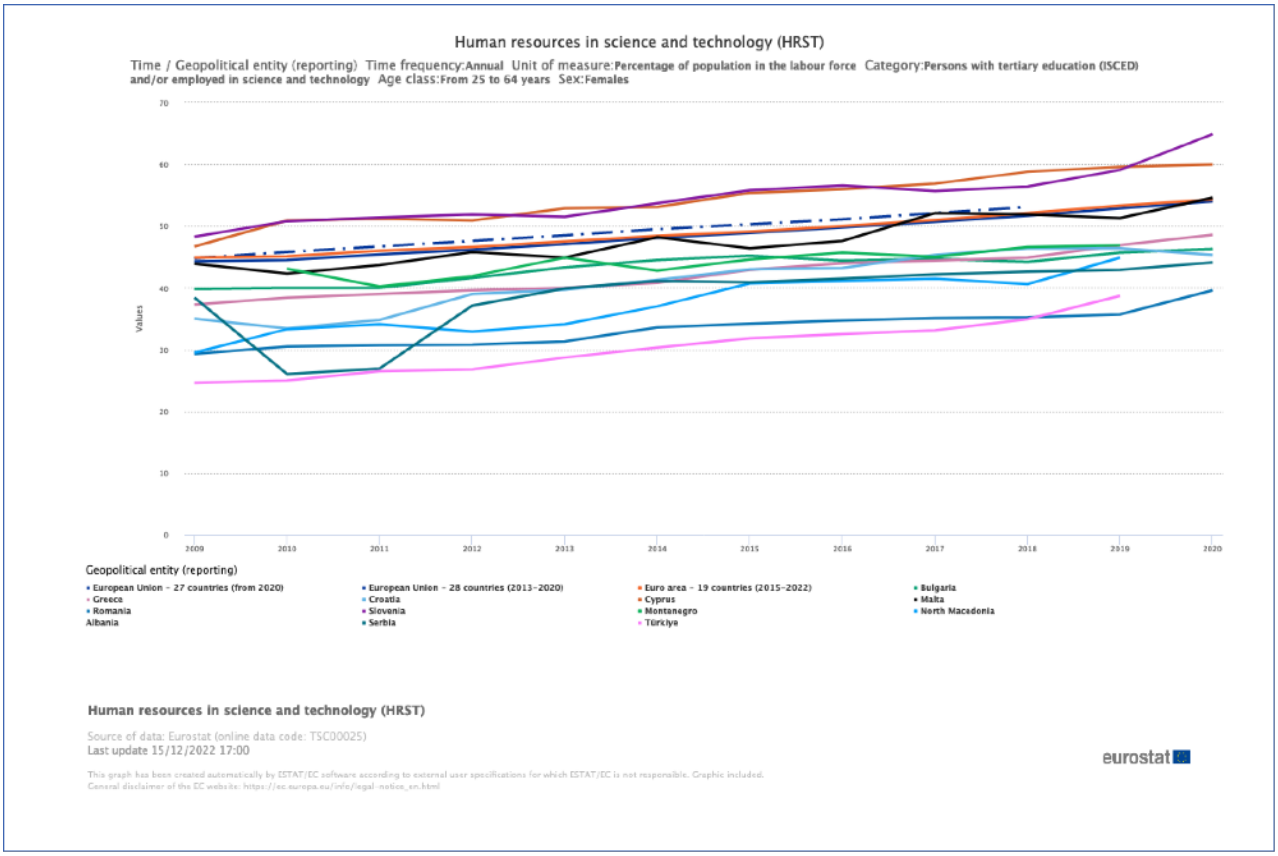

Figure 8: Human resources in science and technology (HRST) - Females

Time / Geopolitical entity (reporting)
Time frequency: Annual
Unit of measure: Percentage of population in labour force
Category: Persons with tertiary education (ISCED) and/or employed in science and technology
Age class: From 25 to 64 years
Sex: Females (graphic)
Human resources in science and technology (HRST) (online data code: TSC00025)
Geopolitical entity (reporting): European Union Bulgaria Greece Croatia Cyprus Malta Romania Slovenia Montenegro North Macedonia Albania Serbia Türkiye

Source: Eurostat - Accessed December 15, 2022

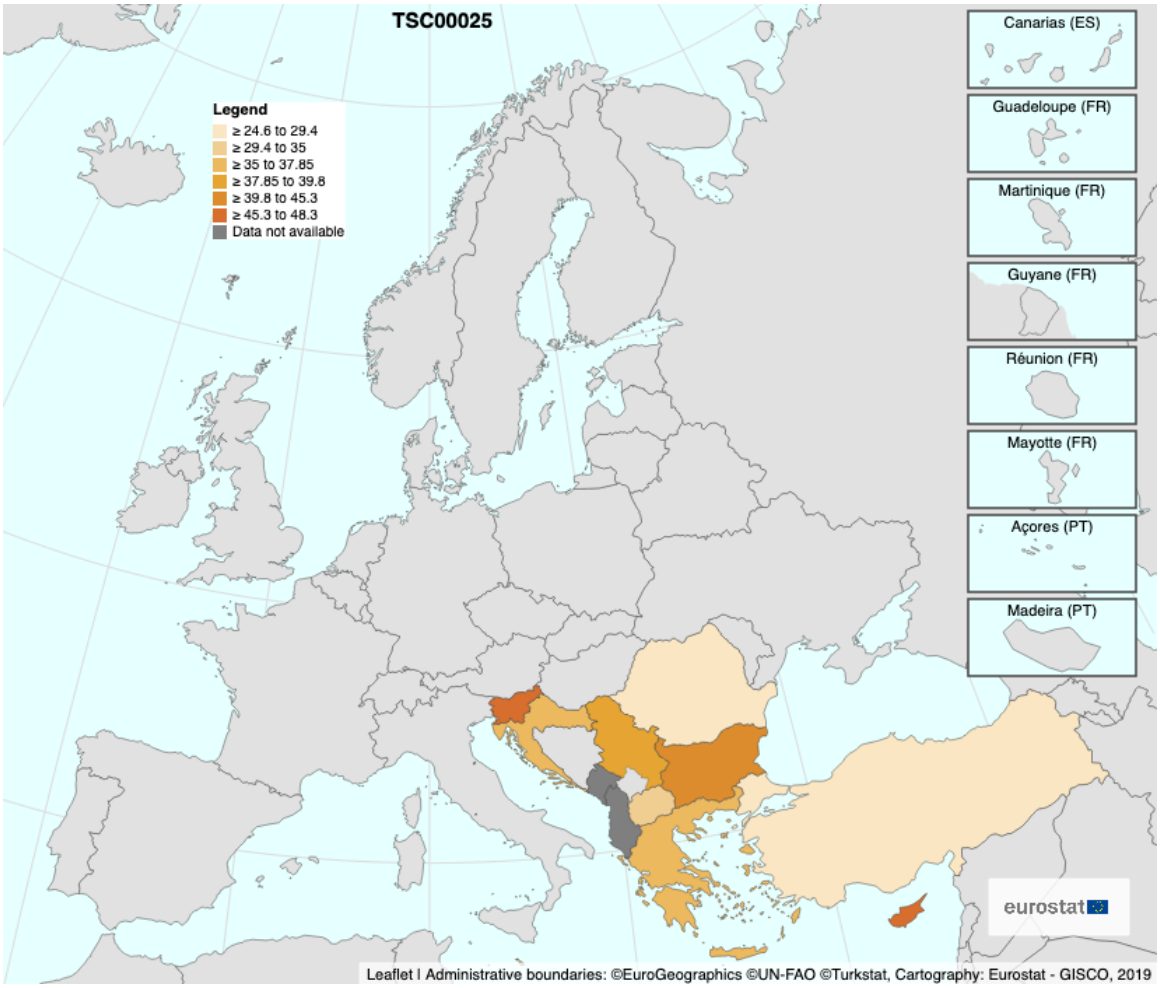

Figure 9: Human resources in science and technology (HRST) - 2010

Geopolitical entity (reporting) / Time: 2010
Time frequency: Annual
Unit of measure: Percentage of population in the labour force
Category: Persons with tertiary education (ISCED) and/or employed in science and technology
Age class: From 25 to 64 years
Sex: Females
Administrative boundaries: @EuroGeographics @UN-FAO @Turkstat, Cartography: Eurostat - GISCO, 2019
Human resources in science and technology (HRST) [TSC00025]
Source of data: Eurostat - Last updated date: Thursday. December 15. 2022 5:00 PM
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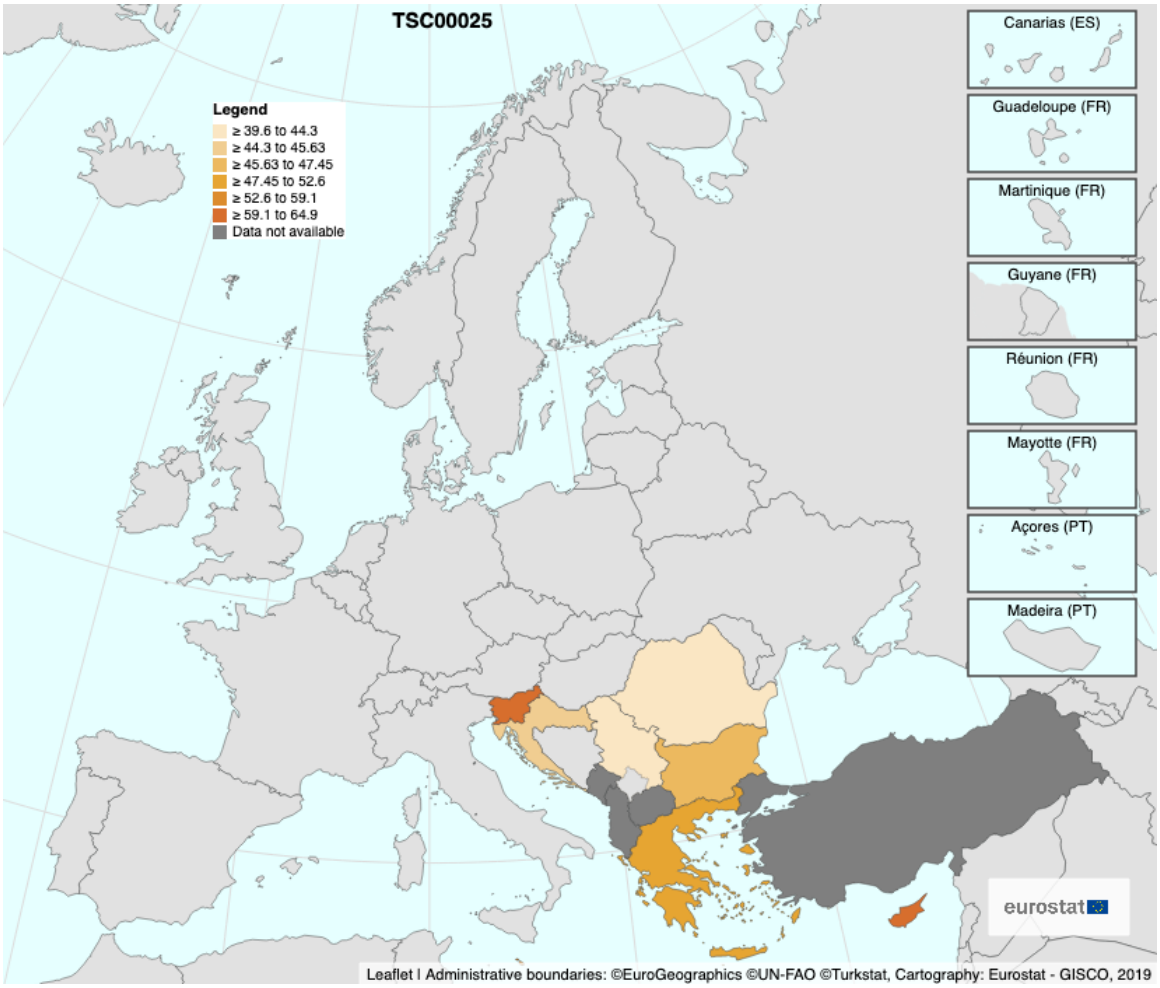

Figure 10: Human resources in science and technology (HRST) - 2021

Geopolitical entity (reporting) / Time: 2021
Time frequency: Annual
Unit of measure: Percentage of population in the labour force
Category: Persons with tertiary education (ISCED) and/or employed in science and technology
Age class: From 25 to 64 years
Sex: Females
Administrative boundaries: @EuroGeographics @UN-FAO @Turkstat, Cartography: Eurostat - GISCO, 2019
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Vrabie, Elena. “How Come Bulgaria and Romania Lead ‘Women in Tech’ Rankings?” *TheRecursive.com*, 7 Mar. 2022, therecursive.com/how-come-bulgaria-and-romania-lead-women-in-tech-rankings.

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C. Curriculum Vitae - Cheryl Miller

Bio:

Cheryl Miller is a recognized leader in grassroots action and global advocacy to close the digital gender divide and promote women's economic empowerment. In 2014, Cheryl founded the Digital Leadership Institute, a Brussels-based international NGO recognized by the UN in 2019 for its global leadership in inclusive digital transformation. In 2018, Google and the Financial Times placed Cheryl among the 100 Digital Pioneers of Europe, and in the same year, Cheryl received a coveted "GLOMO" Global Mobile Industry Leader Award for her work around the world promoting digital equity and women-led entrepreneurship.

In a 30 year career spanning five continents, Cheryl has held progressive leadership roles in global trade, the automotive sector, ICT, and in innovation and technology policy in Europe, the US, Japan, and Russia. Since 2010, she has advocated at the EU, UN and G20, and led global digital skills and entrepreneurship programs benefiting the world's most under-served communities. Since 2017, Cheryl has served as Co-Head of EU Delegation to the G20 Women20 engagement group, leading W20 policy work on Digital Inclusion, Women's Entrepreneurship and Education at the G20 meetings in Argentina, Japan, Saudi Arabia, Italy, Indonesia and India.

Cheryl regularly authors and is featured in articles on the subjects of digital transformation, digital equity and inclusion, future workforce, entrepreneurship, innovation and education, for scholarly journals and global media outlets like The Economist and Financial Times. She has presented at the UN and European Parliament, and at industry events including Mobile World Congress, TEDx, EmTech, OSCON, CPDP and FOSDEM.

Cheryl is past-President and Chair of the Women Entrepreneurship Platform, founding member of the European Commission Digital Jobs and Skills governing board, and European Centre for Women and Technology network chair. She currently serves as Education, Skills and Labour Force Participation Task force Chair for W20 India, Digital Equity Chair for Women Entrepreneurship Act (WE Act) initiative of the G20/Women20, Policy Chair and Community Councilmember for WEgate, and Advisory Board Member to the EU Young Entrepreneurs Organization. Cheryl also advises European Commission projects on topics of Entrepreneurship, Technology, Ethics, and Diversity, Equity and Inclusion in RD&I.

Cheryl holds a degree in International Relations, Law & Organizations from the Georgetown School of Foreign Service and a Master of International Business Studies from the Moore School of Business at USC. Cheryl is both Belgian and American, and speaks, reads and writes English, Japanese, Dutch, French, Italian and Russian at an intermediate or higher level.

Work Experience:

- ***Director***
  Digital Leadership Institute - Brussels, Belgium
  March 2014 - Present
  Founded and leads award-winning international nonprofit promoting inclusive digital transformation; deploying high-visibility global engagement campaigns, and high-impact digital and entrepreneurship skills programs that leverage disruptive technologies for the world's most under-served communities; leadling grant-writing and project delivery in the millions of euros; securing partnerships at highest level in international public and private sectors; generating thought-leadership articles and speaking on subjects of digital disruption, inclusion, education, and workforce of the future.

- ***Chief Executive Officer***
  Zen Digital Europe - Brussels, Belgium
  September 2003 - December 2018
  Founded and led consultancy in cybersecurity and IT organizational change for finance/banking, aerospace, ICT and public sector organizations; served as interim executive IT manager for global ICT service organizations.

- ***Senior Consultant***
  Quint Wellington Redwood - Antwerp Belgium
  February 2001 - September 2003
  Provided IT Service Management consulting for multi-million dollar mission-critical IT organization projects impacting tens of thousands of users, for blue chip banking sector, airline industry and public sector organizations.

- ***Senior Consultant***
  GlobalSign - Brussels, Belgium (now Verisign, South Africa)
  September 1999 - September 2001
  Managed business development, quality assurance and European Commission PKI cybersecurity projects impacting thousands of end-users.

- ***"Russia Online" Business Unit Manager***
  Global TeleSystems - Moscow, Russia
  September 1996 - December 1998
  Managed "Russia Online" Internet Service Provider business unit with direct report staff of fifteen people and multi-million dollar annual revenue.

- ***Strategic Marketing Consultant***
  General Motors - Delphi Automotive Systems - Tokyo, Japan
  July 1995 - January 1996
  Authored General Motors APAC business strategy under John "Jack" Smith, Jr.; organized Asia region auto trade shows and OEM visits; oversaw APAC corporate communications and coordinated integrated marketing strategy.

- ***Non-ferrous Sales and Precious Metals Trader***
  Sumitomo USA - New York, NY
  January 1992 - May 1994
  Managed precious metals positions and researched and developed business intelligence brieings on non-ferrous metals business opportunities for trading company member companies.

- ***Policy Analyst and Business Development - Technical Development Center***
  Mitsui & Co. - Washington DC & New York, NY
  January 1992-January 1996
  Researched and disseminated intelligence brieings on US criticial technology policies; and successfully deployed business opportunities for uptake in the Japanese market in areas of information services, telecommunications and digital media.

- ***Legal Assistant***
  Reed Smith - Washington DC
  September 1989-January 1992
  Carried out patent litigation research and English-Japanese translation for US-Japan patent litigation in telecommunications.

Board & Ambassador Appointments:

- ***Head of European Union Delegation***
  G20 / Women20 Stakeholder Group
  January 2018 - Present
  EU delegate and expert on Digital Inclusion and Entrepreneurship for the Women20 interest group to the G20 meetings in Argentina, Japan and Saudi Arabia, Italy and Indonesia.

- ***Cloud Ambassador***
  Amazon Web Services (AWS)
  2020 - Present
  Evangelist for the world's largest cloud computing education platform, AWS Educate, sharing knowledge and experience in teaching cloud computing, particularly to vulnerable and under-served communities.

- ***Governing Board Member***
  European Commission Digital Skills & Jobs Coalition
  September 2017 - April 2020
  Providing strategic leadership and high-level advice to improve functioning and impact of the Digital Skills and Jobs Coalition of the European Commission, monitoring its overall progress, representing partners at European level, and acting as a link between pledgers, national Coalitions and civil society partners.

- ***Chair, President and Board Member***
  Women Entrepreneurship Platform (WEP)
  October 2017 - September 2021
  Provided strategic and operational leadership to flagship European platform of associations promoting the interests of ten million women entrepreneurs in Europe.

- ***Policy Chair and Community Council Member* - WEgate**
  2020 - Present
  Policy Chair and Community Council Member for flagship European Commission program promoting women-led entrepreneurship.

- ***Chair* - European Centre for Women and Technology (ECWT)**
  June 2011 - May 2015
  Chair of national point of contact for pan-European multi-stakeholder network promoting greater participation of women in digital studies and careers.

- ***Ambassador* - Women's Entrepreneurship Day**
  2015 - Present
  National ambassador for the Women's Entrepreneurship Day (WED), #ChooseWomen campaign and portal which collectively represent a grassroots movement to promote women in business worldwide.

- ***Ambassador* - Startup Europe Week**
  2015 - 2018
  Founding ambassador to pan-European network promoting entrepreneurship and entrepreneurial culture through awareness-building events, trainings and mentorship.

- ***Ambassador* - Europe Code Week**
  2013 - 2016
  Founding ambassador to pan-European network promoting uptake of digital skills and jobs through awareness-building and training.

Sample DLI Project Work:

- **R&I PEERS** (Research & Innovation Peers) Project– *European Union Horizon2020* funding scheme, 2017-2023: Project implementing Gender Equality Plans in European research institutions.

- **ATHENA** (Approaches To valorise the High ENtrepreneuriAl potential of migrant women) – *European Union Asylum, Migration and Integration Fund (AMIF)*, 2021-2023: Project promoting digital and entrepreneurship skills to women migrants to the European Union.

- **WE4Change** (Women in Entrepreneurship for Environmental Change) – *European Union Erasmus+* funding scheme, 2021-2023: Project promoting digital and entrepreneurship skills to teen and adult women to promote climate change action.

- **Digital BrussELLES** – *Digital Belgium Skills Fund*, 2017: Female-focused innovation hub supporting entrepreneurship by teen and adult women through digital and enterpreneurship skills trainings, project acceleration and incubation, and mentorship.

Education:

- **Georgetown University** - Washington, DC, USA
  Bachelor of Science in Foreign Service
  International Relations, Law & Organizations
  +Full scholarship
  +Minor/Certificate in Asian Studies
  +SFS Language Ratings:
  —Japanese: "Very Good"
  —Italian: "Good"

- **Darla Moore School of Business** - University of South Carolina - Columbia, SC, USA
  International Master of Business Administration - IMBA
  Master of International Business Studies (MIBS)
  +Intern at General Motors APAC
  +International Marketing, Management Information Systems, and Operations
  +Japanese Language Concentration

- **Sophia University** - Tokyo, Japan
  Faculty of Comparative Cultures
  International Relations and Affairs
  Activities and Societies:
  +Sophia Athletic Association Kendo Team - All-Tokyo Team & Singles Competitor
  +21 months of study credited toward Georgetown BSFS Degree

Publications & Interviews:

Digital Equity for Women's Economic Agency (forthcoming)
Author - *Digital Inclusion Policy and Research, Volume 2*, Palgrave, 2023

Digital Equity and The Fourth Industrial Revolution
Author - *The Fourth Industrial Revolution and Its Impact on Ethics*, Miller, K., Wendt, K. (Eds.), Springer, 2021

The Economist - Open Digital: Breaking Gender Barriers
Interview with *The Economist Intelligence Unit*, Jun 2018

UN Women #BreakTheGlass Global Campaign for Women's Economic Empowerment
Interview with *UN Women* EmpowerWomen.org, May 17, 2017

UN Human Rights - Ways to Bridge the Gender Digital Divide from a Human Rights Perspective
Contributor - *UN Human Rights* - OHCHR, May 5, 2017

European Commission: Girls in ICT Every Day
Author - *European Commission* - DG Connect, April 27, 2017

GE Reports - The Digital Gender Divide Is An Economic Problem For Everyone
Author - *GE Reports*, March 8, 2017

EU Eskills Manifesto -Toward Inclusive Digital Transformation
Author - *European Eskills Manifesto* - Coalition for Digital Skills and Jobs in Europe, December 31, 2016

El Mundo - Can Technology Bridge the Gender Gap? We Ask Cheryl Miller (El Mundo)
Interview with *El Mundo* (Spain), Jan 2016

EY Women Fast Forward - Who Holds the Key to Closing the Skills Gap
Contributor - *EY - Women Fast Forward*, 2016

Handelsblatt - Participation of Women Benefits the Economy
Interview with Handelsblatt (Germany), Nov 2015

UN ITU Broadband Commission - "Eskills for Girls & Women" Report
Author - UN ITU Broadband Commission New York Meeting, September 21, 2014

Journal of International Innovation - Digital Leadership Institute
Author - International Innovation, March 15, 2014

Women2020 Action Plan: Time to Act
Coauthor - Women2020, March 6, 2014

Excelsior Mexican Financial Daily - Driving Participation of Women in Tech
Interview with Excelsior - Mexican Financial Daily, May 3, 2013

Data News - Quickest Win for ICT? Attract More Women!
Author - Data News, December 10, 2012

European Voice - Europe Needs More Women in Science
Author - European Voice, April 26, 2012

Jyllands-Posten - Getting Kids into IT
Interview with Jyllands-Posten, April 18, 2012

Parliament Magazine - In the Market
Author - Parliament Magazine eSkills Supplement 2012, March 26, 2012

Toronto Sun - Pushing Girl Power
Interview with Toronto Sun, March 8, 2012

City 2020: ICT-driven Transition to the Low Carbon City
Coauthor - European Commission, Publication #KK-02-13-025-EN-N, 2010

Foresight 2030 Energy Report
Author - *COST European Commission*, Oct 2009

Club of Rome - Selective Growth for Survival
Editor - Club of Rome Statement for UNCCC, 2009

Honors & Awards:

- Women in Tech Global Award Finalist - WomenTech Network - Nov 2022
- UN EQUALS Global Leadership - UN EQUALS Partnership - Nov 2019
- 100 Digital Champions of Europe - Financial Times and Google - Nov 2018
- Global Mobile Award 2018 Winner - Mobile Industry Leader - Individual - GSMA - Mar 2018
- Best 100 Startups - DigiMedia - Oct 2017
- Global Mobile Award 2017 Finalist - Mobile Industry Leader - Individual - GSMA - Mar 2017
- Global Mobile Award 2017 Finalist - Mobile Industry Leader - Organisation - GSMA - Mar 2017
- 2016 European Best Digital Changemaker Finalist - Telecentre Europe - Oct 2016
- InspiringFifty Europe 2017 Key Influencer on Women in Tech in Europe - InspiringFifty - Oct 2016
- InspiringFifty Europe 2016 Key Influencer on Women in Tech in Europe - InspiringFifty - May 2016
- GEM-TECH Awards 2015 for Promoting Women in the Technology Sector - Europe - International Telecommunications Union - Sep 2015
- GEM-TECH Awards 2014 for Enabling Girls to Become ICT Creators - Europe - International Telecommunications Union - Sep 2014
- World Summit on Information Systems - Girls in ICT Best Practices Award Winner - International Telecom Union - May 2012
- Inspiring Woman of The Year 2012 Finalist - Inspiring Wo-Men - Mar 2012
- Bursary for Compostela Prize on behalf of European Commission VP Neelie Kroes - Grupo Compostela-Xunta de Galicia - Jun 2011

Languages:

- Japanese
- Dutch
- French
- Russian
- Italian