



**Digital
Future Society**

Guidelines for increasing women's participation in The Collider and other deep tech venture building programmes

The Collider programme

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Digital Future Society is a non-profit transnational initiative that engages policymakers, civic society organisations, academic experts and entrepreneurs from around the world to explore, experiment and explain how technologies can be designed, used and governed in ways that create the conditions for a more inclusive and equitable society.

Our aim is to help policymakers identify, understand and prioritise key challenges and opportunities now and in the next ten years in the areas of public innovation, digital trust and equitable growth.

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Introduction

While women's participation in deep tech is an emerging topic, there has been a great deal of research examining the participation of women in science, technology, engineering, and mathematics (STEM) professions. Though deep tech and STEM are distinct, they are mutually reinforcing fields.

Women are under-represented in STEM. Even though women represented 48.1% of Doctoral graduates at the European level in 2018 and the proportion of Doctoral graduates was gender-balanced (where women make up between 40%-60%), in the majority of the 27 EU Member States and Associated Countries, great gender imbalances remain in broad fields of study (EC, 2021). Women Doctoral graduates tend to be over-represented in education and under-represented in information communication technologies (ICT), engineering, manufacturing and construction. The current She Figures¹ highlight how very little progress has been made in increasing the representation of women in Doctoral graduates in science, technology, engineering and mathematics (STEM) since the publication of the previous edition (EC, 2021).

The case against the under-representation of women in STEM goes beyond social justice alone. In fact, there are three main arguments. These are the social justice argument, the business case and the point of scientific excellence and inclusive innovations. Accordingly, there has been substantial investment in increasing the participation of girls and women in STEM around the world for many years. These interventions have been meticulously documented and have produced a substantial evidence base into what works and why. Other interventions have also sought to encourage more women into entrepreneurship.



¹ See annex 1 for more information.

However, as mentioned, though distinct, there is an intimate relationship between deep tech and STEM. STEM refers to a broad field that focuses on foundational knowledge, research, and practical applications across its domains of science, technology, engineering and mathematics. STEM professionals contribute to various industries, including healthcare, telecommunications, and environmental science. Deep tech, on the other hand, is a subset of innovation-driven enterprises that go beyond conventional technology. The key distinctions are the following:

- **Depth of innovation:** Deep tech ventures involve cutting-edge research and development, often rooted in scientific breakthroughs. Examples include biotechnology, quantum computing, and advanced materials.
- **Long-term impact:** Deep tech aims for transformative impact over the long term. It addresses complex challenges, such as climate change, healthcare, and space exploration.
- **Risk and investment:** Deep tech projects require substantial investment and face higher risks due to their novel nature. Investors recognise the potential for significant societal benefits.
- **Interdisciplinary approach:** Deep tech draws from multiple disciplines, bridging the gap between science and commercialisation.

In summary, while STEM provides the foundation, deep tech pushes the boundaries of innovation, creating solutions that shape our future. Both are interconnected, with STEM feeding into deep tech advancements (Wang, 2022). Increasing women's participation in STEM should, therefore, increase women's participation in deep tech. In this regard, Digital Future Society commissioned Notus to produce these guidelines in an attempt to foster greater participation of women in the Mobile World Capital Foundation's Collider initiative, which acts as the foundation's tech transfer programme.

The under-representation of women as Collider programme participants can be seen as symptomatic of the broader under-representation of women in STEM and as entrepreneurs, something beyond the scope of a single programme. However, beyond its recommendations for The Collider, this guide seeks to also serve as a point of reference for similar programmes around Europe, thereby contributing to a more inclusive European STEM and deep tech ecosystem.

Tech Transfer Programme vs Deep Tech Venture Builder Programmes

A Tech Transfer Programme facilitates the transition of innovations and technologies developed in research institutions (such as government agencies, universities, or private companies) into practical applications for broader use.

Deep Tech Venture Builder Programmes foster the creation and growth of technology companies focused on cutting-edge innovations.

The Collider programme

The Collider is Mobile World Capital Barcelona's dedicated tech transfer programme. It supports scientific and innovative projects as they transition from the lab to the market. Through its multiple initiatives, The Collider works with ecosystem agents to strengthen technology transfer mechanisms in Catalonia, Spain and Europe, facilitating the consolidation of scientific-technological spin-offs or spin-outs.

The ultimate mission of The Collider programme is to reduce the gap between science and the market through technology transfer in response to the challenges posed by the Sustainable Development Goals (SDGs) and an increasingly globalised and technological society.

Over the last 7 years the Collider programme has supported over 200 research projects, worked with over 100 Research Centres and created 20 spin-offs, 15 of which are active. It is currently the European Innovation Council's Venture Builder Partner with a goal of supporting more than 80 projects per year starting in 2023. It has garnered 714,000 EUR of direct investment, raised 8.55 million EUR of capital, and 31 million EUR market valuation.



“ Our mission is to rally powerhouse teams and guide them on their entrepreneurial journey. We accelerate the transfer of disruptive tech to society by launching deep-tech spin-offs into the market, and we've been doing it for 7 years.



Objective

These guidelines seek to examine and demonstrate why it is important for more women to participate in programmes such as The Collider. They will then build on existing knowledge to offer action points The Collider and similar programmes around Europe can follow to increase women's involvement in their activities.

Methodology

These guidelines have been developed using a mixed methodology including a desk-based literature review, policy analysis, semi-structured interviews and two participatory workshops. A first approach included a basic search of the literature examining the lack of women in STEM, women entrepreneurs and more specifically women in 'deep tech'. This first approach also reviewed the success achieved through a range of interventions aiming to increase the participation of women in STEM and women entrepreneurs. While there is also a severe under-representation of women as STEM professionals, entrepreneurs and investors, the focus remained on the first two groups as they are more relevant to the Collider programme. Consequently, the under-representation of women as investors lies beyond the scope of these guidelines.

As the aim of these guidelines is to examine how to increase women's participation in the Collider programme, tapping into the in-depth knowledge of those responsible for the design and implementation of the programme marked an important step. Two workshops were held with the Collider team and individual semi-structured interviews also took place. The workshops provided space for the latest scientific knowledge in the field to be contrasted and tailored to the real needs of the Collider programme.

These guidelines are the result of this work and aim to provide evidence-based practical actions to increase the participation of women, which are particularly relevant for the Collider programme, but that could also be adapted to other programmes across Europe and beyond.



State of the art: women in deep tech

The following section highlights how understanding the under-representation of women in deep tech can be partially explained by the under-representation of women in STEM and the under-representation of women as entrepreneurs. It will show why tackling the under-representation of women in deep tech matters for three primary reasons: social justice, the business case, and also to strengthen scientific excellence by promoting more inclusive innovations. This is followed by a brief reflection on what has been done to increase the participation of women in STEM, as entrepreneurs and as STEM entrepreneurs.

Under-representation of women in STEM and as entrepreneurs

The current She Figures (EC, 2021), which provide pan-European statistics on the state of gender equality in research and innovation (R and I) highlight how little progress has been made in increasing the representation of women Doctoral graduates in STEM since the publication of the previous edition.

This situation leads to the under-representation of women in scientific and technical fields as well as technological professions in the labour market. For example, in 2019 women were under-represented as employed scientists and engineers (41.3%). This under-representation is magnified in technology-oriented entrepreneurship activities with women representing less than 25% of self-employed professionals in science and engineering and information communication technology (EC, 2021). The figures also highlight major disparities regarding research and innovation outputs, usually measured by the number of publications and patents. Gender gaps in active authorship are greater in the fields of natural science, engineering and technology. Between 2015 and 2019 women were more likely to be under-represented among active authors who led research, while between 2015 and 2018 women held only one inventorship for every 10 held by men (EC, 2021).

The Global Entrepreneurship Monitor (GEM) report is the world's most reliable data source on entrepreneurship.² The under-representation of women as entrepreneurs is starkly shown in Figure 1, which shows the levels of total early-stage (TEA) entrepreneurial activity by the percentage of women and men across various countries. The proportion of women starting or running a new business is the same or higher than that of men in only 5 of the 49 economies studied (GEM, 2024).

These charts show that the absolute entrepreneurial activity gap for new businesses was typically smaller than for established businesses, suggesting either a recent flourish in women starting new businesses or a lower transition rate from new to established businesses for women. However, while an optimist might emphasise the lower gender gap in early-stage entrepreneurial activities as pointing to a positive trend towards gender equality, caution remains wise. The GEM report also highlights the difficulties women face as they seek to become established business owners.

² Global Entrepreneurship Monitor (GEM) has collected primary data about entrepreneurship for 25 years, making it by far the world's largest and longest-running research study on levels of entrepreneurial activity. In that period, around 4 million people will have been surveyed across 120 different countries, and views sought from nearly 50,000 national experts.

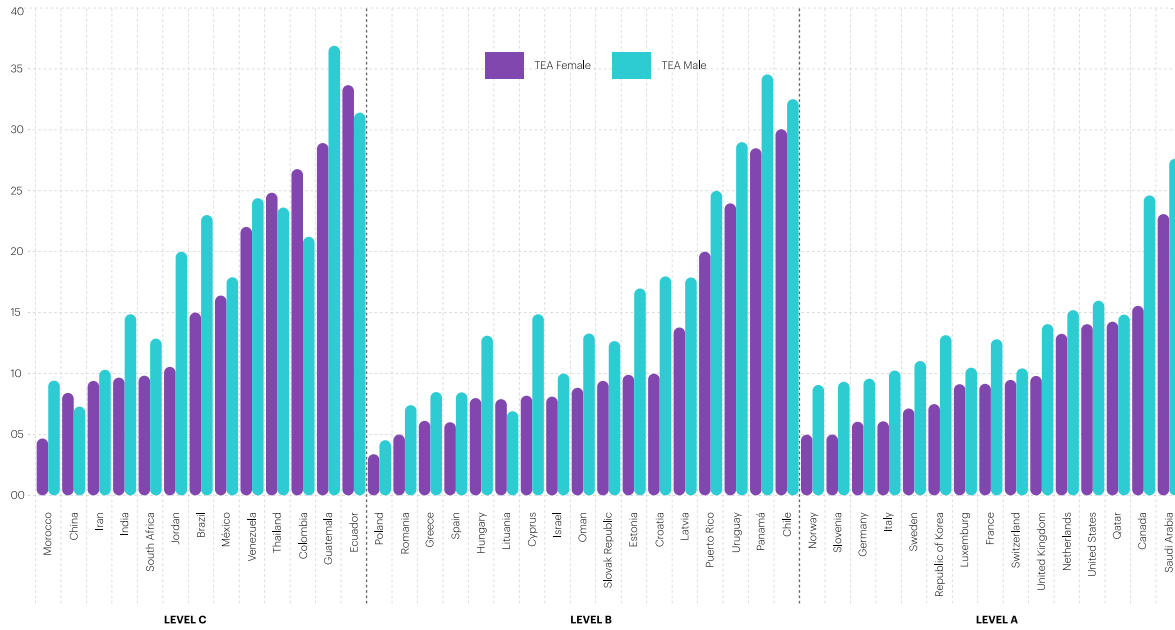


Figure 1. Levels of total early-stage entrepreneurial Activity (TEA) (% women and men)
Data source: GEM, 2024

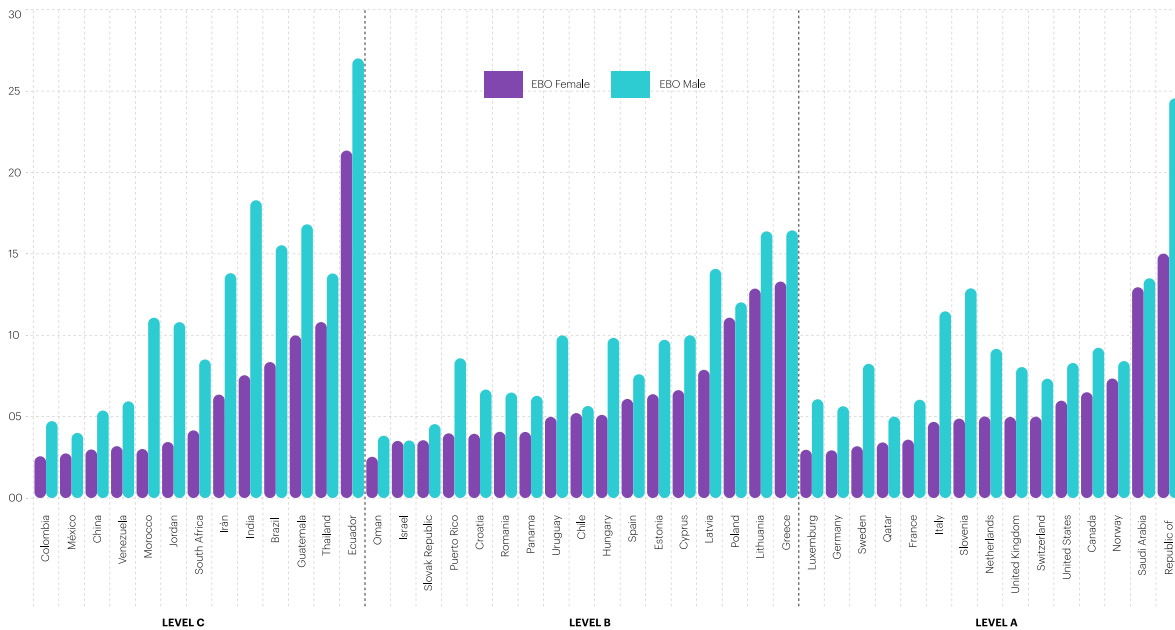


Figure 2. Levels of Established Business Ownership (EBO) (% women and men)
Data source: GEM, 2024

Focusing on the data for deep tech start-ups in Europe shows that less than 20% of senior management in deep tech start-ups (that have raised series A or B) are women while the percentage of women holding CTO positions has remained at 1% for the past 3 years (Atomico, 2020). Raising capital for technology investment is also characterised by extreme gender imbalance: 91% of all capital raised across Europe in 2020 was by men-only teams (Atomico, 2020). These imbalances play out in both Central and Eastern Europe as well as the Nordic countries. For example, in Central and Eastern Europe only 19% of venture capital firms are led by either women or mixed teams with 81% led by men-only teams. In the Nordic countries, only 11% of VC partner positions are held by women (UV Report, 2020, EIC, 2021).³

³ See: <https://report2020.unconventional.vc/>

Why this matters

There are three main arguments for working to address the under-representation of women in STEM and deep tech. These are the social justice argument, the business case argument and the scientific excellence and inclusive innovations arguments.

The social justice case

The social justice case is intimately linked to the case for gender equality as a fundamental human right and articulated as one of the 17 Sustainable Development Goals adopted by the United Nations.⁴ Social justice is also tied to economic justice, i.e. gender imbalance “limits opportunities for women as entrepreneurs within fields where earnings are higher, start-ups have higher growth expectations, and both public support systems and private venture capital tend to focus” (Kuschel et al. 2020). STEM fields are important for innovation and technological development and tend to be high ‘value’ professions in which individuals can command relatively high salaries, while jobs in STEM fields also tend to be jobs with a high demand. Girls and women tend to be under-represented in STEM. Therefore, increasing the participation of girls and women in STEM fields has long been a policy objective in the fight for gender equality in the economic domain.

The business case argument

Further to arguments for more equitable distribution of resources, the business case argument highlights how “improving gender equality would lead to an increase in EU (GDP) per capita by 6.1 to 9.6%, which amounts to 1.95 to 3.15 trillion EUR.” (EIGE, n.d.). Evidence has also demonstrated that “firms with higher gender diversity in management had 35% better return on equity than firms with poor gender equity” (Catalyst, 2004). Focusing on tech in Europe, it has been estimated that “if companies were to double the share of women in the tech workforce to about 45%, or an estimated 3.9 million additional women by 2027, GDP could receive a boost of as much as 260 billion to 600 billion EUR” (McKinsey, 2023).”

⁴ See: <https://www.un.org/sustainabledevelopment/gender-equality/>

The scientific excellence and inclusive innovations point of view

Including more women in the workforce predominantly responsible for deep tech innovations also makes sense from a scientific excellence and inclusive innovations point of view. STEM entrepreneurship is developed in team-based collaboration and research has demonstrated that more gender-balanced teams tend to have better team dynamics and, as a result, demonstrate increased team performance (Neumeyer and Santos, 2020). Literature looking at gender diversity in management teams (Hoogendoorn, et al. 2013), management teams in STEM (Ruiz-Jiménez et al. 2016), and innovation teams (Kuschel et al. 2018, 2020) bears this out. Therefore, having a gender-diverse team is important as it leads to better science (Nielsen et al. 2017). Meanwhile other research demonstrates that “Inclusiveness creates the foundation for individuals to take part in and contribute to research on equal terms; it is the catalyst that makes gender diversity function as a tool for better research processes” (Müller et al, 2018).

Examining the impact of more gender diversity in science has also been noted for expanding the scope of knowledge as well as creating additional new perspectives (Nielsen et al. 2017). For example, women-founded businesses are significantly more likely to focus on sustainability, with nearly one in four women-led scale-ups working to fight climate change (EIT, 2023). This also holds in the sphere of innovation with research demonstrating that companies with balanced management staff achieve greater productivity and get better results in innovation development (Fine et al. 2020).

What’s being done to address the issue

Having examined the under-representation of women in STEM and as entrepreneurs and looked at the reasons this issue needs addressing, the guide will now examine some of the inspiring practices being implemented that seek to do so.

Increasing the participation of women in STEM

- **Collaborations between schools, science museums, and STEM departments in universities.**
The lack of women in STEM employment is often attributed downstream to the lack of girls choosing STEM subjects in high school (Sáinz et al, 2020).
- **Creating informal STEM learning environments, after-school activities and summer camps.**
Interventions include collaborations between schools and STEM departments in universities (Dasgupta and Stout, 2014).
- **Investing a great deal of resources through dedicated programmes.**
Both the United States and Europe have invested a great deal of resources into universities and research-performing organisations to increase the participation of women in STEM. These programmes have shifted a focus from ‘fixing the women approach’ to ‘fixing the institution’ and ‘fixing the knowledge’ (Schiebinger, 2011).

- 
Taking an affirmative action approach such as introducing quota.

Experimental evidence has demonstrated that the introduction of quotas reduced discrimination against women (Beaurain and Masclet, 2016).
- 
Creating retention programmes including mentoring and coaching, career development guidance, peer support and safe spaces.


Programmes have been developed to retain women in STEM through the use of mentoring and coaching practices. Carter-Sowell et al. (2019) chart a programme to enhance the professional visibility of minoritised women scholars and highlight the following outcomes: all groups perceive the programme to be valuable, promoting well-being, reducing isolation and providing encouragement.
- 
Mitigating gender bias in the evaluation process through unconscious bias training, a ‘blind’ reviewer approach to applicant identity, and having gender observers present in evaluation panel meetings or structured recalls.

Unconscious bias training aims to address the mental shortcuts that lead to snap judgments based on race, gender, or other factors. The goal is to reduce bias in attitudes and behaviours at work, including hiring and promotion decisions (Coffman and Coffman, 2021). Assessment of its effectiveness demonstrates how it should be used in conjunction with other measures and that it can reduce bias, but it is unlikely to eliminate it (Atewologun et al. 2018). Including gender observers in evaluation panel meetings to call out bias has also proven an effective intervention used by the Swedish Research Council (Swedish Research Council, 2020) while the Irish Research Council has taken a ‘blind’ reviewer approach to applicant identity (Irish Research Council, 2020).
- 
Creating accountable leadership and overcoming epistemological hurdles.

The ADVANCE programme in the United States has included several practices that have proven key in rethinking institutional change for under-represented minority women in STEM. These include creating accountable leadership, identifying climate zones, understanding the numbers game, overcoming epistemological hurdles and promoting community structures (Armstrong and Jovanovic, 2017).
- 
Promoting community structures, networks and supporting communities of practice.

Establishing communities of practice has proven an effective strategy both within research-performing organisations (Wroblewski and Palmén, 2023) and between organisations. Practitioners can create a vision, a sense of community and a joint project for the effective implementation of gender equality plans and measures (Palmén and Müller, 2023).

Increasing the participation of women as entrepreneurs

- 
Promoting self-confidence, institutional support and assistance.

Self-confidence, institutional support and assistance, and the ability to access credit services and social networks have been found to facilitate women in their quest to become entrepreneurs (Mishra, 2015; Cardella et al. 2020).

● **Ensuring that evaluation processes for securing external finance are not biased.**

It is more difficult for women to secure external finance, i.e. risk capital. Research has shown that women are 63% less likely than men to obtain external finance and attribute the most significant part of the gap to gender differences (Guzman and Kacpercyk, 2019). “During observations of pitches performed by female and male-led company leaders, Kanze et al. (2017) noticed that 67% of the questions posed to male entrepreneurs were promotion-orientated, while 66% of those posed to female entrepreneurs were prevention-orientated. This means that while men were asked about their business development, women were asked about their strategies to prevent failure. As a result, presentations made different impressions and directed investments in favour of male-led companies (Kovaleva et al. 2023).”

Increasing the participation of women as STEM entrepreneurs

● **Increasing gender-sensitive entrepreneurial competencies — specifically in opportunity identification and evaluation — combined with mentoring actions.**

Increasing entrepreneurial competencies — particularly in opportunity identification and evaluation — positively contributes to the development of entrepreneurial intentions in potential STEM entrepreneurs (Armuña et al. 2020). This should be combined with courses providing information about legal aspects, accessing funding and team building (Kovaleva et al. 2023). To address inequalities in this arena it becomes important to assess how entrepreneurial competencies are developed, in which arenas and who is included in these processes (Kuschel et al. 2020).

● **Defining new metrics of leadership, influence and relationships by applying new methods of data analysis.**

Defining new metrics of leadership, influence and relationships, through applying new methods of data analysis enables a better understanding of the role women can play in innovation and excellence activities (López Barrio et al. 2024). Others point to gender-sensitive entrepreneurship education as a way to develop such competencies, or to a combination of education with mentoring actions (Mavriplis et al. 2020; Kuschel et al. 2020).

● **Allowing women to enter the entrepreneurial arena on an equal footing by reducing financial risks while providing tailored support.**

Research demonstrates that reducing financial risks while providing targeted funding programmes for women entrepreneurs can boost women’s participation as tech entrepreneurs (Kovaleva et al. 2023).

● **Generating references, suitable examples and success stories.**

Successful women entrepreneurs do exist, but they tend to be less visible. Promoting stories of successful women entrepreneurs increases the number of role models women can be inspired by (Kovaleva et al. 2023).

● **Promoting dedicated research that contributes to an evidenced-based knowledge of the deep-rooted causes of inequalities in technology entrepreneurial ecosystems.**

There is a need for more research on the gendered nature of entrepreneurial ecosystems, specifically in STEM and deep tech. This is particularly important in this area due to the demonstrated importance of supporting actors, as well as the embedded nature of deep tech ecosystems (Kovaleva et al. 2023).



The European Policy Framework

In the Gender Equality Strategy 2020-2025, the European Commission emphasises that empowering women in the labour market also means enabling them to thrive as entrepreneurs, particularly in male-dominated fields (EC, 2020). Empowering women innovators has become a priority and different interventions have been employed by the European Innovation Council (EIC) in an attempt to remedy the situation including:

- Ensuring that 50% of jury members for accelerator funding interview pitches are women.⁵
- Prioritising inviting women-led companies to interview pitches (this action employed in 2020 led to an increase in the share of EIC-funded start-ups with a female CEO — from 8%-29%).⁶
- Promoting women as business coaches who advise and mentor EIC-supported start-ups (in 2021 women represented 42% of business coaches).⁷
- The Women TechEU scheme.⁸
- The Women Leadership Programme for EIC companies.⁹

The EIC pilot advisory board has developed several recommendations including the following:

- At the research phase target an equal share of women to lead a research work package in EIC Pathfinder projects.
- At the entrepreneurship phase, expand the share of women-led companies invited to EIC jury pitches to above 40% and broaden the definition of women-led to recognise leading executive roles beyond the CEO, such as the CTO, CSO, and COO.
- At the investment stage the EIC Fund should partner with a maximum number of women-led funds and funds with diverse management teams including decision-makers that are women. Funds of funds should prioritise backing venture funds with diverse management teams to implement concrete strategies to change the status quo (EIC, 2021).

⁵ See: https://eic.ec.europa.eu/news/statement-gender-diversity-eic-2021-06-03_en

⁶ See: https://eic.ec.europa.eu/news/statement-gender-diversity-eic-2021-06-03_en

⁷ See: https://eic.ec.europa.eu/news/statement-gender-diversity-eic-2021-06-03_en

⁸ See: <https://womentecheuropa.eu/>

⁹ See: https://eic.ec.europa.eu/eic-funding-opportunities/business-acceleration-services/eic-women-leadership-programme_en



Recommendations

Building on the previous sections, the following section will provide recommendations for the Collider Programme and other programmes. These recommendations are structured according to the programme's main phases or services as well as offering general recommendations to support gender mainstreaming throughout the programme.

1. Call for technologies
2. Opportunity validation
3. Team creation
4. Business validation
5. Spin-off and portfolio
6. Gender mainstreaming



Figure 3. Process map: the main phases of the Collider Programme

1. Call for technologies

The Call for technologies (Call4Tech) is permanently open. Applications can be submitted via an online form and are reviewed on a rolling basis. The admissions process consists primarily of ensuring the eligibility of applicants.

The Call4Tech eligibility checklist has four main elements:

- **Applicant profile**
 Researchers from a research institution (University, Tech Centre). Research teams can include PhD and Master candidates.
- **Endorsement from technical training organisation (TTO)**
 Projects must be supported and endorsed by their respective institutions' TTOs.
- **Protected technology with technology readiness level (TRL) 3-6**
 The tech's intellectual property (IP) must be protected, or the team must have an IP protection strategy. The technology must be between TRL 3-6.
- **Committed project team**
 The Project team must be committed to bringing the technology to market and impacting society.

Recommended actions for a more gender-inclusive call

- The rules for participation should explicitly state: "The Collider Programme is committed to gender equality and to being an active actor in closing the gender gap in STEM. We encourage applications from women and under-represented groups".
- The recommendation above needs to be implemented in tandem with data collection systems that monitor the demographics of applicants. Some studies show that women are more likely to apply only when they think that they stand a good chance of succeeding (Ranga et al. 2012).¹⁰

¹⁰ See: <https://eige.europa.eu/gender-mainstreaming/toolkits/gear/gender-sensitive-research-funding-procedures?>

- Use inclusive language and gender proof the Call4Tech application form to ensure no bias in wording or images. This can impact the number of women who feel encouraged to apply. Avoid gender-stereotypical wording and images online and in publicity material.¹¹ If unsure, use online programmes to check the gendered connotations of language.¹² While these programmes should be used with caution, they are useful tools to help call designers begin to think about how the framing of the call can impact the demographic base of the applicants.¹³

Suggestions:

- Avoid images of all-male or male-dominated groups
- Use images of diverse teams that include women and minorities groups
- Display images of women in active roles (speaking or explaining, not only listening; women as creators/researchers, not only users)

- It is important to think about the different communication channels used to distribute the call. One strategy would be to target women's networks. Some research funders, the European Research Council, for example, use 'ambassadors' to address the pool of potential women applicants.¹⁴ The Collider programme could promote stories of successful women participants and distribute these to the relevant professional networks. One strategic partnership in this sense could be, for instance, with AMIT (The Association of Women Researchers and Technologists) (*Asociación de Mujeres Investigadoras y Tecnólogas*)¹⁵ or Women Tech (*Dones Tech*).¹⁶
- The provision of dedicated gender-sensitive support structures (training not on weekends or in the evening, etc.) can be implemented to encourage more women applicants. For example, the Austrian Science Fund (FWF) provided individualised support through a grant.¹⁷ Mandatory mentoring is part of each early-stage programme: research, innovation and training (ESPRIT) application. The aim is to have a mentor 'assisting the principal investigator in their professional and personal career development'.

¹¹ See: https://eige.europa.eu/gender-mainstreaming/toolkits/gear/gender-sensitive-research-funding-procedures?language_content_entity=en

¹² Like the Gender Decoder or, in Spanish, the inclusive language corrector "THEMIS".

¹³ For a more extensive version that looks at a range of diversity characteristics see: <https://www.developdiverse.com/>

¹⁴ See: <https://eige.europa.eu/gender-mainstreaming/toolkits/gear/gender-sensitive-research-funding-procedures?>

¹⁵ See: <https://amit-es.org/>

¹⁶ See: <https://donestech.net/donestech>

¹⁷ See: <https://eige.europa.eu/gender-mainstreaming/toolkits/gear/gender-sensitive-research-funding-procedures?>

The admissions process is as follows:

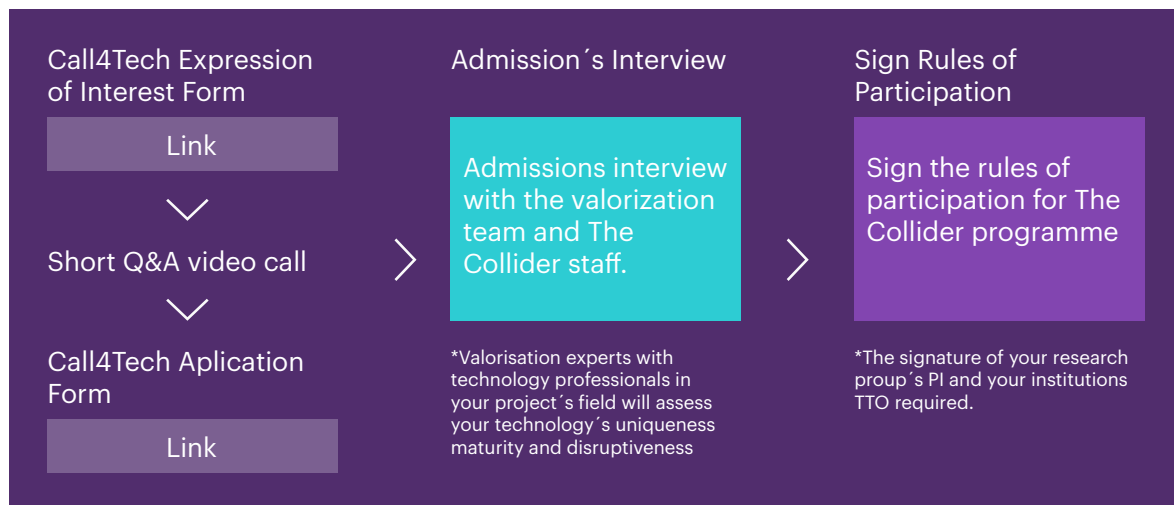


Figure 4. Process map: steps of the admissions process

Recommended actions for a more gender-inclusive admission process

- Use inclusive language in the application form.
- Add a note to the application form requesting information about other researchers interested in participating, stating "it will be positively taken into account if the teams are diverse and gender-balanced."
- Include a question about diversity and inclusive innovations in admission interviews.
- Run gender competence and unconscious bias training workshops for the valorisation staff and Collider team during the provider project kick-off.
- Include a new gender and diversity criterion to the 8 existing evaluation criteria with the same weight as the rest (1/9), and/or add a gender perspective to the existing criteria. e.g. for criterion 2 on "Degree of disruption and innovation: How much better is the technology compared to other similar technological solutions?" ask for the gender perspective as an added value. Or for criterion 7 on "Team's competencies" ask if any of the team members have competencies or knowledge on gender in R and I.



2. Opportunity validation and industry committee

The purpose of the opportunity validation stage is to provide the project with an objective analysis of its potential benefits, risks, costs, and challenges so the project team can make an informed decision over the most beneficial next steps.

The opportunity validation phase of the programme is comprised of the following four main activities and requires a four-hour dedication per week:

- **Mentoring**
An experienced individual is assigned to act as a counsellor for the participants. The mentor meets with the research team weekly and guides them towards their business objectives while overseeing the team's work on the deliverables (tech deck).
- **Team alignment**
Team alignment group sessions are moderated by a coach and see participants focusing on their expectations and commitments in both the short and long term. The coach also assesses cohesion and role balance.
- **Tech transfer advisory**
An alignment session for researchers and their institutions on the specifics of spinoff creation: equity rationale, investment conditions, legal agreements and fundraising support.
- **IP assessment**
Due diligence analysis of the projects' IP protection strategy. The report describes the existing tangible and intangible assets, the state of protectability, potential risks to foresee and recommendations for the next steps.

This analysis is condensed into a master report, which includes:

- A weekly report of deliverables and project progress provided by the mentor.
- An analysis of key aspects of the project provided by internal and external subject matter experts (IP, tech transfer maturity, team).
- Comments and feedback provided by industry during a demo day.

The main outputs of this stage of the programme are the tech deck and one-pager deliverables:

- **Tech deck:** Teams are required to elaborate a tech deck with clear information about the technology, main use cases, value proposition, market competitive advantage, and roadmap. Tech decks act as a bridge between the complex innovation and the business aspects enabling potential investors, partners or stakeholders to understand the value and potential of the technological breakthrough.
- **One-pager:** Mentors should work with the team to develop a comprehensive one-pager, with all essential information presented in a pre-given template. One-pagers aim to build a concise shared understanding of the opportunity, value, impact, outcomes, risk, and viability. One-pagers become the first draft of some of the most important pitch deck foundations, such as the team and financial slides.

Recommended actions for a more gender-inclusive opportunity validation process

- Raise awareness of the opportunity validation and industry committee and the formal policies in place as well as how to put them into practice in a gender-sensitive manner to contribute to gender-fair outcomes.
- Include into team roadmap reporting governance: team diversity and inclusive innovations as a bonus point.
- Present a diversity of use cases in the use case definition (encourage it during the mentor's kick-off): Ensure the diversity of use cases captures the needs, preferences, and experiences of diverse user groups. This can be based on focus groups, interviews, or usability testing with participants from various demographics. This could be integrated into the one-pager, expanding it to encompass a diversity of use cases. Diversity could also be integrated into the market assessment and the market research on which this is based, as well as integrated into the proof of concept.
- If all team members agree, document the diversity of team members in terms of gender/age/race/ethnicity/disability in the tech deck contents — under the section Team and Institution.
- Induct mentors with a training session on the gender dimension (part of the value proposition). To enhance the process and assessment criteria from a gender-sensitive perspective it is essential to create awareness among panel members and chairs before they commence their work. This can be achieved, for instance, by having them watch an informative video and then respond to related questions. Considering the limited time resources of reviewers and panel members, the research body's management must issue a clear directive regarding mandatory participation in gender training.¹⁸
- Ensure a gender-balanced pool of mentors and prioritise female entrepreneurs as mentors when we have female scientists and female entrepreneurs (role modelling).



¹⁸ See: <https://eige.europa.eu/gender-mainstreaming/toolkits/gear/gender-sensitive-research-funding-procedures?>

3. Team creation

Working groups are transformed into comprehensive and complementary teams to become cofounders of a new disruptive deep tech start-up.

Key activities of this stage include coaching sessions which aim to develop trust through self-awareness (values, work style, strengths, growth opportunities, goals, etc.), healthy dynamics (communication, feedback, goal expectations), and internal process (work culture) and creating the right balance between team members (functions and backgrounds, personality, natural traits and common values).

Recommended actions for a more gender-inclusive team formation

- Rules of participation: Publicise and emphasise the code of conduct in the coaching sessions. One option would be to use part of the coaching sessions to provide feedback on the code of conduct and update it accordingly. This could create buy-in from participants as well as create and enhance the psychological safety aspects of the team creation.
- Assess gender (and other aspects of) diversity during the call for applicants. This could be done in two ways. Firstly, assessing the demographically diverse characteristics of teams and developing criteria where gender diversity and other characteristics are positively valued. Secondly, ask what types of inclusion activities the team foresee throughout creating the start-up.
- Stress gender diversity as a recommendation for team creation. Stress that male-only teams will not be encouraged.
- Ensure that the call for entrepreneurs does not use biased language and make sure that appropriate dissemination channels are identified and used (see useful resources section).
- New alliances with hubs of female talent and women's entrepreneurs and scientist associations.
- Proactive recruitment of female candidates.
- Ensure a gender-balanced pool of coaches.

4. Business validation and investment committee

At this stage of the programme, teams are asked to have a credible business and financial plan. This is built progressively through weekly deliverables with the support of the team's mentor and subject matter specialists. They also need two signed letters of intent with a corporation and an investor, which include the corresponding conditions, roadmap, and outputs. They also need to produce a pitch deck which will be presented in front of the investment committee and an agreed term sheet. This stage also includes 1:1 advisory services, which can help each team with how to tackle public funding, entrepreneurial finance, how to protect the knowledge and results of innovation, and how to pitch like an entrepreneur.

Recommended actions for a more gender-inclusive validation process

- Include how to build a diverse and gender-aware team into the advisory service.
- Include a description of a diverse team in the team cohesion conditions in the investment committee criteria.
- Include discussions of diversity and inclusive innovations in the welcome day schedule.
- Build on the vision positioning: "to be a global reference for a sustainable future: more inclusive, more equitable, more responsible, through the humanist use of technology".
- Remain vigilant to ensure that women do not face particular difficulties in securing letters of commitment from relevant industry players and offer orientation and specialised support where constraints are identified.
- Offer women-only coaching sessions and ensure that there are mentors/coaches with competencies to deliver specialised support for gender-sensitive communication and leadership abilities, oriented to the pitch deck.
- Ensure that there is at least one gender expert within the expert's committee on the demo day and provide a note on gender biases for the whole committee (or provide a quick reminder/5-10 mins awareness tip on biases right before the pitches).



5. Spin-off and portfolio

This phase aims to develop the minimum viable product and carry out pilot tests in an industrial environment. The pilot tests aim to validate the market potential of the technological solutions, pivot the technological solution if necessary and have the first business metrics that make it possible to accompany the programme in the development of a go-to-market strategy and plan future rounds of financing through external investment.

Recommended actions for a more gender-inclusive portfolio

- Promote a shift in traditional business metrics, allowing gender and diversity data management and monitoring systems and including new metrics related to social and gender impact.
- Acknowledge structural difficulties that hamper women’s access to funding and tackle the barriers by putting in place dedicated funds, searching and disseminating other specific funding programmes for women and securing dedicated accompaniment for women through the different rounds of investment search.

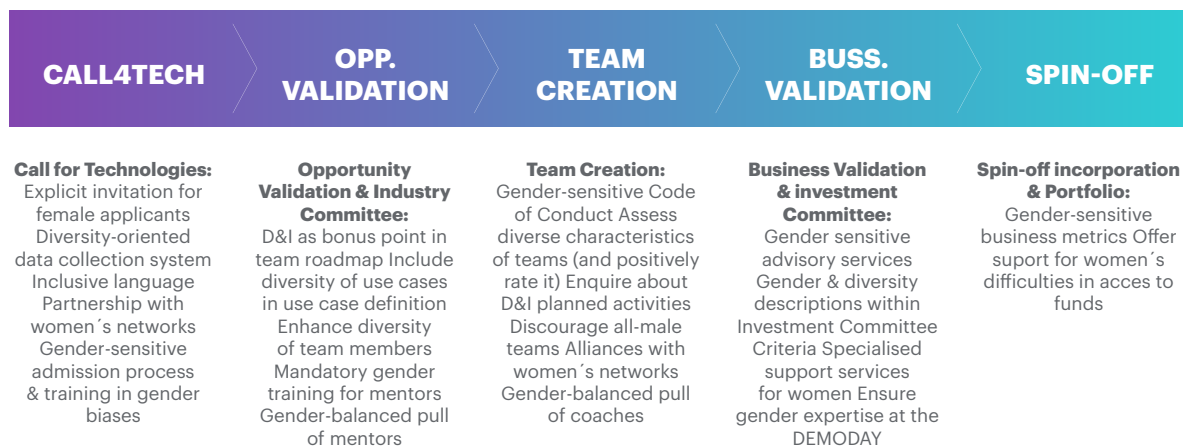


Figure 5. Process map: Recommendations for each step of the programme

6. General recommendations: gender mainstreaming throughout the programme

● **Assessment (running throughout various stages of the Collider programme)**

Providing and implementing clear evaluation guidelines alongside a precise assessment criterion minimises gender bias.¹⁹ In panel meetings, a clear list of criteria should be used for the discussion and the panel should make sure the same criteria are applied to each applicant. This should be communicated explicitly in briefing meetings for reviewers and panel/board members. The panel chair should guarantee that everyone plays by the same rules. Building on the experience of the Swedish Research Council it is recommended to include a gender equality observer, i.e. external gender experts or specifically trained and appointed internal staff. Their role is to call out, evaluate and report whether and how gender bias is manifested in the discussion of proposals.²⁰

● **Decision-making (running throughout various stages of the Collider programme)**

Managing the final decision-making process about who is accepted into the programme depends on a range of different processes such as internal triage/shortlisting, panel/interview assessment or re-ranking. Mitigating bias through this process is key while it largely depends on whether the final decision is taken by a panel or a scientific management board. Some bodies apply a gender quota to fund women (e.g. at least 40% or an equal share of women grantees as a share of women applicants) or implement a tie-breaking approach. Science Foundation Ireland for example, will choose women applicants if they have an equal score to their male colleagues.

This implies that gender needs to be considered in the negotiation and final decision-making process. The GEAR tool stresses that this approach needs to be complemented with gender awareness-raising training for members of management and decision-making bodies.²¹

● Make gender and other forms of diversity a requirement when recruiting all stakeholders into the programme, i.e. mentors, industry/investment committee members (public and private), expert panel members, participants, trainers etc.

● Further stress the framing of 'deep tech' as having a higher potential to solve social challenges (research done that emphasises gendered impacts of framing). While this is already done very successfully, it is important to emphasise that this has the potential for further impact. This may be particularly relevant for the communications team.

¹⁹ See: <https://eige.europa.eu/gender-mainstreaming/toolkits/gear/gender-sensitive-research-funding-procedures>

²⁰ See: <https://eige.europa.eu/gender-mainstreaming/toolkits/gear/gender-sensitive-research-funding-procedures>

²¹ See: https://eige.europa.eu/gender-mainstreaming/toolkits/gear/gender-sensitive-research-funding-procedures?language_content_entity=en

- Further understand the gendered dimensions of 'risk-taking' and 'confidence building' and integrate this throughout relevant programme elements. For example, revise the rules for participation to stress that while maximum dedication is required, this may be compatible with other commitments.
- Establish robust data collection systems. This will facilitate the collection of sex/ gender-disaggregated data as well as for other demographics (age, race/ethnicity, disability, etc.) of (potential) programme participants for different stages of the programme e.g. applications and recruitment, as well as for other programme stakeholders, e.g. mentors.
- Consult the guide to promoting gender equality for research and innovation funding organisations. Data collection and impact monitoring (Fritch et al. 2022) provides a useful framework for innovation funders to begin to think about what data they need to collect and analyse for monitoring purposes.
- Carry out further research on the gendered nature of entrepreneurial ecosystems, including defining new metrics of leadership, influence or competencies.
- Develop and run training workshops on gender mainstreaming and inclusive innovations.



Looking forward: beyond The Collider

These guidelines have provided specific recommendations for The Collider to increase the participation of women throughout different stages of its deep tech venture-building programme. They have also provided general recommendations on how to mainstream gender throughout broader assessment and decision-making processes, which run throughout the different stages of the programme. While these recommendations are specific to the Collider programme, they aim to contribute to the current debates happening across the European deep tech venture-building landscape that recognise the under-representation of women in this emerging field. A field which has great potential to help solve grand societal challenges, like climate change or the application of artificial intelligence in key areas such as health, or the development of related technologies.

As the guidelines have shown, increasing the participation of women in deep-tech venture-building programmes in Europe offers a key route towards achieving social justice, ensuring women do not get left behind to be excluded from reaping the economic benefits of these developments. It also makes good business sense as increased gender diversity in management leads to a better return on equity. Deep tech innovations — based on scientific excellence — are increasingly recognised as more difficult to achieve without diverse teams, while the reach of these innovations in terms of scope and creating additional new perspectives is enhanced by the greater diversity of those that create these innovations. It is the hope that these guidelines can assist in achieving these aims.



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Annex: Useful resources

Data:

She Figures

Abstract: Equality between women and men is one of the EU's founding values. Since the European Commission's ERA Communication of 2012, gender equality in research and innovation (R and I) as a priority has been strengthened progressively. The She Figures 2021 publication uses the latest available statistics to monitor the state of gender equality R and I across Europe and beyond, by providing comparable data and analysis for approximately 88 indicators. The data follow the 'chronological journey' of women from graduating from doctoral studies to participating in the labour market and acquiring decision-making roles, while exploring differences in women's and men's working conditions and research and innovation output.

European Commission, Directorate-General for Research and Innovation, (2021). She figures 2021: gender in research and innovation: statistics and indicators, Publications Office. <https://data.europa.eu/doi/10.2777/06090>

Global Entrepreneurship Monitor (GEM)

Mission: Entrepreneurship is an essential driver of societal health and wealth. It is also a formidable engine of economic growth. It promotes the essential innovation required not only to exploit new opportunities, promote productivity and create employment but to also address some of society's greatest challenges, such as the United Nations Sustainable Development Goals (SDGs) or shocks from different global events.

Governments and other stakeholders increasingly need hard, robust and credible data to make key decisions that stimulate sustainable forms of entrepreneurship and promote healthy entrepreneurial ecosystems worldwide. To capture a complete picture of an entrepreneurial ecosystem, it is important to go beyond official statistics, like the number of registered businesses. Stakeholders need to understand on the ground perceptions about entrepreneurship. GEM is the only global research source that collects data directly from the source — entrepreneurs.

During its 25 years of existence, GEM has repeatedly provided policymakers with valuable insights on how to best foster entrepreneurship to propel growth and prosperity. The networked consortium of national country teams, primarily associated with top academic institutions, carries out survey-based research on entrepreneurship and entrepreneurship ecosystems around the world.

<https://www.gemconsortium.org/about/gem/5>

Data Impact and Monitoring Guide for Research Funders

The Guide to Promoting Gender Equality for Research and Innovation Funding Organisations: Data collection and impact monitoring (Fritch et al, 2020) provides a useful framework for innovation funders to begin to think about what data they need to collect and analyse for monitoring purposes. The guide states: "Annual data collection by R and IFOs from their own portfolio, and respective applicants and funded researchers, allows for monitoring of progress and identification of potential barriers. For example, looking at the application versus the award rates can aid R and IFOs in identifying if actions are required to increase the number of women applying, or focus on the review process if the award rate is significantly lower. In this way, targeted actions can be designed to promote gender equality in the R and IFO's portfolio of grants."

<https://research.ie/assets/uploads/2023/02/SFI-FORGEN-data-collection-impact-monitoring.pdf>

Policy framework:

Gender Equality Strategy 2020-2025

The EU Gender Equality Strategy delivers on the von der Leyen Commission's commitment to achieving a Union of Equality. The Strategy presents policy objectives and actions to make significant progress by 2025 towards a gender-equal Europe. The goal is a Union where women and men, girls and boys, in all their diversity, are free to pursue their chosen path in life, have equal opportunities to thrive, and can equally participate in and lead our European society.

The key objectives are ending gender-based violence; challenging gender stereotypes; closing gender gaps in the labour market; achieving equal participation across different sectors of the economy; addressing the gender pay and pension gaps; closing the gender care gap and achieving gender balance in decision-making and in politics. The Strategy pursues a dual approach of gender mainstreaming combined with targeted actions, and intersectionality is a horizontal principle for its implementation. While the Strategy focuses on actions within the EU, it is coherent with the EU's external policy on gender equality and women's empowerment.

https://commission.europa.eu/strategy-and-policy/policies/justice-and-fundamental-rights/gender-equality/gender-equality-strategy_en

Gender equality in Horizon Europe

"With Horizon Europe,²² the Commission reaffirms its commitment to gender equality in research and innovation making it a cross-cutting priority and introducing strengthened provisions.

The goal is to improve the European research and innovation system, create gender-equal working environments where all talents can thrive and better integrate the gender dimension in projects to improve research quality as well as the relevance to society of the knowledge, technologies and innovations produced.

There are 3 main levels at which gender equality is addressed in Horizon Europe:

- 1.** Having a Gender Equality Plan (GEP) in place is now an eligibility criterion for certain categories of legal entities from EU countries and non-EU countries associated to Horizon Europe
- 2.** The integration of a gender dimension into research and innovation content is a requirement by default, and evaluated under the excellence criterion, unless the topic description explicitly specifies otherwise.
- 3.** Increasing gender balance throughout the programme is another objective, with a target of 50% women in Horizon Europe-related boards, expert groups and evaluation committees, and gender balance among research teams set as a ranking criterion for proposals with the same score.

²² See: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

Furthermore, specific funding will be dedicated to:

- Gender and intersectional research is promoted in different parts of Horizon Europe, in particular under Cluster 2 of the programme Culture, Creativity and Inclusive Society²³
- Developing inclusive gender equality policies in support of the new European Research Area, through the Widening Participation and Strengthening the European Research Area programme part, Reforming and enhancing the European Research and Innovation System²⁴
- Empowering women innovators, in particular through Pillar III of the programme, Innovative Europe, and the European Innovation Council (EIC)²⁵ (see statement on gender and diversity of the EIC Pilot Board²⁶)”

https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/democracy-and-rights/gender-equality-research-and-innovation_en

SWD Seminar Series

The Scientific Workforce Diversity Seminar Series (SWDSS), convened by the Chief Officer for Scientific Workforce Diversity (COSWD) office. This popular online speaker series was started in 2021 as part of the vision for the COSWD office. We share the latest research on scientific workforce diversity topics by engaging with interested professionals and researchers in the biomedical and behavioral research ecosystem.

Each seminar features renowned researchers who contribute to the growing body of knowledge on topics relevant to scientific workforce diversity, evidence-based interventions, and more.

<https://diversity.nih.gov/disseminate/swd-seminar-series>

<https://diversity.nih.gov/disseminate/swd-seminar-series/how-does-diversity-impact-innovation-team-science>

Networks/Conferences of women in Tech

<https://europeanwomenintech.com/>

<https://women-in-tech.org/who-are-we/>

²³ See: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/cluster-2-culture-creativity-and-inclusive-society_en

²⁴ See: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/reforming-and-enhancing-european-research-and-innovation-system_en

²⁵ See: https://eic.ec.europa.eu/index_en

²⁶ See: https://eic.ec.europa.eu/news/statement-gender-diversity-eic-2021-06-03_en

GEAR Tool

Making universities and research organisations equal for women and men

The Gender Equality in Academia and Research (GEAR) tool provides universities and research organisations with practical advice and tools through all stages of institutional change, from setting up a gender equality plan to evaluating its real impact.

<https://eige.europa.eu/gender-mainstreaming/toolkits/gear?>

Gender Observer: Swedish Research Council

“One of the principal tasks of the Swedish Research Council is to allocate grants to basic research of the highest quality. Gender equality is a quality issue for the entire research system, and the Swedish Research Council has been mandated to promote gender equality between women and men within its own area of activities. The Swedish Research Council has built up knowledge over a number of years about how the work towards increased gender equality in conjunction with research funding can be conducted. One tool used by the Research Council is gender equality observations.”

https://www.vr.se/download/18.6bd0597171d2a04c52e2/1588772625282/A%20gender-equal%20process_VR_2020.pdf

European Prize for Women Innovators

The European Prize for Women Innovators celebrates the women entrepreneurs behind Europe’s most ground-breaking innovations. The prize awards women from across the EU and countries associated to Horizon Europe, whose disruptive innovations are driving positive change for people and planet.

The prize is managed jointly by the European Innovation Council and SMEs Executive Agency and the European Institute for Innovation and Technology. The winners are chosen by an independent expert jury.

https://eic.ec.europa.eu/news/european-prize-women-innovators-celebrating-womens-outstanding-contributions-innovation-and-2024-03-18_en

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