

Bridging the gender gap in digital, research and industry: What is the way forward?



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Abstract

These proceedings summarise the discussions that took place during the ITRE workshop held on June 17th, 2021, aimed to analyse the existing gender gaps in the digital sector. It was structured in three sessions, each consisting of two presentations, and a final Q&A round. Stereotypes hindering a greater participation of women in the digital sector, the role of women in the digital entrepreneurship ecosystem and the current situation of women in the Artificial Intelligence industry were addressed.

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
CEO	Chief Executive Officer
DG-IPOL	Directorate-General for Internal Policies of the Union
DSA	Digital Services Act
ECR	European Conservatives and Reformists in the European Parliament
EP	European Parliament
EPP	Group of the European People's Party (Christian Democrats) in the European Parliament
EU	European Union
FEMM	Committee on Women's Rights and Gender Equality
Greens	Group of the Greens in the European Parliament
ICT	Information and Communications Technologies
IPO	Initial Public Offering
ITRE	Committee on Industry, Research and Energy
ML	Machine Learning
OECD	Organisation for Economic Co-operation and Development
R&D	Research and Development
S&D	Group of the Progressive Alliance of Socialists and Democrats in the European Parliament
SME	Small and Medium Enterprise
STEM	Science, Technology, Engineering and Mathematics
US	United States
UNESCO	United Nations Educational, Scientific and Cultural Organisation

EXECUTIVE SUMMARY

Background

The workshop “Bridging the gender gap in digital, research and industry: What is the way forward?” took place on 17 June 2021 and was organised in cooperation with the Policy Department for Economic, Scientific and Quality of Life Policies at the request of the ITRE Committee.

The workshop falls within the framework of the priorities set by President von der Leyen's Commission, “A Union of Equality” and “A Europe fit for the digital age”, a digital transition that opens up new opportunities, but also raises many challenges in the search for gender balance in key policy areas: digital, research and industry.

It consisted of three sessions with two speakers per session and a final Q&A round, on key aspects regarding the gender digital gap: stereotypes, female entrepreneurship and women’s participation in AI research and industry.

It was chaired by **Mr Cristian-Silviu Buşoi**, MEP and Chair of the ITRE Committee, and hosted by **Ms Josianne Cutajar**, MEP and ITRE standing rapporteur on gender mainstreaming.

Aim

The workshop aimed to provide an overview and raise awareness of the gap women face in the digital sector and as entrepreneurs.

Among its objectives, the workshop sought to discuss the state of play and to build the way forward on gender in such an important dimension as research and the digital industry.

Summary of presentations

Ms Josianne Cutajar, MEP, introduced the workshop by providing some data on the gender gap in digital and highlighting the need of the ITRE Committee members to commit with the increase of female participation in the digital industry and research.

The first session, “Women in stem. How to break stereotypes?”, was conducted by **Dr Konstantina Davaki**, researcher in Social Policy at the London School of Economics and **Mr Miguel Castro**, Global Lead for Diverse Ecosystem at SAP.

Dr Davaki, in her presentation “There are more colours than pink and blue: Gender stereotypes and inclusion in education”, described how gender stereotypes, conscious and unconscious, affect girls from an early age in their decisions regarding STEM studies, and how the family, school and social environment inculcates and perpetuates these stereotypes. She suggested lines of action to break these stereotypes, such as teachers’ training, school materials or role models.

Mr Castro presented SAP's long-standing experience in breaking down gender stereotypes in its industry, in a presentation titled “Innovative and practical ways to foster gender equality in STEM careers”. In explaining SAP's policy, he outlined how the company addresses the significant challenges posed by the gender gap. From an internal company point of view, he recounted the initiatives that combat the impact of gender biases and inequalities (strategic decisions, leadership positions, recruitment, organisational culture, etc.). And externally, he described the initiatives put in place to support women entrepreneurs, create role models, develop digital skills in girls, or reskill employees.

The second session, “Female entrepreneurship: how to unlock the hidden potential”, was opened by **Ms Eszter Zsabó**, founder and president of the Women/Business/ Angels association, that talked about

“The business angel side of the innovation table”. She explained her experience in the angels’ investment field in Central Eastern Europe and stated that, from her experience, women need three things for entering the business angel investing: visibility, to be engaged in a network and training.

Ms Cheryl Miller Van Dÿck, Chairwoman at the Women Entrepreneurship Platform and Digital Leadership Institute, gave a talk titled “Women entrepreneurs and the digital disruption: “Plus ça change...?” In her speech, she described the double challenge faced by women as entrepreneurs and in the digital society and pointed out the risk of leaving women behind when we look at the opportunity of the digital green transformation. Actions, in her view, to deal with the situation require a strong leadership at the European level and a cross-cutting action to support women entrepreneurs no matter where they are.

The third session focused on “Artificial intelligence: where are the women?” and counted with the participation of **Mr Juan Mateos-Garcia**, Director of Data Analytics Practice at NESTA, and **Ms Caroline Lair**, Founder of The Good AI, co-founder of Women in AI.

Mr Mateos-Garcia provided “Empirical evidence of a gender gap in AI research” and explained the implications of this gap. He shared data on women participation in AI research - only 12% of all researchers are female – and pointed out that, as a result, the sector faces a relevant lack of diversity in skills supply. This is going to create ethical risks, considering that the technologies developed today are going to create the infrastructure and the foundation of our society and economy of tomorrow.

Ms Lair reinforced the idea expressed by Mr Mateos-Garcia that AI is a once-in-history opportunity to shape a society that truly puts human rights at its heart, because the society can introduce some values and principles into algorithms. For that same reason, AI might also exacerbate the gender gap and it is necessary to actively work on mitigating gender biases in algorithms. She shared some recommendations to mitigate and reduce the gap.

The Q&A round included several interventions of members of the ITRE Committee and of representatives of the FEMM Committee:

- **Ms Romana Jerković**, representative of the S&D group.
- **Mr Rasmus Andresen**, representative of the Greens group.
- **Ms Jessica Stegrud**, representative of the ECR group.
- **Ms Evelyn Regner**, Chair of the FEMM Committee.
- **Ms Maria Noichl**, S&D coordinator of the FEMM Committee.
- **Ms Pernille Weiss**, representative of the EPP group.
- **Mr Seán Kelly**, representative of the EPP group.

Questions raised by MEPs were focused on identifying concrete examples of best practices to tackle the digital gender gap, considering both private initiatives and successful public policies. The speakers presented some European and international examples of what can be done to bridge this gap.

Final remarks

Ms Josianne Cutajar, ITRE standing rapporteur on gender mainstreaming, closed the workshop thanking all participants for their interventions and hoped that the discussion is a first step to enhance the gender mainstreaming in the parliamentary activity, as 2021 is a crucial year because of the economic recovery and because it is the first year of what the European Commission has defined as the “**Digital Decade**”.

She stressed the relevance of the work of the ITRE Committee on key pieces of legislation to enable the Digital Decade and the importance of ensuring that the gender perspective is included in this legislative work.

She expressed her conviction that considering the gender dimension on the digital world can represent a real driver for change and enable women to be at the centre of the digital transition, giving them the role they deserve.

1. INTRODUCTORY WORDS

Mr Cristian-Silviu Buşoi, MEP and Chair of the ITRE Committee, opened the ITRE workshop entitled “Bridging the gender gap in digital, research and industry: What is the way forward?” He welcomed the speakers and thanked them for accepting the invitation to participate in the workshop. Mr Buşoi briefed that the workshop was organised in cooperation with the Policy Department for Economic, Scientific and Quality of Life Policies at the request of the ITRE Committee and explained that it would look at the important issue of bridging the gender gap in STEM studies, careers and entrepreneurship. Finally, he gave the floor to **Ms Josianne Cutajar**, MEP, to introduce the workshop.

Ms Cutajar began her intervention by expressing her enthusiasm to listen to the panellists and colleagues on such an important cause as gender, which should be mainstream in all EP committees. Ms Cutajar thanked the Chair, the coordinators of the political groups, the Secretariat and the DG-IPOL (Directorate-General for Internal Policies of the Union) for the support and the possibility to hold the workshop.

Ms Cutajar outlined that the **aim of the workshop was to discuss the state of play and to build the way forward on gender in such an important dimension as research and the digital industry**. She underlined that women are the majority of the European population, but account for only a third of the entrepreneurs. There is also a shortage of women in the STEM (Science, Technology, Engineering and Mathematics) world, with only 36% of graduates in these fields being women. And only 2 out of 5 scientists and engineers are women. She recalled the participants that, as members of the ITRE Committee, they should be more committed to ensuring that girls and young women have more opportunities to have a career in science, as there is a knowledge gap about the real opportunities. Ms Cutajar highlighted the positive example set by the SME Strategy in addressing the gender gap in entrepreneurship.

Ms Cutajar mentioned that the workshop will offer different ways to address the gender gap that still exists in the sphere of entrepreneurship and digital research, with a focus on **breaking stereotypes in STEM careers, unlocking the potential of women in entrepreneurship** and **assessing the opportunities and risks of artificial intelligence**. She ended her speech by expressing her conviction that the discussion would be useful for the parliamentary work.

Mr Buşoi took the floor and invited the first speaker to begin her intervention.

2. SESSION 1. WOMEN IN STEM. HOW TO BREAK STEREOTYPES?

2.1. There are more colours than pink and blue: Gender stereotypes and inclusion in education

Dr Konstantina Davaki, researcher in Social Policy at the London School of Economics

Dr Konstantina Davaki began her presentation by highlighting the **underrepresentation of women in STEM** fields and giving the 2019 figure of 6.3 million women scientists and engineers in the EU, 41% of total employment in the sector. Despite robust progress towards equality, gender inequality remains the defining characteristic of STEM education. Dr Davaki argued that the answer to the question of why underrepresentation exists is to be found in social, psychological and socio-cultural theories and the extensive analysis of gross national data that support them. In this sense, studies indicate that macro level cultural conditions affect gender differences in STEM interest through a variety of causal mechanisms. These mechanisms are encoded and conveyed through parents, teachers, attitudes and expectations.

After this introduction, Dr Davaki focused on **stereotypes** which defines as **shared beliefs about traits that are characteristic of the members of a specific social category**. Stereotypes can serve a social norm, affecting expectations and behaviour towards members of a particular social group. There are explicit and implicit stereotypes. The first are conscious beliefs that the individual holds, while the second ones are automatic, and often unconscious associations that people quickly make. Dr Davaki underlined that gender is a social category in which stereotypes appear in middle childhood. For instance, that mathematics is for boys. These stereotypes are not based on women's actual performance or differences in skills and can lead to the social exclusion of women from childhood to adulthood. Dr Davaki considered that these stereotypes are interiorised and can be predictive of self-reported perceptions of individual ability and measures of scientific capital. That is, children's exposure to STEM-themed books, stories and clothing provides further information about the development of STEM gender stereotypes. Stereotypes developed in childhood are later reinforced by male teachers in STEM subjects, an unbalanced gender composition in the classroom and, later, in the workplace and in society at large. She stressed the need to challenge ideas about STEM ability based on gender which contributes to disparities in gender representation in higher education and employment.

She then focused on the influence of the **social environment and especially in teachers' influence**. To understand STEM education and related gender stereotypes, it is necessary to recognise that many social forces affect educational outcomes. The family is one of the key institutions that influence education. The education of parents and their occupation is crucial in the educational outcomes of children. Family structure, parental mindset and gender mindset, and behaviours affect exposure and experience in STEM, as they do for education in general. But research on contextual factors influencing STEM education has focused on school specific factors that are expected to affect participation and achievement in STEM education. In this context, **teachers' expectations of students** are of great importance and can affect their performance. Some studies have shown that teachers' expectations are quite stable and persistent over time. Gender differences are partly socially constructed, and teachers' stereotypes may influence students' gender mentality. The key question here would be whether gender-stereotyped teachers bias expectations about students' abilities in a direction that corresponds to the teacher's cultural stereotypes. Conversely, interaction with STEM teachers with anti-stereotypical thinking may negatively affect the prevalence of stereotypes. This affects both girls and boys and independently of the teacher's gender. In this point, Dr Davaki pointed to the theory of stereotype threat which helps to explain the girls STEM avoidance. Under this theory, there is a fear of

confirming a negative stereotype about one's group in a given ability domain. Students may underperform because of the cognitive load created by the awareness of negative stereotypes about the group.

Dr Davaki concluded her presentation by **suggesting some lines of action**. One of them is the design of **interventions that increase the feeling of belonging**. These interventions should include men as well. She also focused on **school materials, which should not reinforce stereotypes and should encourage counter-stereotype thinking**. In classrooms, **pictures of scientific personalities should respect a gender balance**. Other suggestions are the **training of teachers to erode gender stereotypes, encourage beliefs about women's abilities in early childhood through media or role models**, and, finally, to **know how to read stereotype threats in early childhood** before the age of 12.

2.2. Innovative and practical ways to foster gender equality in STEM careers

Mr Miguel Castro, Global Lead for Diverse Ecosystem, SAP

Mr Castro began his presentation by referring to SAP's policy on diversity and parity. In terms of diversity and inclusion, the SAP's aspiration is that the workforce reflects the diversity of society, including not only gender, but also the demographics of the regions where they are present. To this end, **the company uses its own artificial intelligence and machine learning solutions to detect and eliminate the effect of biases in each decision**. This applies at different levels in the company. For example, for all employees, for leadership positions, and for experts in technical expert roles. In performing these analyses, specific targets are set to achieve gender equality. The most recognised of SAP's targets is to reach 30% of women in leadership positions by 2022. The initial responsibility for these issues lies with the Global Diversity and Inclusion office. However, Mr Castro highlighted the strong collaboration with the SAP Business Network and the SAP Women in Tech community, which helps female tech leaders from SAP to demonstrate their business expertise.

Mr Castro enumerated some of the programs that SAP has developed to achieve gender equality. He highlighted the project "Girls and Women Talking Tech". Focusing on the decision-making level, Mr Castro recalled that the leadership community within the company has an inclusive mindset. He highlighted the "Inclusive Leadership Challenge", which comprises a constant flow of micro-learnings and challenges for SAP leaders to try new behaviours that help broaden the mindset of inclusive leadership. Regarding recruitment, Mr Castro commented that SAP has its inclusive hiring processes and guidelines and stressed the big success of flexible work arrangements to foster gender equality.

Mr Castro then discussed SAP's contribution to society in promoting gender equality, **starting with role modelling**. SAP pays special attention to the representation of women on both its executive board and its advisory board. And he said they are very proud of the public recognition they have. For example, the Dow Jones Sustainability Index has recognised SAP as the global software industry leader for the 14th consecutive year. They have also been recognised three years in a row by the Bloomberg Gender Equality Index. And they have gone through the EDGE certification process twice to analyse their policies, practices and numbers in the different areas that constitute gender equality at SAP. Mr Castro highlighted that, in the field of external visibility, partnerships are critical. SAP engages with the United Nations to boost the Sustainable Development Goal 5 (gender equality), participates and collaborates with Women in Data Science (Stanford University), the Female Quotient and Grace Hopper Celebration. At the European level, SAP is participating in the European Round Table for Industry with the presence of its CEO Christine Klein.

After that, Mr Castro talked about **the corporate social responsibility initiatives** of SAP. He argued that one of the most impactful ways to facilitate opportunities for people around the world is digital inclusion. In 2020, SAP impacted the lives of 83 million people around the world. And 50% of the beneficiaries of digital skills programs were women and girls. One of the programs he highlighted is the Meet and Code initiative in collaboration with TechSoup Europe and Haus des Stiftens gGmbH, which aims to introduce children and young people between the ages of 8 and 24 to the world of technology and coding. And this program does so by promoting science and technology related events during the EU Code Week. In 2020, SAP participated in events in 35 countries (also outside Europe) and more than 1,300 events were held.

Mr Castro highlighted an initiative to improve digital skills of workers, aimed to reskill 1 million adults of all ages in Europe by 2025. At country level, in three Member States (Portugal, Spain and Sweden) SAP is leading works in partnerships with local public and private entities. They are already engaging with European Commission through the support of the Pact for Skills.

In the final part of his conference, Mr Castro talked about two **initiatives of SAP related to entrepreneurship**. One of them is the venture capital fund of SAP.iO program. As part of SAP.iO, No Boundaries specific program was launched in 2019, in which they pledged to help globally over the next five years at least 200 start-ups, founded by women or with at least half of the C-level executives female or one underrepresented person from an ethnicity point of view. The motivation for this initiative is that several studies show that in the US only 13% of the venture capital goes to organisations that have at least one female funder, while in Europe that number drops to only 7%. In the first two years SAP has funded more than 100 start-ups having a female founder or C-level executives. The other initiative pointed by Mr. Castro is the commitment of SAP with supplier diversity. In 2020, the "5&5 by '25" initiative was launched to help procure for women own businesses. The target is to spend 5% of SAP addressable budget within social enterprises and diverse businesses by 2025. Businesses led by women fall under this category. The motivation for this initiative is that more than 30% of companies around the world are owned by women, while only 1% of corporate procurement contracts are awarded to women-led businesses.

3. SESSION 2. FEMALE ENTREPRENEURSHIP: HOW TO UNLOCK THE HIDDEN POTENTIAL

3.1. The business angel side of the innovation table

Ms Eszter Zsabó, founder and president of the Women/Business/ Angels association

Ms Zsabó began her intervention in the workshop with a brief introduction of herself and explaining that her association (Women/Business/Angels) involves three different concepts and she was going to address them in this presentation. She explained how the association was born. Four years ago, she started to work on foreign direct investment with a couple of friends in the region to increase local capital in Central Eastern Europe. After only 30 years of experience in the market economy in the region, families live on their salaries and do not invest because there is nothing to invest in. If someone wants to start a company (most probably technological) quickly, they ask for money from family, friends... So, the first investor is an angel investor. That is why the first name of the association is Angel. After angel investors, there are other funding instruments such as venture capital, IPO (Initial Public Offer), stock exchange, or mergers and acquisitions by multinational companies. Four years ago, the association started from scratch and tried to involve different actors from Central Eastern Europe, especially from Hungary, with a focus on women who could potentially become angel investors and with whom they could increase the number of start-ups and achieve the gender balance.

Ms Zsabó highlighted that there are three main things that women demand when asked about their needs to enter the business angel sector: **visibility, to be engaged in a network and training.**

Afterwards, Ms Zsabó moved on to explain the activities and initiatives of the association. The association started using an existing platform in Central Eastern Europe. They organise conferences and round tables every year for women on innovation. This year, starting from January, they started training and club sessions in order to teach people how the innovation ecosystem is and how they can be part of it. Their aim is to increase the number of women that want to become business angels and want to share their experience and network with start-ups in Central Eastern Europe. Then, she provided some data. The 2021 report from the Polish organisation “European Women in Venture Capital” shows that 1% of the start-ups get money from the investor community. If they do not get money from the investor community they are on their own, because no bank is going to finance a start-up on a new area. **In Central Eastern Europe 94% of financed companies are led solely by men. Other reports give better figures** but leave out relevant sectors such as the oil, **reporting that women receive 26% and men 74% of funds.**

To conclude her presentation, Ms Zsabó stressed the need of women to get involved, the need to have actions and the need to have local players. These local partners, key for increasing female participation, need to receive funds from different sources.

3.2. Women entrepreneurs and the digital disruption: “Plus ça change...?”

Ms Cheryl Miller Van Dÿck, Chairwoman at the Women Entrepreneurship Platform and Digital Leadership Institute

Ms Van Dÿck started her intervention thanking Ms Cutajar for her important work on the subject and announced that her conference would be about digital disruption. She recalled that, since 2013, we have seen a shift impacting society largely driven by cloud computing, mobile access and, of course, the use of massive amounts of data. So, disruption is here and there is no need to discuss the

implications it has for everyone in everyday life. She paraphrased William Gibson saying that “the future is here, it is just not evenly distributed”. Ms Van Dÿck explained **the situation in Europe impacting women entrepreneurs** and women more broadly and giving some ideas on how to fix it.

Technology is seen in our society of 7.8 billion people as the great equalizer. However, trends show that the **uptake of technology is not evenly distributed between men and women**. This is even the case in Europe, where the internet gender parity score is 0.94, meaning that **men are more likely to have access to the internet than women**. Men are more likely to have high digital skills. **Women are more likely to have no or low digital skills**. And **about 80% of IT professionals in Europe are men**. About **only 1% of tech start-ups are led by women**. Not to mention how much women get funding for creating start-ups of any kind. What this looks like in practice is that half of the European population has digital skills, but between the ones who do not, there are more women. This reflects a total digital skills gap of about 12 million women, a persistent trend over decades.

She stressed that, despite the digital disruption, the participation of women as IT experts has flatlined. And even today, about one in five IT professionals is female, despite the explosive growth in demand for jobs of this kind, and that these jobs are indeed being filled at a much faster pace than the rest of the jobs available. She recalled that there are about a million digital jobs available and there is however huge youth unemployment in Europe and massive unemployment among women. She noted that **9 billion euros more per year could be added to the EU economy if women are engaged in the digital economy at an equal rate as men**.

Ms Van Dÿck highlighted that the green digital transformation offers huge opportunities for women. However, the **general participation of women as entrepreneurs in Europe is about one third**. But it is more disturbing that **only one in ten tech starters are female**. She commented that this statistic may not even be accurate because no sex disaggregated data is collected on the subject, and that is one area for action. She also noted that 85% of women entrepreneurs in Europe run their businesses alone and 85% of the so-called “solopreneurs” are female. In general, they are people who have hit the edge of their traditional career paths and are forced into entrepreneurial activity, a fact that the pandemic has exacerbated. She cited a McKenzie statistic that 80% of women are marginalised by traditional career paths. So, she applauded that organizations like SAP are targeting diversity in top leadership. And, of course, the Women on Boards European Directive.

At this point, Ms Van Dÿck focused on **venture capital**. Research on all of Europe shows that, although indeed women enter entrepreneurship at a lower rate than men, they are still being funded at a significant disproportionately lower number. Of all women starters that got funding between 2014 and 2018, only 30% got VC funding, and only 11% of those Series A. Ms Van Dÿck considered that, in addition to sexism in the workplace, there are many other “isms”. She mentioned ageism, because when talking about women entrepreneurs, the fact that many of them are more mature is often overlooked, and some programs targeting the youth might be missing a lot of women entrepreneurs.

Ms Van Dÿck highlighted that there is not enough research on the impact of sexism and ageism on Europe's GDP and employment and when we look at the opportunity of the digital green transformation, we are still seriously at risk of leaving women behind.

In the last part of her speech, Ms. Van Dÿck discussed **the actions needed to deal with the situation** described. The challenge should consider the double strand that women are facing as entrepreneurs and in the digital society. First, the gap in digital skills. Second, that they lack the encouragement towards entrepreneurship that is often forced upon them.

Ms Van Dÿck concluded her intervention by calling for leadership to respond to this challenge at the European level, because without it, the change is not going to happen. This could take the form of a **bill of rights for women entrepreneurs** that allows to activate funds and resources across the different silos of the European Commission and policymakers, supporting women entrepreneurs no matter where they are. European institutions need to lead the way.

4. SESSION 3. ARTIFICIAL INTELLIGENCE: WHERE ARE THE WOMEN?

4.1. Empirical evidence of a gender gap in AI research

Mr Juan Mateos-Garcia, Director of Data Analytics Practice at NESTA

Mr Mateos-Garcia opened his presentation by raising three key questions:

- Why is so important to reduce the gender gap in AI?
- What do we know about this gap, considering its levels and evolution, its geography, and its impact?
- Where do we need to go next?

Mr Mateos-Garcia stressed the current exciting momentum of AI, enumerating different applications where AI is crucial: search engines, targeted advertising, self-driving cars and machine translation. He explained that **93% of all research in the field of AI was published after 2012**. He also noted that, in contrast to other industries, private sector companies have played a very important role generating these breakthroughs. Mr. Mateos-Garcia suggested that **AI research is a field dominated by men**, which is negative for many reasons. The most relevant one refers to the **lack of diversity in skills supply**. People with the right skills to develop and encourage the adoption of this technologies are needed and no group should be excluded from participating in AI research. In addition, **different types of people boost diversity, which is very good for creativity**. Finally, Mr Mateos-Garcia recalled the fact that not having inclusion in AI research is going to create ethical risks. The big concern is that systems which are developed by narrow groups are going to be narrow and mainly lead to unfair and discriminatory outcomes, as the book "The invisible women" by Caroline Criado highlights.

Mr Mateos-Garcia noted that there are lot of research starting to show some of the implications of these narrow systems for justice and fairness. For instance, many papers show the problems when ML systems are trained with data that do not have enough representation of women. These algorithms are going to make predictions which are more likely to fail in the case of women. Mr Mateos-Garcia emphasised that it is very important to start addressing these situations, not only because of the current impact, but also because the technologies developed today are going to create the infrastructure and the foundation of our society and economy of tomorrow.

After the introduction to the topic, Mr Mateos-Garcia focused his intervention on the findings of his research, carried out for a Horizon 2020 project aimed to develop big data indicators to inform and improve research and innovation policy in the EU. The research involved the analysis of 1.3 million papers published globally. Mr Mateos-Garcia and his team used diverse methods to identify female researchers in these papers. They found that **the share of female researchers had barely increased since the 1990s, the share of papers around AI including women is just around a quarter today and only 12% of all researchers are female**. They especially found that **female researchers are underrepresented in computer science and data related disciplines**, with differences between countries. They also looked at the career transition of researchers from the academia to industry and found that **women are especially underrepresented in the private sector**, which is very important as the private sector is playing a key role in some of the biggest breakthroughs around AI. Therefore, the lack of women in the AI industry is a big problem.

Mr Mateos-Garcia underlined that all the findings of their research were consistent with other works. He cited an interesting report by the Alan Turing Institute, which showed that women are underrepresented in all occupations in AI industry.

Mr Mateos-Garcia explained that, in their research, they compared the kind of research that involves female researchers with the kind of research that does not involve female researchers. They found that **female AI researchers are overrepresented in topics focused on health and societal applications of AI**. Female researchers barely develop generalist algorithms, but they develop algorithms for the public good. They also found that **research involving female researchers is more likely to include terms related to ethical values and risks**. Female researchers pay more attention to some negative consequences of AI.

An interesting finding highlighted by Mr Mateos-Garcia is that **research involving female researchers tends to be more interdisciplinary**, and thus creating more innovation, greater impacts and greater societal benefits.

Mr Mateos-Garcia stressed that some of the fantastic research on the biases of ML models and ethical risks involve female researchers and women of colour. He cited one important example: Timnit Gebru, who was a leading researcher in Google Brain, was dismissed for publishing research that showed the ethical and environmental risks of some of the technologies they were developing. According to Mr Mateos-Garcia this example illustrates the challenges women face in the AI industry.

Mr Mateos-Garcia concluded his presentation by stressing that **there is a persistent and significant gender diversity gap in AI research**, with differences between countries and types of organisations. **Female researchers tend to focus on public good applications and are more aware on the ethical issues in the AI research**. He highlighted the need to consider intersectionality, as it is not only a gender issue but also involves other sociodemographic characteristics. He underlined the need to understand the mechanisms driving the increase in female participation in AI research and start to quantify the impacts even better than they have done so far. He also recalled that it is necessary to start considering that the impacts are not only related to the research field but also to the applications and industry. Finally, he stressed the need for using this evidence to inform policies in order to have a more inclusive AI workforce and contribute to the development of technologies that are more beneficial for everyone.

4.2. Women in AI: what it takes?

Ms Caroline Lair, Founder of The Good AI, co-founder of Women in AI

Ms Caroline Lair started her intervention by sharing her conviction that the AI revolution is offering a once-in-history opportunity to shape a society that truly puts human rights at its heart. And this is because the society has the opportunity to introduce some values and principles into algorithms.

When it comes to the gender gap, Ms Lair reminded that it is necessary to actively work on **mitigating gender biases in algorithms**, hence improving women's access to healthcare, work, education, justice, finance, housing and so on. She noted that, nowadays, we may find the opposite: **AI may exacerbate the gender gap**. To prove this assertion, she referred to some reports from UNESCO, the International Monetary Fund and the Institute for Women's Policy Research which state that women would be more impacted by job automation than men. Indeed, most workers in jobs with a high risk of automation, such as clerical, administrative, bookkeeping and cashier jobs are women.

Ms Lair noted that **there is an important risk to reproduce gender bias and sexism into AI systems**. Conscious or unconscious biases are transferred to datasets used to train algorithms and the way they

are designed. She highlighted that Gartner predicted that by 2022, 85% of AI projects will deliver erroneous outcomes due to the bias in data, algorithms or the teams responsible for managing them. She also stated that this will happen if this risk is ignored and if the opportunities to use AI to change the status quo are not seized.

Ms Lair was optimistic about the possibility of reducing the gender gap thanks to AI. She considered that women will not be the losers of the AI revolution, because **soft skills are a must in the AI era**. Women will need to choose what problems they want to solve and how to resolve them. Women will also need to design what work they would like to do and what work they want the machines to do for them. In this scenario, soft skills are fundamental for problem solving, and research suggests that women are better than men when it comes to soft skills and team problem solving. Furthermore, women are much more needed in AI teams. To create AI-based solutions that match customer needs (she recalled that 50% of mankind, and consequently customers, are women), companies need female engineers and data scientists to participate in the design and deployment of inclusive AI solutions. Ms Lair stressed that, to achieve this goal, it is crucial to avoid the vicious circle of bias automation to allow for greater fairness in society.

Ms Lair asked what it takes to meet this objective. Before discussing the answers, she provided some known figures on women's participation in the AI industry: **only 35% of STEM students are women. Only 22% of AI professionals are women** globally. And **only 38% of women who majored in computer science are working in the field** compared to 53% of men.

She highlighted that many actions are needed to create gender inclusive AI solutions at different moments of the AI development cycle, but also in other fields such as education, media and recruitment. She summarised the recommendations included in her presentation:

- To improve access to STEM education for girls.
- To shift the narrative that computer science and engineering are a male domain to inspire more ladies to enrol in these careers.
- To value and promote soft skills, that are crucial in an automated world.
- To raise awareness and improve education about the ethical side of AI, at school but also within companies.
- Companies need actively recruit and retain women in AI teams.
- Governance strategies, frameworks and tools to build inclusive AI solutions should be deployed at every company developing AI solutions.
- Finally, audits, standards and certifications are a must, and should be required before releasing any AI solution in the market.

After describing the work of her organisations (Women in AI and The Good AI), Ms Lair concluded her presentation by recalling that the World Economic Forum estimated that it would take more than 130 years to close the gender gap and expressed her confidence in the power of inclusive AI-based solutions and the work of non-profit organisations to dramatically reduce this timeline.

5. Q&A SESSION

5.1. Interventions of ITRE Committee members

The Q&A session started with several interventions of members of the ITRE Committee. There were also interventions of representatives of the FEMM Committee.

The first intervention came from the representative of the S&D group, **Ms Romana Jerković**. She noted that the current transformation of our society and economy is of historical importance, and it is essential that this transformation is socially inclusive and creates equal opportunities for all. In the EU, the debate on AI has been more about not losing the race with the US or China than about finding ways to seize the opportunities offered by AI without compromising the European values. However, she stressed that **discussions should also be about how to make the engineering process behind these technologies more reflective of our diversity**.

Ms Jerković highlighted that much of the value of human potential is related to the promotion and development of talent based on merit. This is the reason why is necessary to proactively designing AI solutions without gender or other biases, encouraging diversity in the workplace. She referred to the WEF report “Future of Jobs 2020” which stresses the need to address the disruption underway both by supporting and training displaced workers and by monitoring new opportunities in the labour market. She recalled that study after study has shown that the gender gap would have been more deeply impacted by the pandemic, so **it is imperative that discussions and conclusions on the gender gap in digital research and industry are translated into actions**.

She finally suggested that legislation against gender bias in AI should explore the connection between women, wages and skills capabilities of workers. She concluded her intervention recalled that by harnessing the talents of all sectors of the population and using them to develop cutting-edge technologies such as AI, growth and prosperity for all can be boosted.

The second intervention was made by the representative of the Greens group, **Mr Rasmus Andresen**.

Mr Andresen **highlighted the need to ensure gender equality**, as it should be the leading principle of the digital economy and also the STEM careers. He agreed that there is not a single answer and that many things have to be done at different political levels, such education and economic policy, to achieve this goal. He asked the speakers, specifically Mr Castro, Ms Szabó and Ms Miller, some questions. The first one was aimed at knowing more about concrete best practices, especially when it comes to public policies. The second one referred to examples of actions and programs currently developed in the US and ways to push the role of private businesses in bridging the digital gender gap.

On behalf of the ECR group, **Ms Jessica Stegrud** intervened. She noted that when talking about discrimination and exclusion of women from STEM careers it is suggested that it is because women do not get the same opportunities. It has to do with attitudes, gender stereotyping, and few role models amongst women.

She summarised the situation in Sweden, one of the most equal countries in the world. In Sweden, traditional gender stereotypes are challenged since childhood. At University level, women are the majority, and also in the public sector. So, **she did not think there is any structural impediment to women to become a researcher or an engineer**. But notwithstanding that fact, she stressed there are very few women who choose to go into these particular professions, and still today women go for more traditional so-called female jobs. According to Ms Stegrud, this is because women have the choice. It

seems that the more economically balanced a society is the more women and men are free to choose what job they want. She defined this fact as the **equality paradox**.

She agreed that women should have the opportunity of choosing STEM careers if they wish, but they should also have the option of not choosing STEM professions, if they don't want them. She suggested that **it is necessary to make sure that men and women work on an equal footing and that all have equal opportunities**, which is a precondition for our competitiveness. She considered that the key questions are how we can attract talent, how we can offer high quality education training and risk capital. She closed her intervention by suggesting that more attention should be paid to skills and capabilities than to gender.

The fourth intervention was delivered by the Chair of the FEMM Committee, **Ms Evelyn Regner**. She began by thanking the workshop organisers and speakers. She raised a question about whether women should adapt to the digital research and industry as it is or whether digital systems should change in order to be more inclusive. After presenting an example of lack of work life balance, she also asked what could be done to improve it in the AI world.

She recalled another example provided by Ms Van Dÿck in her presentation, which refers to **only one in ten tech entrepreneurs are women**. She highlighted that this low figure is consequence of the difficulties for women to convince financial institutions (mainly managed by men) to fund their projects.

She concluded her intervention stressing the **need to include the gender perspective in all those areas, including public tenders**.

After the intervention of the Chair of the FEMM Committee, the S&D coordinator of this Committee, **Ms Maria Noichl**, took the floor.

She agreed that all people know what is wrong and where the problem lies. She pointed to the example of manspreading in public transport as a symbol of women are not given the physical space to express themselves. Although it would be sensible to launch an EU wide project working on education and awareness raising and bringing up these questions in schools for STEM subjects, **she raised the question about whether it would better to educate girls separately**. She commented the case of Germany, where they have noticed that more girls educated in single sex schools continue with their studies in STEM subjects, because they are given the time and the space to interact and express themselves. She was interested to know the speakers' views on whether mixing boys and girls at schools studying STEM subjects is actually contributing to the problem.

The following intervention was delivered by **Ms Pernille Weiss**, representative of the EPP group. She recalled that, in addition to being a member of the ITRE Committee she is also a substitute member of the FEMM Committee and rapporteur on an own-initiative report entitled "Reaching women's economic independence through entrepreneurship and self-employment". She considered the workshop very fruitful.

Regarding the questions, she followed the line of the representative of the Greens group, Mr Rasmus Andresen, **asking about examples**. She also urged the EP to **collect all relevant examples and cases that can move the facts forward so that there are more women in entrepreneurship**. She considered very important, as it can add value to their work, to have more concrete examples of what benefits and supports women to succeed as entrepreneurs, but also examples of how good it is for a business to have a woman as a self-employed business owner.

The last intervention came from **Mr Seán Kelly**, of the EPP group. He referred to the discussion about coeducation, which is a problem that the EP need to look at and discuss in a wider context. He raised a question about how to define a women's rights bill, mentioned in one of the previous presentations.

5.2. Answers and final remarks of speakers

After the interventions of the members of the ITRE and FEMM Committees, the Chair gave the floor to the speakers to answer the questions and provide their concluding remarks.

Ms Konstantina Davaki started her intervention by answering Ms Noichl's question about the benefits of differentiated education. Ms Davaki confirmed that **single sex schools lead to better outcomes in STEM for girls**. However, she expressed her doubts about other matters that should be considered before deciding not to coeducate children. **Exposing girls to only their own gender during very important and formative years of their lives may have other repercussion on the socialisation, relationships with other genders, etc.** This is an important issue because it is proven that girls get intimidated by boys when it comes to STEM subjects. Another relevant problem is that there are not just two gender identities and accommodate different gender identities could be harder in single sex schools.

After answering this question, she resumed her presentation. She recalled the interconnectedness of social and school environment, which through beliefs, practices and processes have led to girls and women's underrepresentation in STEM. She highlighted the influence of education, employment and family policies, their interrelation and the need for similar interventions in all those domains. She stressed that **it is not enough to promote gender inclusion and diversity in education unless this inclusion is sustained in the labour market**.

Ms Davaki pointed to interventions in education and to achieve a real work-life balance, as the pandemic has demonstrated that women work much harder when there is flexibility. She also proposed labour market policies and funding for women entrepreneurs. All these are crucial matters that cannot be isolated and cannot be tackled only through education policies.

Mr Miguel Castro answered the questions addressed to him, related to best practices. He highlighted **the role the EU Platform of Diversity Charters is playing in sharing best practices**. He recalled that SAP is member of the German charter and signatory of the commitment for diversity inclusion. This is a very relevant forum when it comes to share experiences between companies on how to finance initiatives for diversity and gender inclusion. Mr Castro also noted that, in many cases, best practices are provided through cross company efforts. He recalled that SAP had recently published a compendium of 20 best practices to foster diversity and inclusion from the largest companies in the technological sector.

Mr Castro also commented on initiatives related to investments in digital transformation, as they have a strong focus on gender equality. He pointed out that having public funding to carry out such programs allows them to have a much greater impact in helping the European society to be more prepared for the future. Regarding the presence of women on companies, Mr Castro stressed the need to give them more visibility through the supply chain. Finally, considering female entrepreneurs, he suggested that large companies like SAP could support them through procurement.

Ms Eszter Szabó recalled the importance of the three steps already mentioned: the **financing of new companies**, the **networking** and the **training of people who become new business angels, investors or venture capital partners**. It is therefore important to strengthen the side of the capital, as this would lead to more investment in female entrepreneurs.

Ms Cheryl Miller Van Dÿck took the floor to answer the question about sex disaggregated data. She noted that the **Digital Scoreboard for Europe is a best practice globally**. However, **there are still challenges getting gender related items into the scoreboard**. Indicators on tech start-ups and funding for tech start-ups by women are needed. In terms of policy-related opportunities, Ms Van Dÿck pointed to a new OECD report that focuses specifically on a policy framework to support entrepreneurship from a gender perspective. She encouraged MEPs to look at that this report, which was released in 2020.

Regarding the question of US practices to foster gender equality, Ms Dÿck noted that in the US, there is the **"Women business ownership act"**, that was passed in 1988. The act intended to facilitate the access to loans and to put home businesses into the statistics as proper businesses. Most importantly, it created the **National Women's Business Council**, which assists 80 agencies across the United States that support local women entrepreneurs with the resources they need to start and grow. To build such an infrastructure in Europe would be a major challenge, but it could start with sustained support for organisations like the Women Entrepreneurship Platform at the European level, and then creating the infrastructure that supports capacity building among local organisations across the EU Member States.

Ms Van Dÿck recalled that she had mentioned the bill of rights for women entrepreneurs. However, she pointed out that it has not yet seen the light of day. As a first practical step she proposed to carry out a **study on the losses to the European economy due to the failure to support women entrepreneurs**. She highlighted that there are more women entering entrepreneurship right now than ever. And if they are empowered with the skills and the resources they need to survive and thrive, the boom in the European economy, not to mention to society at large, is going to be immeasurable.

Mr Juan Mateos-Garcia focused his last intervention on **policies that can indirectly help to address the gender gap**, especially in the private sector. He noted that the **regulation on algorithmic transparency and trustworthy AI**, which the EU is leading, can create incentives for businesses to increase their gender diversity. The only way to deploy an algorithm legally is to ensure that it is safe, fair and unbiased. And the way to develop those algorithms in that way is to have more diverse teams. Therefore, that regulation can help to indirectly increase demand for more diverse teams, including woman in the AI workforce.

Mr Mateos-Garcia also stressed the importance of **increasing competition** so that women who want to go into AI have more career options. **Supporting start-ups**, especially those led by women would be one way to address this issue.

Finally, Mr Mateos-Garcia focused on research and innovation policies. He highlighted the **opportunities opened up by the new Horizon Europe** programme to tackle societal challenges and to deploy AI for good and social impact. As these are areas where AI female researchers are particularly active, supporting that kind of work will be another way to help to bridge the gender gap.

Ms Caroline Lair pointed to two additional measures to complement what Mr Mateos-Garcia just mentioned. These measures could render interesting outcomes, to motivate girls to study STEM careers, to encourage women to train in AI and to incentivise companies in diversifying AI teams. The **first measure is related to shift the narrative**, as there is still lack of role models when it comes to inspiring girls to study STEM careers. **Massive communication campaigns** that present women who are data scientists, machine learning engineers and feature them as new shapers, new heroes working at creating a fairer society would be very useful for inspiring girls.

The second measure is to create **certification labels for acknowledging companies when they have diverse AI teams**. This would create strong incentives for companies to hire more women and to launch internal campaigns to upskilling and rescaling the current workforce.

6. CLOSING REMARKS

Ms Josianne Cutajar, ITRE standing rapporteur on gender mainstreaming, closed the workshop with her final conclusions. She thanked all participants (experts and members of the European Parliament) for their interesting interventions and hoped that the discussion is a first step to enhance the gender mainstreaming in the parliamentary activity.

Ms Cutajar highlighted that 2021 is a crucial year for two main aspects. The first one is the expected end of the Covid-19 pandemic and the start of the economic recovery. 2021 is also relevant because it is the first year of what the European Commission has defined as the “**Digital Decade**”. She stressed that it is a great opportunity to shape the future of many sectors and empower women to lead this change.

Ms Cutajar considered that **there is still a long way to go when it comes to breaking and addressing gender stereotypes** that affect the business community, and more generally the society. She urged to continue collaborating and working further together, to ensure bias-free hiring processes, to support female students enrolled in STEM careers, and to invest massively in actions related to the European Skills Agenda. Ms Cutajar highlighted this latter instrument to support girls and women to become scientists, engineers and mathematicians.

Ms Cutajar stressed the need to avoid that AI and algorithms posing a threat for women. She commented that the ITRE Committee is currently working on the DSA (**Digital Services Act**) and will work soon in several pieces of legislation to enable the Digital Decade. She highlighted the importance of **ensuring that the gender perspective is included in their legislative work**. In particular, regarding AI, she urged to assess legislative ways to reduce the risk of biases together with other stakeholders.

Ms Cutajar suggested not only looking at long-term challenges and measures, but also understanding the current situation to activate immediate mechanisms that can instil real change and do so by having achievable goals that yield tangible results.

Ms Cutajar concluded by encouraging further discussions with the speakers and her colleagues in the European Parliament to support additional initiatives linked to the legislation they are going to work on. She finally expressed her conviction that considering the gender dimension on the digital world can represent a real driver for change and enable women to be at the centre of the digital transition, giving them the role they deserve.

ANNEX 1: WORKSHOP PROGRAMME

‘Bridging the gender gap in digital, research and industry:

What is the way forward?’

Thursday, 17 June 2021, 13.45 – 15.25

Room: Paul-Henri Spaak 1A002,

(also on Interactio’s virtual room and Webstreaming)

Programme

- 13.45-13.50 **Opening remarks and introduction**
Cristian-Silviu Buşoi, Chair of the Committee on Industry, Research and Energy (ITRE), European Parliament
Josianne Cutajar, MEP, ITRE Standing rapporteur on gender mainstreaming, European Parliament

Session 1: Women in STEM: how to break stereotypes?

This session will be focused on how gender stereotypes hindering the participation of women in STEM careers are created during the educational process and the ways to break them. The session will pay attention to the causes and potential solutions to reduce/break gender stereotypes in both early educative stages and higher education from both theoretical and practical perspectives.

- 13.50-14.00 **There are more colours than pink and blue: Gender stereotypes and inclusion in education**
Speaker: Dr Konstantina Davaki, researcher in Social Policy at the London School of Economics
- 14.00-14.10 **Innovative and practical ways to foster gender equality in STEM careers**
Speaker: Mr Miguel Castro, responsible of Diversity & Inclusion at SAP Global, SAP, Spain

Session 2: Female entrepreneurship: how to unlock the hidden potential

Issues related to digital female entrepreneurship will be discussed in this session. The session will combine the two main perspectives within the entrepreneurship ecosystem: the vision of entrepreneurs about the current challenges (barriers and obstacles to women entrepreneurship) and opportunities, and the vision of the venture funders.

- 14.10-14.20 **The business angel side of the innovation table**

Speaker: Ms Eszter Sabo, founder and president of the Women/Business/Angels association, Hungary

- 14.20-14.30 **Women entrepreneurs and the digital disruption: “Plus ça change...?”**
Speaker: Ms Cheryl Miller Van Dyck, Chairwoman at the Women Entrepreneurship Platform and Digital Leadership Institute, Belgium

Session 3: Artificial intelligence: where are the women?

AI is the cross-cutting technology that is reshaping economic processes and social relationships, with great impact on daily lives of citizens. Such a powerful technology requires the equal presence of men and women in their development. However, a relevant gender bias currently exists in the AI ecosystem (data, algorithms, and devices), affecting the way this technology is being implemented and reinforcing gender bias of the real world. Speakers will discuss the implications of this gender bias in AI and solutions to overcome it, and ways to increase the presence of women in AI research and industry.

- 14.30-14.40 **Empirical evidence of a gender gap in AI research**
Speaker: Mr Juan Mateos-Garcia, Director of Data Analytics Practice at NESTA, United Kingdom

- 14.40-14.50 **Women in AI: what it takes?**
Speaker: Ms Caroline Lair, Founder of The Good AI, co-founder of Women in AI, France

- 14.50-15.20 **Q&A session with Members**

- 15.20-15.25 **Closing remarks**
Josianne Cutajar, MEP, ITRE Standing rapporteur on gender mainstreaming, European Parliament
Cristian-Silviu Buşoi, Chair of the Committee on Industry, Research and Energy (ITRE), European Parliament

ANNEX 2: WORKSHOP PRESENTATIONS

1. **There are more colours than pink and blue: Gender stereotypes and inclusion in education**, by Dr Konstantina Davaki, researcher in Social Policy at the London School of Economics.
2. **Innovative and practical ways to foster gender equality in STEM careers**, by Mr Miguel Castro, responsible of Diversity & Inclusion at SAP Global.
3. **The business angel side of the innovation table**, by Ms Eszter Zsabó, founder and president of the Women/Business/ Angels association.
4. **Women entrepreneurs and the digital disruption: “Plus ça change...?”**, by Ms Cheryl Miller Van Dÿck, Chairwoman at the Women Entrepreneurship Platform and Digital Leadership Institute.
5. **Empirical evidence of a gender gap in AI research**, by Mr Juan Mateos-Garcia, Director of Data Analytics Practice at NESTA.
6. **Women in AI: what it takes?**, by Ms Caroline Lair, Founder of The Good AI, co-founder of Women in AI.

ACCESS TO THE FULL CONTENT OF THE PRESENTATIONS HERE:

<https://www.europarl.europa.eu/committees/en/bridging-the-gender-gap-in-digital-resea/product-details/20210603WKS03661>

These proceedings summarise the discussions that took place during the ITRE workshop held on June 17th, 2021, aimed to analyse the existing gender gaps in the digital sector. It was structured in three sessions, each consisting of two presentations, and a final Q&A round. Stereotypes hindering a greater participation of women in the digital sector, the role of women in the digital entrepreneurship ecosystem and the current situation of women in the Artificial Intelligence industry were addressed.

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