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Women in tech: The best bet to solve Europe's talent shortage

To remain competitive in technological growth and innovation, Europe must recruit and retain women for the fastest-growing tech roles of the foreseeable future.

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European leaders looking to build competitive advantage and growth by addressing their technology gap should consider one fact: women[1] occupy only 22 percent of all tech roles across European companies.[2] That's a stunning statistic at a time when technology underpins so much of the innovation and growth in the world today.

Addressing this shortfall is about much more than doing the right thing; it's an economic necessity. While the spate of tech layoffs in the face of economic uncertainties ahead has caused companies to rethink their talent strategies, only 7 percent of the layoffs have been in Europe, according to the *State of European tech* report for 2022,[3] and the underlying economic fundamentals that rely on tech talent remain in place. In fact, McKinsey analysis shows a tech talent gap of 1.4 million to 3.9 million people by 2027 for EU-27 countries.[4] If Europe could double the share of women in the tech workforce to about 45 percent, or an estimated 3.9 million additional women by 2027—something we believe is possible—it could close this talent gap and benefit from a GDP increase of as much as €260 billion to €600 billion.[5]

To better understand why Europe struggles to find and retain tech-talented women, and to determine how best to address the issue, we undertook a detailed analysis of the entire development funnel in Europe, from primary school all the way to entering the workforce (see sidebar, "About the research"). The analysis produced some interesting insights:

— A significant drop in the percentage of women in STEM (science, technology, engineering, and math) classes happens at two points: during the transition from primary and secondary education to university, when it drops 18 percentage points, and during the transition from university to the workforce, when it drops another 15 (Exhibit 1).

— While the rate of women working within tech *companies* (such as social networks) is closer to parity, the rate of women working within tech *roles* (such as developers and data engineers) is much lower.

— The problem is likely to get worse. Women's graduation rate in STEM disciplines during higher education is declining.[6] Furthermore, the share of women in the workforce is lowest in the tech roles that are growing fastest, such as DevOps and cloud. At current rates, the share of women in tech roles in Europe is heading toward a decline to 21 percent by 2027.

This is a tough problem to solve. However, although there are no silver bullets, four interventions—redressing bias in the workforce, improving retention rates, reskilling women into tech roles, and bolstering girls in STEM classes earlier in their educational process—can have a significant impact.

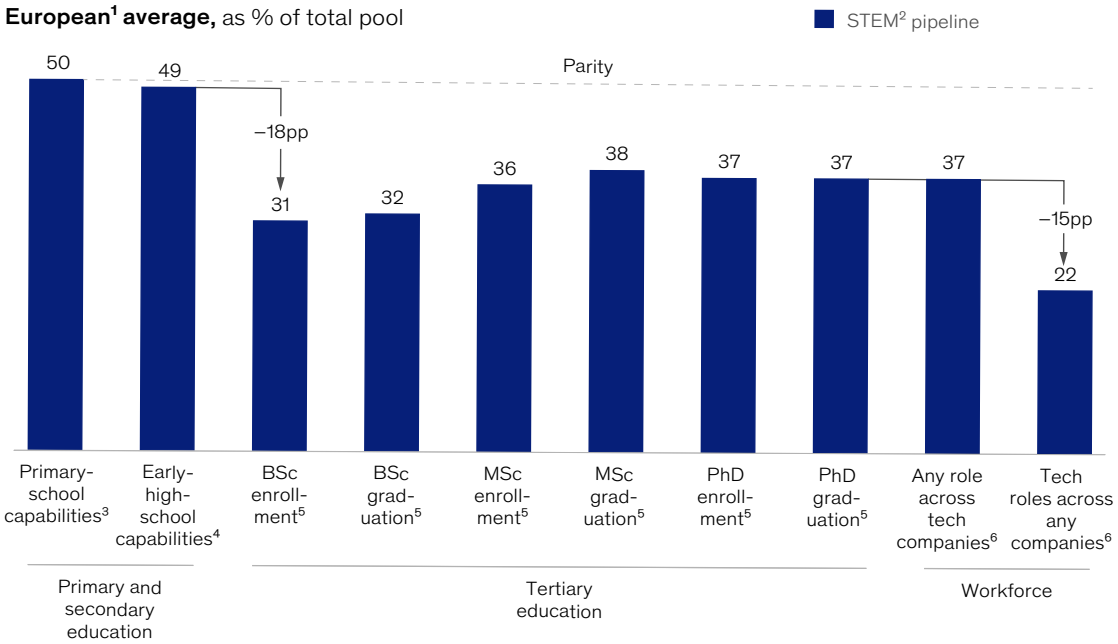
[1] The data available for this study did not measure whether the career trajectories of nonbinary people conform to those of their birth gender, the gender with which they identify, or are unique in ways that are not yet statistically clear. We have therefore used the words "men" and "women" throughout, as applicable to the broad categories for which data was collected in this study.
[2] McKinsey and Eightfold AI analysis. See more on our analysis in the sidebar, "About the research."
[3] *State of European tech 2022*, Atomico, December 2022.
[4] McKinsey Global Institute projection of OECD 2019 data as analyzed in "The vital role of gender equality in Europe's post-pandemic future," November 2021; and McKinsey analysis for EU-27 countries built upon existing talent gap in Germany as analyzed in "Die Lücke wird größer," Stifterverbrand and McKinsey, November 24, 2021.
[5] 2022 GDP data from Statista, tech contributions to GDP in 2022 from the Organisation for Economic Co-operation and Development (OECD), and McKinsey and Eightfold AI analysis.
[6] Eurostat data.

About the research

Insights in this article were generated from two main sources. McKinsey analysis on schooling (primary, secondary, and tertiary education) was based on publicly available data from Eurostat, the Program for International Student Assessment (PISA), and the Trends in International Mathematics and Science Study (TIMSS) focused on the EU-27 member countries (see footnotes in the exhibits). Proprietary analysis on the European workforce conducted by McKinsey jointly with Eightfold AI, an AI platform for talent development, in August 2022 was based on Eightfold AI's proprietary database on the European workforce. The analysis focused on the EU-27 member countries, Eightfold AI's proprietary data set of more than 60 million European workforce profiles, and more than one million tech profiles.

Exhibit 1

There are two major drop-off points for women in European tech: at the end of secondary education and at workforce entrance.



[1]Defined as EU-27 countries.
[2]Defined as total across natural sciences, mathematics, statistics, ICT, engineering, manufacturing, and construction.
[3]Calculated through average TIMSS Grade 4 test scores across science and math for EU-27 participants, IEA TIMSS test scores, 2019.
[4]Calculated through average PISA/TIMSS Grade 8 test scores across science and math for EU-27 participants, OECD PISA, 2019.
[5]Eurostat data on students enrolled in tertiary education for EU-27 countries, 2020.
[6]McKinsey and Eightfold AI research on state of European tech, which draws on proprietary Eightfold AI data source of more than 60 million European workforce profiles, 2022.

A closer look: First drop-off—from primary and secondary education to university

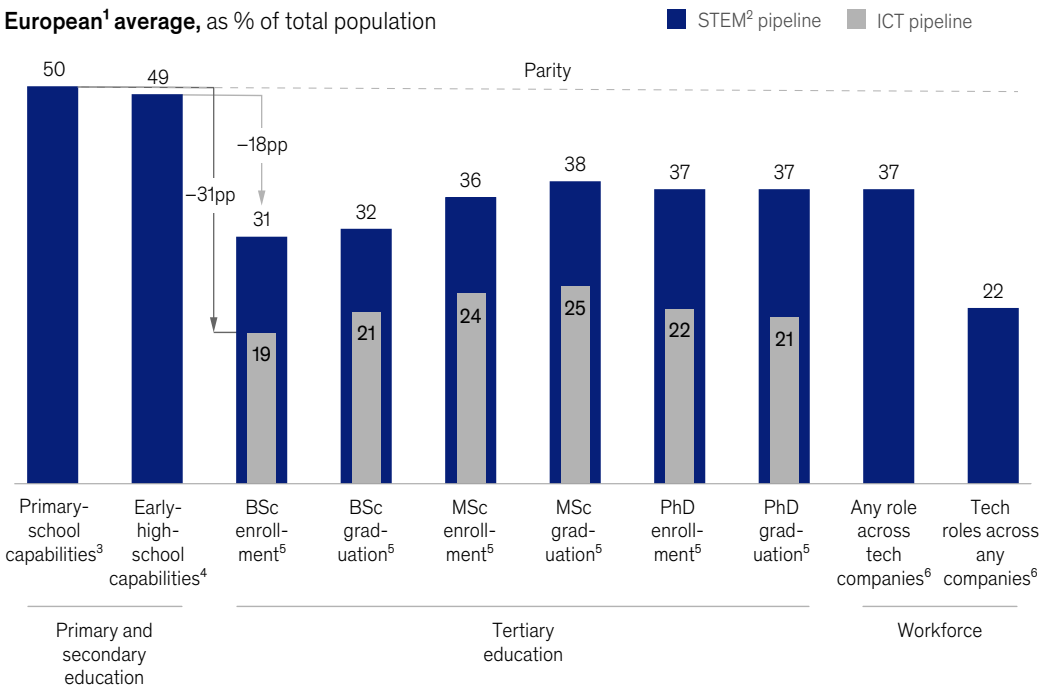
During primary and secondary education, there are no indications that girls lag behind boys in STEM classes. In fact, in Bulgaria, Finland, Latvia, and Sweden, girls slightly outperform boys in science and math tests.[7]

Despite this fact, there's an 18-percentage-point drop in girls going into STEM disciplines when they go to university. The drop is even more dramatic—31 percentage points—when analyzing young women going into ICT disciplines (ICT is a subsegment of STEM that focuses on information science, computer science, and technology, fields that more closely match education requirements for those going into tech roles) (Exhibit 2). Worse, trend lines showed a small but steady decline of one to two percentage points in women STEM graduates from 2016–20. This is all the more discouraging because in some STEM disciplines, such as natural science, we are almost reaching gender parity.

There are two main reasons for these drop-offs. The first is that secondary-school girls get significantly less teacher, parental, and peer support than boys do for pursuing STEM careers.[8] Second, some research

Exhibit 2

Women's participation in ICT disciplines, a core element of STEM and fundamental for tech, drops drastically in tertiary education.



[1]Defined as EU-27 countries.
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[4]Calculated through average PISA/TIMSS Grade 8 test scores across science and math for EU-27 participants, OECD PISA, 2019.
[5]Eurostat data on students enrolled in tertiary education for EU-27 countries, 2020.
[6]McKinsey and Eightfold AI research on state of European tech, which draws on proprietary Eightfold AI data source of more than 60 million European workforce profiles, 2022.

[7] According to TIMSS and PISA test scores, standardized science and math tests conducted at different age levels across multiple European countries.
[8] Zacharias C. Zacharia, Tasos Hovardas, Nikoletta Xenofontos, Ivoni Pavlou, and Maria Irakleous, *Education and employment of women in science, technology, and the digital economy, including AI, and its influence on gender equality*, European Parliament, April 15, 2020.

suggests that girls are told that they aren't good at STEM, often communicated in subtle but debilitating behaviors, such as teachers in STEM classes calling on boys more than girls.[9]

This drop-off has the potential to create a self-fulfilling downward cycle. With only 19 percent of ICT bachelor students being women, the resulting isolation is often another reason women drop out of these classes.[10] The silver lining in the data is that women's graduation rates are on par with or slightly higher than men's, suggesting that women who choose these disciplines are more likely than men to stick with them over the course of their higher education.

A closer look: Second drop-off—from university to the workforce

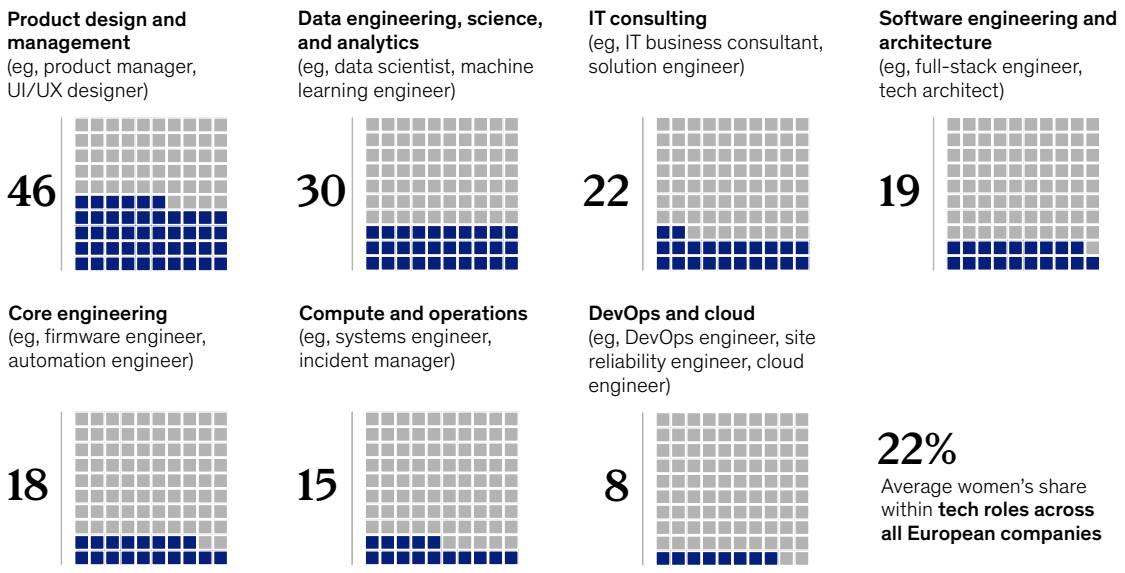
Across multiple industries, the data shows another dispiriting and significant drop-off in the percentage of women who transition into tech roles after graduation. Only 23 percent of women STEM majors end up in tech roles, compared with 44 percent of men.[11]

The distribution of women in specific tech roles across all companies also varies significantly (Exhibit 3). Their greatest participation rate as a percentage of available roles is in product design and management (46 percent) and in data engineering, science, and analytics (30 percent). Their lowest participation rates are in DevOps and cloud roles (8 percent) and compute and operations roles (15 percent).

Exhibit 3

Across all European companies, women are least represented in DevOps and cloud roles.

Average women's share in tech roles, % (n = >1 million profiles)



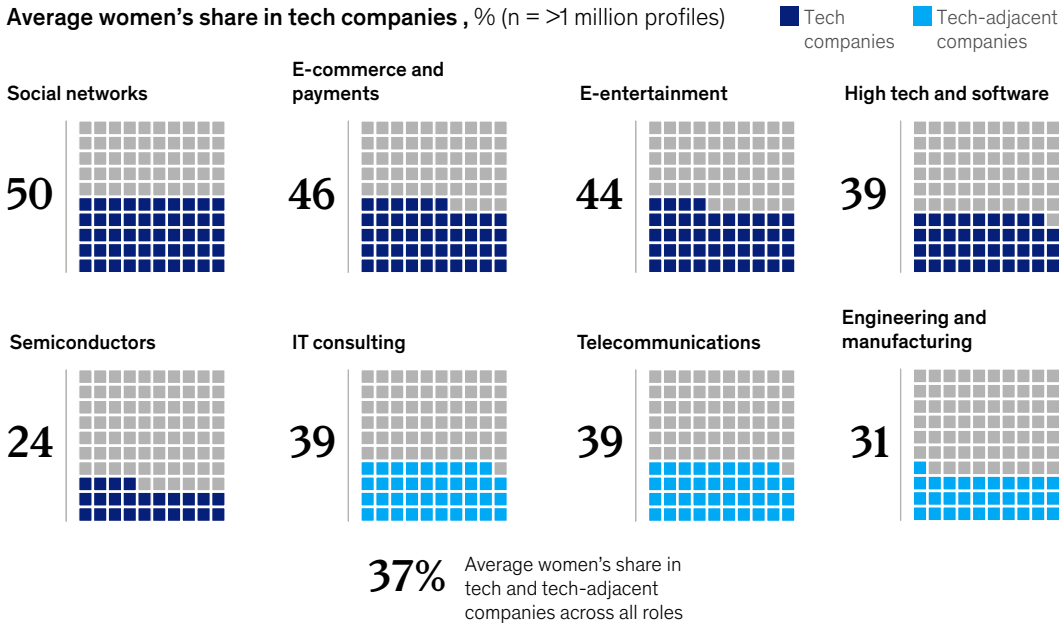
Source: McKinsey and Eightfold AI research on state of European tech, which draws on proprietary Eightfold AI data source of more than 1 million European tech workforce profiles, 2022.

[9] Ibid.
[10] Ibid.
[11] The top nontech roles women STEM majors enter are project management, assistant professor/academia, business analyst, teacher, sales manager, account manager, business development manager, and researcher.

The data is only slightly more promising when we consider women who work at tech companies. While 37 percent of people who work in European tech and tech-adjacent companies are women, with the highest share being in social networking companies (50 percent) and e-commerce businesses (46 percent), the broader pattern remains the same, with women as just 25 percent of those working in tech roles (Exhibit 4).

Exhibit 4

Women's highest share across all roles occurs within social networks and in e-commerce and payments companies.



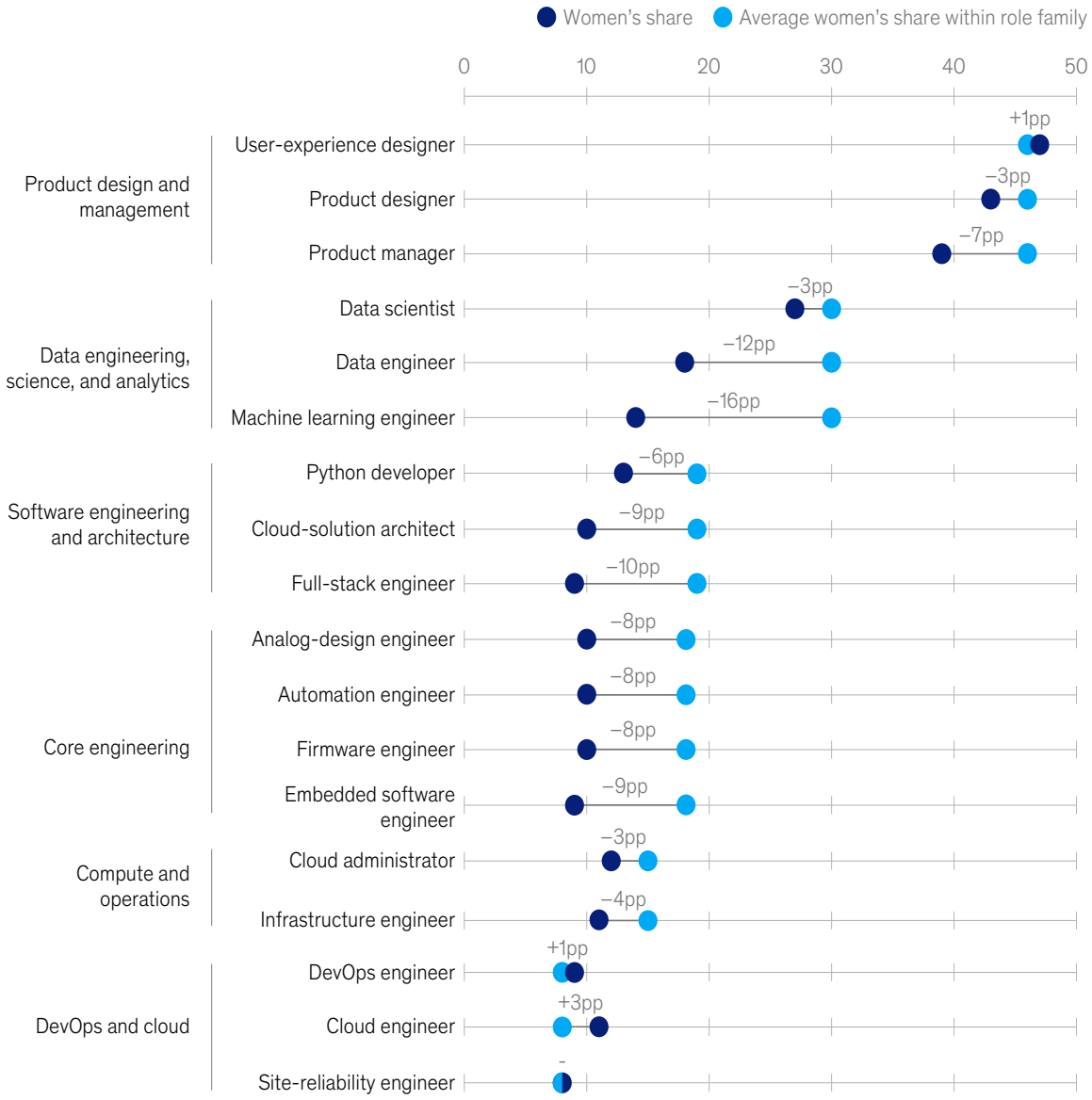
Source: McKinsey and Eightfold AI research on state of European tech, which draws on proprietary Eightfold AI data source of more than 1 million European tech workforce profiles, 2022.

Furthermore, the current representation of women in tech is particularly concerning because the very roles where women have the lowest share are exactly those that will have the highest demand and impact in coming years. For example, while 19 percent of people in the software engineering and architecture functions overall are women, they are only 10 percent of the cloud solution architects and 13 percent of the Python developers, two roles with the highest demand in the job market, according to Eightfold AI analysis (Exhibit 5). Even as a new generation of advanced technologies—from low-code/no-code solutions to generative AI—becomes more common, we anticipate there will continue to be an important need for skilled engineers and developers to not just enhance and maintain those technologies but also develop the next generation of technologies (for example, quantum, Web3, and trust architectures).

Exhibit 5

Women's representation in tech's fastest-growing roles is especially low.

Women's share across fastest-rising tech roles, as % of tech employees (n = >1 million profiles)



Source: McKinsey and Eightfold AI research on state of European tech, which draws on proprietary Eightfold AI data on more than 1 million European tech workforce profiles, 2022.

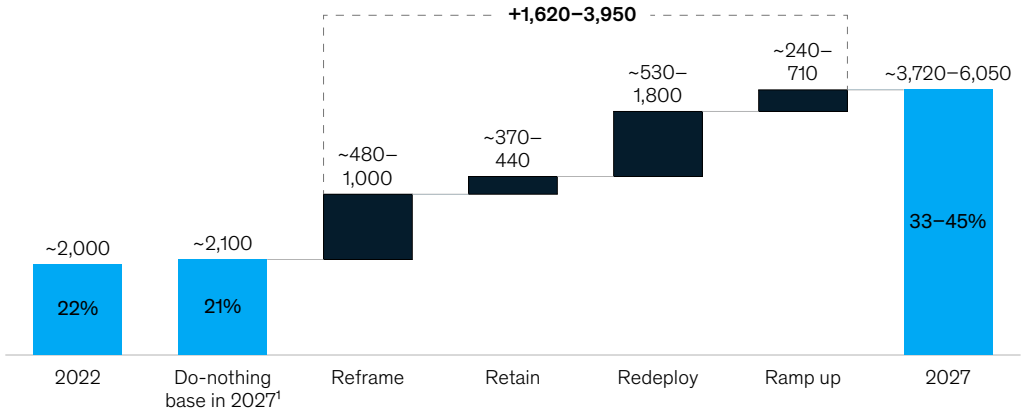
The way forward: Four interventions

Redressing this imbalance is not easy, and no single solution has emerged. But four intervention strategies could have a big effect (Exhibit 6).

Exhibit 6

Four interventions could raise women's share of total tech roles across Europe to around 45 percent by 2027.

Potential effect of coordinated interventions on women's share of tech roles,
in absolute numbers (thousands) and as % of employees



[1]Assumes growth across total number of people in tech and increase in women's share.
Source: McKinsey and Eightfold AI analysis, 2022.

Reframe: Enable women in tech to thrive at work

Based upon our analysis, companies can increase the number of women in tech roles by 480,000 to one million by ensuring companies, and men in positions of influence, provide women with support so they can thrive today in today's digital workforce.

Companies should start with a comprehensive plan that actively addresses the pain points and needs of women. Some 70 percent of women in tech, in fact, still feel like they need to work harder and prove themselves because of their gender.[12] Reducing isolation of women in tech roles by ensuring multiple women are working in the same location can help, as does instituting broader support networks, supportive HR policies, and effective sponsorship.[13] Active sponsorship—often from men—in the form of advocating for women and opening doors to sponsors' networks, in fact, increases the chances that women's ideas are heard (by 70 percent) and are likely to be implemented (by 200 percent).[14]

Improving flexibility at work can have a profound effect on addressing women's needs as well. Around 7 percent of European women (versus 0.5 percent of men) are out of the workforce due to caregiving responsibilities at home, and almost one in four women cite lack of work–life balance as a key reason for leaving tech careers.[15] Offering remote or hybrid working programs, flexible working hours, and on-site childcare, for example, can make a big difference. One European entertainment company found that offering a "work from everywhere" policy lowered its attrition rates by 15 percent and increased women leaders from 25 percent to 42 percent.

[12] *The state of gender equity in tech*, Web Summit, 2022.
[13] Kevin Sneader and Lareina Yee, "One is the loneliest number," McKinsey, January 29, 2019.
[14] Sylvia Ann Hewlett and Laura Sherbin, *Athena Factor 2.0: Accelerating female talent in science, engineering, and technology*, Center for Talent Innovation, 2014.
[15] Eurostat data on people outside the labor force by sex, age, and level of education, 2022.

Retain: Give women a reason to stay in tech

Over half of women in tech leave the industry by the midpoint of their career—more than double the rate of men—resulting in many fewer women reaching leadership roles.[16] By improving the retention of women, European businesses could increase the number of women in tech by 370,000 to 440,000, according to our analysis.[17]

Research shows that women cite two primary reasons for leaving. One is that companies do not provide them with strong management support and/or good opportunities. A recent Integrating Women Leaders Foundation study underscores this issue, finding that while 77 percent of executive men believe they are active allies for gender equality in their companies, only 45 percent of women executives agree.

Addressing this issue is complex, but an important element is developing effective diversity, equity, and inclusion (DEI) practices, such as strong assessment and measurement programs and accountability, and integrating them into the natural flow of business. That includes, for example, having KPIs for retaining women talent as part of the overall talent dashboard that leaders use (rather than making it a separate dashboard) and including retention goals for women as part of managers' performance reviews.

The second issue is that women who aspire to better tech roles often feel they need to change employers. This is part of a broader trend: McKinsey research shows that more than 80 percent of role moves involve people moving from one employer to another, suggesting that changing employers is the route taken by most workers wanting to upgrade their roles.[18] While reasons for switching employers vary, offering flexible career pathways and proactively working with women to explore new tech paths in their career development can help organizations retain more women.

Redeploy: Ensure women are in tech roles that matter

Companies can increase the number of women in tech roles by as much as 530,000 to 1.8 million by 2027 through a range of practices. These include hiring women from untapped pools, training them in modern technologies (such as agile and MLOps), and building up their tech skills.[19]

While this hiring aspiration represents the top threshold of potential in terms of pure numbers, the greater value is more in the quality of the shift rather than in the quantity of those making it. Many women, in fact, work in the fastest-declining tech roles, such as systems administrators and programmer analysts, which are also the roles that have been disproportionately affected by the recent waves of tech layoffs.[20] Companies should focus on hiring and training women to assume tech roles that are gaining importance in the marketplace and society, such as product leads, machine learning engineers, and AI experts.

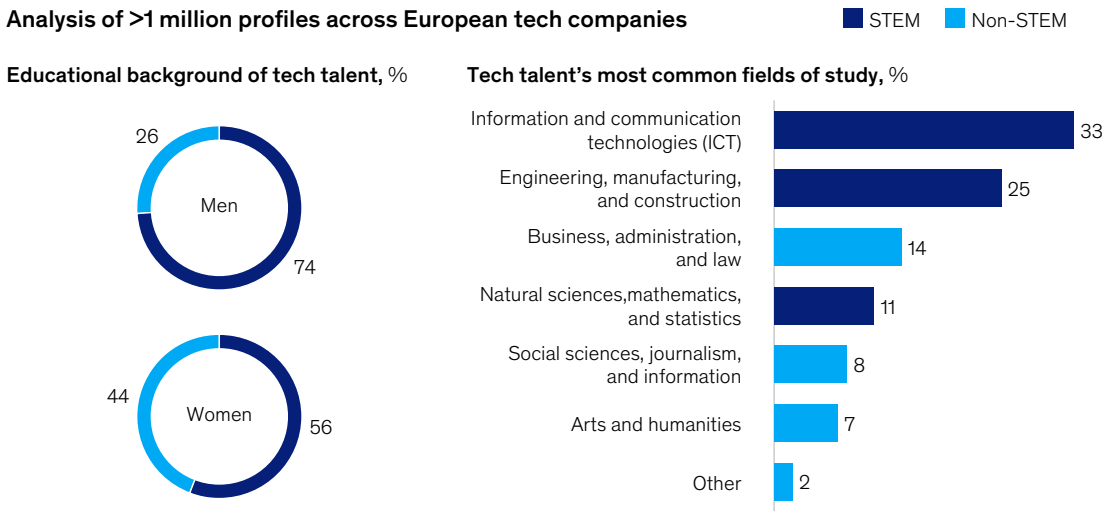
Companies could borrow a page from tech companies, where today about 44 percent of women in tech roles come from non-STEM educational backgrounds and learn on the job (Exhibit 7).

The full potential that can be unlocked by redeployment comes from three groups, totaling 270,000–850,000 women. The first is STEM-educated European women who have the most in-demand tech skills, such as SQL and Python, but are working in nontech roles (39 percent of this group). The second is European women who also possess these in-demand tech skills and are working in nontech roles (3 percent of this much larger group). And the third group is made up of European women with tech skills adjacent to those that are most in demand—for example, adjacent skills such as C++, Java, and Linux for top-rising skills such as Python.

[16] Macy Bayern, "Why more than half of women leave the tech industry," TechRepublic, October 16, 2019.
[17] *State of allyship-in-action benchmark study*, Integrating Women Leaders Foundation, July 2022.
[18] "Human capital at work: The value of experience," McKinsey Global Institute, June 2, 2022. This analysis is for workers in the United States overall and did not split the answers by gender.
[19] Davis Carlin, Anu Madgavkar, Dana Maor, and Angelika Reich, "Overcoming the fear factor in hiring talent," McKinsey Global Institute, August 31, 2022.
[20] McKinsey and Eightfold AI research.

Exhibit 7

European tech companies already draw tech talent from nontraditional pools.



Source: McKinsey and Eightfold AI research on state of European tech, which draws on proprietary Eightfold AI data source of more than 1 million European tech workforce profiles, 2022.

One leading big-tech company is tapping this potential with an apprenticeship program to reskill and upskill traditionally overlooked talent pools such as single stay-at-home mothers. By combining in-class learning and hands-on engineering projects, the company has hired 98 percent of the women in its North American and African cohorts.

Ramp up: Address STEM drop-off in university

Getting more girls to choose a STEM major is a great ambition, but it won't help much, according to our analysis. Given current drop-off rates across bachelor's degree programs, even if countries could increase the number of girls enrolling in STEM university classes by 1 percent (around 300,000 women), that would lead to only about 15,000 more women entering tech roles until 2027.

To drive significant change, programs supporting women already in university STEM classes can have the most impact. Providing more and better internship opportunities, mentoring and coaching women as they prepare to enter the workforce, and actively recruiting women to work on cutting-edge projects in leadership roles, among other programs, can help increase graduation rates for women in STEM and increase their overall numbers in tech by about 225,000–695,000, according to our analysis. The earlier drop-offs across primary and secondary education must also be addressed to fix the broken STEM rung in women's tech career ladder over the long term.

Women can fix European tech's talent challenge, but only if and when companies address the issues that keep more women from joining and staying in the tech workforce can Europe hope to build its competitive edge.

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