CHALLENGES AND EXPECTATIONS OF WOMEN IN STEM: The Academic and Industrial perspective
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INTRODUCTION

The project “Female Empowerment in Science, Technology, Engineering and Mathematics in Higher Education” (FeSTEM) is an Erasmus+ KA2 project aims to promote an innovative method and pedagogy that will allow Higher Education (HE) students to use traditional and computationally-rich media to create meaningful, shareable exhibits that will act as mentoring models for encouraging girls and women to remain active in STEM.

The FeSTEM project is an attempt to contribute to the elimination of the stereotypical woman profile as excluded from STEM-related professions and promote women’s empowerment, equality and social coherence. Thus, the principal objective of the FeSTEM project is to promote an innovative approach that will allow HE educators to raise awareness on gender issues and invite HE students to take action about gender inequality in the field of STEM. This project is also expected to help HE instructors to improve their teaching practices and HE students to receive support and advice in regards to self-improvement, and increase their self-esteem, personal and social power and solidarity in their STEM career.

For this purpose, the FeSTEM project includes the development of a gender-sensitive teaching methodology for engaging HE students in making shareable exhibits and promoting gender-equality issues, an open source online instrument for making gender-sensitive shareable exhibits, resources in the form of examples to illustrate how shareable exhibits can act as mentoring constructs for women in STEM, a community of practice for engaging HE instructors in a sharing community of practices and ideas and a mentoring community platform for STEM HE students.

The project is divided in eight different Intellectual Outputs as follows:

- IO1 - Mapping the challenges and expectations of women in STEM: the academic and industrial perspective;
- IO2 - Development of a toolbox with traditional and digital materials for constructing gender-sensitive exhibits;
- IO3 - Development of FeSTEM methodology;
- IO4 - Implementation and evaluation of the gender-sensitive methodology;
- IO5 - FeSTEM Online Learning Unit
- IO6 - FeSTEM industry-informed Toolkit
FeSTEM project -PROJECT NUMBER – KA2 - 2019-1-CY01-KA203-058407

- IO7 - FeSTEM Community of Practice (CoP)
- IO8 - FeSTEM community platform for empowering women in STEM.

Through these eight phases, the project will build a gender-sensitive approach in HE, incorporate traditional and computationally-rich tools in the instructional process, trigger HE students’ visions and ambitions, and build a close cooperation with the business sector.

The project is managed by a consortium of 6 partners from 5 European countries, covering a wide range of expertise related to the scope and the aims of the project, having as well a Pan-European outreach in their activities. The partners are:

- Technologiko Panepistimio Kyprou (Cyprus),
- CESIE (Italy),
- University of Macedonia (Greece),
- Magenta Consultoría Projects SLU (Spain),
- Izobrazevalni center Geoss d.o.o (Slovenia),
- ARIS - A Really Inspiring Space Ltd (Cyprus)

The FeSTEM project is funded by the European Commission under the Key Action 203 - Strategic Partnerships for Higher Education, and will last two years from December 2019 until December 2021.

PURPOSE OF THE DOCUMENT

The main purpose of this document is to show the current state of the art in each of the participating countries regarding the needs, challenges, difficulties and expectations of women in STEM in HE and the industry. It will also provide recommendations on good practices, including approaches to deploy for keeping girls and women aware of the challenges encountered in STEM.
REPORT ON CHALLENGES AND EXPECTATIONS OF WOMEN IN STEM: THE ACADEMIC AND INDUSTRIAL PERSPECTIVE

Executive Summary
The FeSTEM partnership (Technologiko Panepistimio Kyprou, Cyprus; CESIE, Italy; University of Macedonia, Greece; Magenta Consultoría Projects SLU, Spain; Izobrazevalni center Geoss d.o.o, Slovenia; ARIS - A Really Inspiring Space Ltd, Cyprus) gathered corresponding information regarding the needs, challenges and expectations of women in STEM in Higher Education and in the industry. The methodology to gather the information is mixed and comprises desk research, surveys and questionnaires with key stakeholders (teachers, academics, students and entrepreneurs), as well as direct contact with women who will narrate their experiences. Magenta Consultoría Projects as the Leading Organisation offered a common methodology and coordinated the collection of data with the participation of all partners. Quantitative and qualitative data was collected through the research and the consultation with the project’s stakeholders and participants. The data was then analysed and the report was compiled.

The research involved the following main steps:
I. Desk research
II. Capturing women’s experiences, practices and challenges in HE and industry
III. Online surveys and interviews
IV. Analysis of data
V. Executive report and summary

This report captures the needs, challenges and expectations of women in HE and the industry and highlights that the glass ceiling is still prominent in STEM careers. Good practices from HE and the industry are also provided.
Introduction

According to the Declaration on the Digital Day 2019 for the commitment on women in digital (2019) the EU is facing an unparalleled shortage of Information and Communication Technologies (ICT) professionals. Women account for 52% of the European population, yet hold only 15% of ICT-related jobs. Women constitute only one in six of the ICT specialists in the EU and only 1 in 3 of the Science, Technology, Engineering and Mathematics (STEM) graduates. This under-representation occurs at all levels of the digital economy: in the engineering and physical sciences, but also in the number of women who are employees, corporate leaders and entrepreneurs. Increasing women’s visibility and engagement in the digital economy could help address the EU’s ICT skills shortage and drive economic growth and wider social progress. Only the 33% of workers in the scientific community are women and only 30% work in computing engineering. These numbers represent the same percentage in the technological field and the gap between men and women remains constant.

The low participation of women in the digital economy has complex and multifaceted roots. The main obstacles are gender bias and socio-cultural constructs, which at different life stages dissuade girls and women from taking up Science, Technology, Engineering and Mathematics (STEM) studies and careers. It is essential to integrate awareness of gender bias across all relevant sectors including in the initial and continuous training of teachers; address structural barriers such as work conditions and culture, which hinder girls and women to enter a predominantly male-dominated field; and increase the visibility of insufficiently valued role models to inspire women and girls (DG CONNECT, 2019).

In this context, building on EU’s hi presidency conclusions of 6th of December 2018 on gender equality, youth and digitalisation and the Declaration on gender equality signed by 27 Member States on 12 October 2018 (Austrian Presidency of the Council of the European Union, 2018), a Women-in-Digital declaration was signed in 2019 by 28 countries including the countries comprising the FeSTEM consortium: Cyprus, Greece, Italy, Spain and Slovenia. The declaration acknowledges that women in ICT sectors earn less than men, notes women’s underrepresentation in leadership positions in the digital sector, recognises that gender stereotyping, cultural discouragement and lack of awareness and promotion of female role models hinders and negatively affects girls’ and women’s opportunities in STEM studies, related careers and digital entrepreneurship. The Declaration commits the signatories to enact a national inter-
sectoral, target-based strategy to increase gender equality in the digital sector, encouraging women-friendly working environment, equal opportunities and non-discrimination in the labour market. Specific goals mentioned are: combating digital gender-related stereotypes; promotion of role models; early motivation of girls to explore STEM studies; simulating the re-skilling or upskilling of women from the existing workforce; establishing mentoring schemes; supporting digital skills enhancement for unemployed women and women from vulnerable groups and improving the awareness of and image of ICT careers.

Other measures encouraged by the declaration are encouraging the media to take appropriate measures to create a positive public image of women in ICT, establishing a Europe-wide Girls and Women in ICT Day to take place the same day across the EU in order to raise awareness of role models in STEM fields, encouraging girls and women to opt for STEM-related studies and work opportunities; and to display the link between STEM education and real professional pathways as well as engage men in awareness-raising work to represent the importance of a more gender-balanced industry and society (DG CONNECT, 2019).

Figure 1 gives an overview of the main issues related to the participation of women in the digital sector and the current EU actions to address them.
MORE WOMEN IN DIGITAL: THE ROAD TO GROWTH & EQUALITY

Only 1 in 6 Information and Communication Technology (ICT) specialists is a woman

Only 1 in 3 graduates in science, technology, engineering, and mathematics (STEM) is a woman

Women in the information and communication sector earn almost 20% less than men

KEY CHALLENGES IDENTIFIED THROUGH THE STUDY ON WOMEN IN THE DIGITAL AGE

1. Lack of digital skills
   Despite the growing demand of ICT specialists and digital profiles, the percentage of Europeans with ICT-related education, at all levels, is decreasing. This trend is shared by both genders, but the gap has slightly broadened. There are still 4 times more men than women in Europe with ICT-related studies.
   - Of every 1000 women only 24 graduate in ICT related studies in the EU and only 6 go on to have a career in ICT-related fields.
   - Only 13% of women with higher education in ICT-related fields work in the ICT sector.
   - Women are 8 times less likely to have a technical job in the digital sector compared to men even with the same level of education.

2. Gender bias and stereotypes
   The ICT and digital sectors seem to have specific barriers and difficulties for women. A developer or Information Technology (IT) expert is normally pictured as a man. 90% of girls are interested in ICT but do not go on to take up their higher education in this field because there is a lack of inspiration role models.
   - Women are less confident of their digital skills than men.
   - Women are under-represented on-screen and off-screen on media and rarely portrayed as experts in scientific or technical roles.

3. Low participation of women in digital entrepreneurship and innovation
   Even though studies show that female-led startups are more likely to be successful than all-male startups as diversity can boost innovation, there is a very slow growth in the percentage of female entrepreneurs in the digital sector.
   - One of the reasons that there are fewer women entrepreneurs in the digital sector is lower access to funding. Male entrepreneurs are 60% more likely to attain pitch competition than women.
   - Tech entrepreneurs are five times more likely to be men than women, in some places this ratio is close to 100:1.
   - In leadership across the board, including in the technology sector, women make up only 4% of corporate CEOs and they hold less than 15% of board roles in the private sector.
Figure 1. EU actions progress - Women in Digital Age, European Commission (2018)
PRACTICES AND CHALLENGES OF WOMEN IN STEM IN HIGHER EDUCATION

Women in STEM in Higher Education: Cypriot Context

Cyprus a member of the European Institute for Gender Equality, a European Union-initiated body dedicated exclusively to gender equality. Until October 2015, no stimulatory initiatives specifically dedicated to mainstreaming gender in research have been put in place (EIGE, 2021). Higher Education institutions in Cyprus have taken measures towards gender equality. More specifically, the University of Cyprus established the UNESCO Chair on Gender Equality and Empowerment in 2009 (https://ucy.ac.cy/unesco/en/). The UNESCO Chair on Gender Equality and Empowerment aims “to provide a new paradigm on how common problems faced by the populations of the region can be addressed through the gender perspective. To achieve its objectives, the Chair undertakes an integrated system of research, training, information and documentation activities in the field of women and gender studies” (UNESCO Chair in Gender Equality and Empowerment, 2021).

On the same line, the Cyprus University of Technology developed a Gender Equality Plan for 2014-2020, under a Rector’s Council’s decision. The plan pertains to all departments and the administration of the University and involves members of the academic and administrative staff, as well as students. The University has put forward a plan for promoting actions related to gender equality such as training for promoting expertise on gender equality, development of procedures to combat sexual harassment and discrimination, use of gender neutral language, collection and use of sex-disaggregated data, review and assessment of actions.

The Committee for Gender Equality at the Cyprus Technology University has proposed the following actions: Guidance for the development of expertise and personal development of women, quotas on higher positions, committees and key positions at the University, flexible working hours, the creation of a childcare facility and offering the possibility of working from home to promote the reconciliation of family and working life. Recently, the CUT Rector’s office has announced the University’s alignment with the UN sustainable development goals on achieving gender equality -UN Sustainable
Development Goal 5 addresses key challenges e.g. poverty, inequality and violence against women.

The Cyprus Institute of Neurology and Genetics has recently announced the plan to carry out gender equality initiatives.

Regarding the situation in Cyprus, EIGE’s 2017 report on gender segregation in education, training and the labour market in EU member states shows that more women than men are graduates of tertiary education. Findings from the international PISA 2015 survey focusing on performance of 15-year old students shows that, in contrast with other OECD countries, girls outperform boys in all three subjects under evaluation (science with 17 points, mathematics with 5 points and reading with 52 points). Data from the Statistical Service of the Cyprus Ministry of Finance shows that over the recent three years’ data (2015-2017) more women are in tertiary education than men. However, in Cyprus, 38.11% of STEM graduates are women (Eurostat, 2017). Cyprus ranks high (top 5 countries in the EU) in female ICT students, yet the figure is far from impressive if we consider that 26% ICT students are women and 74% men (Eurostat, 2016). Noticeably, a little less than 15% are later employed in the same field (Eurostat, 2017). With regard to the teaching staff, the majority of teaching staff in pre-primary, primary and secondary education are women, in higher education the majority is men. Koutselini (2014) showed that the participation of women in higher education starts at best from 50% in undergraduate and postgraduate and decreases to 30-35% in the case of non-permanent positions and continues to decrease to 17% in the case of permanent positions. It is obvious that the academic space is male dominated. Few women hold permanent positions in higher education, whilst women are also under-represented in Decision-Making Centers in administrative and academic positions. The problem lies in the academic culture itself, which is not aware of the negative stereotypes being deeply internalized.

In Cyprus there are few women's organizations that support women's education and mentoring in STEM in Higher Education. For example, the ACM-W-Cyprus chapter...
(https://acmwomencyprus.wordpress.com/) which aims to support women in computing by celebrating the engagement of women with the computing community locally, but also as part of ACM-W in Europe and internationally. ACM-W brings together women from the area of computing in order to enhance a higher level of commitment and understanding. All these initiatives are considered an important step to creating gender equality in the field of computer science and engineering in Cyprus and encourage women in STEM to become active role models in the field.

Several EU projects have been implemented in Cyprus either by HE institutions or NGOs with an eye to encourage the participation of women in STEM. Womenpower project (2014-2015) was funded by UNDP and implemented by the Cyprus University of Technology aimed at linking women mentors and mentees together through an online community platform to be developed following a user-centered approach. More specifically Womenpower aimed at helping young women to receive support and advice in regards to self-improvement, in order to increase their self-esteem, personal and social power and solidarity. The project provided women with practical advice on how to deal with difficulties in their personal and professional life in order to overcome the glass-ceiling effect and promote gender equality. Moreover, the platform also allowed its members to organize local WE-ME Mentoring/supporting- meetings, seminars and/or fairs and a yearly WE-ME Mentoring-conference in Euro-Mediterranean region (Kouta, Parmaxi, & Smoleski, 2017; Parmaxi, Vasilious, Ioannou & Kouta, 2017). Gender-SMART (https://www.gendersmart.eu/) is another initiative implemented by the Cyprus University of Technology aiming to tackle the following areas of actions: Building a Gender Equality Culture; Developing equal career support measures; Reshaping decision-making and governance; Integrating gender in funding, research and teaching. In the Cypriot Context, the Mediterranean Institute of Gender Studies (https://medinstgenderstudies.org/) also puts forward actions and projects that aim at tackling gender equality. Amongst the projects implemented by are FEM-UnitED to prevent IPV/DV Femicide in Europe, ARTEMIS (https://www.artemis-europa.eu/)
aiming to increase the level of awareness of the European Protection Order (EPO) among European citizens, lawyers and the personnel of NGOs and CSOs, OMC working Group, Play 4! aiming to foster critical and creative use of social media amongst young people to fight gender-based stereotypes, discrimination and sexist hate speech, Dream Fighters aiming to combat gender stereotypes through play. Another project implemented by CARDET is Ed.G.E - Educating girls and boys for Gender Equality (https://www.genderequality-edge.eu/) which anticipates to enhance the education and awareness of girls and boys through the implementation of an educational methodology based on creative art/cultural practices, so that they can challenge social norms, gender stereotypes and roles that encourage or condone violence and promote gender equality and respect for others.

**Women in STEM in Higher Education: Spanish Context**

Spain’s situation regarding women in STEM in Higher Education could be summarized in two main points: the glass ceiling is still prominent in investigation careers; and the gender gap is also present in R&D projects. Although these previous remarks do not seem very positive, if we check official data regarding the overall situation, we can see some silver linings such as the fact that research teams have improved the percentage of women in Public Administration (48%) and universities (43%). But this is not enough taking into consideration that gender segregation is stronger in vertical work structures (glass ceiling), emphasizing in research careers and it is also noticeable in horizontal structures. Less than half of government bodies and teams have a balanced composition and regarding scholarships for R&D projects, the gender gap is still prominent in favour of men.

The Spanish Government has interesting ideas and the willingness to implement them but there are still a lot of difficulties that the Spanish context needs to face and overcome. This can be seen when comparing men and women of the same age, with the same amount of time since their PhD, the same field of knowledge and recent
academic production in terms of articles and books published, as well as dissertations or theses directed, we see that the probability of a male Associate Professor being promoted to Full Professor is 2.5 times higher than that of a woman with similar personal, family and professional characteristics.

Nevertheless, FEM (Feminist Studies) programmes have been more and more successful throughout the years. Nowadays, every Public Investigation Organisation and 96% of public universities have had at least one gender-equality plan. The most extended measure in universities are internal protocols for prevention and protection against sexual and sexist harassment.

The ‘White Paper on the position of Women in Science in Spain’ (Madariaga, Rica, & Dolado, 2011), states that:

*In spite of the fact that the majority of university alumni today are women, and that they finish their studies with better average grades than their male counterparts, there are certain disciplines that are still resistant to female participation. Such is the case of engineering and some experimental sciences where less than 30% are women.*

The fact that this situation is currently so unbalanced is a big problem, and it is even worse when we see that the situation is unchanging, and it will not change in the next years, new policies and measures adapted to the actual situation and with a strong gender perspective are implemented. For this exact reason, it is crucial for the government and policy makers to implement new measures and new innovative programs that allow changes that improve the inclusion and representation of women in STEM in HE.

There are various plans and measures being implemented in Spain by different institutions such as the ‘Women, Science and Innovation Observatory’ created by the Spanish Government as well as new measures for the evaluation of entities that
request financial support in order to achieve gender equality and to integrate the gender perspective in the content of the research proposal if it is needed. Furthermore, a new policy was introduced in the State amendments against gender violence focusing on the elaboration and revision of prevention and protection protocols against sexual harassment in universities and public investigation entities and some initiatives by private foundations are being implemented such as ‘Mind the Gap: women, science and innovation’ an event created by Fundación Telefónica in collaboration with the Spanish government or an educational project by Fundación ASTI for the development of talent and the promotion of scientific-technological vocations targeted at women with the aim of inspiring and empowering young women to pursue STEM careers.

These are only some of the many interesting projects Spain is supporting and organizing to raise awareness about the current situation. With the help of private and public institutions, these and other projects could be applied to different levels of the education system and different working areas, tackling several generations that can benefit from them. This will be further developed in chapter 2.4 Public policies, measures, initiatives and support.

WOMEN IN STEM IN HIGHER EDUCATION: SLOVENIAN CONTEXT

As Slovenian Minister for Education, Science and Sports, Dr. Jernej Pikalo expressed, at last year’s International Day of Women and Girls in Science, that Slovenian female researchers contribute importantly in the field of Research and Development. However, there are too few female scientists in leadership positions in science. Although the number of female Ph. D. is almost equal to the number of men Ph. D., during the academic career, the number of women decreases to around 17% of women pursuing STEM studies. Slovenia is trying to create an encouraging, inclusive and ethical research environment, which will consistently consider the principles of gender equality in science. The legal responsibility for advancing gender equality in institutions of the
public research sector in Slovenia is the Ministry of Labour, Family and Social Affairs and the Ministry of Science (mainstreamed responsibility).

Many stereotypes regarding gender roles and the innate talent each gender holds persist in the Slovenian society, preventing a lot of girls and young women from pursuing scientific and technical sciences according to Dr. Andreja Gomboc, head of the governmental Council for Science and Technology of Slovenia. Among recipients of the Zois and Puh awards last year, women accounted for 12% of awardees and there were very few women nominated for the award in the first place. This means that the environments where female researchers work do not value their achievements as they do the achievements of men colleagues.

The Ministry of Education, Science and Sport, assisted by an expert body, the Equal Opportunities Commission for Science (formerly the Commission for the Promotion of the Role of Women in Science), which has been operating since 2001, supports and promotes equal opportunities in the field of equal opportunities in science, the principle of balanced representation of both sexes in the designation of working bodies within the competence of the Ministry and in the preparation of legal acts and other strategic documents in the field of science. The Commission assists the Ministry in collecting and analysing data for the effective formulation of equal opportunities policies in science. The Commission cooperates with the Public Research Agency of the Republic of Slovenia with a view to eliminating discriminatory provisions in obtaining funding for research work or in evaluating applicants and applicants who usually occurred in the event of maternity or maternity leave. The result of the awareness of all parties about the importance of the equal role of women in science, including in decision-making in science, was the adoption of the regulations of the Public Research Agency of the Republic of Slovenia, which define the gender-balanced composition of permanent and occasional professional bodies.
Awards are also an important segment of equality. That is why the Ministry, together with the Commission, has been working hard in recent years to make state awards and honours in science and technology more balanced. Unfortunately, in this case too, we often encounter a (too) small number of women among the proposed candidates and, consequently, among the winners. One of the most important activities of the commission is the organization of a spring and autumn consultation to encourage debate on the possible causes and obstacles to women’s greater role in science, the broader issue of equal opportunities, and the necessary structural changes to ensure equal opportunities in science.

WOMEN IN STEM IN HIGHER EDUCATION: GREEK CONTEXT

Although in recent years, the number of women in the engineering profession has increased (Technical Chamber of Greece), Greece still falls behind in comparison to the rest of the European Union, with only 37.7% of female researchers, who tend to have lower salaries than men.

In Greece there are several STEM women’s organizations that promote STEM in women’s education, mentoring, participation in jobs and society. For example, the Hellenic University Women’s Association (ELEGYP, http://www.elegyp.gr) is a non-profit, scientific association whose main goal is to improve the position and prestige of women in the academic institutions of Greece and to promote their scientific projects and their social contribution. Specifically, EL.E.GY.P., which is an independent legal entity independent of political expediency, seeks to develop support mechanisms for university women in their workplace, to ensure their equal participation in all bodies, committees, programs and activities of Universities including the promotion of dialogue, teaching and research on issues of gender, society and science. By participating in EU programs for STEM women, Association of Graduate Greek Engineers (EDEM, http://www.edem-net.gr/) acquired experience and material for counselling and
mentoring for women of science and technological studies. The counselling process focuses on factors that will help them to plan their careers and achieve their goals, e.g. communication, networking, leadership skills, etc.

Regarding the laws of the Greek context, there are several laws that were passed on these matters. The country incorporated into the Law 3044/2005 (concerning the fight against discrimination) the European Directives 2000/43 / EC and 2000/78 / EC. According to the Greek legal framework, people considered victim of a discrimination include people with some kind disability, homosexuals, immigrants, Roma, women and the elderly (Balourdos et al., 2014). In addition, the Economic and Social Committee (OCE) (nos. 82E3 S) plays an important role in conducting social dialogue and proposals to the Government and the social partners for the promotion of the principles of equal treatment, while making a decisive contribution to its implementation. Finally, the existence of many non-governmental organizations in the field of combating discrimination is an added value for promoting the principle of equal treatment.

WOMEN IN STEM IN HIGHER EDUCATION: ITALIAN CONTEXT

According to the OECD Programme for International Student Assessment (PISA), shows that the performance of Italian school and university students is in line with or above the EU average. Tertiary education attainment of women has increased to 15.6%, but still remains below the EU-average of 25.8%.

The promotion of gender atypical fields of study still remains one of the main challenges: in Italy there is still the belief of “typical” female fields of study and “typical” male fields of study. For instance, the gender gap in the IT sector in Italy is one of the highest in Europe: only around 30% of the total graduates in IT are women. In the past 10 years, the distribution of women graduated in the STEM sector in Italy was the following: Engineering 23.5%, Architecture 54.8% and Science, including Mathematics,
36.5%. The gender pay gap in Italy significantly increased after the economic crisis of 2008.

Italy’s slow performance in STEM is due to several factors but mainly a low level of education among the population. On its part, in recent years the Italian government has tried to support the digitalisation of population, starting from schools, generalising a digital culture for all through national programmes focused on ICT. In 2015, the Ministry of Education (MIUR) launched the National Plan for Digital Education (Piano Nazionale Scuola Digitale) which has several aims: to develop students’ knowledge and skills in the digital field, in order to promote transversal competences; to upgrade the technology curriculum in middle school and to promote digital competences required for the job market; to fill the gender gap in careers that involve competencies in STEM areas. According to the Ministry’s data, only one out of three female students continue their high school studies focusing on STEM disciplines (Scientix Observatory Report, 2018).

In order to attract students to STEM for the job market, the MIUR has promoted the so-called Piano Lauree Scientifiche, a national plan that supports educational activities directed at encouraging careers in academic studies in the STEM areas, also aiming at promoting gender balance. The MIUR has also launched a series of national initiatives as part of the promotion of equal opportunities aimed at tackling gender stereotypes. Worth of mention is the initiative “March: the STEM month”: the initiative aims at promoting STEM disciplines in school at all levels. On the 8th of March, for the International Women's Day, the STEM: Female plural competition (Ministero dell’Istruzione, 2018) is therefore issued, which aims to encourage reflection on the presence of women in STEM disciplines, in order to encourage students to develop a critical reading of prejudices and gender stereotypes regarding science, technology, engineering and mathematics, and to encourage female students to study these subjects (Noi siamo pari, s.f.).
In the Academic field, it is obvious from our research that there is an underrepresentation of women in all countries analysed. This means that they are not visible, although many of them choose these paths as their careers. Another reason for their invisibility is that, although may start their career in the STEM field, many also left it behind after encountering several problems and obstacles like the lack of support from their environment –both the personal and the professional one–, the lack of opportunities for promotions, and also problems regarding motherhood, as they may feel obliged to choose between being a mother and a researcher. This shows a lack of conciliation in the field, which pushes women to abandon their academic careers in order to be able to have a family, something that does not happen in the case of men.

WOMEN IN STEM IN THE INDUSTRY: SPANISH CONTEXT

As in other countries worldwide, in Spain, there are professions and professional fields so-called “feminine” which include mainly activities related to the caring of others like education, nursing, domestic or social issues, for instance, and others which are so-called “masculine” including the STEM professional field. This situation happens due to the different social contraction and education upon men and women. While women are mostly educated to like and feel satisfied by helping, protecting and taking care of vulnerable human beings, men are driven into economical results type of jobs. If we stay true to what has been said before, and hence we do not think outside the box, STEM would not be a women-driven kind of professional field. Besides, a study carried out by Boston Consulting says that the lack of real information about the STEM profession and the tasks involved in the job make women stay reluctant and out of their interest.

As we can see, the situation of STEM in the Spanish industry is similar to that of Higher Education. However, there are various measures and plans being implemented by
private companies and forced by the Government to ensure equal opportunities for both men and women and to also foster the inclusion of women in STEM careers.

**WOMEN IN STEM IN THE INDUSTRY: CYPRIOT CONTEXT**

With regard to women’s representation in the industry, studies have shown that women’s presence on decision-making boards enhances the level of innovation, reduces conflict and ensures quality in development activities (Ellwood, Garcia-Lacalle, 2015; Torchia, Calabro and Gabaldon, 2018; Saggese and Sarto, 2018). However, in large Cypriot companies, only 4% of members of boards in the largest quoted companies, supervisory board or board of directors are women (EIGE, 2013).

A study on equality in the workplace by the Equality Commission of the Ministry of Labour, Welfare and Social Insurance of Cyprus conducted back in 2012 concluded that stereotypes such as “men are better than women in decision-making”, “women perform better in less demanding positions”, “women are better in communication and therefore more suited for assistant and secretarial duties”, “men should be responsible for the domestic expenses”, “women belong in the family while men at the workplace” and so on, are prominent in Cypriot society. More information from the Ministry of Labour, Welfare and Social Insurance shows that family planning is impacting women’s career progress much more than men including reducing their involvement at work and taking part time positions (more than 70% of part-time workers are women).

There are several organizations active in promoting equality for women in the workplace. For example, CyI Women in STEM (https://www.cyi.ac.cy/index.php/cyi-news/cyi-women-in-stem.html) is an initiative launched by the Cyprus Institute (CyI) aiming at presenting a series of short videos of CyI women scientists, sharing their thoughts on choosing a career in science, identifying the challenges for women in STEM. The Institute aims to increase the visibility of women in STEM professions in Cyprus and encourage the new generations of women to be actively involved in the STEM fields. Another initiative being active in Cyprus is the ‘Women Techmakers Cyprus’ (https://www.facebook.com/pg/wtmcyprus/posts/). Women Techmakers
Cyprus has been instantiated by 3 ambassadors of the global Women Techmakers community that are passionate about technology and would love to provide resources and help to the local community. The purpose of the community is to connect, empower and encourage each and every single woman in tech to understand and pursue her passion in any technology related field. Their goal is to develop industry needed skill sets, aid career development and support women to become industry leaders in all phases of their careers. Finally, Kalys Solutions, a Cyprus based firm, is currently implementing the Mommypreneurs project (https://mommypreneurs.eu/), aiming to strengthen skills of young inactive women on maternity leave or caring for children, to equip them with new digital and/or entrepreneurship skills to improve their potential in re-entering the labour market or start their own business.

WOMEN IN STEM IN THE INDUSTRY: GREEK CONTEXT

During the last years in Greece, the number of women in the engineering profession has increased (Technical Chamber of Greece, https://web.tee.gr). However, there is a trend for female engineers to earn lower salaries and to be employed in the public sector and therefore work fewer hours. The vision of the Greek Chapter of the ACM-W (ACM's Council on Women in Computing, http://acmw-gr.acm.org/index.php/en/) is to foster gender mainstreaming, as well as enhance and advocate gender balance in computer-related scientific fields and professional sectors in Greece. Other STEM women organizations in Greece include the following: Women TechMakers (WTM), EMPOWA, iforU Greek mentoring network, FPower, Women Act, Women On Top, and LeanIn Greece.

An important complement in the field of discrimination is Law 4097/2012 on the application of the principle of equal treatment of men and women in the exercise of independent professional activity. The purpose of this law is to harmonize the legislation with Directive 2010/41 / EU in order to ensure the implementation of the principle of equal treatment of men and women who practice self-employment or
contribute to the exercise of such employment. The Ombudsman is appointed as the main monitoring body for the observance of the principle of equal treatment of men and women. According to article 19 of Law 3304/2005, the promotion of the principle of equal treatment is assigned: a) to the Ombudsman, for cases of violation of the law against discrimination by public services, b) to the Labour Inspection Body for cases of violation by individuals or legal entities in the private sector, in the field of work and employment and (c) the Private Sector Equalization Commission for all areas except employment. The National Commission for Human Rights (ECHR) has a law mainly through the opinions-proposals on issues concerning individual and social rights, but also the Ministry of Labour, Social Security and Welfare regarding the policies against distinctions, as it is responsible for the design, supervision and evaluation of the National Strategy.

WOMEN IN STEM IN THE INDUSTRY: SLOVENIAN CONTEXT

According to the study She Figures (2018) the proportion of female scientists and engineers among the total labour force of Slovenia was 3.4%, whereas for the European Union this figure falls to 3.1%. Furthermore, the proportion of women in grade A positions between 2013 and 2016 increased by 6.4% in Slovenia.

In strategic documents in the field of science and research, Slovenia committed to eliminate legislative and other obstacles and harmonize career possibilities with principles of gender equality, improve gender balance in decision-making and enhance the topic of gender equality in the contents of research programs and projects. Progress in setting goals for a more balanced and inclusive science regarding gender equality is proving to be slow in Slovenia. It is encouraging that the governmental Council for science and technology is led by a woman, Dr. Andreja Gomboc, who is also the president of the Equal Opportunities Commission for Science, during the new mandate period. Furthermore, Dr. Gomboc mentions as a positive change in the last few years the balanced representation by sex in some bodies of the Public Research and Development Agency of the Republic of Slovenia. However, this is not the case for
universities’ rectors, directors of institutes, the members of scientific councils and the composition of the chambers of some faculties which are still mainly composed by men.

WOMEN IN STEM IN THE INDUSTRY: ITALIAN CONTEXT

The current percentage of women on boards reaches 11% in the largest publicly listed companies in Italy (FTSE MIB index), which is below the EU average (15.8%). Women account for 12.9% of non-executive directors in the largest publicly listed companies and 3.9% of executive directors. Both figures are below the respective EU averages (10.2% and 16.8%). Nevertheless, in the last years, Italy has seen a positive trend: the female share in STEM positions, business environment and even corporate boards has increased considerably, but the challenge for the establishment of gender equality remains and the numbers are still lower than the EU average.

With a specific focus on gender equality and measures in support of women, Italian legislative activity has been primarily concerned with measures to address gender-based violence, maternity provisions and work–life balance. New policy interventions have focused on flexibility in the workplace to improve work–life balance, while national guidelines for healthcare services and hospitals seek to provide assistance and healthcare for women victims of violence. (European Institute for Gender Equality, s.f.) However, welfare and social policy initiatives remain unbalanced. Policy measures addressing specific issues (employment, education, health, etc.) exist but are framed rather than taking a systematic gender equality approach. (European Institute for Gender Equality, s.f.)

CHALLENGES FACED BY WOMEN IN STEM

The acquisition of data about women’s reality is key to boost equality politics that are effective for both genders in any field. In addition, data helps to identify the dimensions and the evolution of the problem and to fight against the outdated politics and institutions who may think that current measures are not necessary. In the following
paragraphs we merge the findings from both the HE environment and the working (industry) environment, as they were all the same challenges in both environments. From the information gathered through the desk research, the following summative table can be put together:

Figure 2. Challenges identified for women in STEM

Achieving complete equality in Higher Education and industry is a matter of social justice focused on erasing and preventing any obstacle and gender discrimination. Furthermore, it is essential to improve the quality and excellence of our universities and other institutions involved in any kind of investigation activity. To accomplish it, we should focus on the performances and results bearing in mind the impact they have on society and in the development of the country.

When talking about the balance between work life and personal life, the situation does not seem to improve. When comparing men and women with the same personal and professional characteristics, same academic productivity and both with children, we can extrapolate that having children seems to affect women much more negatively: a man with children is four times more likely to be promoted to Full Professor than a woman with children and similar characteristics.

From the data gathered in the previous work and investigation carried out by the partnership, we could say that opportunities are not equal for men and women, and
that the latter face greater challenges and specific situations -mostly based on gender stereotypes- that men do not have to face. Even though we can infer this from the previous cases, we should be aware that this might be problematic since there is information missing about the academic context of promotions. Nevertheless, the differences between the situation of both, men and women, are interesting and worth analyzing. Different publications, like the following, suggest that merit in Spain is highly gendered biased.

Ceci and Williams (2007) provide an overall view of the main empirical evidence that currently exists on gender bias in science. In order to illustrate this, two examples of the many in the book will be presented: in one study, the same curriculum signed by a man, a woman, or with initials were consistently given the same grading. The curriculum signed with a male name always received the highest scores, while the one signed with a female name consistently received the lowest marks.

When addressing gender inequality, things seem to worsen when women become mothers. The following statement can support this:

The findings of the White Paper on the differences in the promotion to Full Professor, with regards to the family situations of both, men and women, are consistent with similar evidence obtained by Correll et al. (2007). In this study, participants assessed the job application material of two same-sex candidates who only differed in their parental status. The findings show that, for women of equal merit, mothers are perceived as less competent and committed than women without children, whilst men are not only not penalized by their parenthood but rather on the contrary, it has been proven to be a factor that works in their favor in some occasions. The study shows that employers discriminate against mothers and favor fathers.

When analysing gender biased situations within the academic world, many factors have to be considered, as these influence the different situations as well as the many levels at which the analysis would be operating. As the White Paper of the Position of Women in Science in Spain states, we should take into account different aspects such as:

- Gender differences in diverse subject areas at 15-16 years of age
- Gender differences in university education
- The transition from degree/ master’s degree to doctorate
- The transition from doctorate to post-doctorate
Public grants for post-graduate and postdoctoral study

According to what has been mentioned above every step of the academic life of a woman has to be analysed, since various situations which occur in which they will be influenced by their gender.

Regarding challenges to overcome in Slovenia, The Dean of the Faculty for mathematics and physics of the University of Ljubljana states that women advance in their careers a little slower than men do. The reason given by the Dean for this is that women are slowed down by motherhood, and the biological differences are also not negligible; men suffer less from these problems; and women often try advancing in their careers only once and, if they do not succeed, they do not try again.

As the example of Dr. Aleksandra Kornhauser shows, it is important that a woman perceives herself as part of the society and empowered to give the society back by means of whatever she chooses to do. Nowadays, girls are discouraged from taking up STEM studies and redirected to occupations that are more “feminine”. The education and support received from both families and the educational system have to change first if we, as a society, expect the statistics to change. This is a huge challenge for the Slovenian society and amendments are of paramount importance in all segments through active work on the topic.

Women are often concealed from prominent gatherings and positions, such as committees or conferences. There is a need to change this to provide visibility to women researchers and scientists, to empower them and show girls that they can follow their steps and become prominent scientists themselves. However, it is a challenge at the time: there is nothing motivating change and there is not enough information available about good practices, women’s success stories nor women role models.

Motherhood and parenthood are considered a problem of women in Slovenia, which is very much negligible in the case of men. When a call for young researchers is published, the ministry includes a note reading “Freezing of project implementation for the time of maternity leave is not foreseen, such requests are judged restrictively for each case individually and have to be approved by the ministry.” This creates a dilemma for women who want to have a family, but also want to advance their careers, as they are mostly forced to choose between both.
There are other big challenges to overcome at the society level. For instance, the problem of the gender gap is perceived just as any other problem you may find in business, it is not taken seriously by society nor employers. In the same way, women’s credibility depends on the approval of men, so they have to make bigger efforts to be considered just as successful as their male counterparts are. As it was mentioned before, education creates a big division in the careers that women follow. For instance, natural sciences are strongly perceived as a male domain, and due to the strong social division present among male and female occupations, women with skills, knowledge and passion for natural sciences may prefer to avoid them to pursue occupations that are more “feminine”.

There are various difficulties regarding the inclusion of women in STEM professions in Greece. For example, financial difficulties (due to austerity policies and recessions) prohibit large investments on raising awareness about the women's added values in STEM professions and also promoting STEM to women through public funded programs. In this direction, the role of the media as well as education is crucial. Women should overcome stereotypes about STEM careers. In addition, the reconciliation of work and family life is still a challenge. The main challenges found in Greece for the inclusion of women in the STEM industry relate to:

- Socio-cultural situation (Gender stereotypes, male dominant jobs, recruitment biases);
- STEM Misconceptions (scientist “nerve”, unaware of women fit to STEM job/career);
- Personal Circumstances (female role in family, pregnancy, maternity, work-life balance);
- Early-stage career (unaware of STEM career opportunities);
- Career development (lack of career management skills, leadership).

Women in STEM face every day several challenges and obstacles. Here below, the report done by Italy attempts to make a non-exhaustive list of the barriers women face in their daily life:

- Societal stereotypes: there are notable cultural and societal stereotypes that often hold women back. The patriarchal society that sees a woman as a mother and a homemaker resents a strong obstacle for women who aspire to pursue careers in STEM.
Low flexibility: many women need to have a flexible work schedule in order to achieve work-life balance. This often puts many female professionals in a position where they need to choose lower salary, part-time employment or a less interesting job offer in order to be able to continue working, because many jobs don’t guarantee a flexible work environment that allows women with primary care responsibilities to most effectively juggle work and personal demands.

Gender pay gap: among the men and women whose first post-MBA job was in a tech-intensive industry business role, there was a gender pay gap due to women being more likely than men to start out at a lower-level, lower-paying position.

Absence of female role model: women working in business roles are outsiders in tech-intensive industries and face significant barriers to advancement, including the absence of female role models and vague evaluation criteria. There are negative consequences for people who feel like they do not fit in with their team or into the workplace because of their gender, race/ethnicity or nationality. Feeling like an outsider relative to their colleagues affects their access to development opportunities and career advance.

Partner countries’ statistics of women in STEM in HE

According to the OECD (Organization for Economic Co-operation and Development) reports, more than half of the overall students in Spanish universities are women. Nevertheless, numbers descend dramatically when we talk about women in STEM careers. In engineering, for example, female students represent only 23% of the entire student body. The fact that women have scarce representation in such powerful fields that have been growing so much over the last decade, puts them in a position where they could easily stay out of the main workforce in a near future.

Figures 3, 4 and 5 give us information about each one of these fields; R&D, universities and STEM.

As we can see, the percentage of women has improved slightly in public administration and universities. The number of female researchers in Spain has remained constant since 2009 (39%).
Women still have a lower presence in Spanish Universities since data shows that 79% of university professors are men.

Furthermore, in 2016-2017 of all grade A positions in Spanish public universities 79% of them were male and 21% were female. There is a much smaller gap in grade B, C and D positions, with 42, 48 and 49% of females respectively.
Figure 5. Evolution on the distribution of women and men in research staff of Spanish public universities according to their research category. Years 2013-14 and 2016-17 (Ministerio de Ciencia, Innovación y Universidades, 2018)

If we take a closer look at grade A positions in 2013-14 and 2016-17 in Spanish public universities, we can see that women in 2016-2017 only account for 7.4% of grade A positions in STEM (Ministerio de Ciencia, Innovación y Universidades, 2018).

In Slovenia, the study She Figures 2015 monitors the progress of gender equality in research and innovation since 2003 every three years, the last edition is from 2018. Some statistical data it provides:

- Academic career: until Ph. D. level, there is a relatively good balance of genders, no gender less than 40%, in later stages a bigger gap occurs. In STEM in no stage women reach 40% during the whole career.
- Representation of women in leadership and scientific boards accounts to 22% of women, they are rarely leading authors.
- Average gross salary of women is 17.9% lower than of men.
- Need for mobility in academic careers – in lower stages there are no differences between genders, in middle and higher positions mobility level there are significantly more men.
- Proportion of women among doctoral graduates in 2016: SLO 61.3% (EU 47.9%)
- Proportion of women among researchers, 2015: SLO 36.5% (EU 33.4%)
- Pedagogic facilitations: women represented 21% of top researchers in 2013, in STEM 13%.
- In 2012 13.5% of women in R&I worked part-time and 10% had precarious forms of employment.
- In 2011 women represented 33% of total researchers.
Although in Slovenia in 2010 the genders in postgraduate studies were almost equal (share of women 51%) and the share of women receiving a doctoral degree was still 46%, the share of women researchers with doctorate decreases to 31%, the share of women in top research positions, such as full professor status, to a modest 20%. Compared to the average of 27 EU countries in 2010, when the proportion of women on committees with an impact on the distribution of research funding is 36%, this share in Slovenia is only 23%.

The UNESCO Institute for Statistics presented in the year 2019 data showing that the percentage of female researchers in Slovenia was 34,5% in 2016 (Central and Eastern Europe 39,3%). The Statistical Office of the Republic of Slovenia also provides interesting insight of the situation in 2012:

- Number of Ph. D. by sex: 7,779 total, 3,159 (40,6%) women, of this 1,214 (38,4%) in natural, technical and technological sciences.
- Average age at doctorate: 35,49 years both sexes, 35,35 year-old women
- Average duration of doctoral study: 4,49 years both sexes, 4,41 year-old women
- Number of employed Ph. D.: 6,029 total, 2,359 (39,1%) women, of this 912 (38,7%) in natural, technical and technological sciences
- Amount of average gross annual income of employed Ph. D.: 45.164 EUR total, 41.342 EUR women

![Figure 6. Total of Ph.D. holders by gender and proportion of women Ph. D. holders in STEM in Slovenia (UNESCO Institute for Statistics, 2019)](image)

Regarding Greek education, high school girls achieved similar mean score in mathematics (451) to that of boys (452) in PISA (OECD, 2018b; OECD, 2020a), while
girls achieved higher mean score in science (457) than that of boys (446) (OECD, 2020b). At Universities, male and female graduation rates are almost the same up to about 75 months, after which the females have a higher percentage of graduation than males (Caroni, 2011). The estimated percentages of students who fail to graduate are 8.0% of the female students and 14.6% of males (Caroni, 2011).

In 2016, the first-time tertiary graduation rates for Greek students younger than 30 was 50% for women (versus 30% for men) (OECD, 2018a). According to Women in Digital Scoreboard (2019), 1.37% of individuals in 20-29 years’ age are women STEM graduates (versus 2.04% men); and 0.4% of total employees are women ICT specialists (versus 2.5% men).

Regarding Internet skills, 68% of women are regular Internet users versus 71% of men; 33% of women use online banking versus 42% of men; 7% of women use professional social networks versus 9% of men; 33% of women use e-government services versus 40% of men (Women in Digital Scoreboard, 2019). Furthermore, 44% of women have at least basic digital skills (versus 49% of men), 20% have above digital skills (versus 23% of men), and 50% have at least basic software skills (versus 55% of men).

![Internet Skills according to Women in Digital Scoreboard, 2019](image)

**Figure 7. Internet skills** (Women in Digital Scoreboard, 2019)

During EU Code Week, a total of 368 coding activities were held throughout Greece, covering 37.200 participants whose average age was 11, and 44.4% of participants were females (DESI – Greece, 2019). The Ministry of Administrative Reconstruction as
coordinator of the Greek Coalition for Digital Skills issued a national activity to promote the inclusion of coding in school curricula, which was attended by 108 children aged 8-11 and 27 ICT teachers from primary schools all over Greece (52 % of whom were females).

According to a survey by Hellenic Statistical Authority (ELSTAT, 2016) the unemployment rate for women in 2017 was 27.6% while men unemployment rate was 19.4%. Tertiary educated women in Greece hold the highest unemployment rates (18.6 %) among corresponding women in the EU (She figures 2018).

In 2011, 37% of researchers were females distributed to the following sciences: 30.7% (Natural sc.), 29.5% (Eng. & Tech), 43% (Medical sc.), 33.1% (Agricultural sc.), 46% (Social sc. & Humanities) (UNESCO, 2015). Also, 30.8% of researchers in the business sector were females.

![Researchers by sector and gender](image)

Figure 8. **Division of researchers by gender in different sectors of the economy** (UNESCO, 2015)

In the higher education sector, with 37.7% for women researchers, Greece is left behind the European average (42.1%) (She figures 2018). Also, 14.9% of women held level A academic position, compared to the European average at 7.4% (She figures 2018).

Regarding research and innovation outputs and results, in 2017, scientific publications by Greek women using normalized relative impact index was 0.98 (the value of 1
representing parity between men and women authors) and the European average was 0.90, putting Greece ahead of almost all other European countries (She figures 2018).

![Historical progression of female university professors at the University of Athens](image)

Figure 9. **Historical progression of female university professors at the University of Athens** (She figures 2018)

We can see in the chart above that the presence of women in the teaching staff has been following an increasing trend. On the other hand, it can be seen that this is not the general trend does not transpire into higher positions: In 2003, in all Higher Education Institutes, there was none female rector and only 5 female vice-rectors (12.5%), 3 school deans (9.5%), 24 department chairs (13%), 2 engineering department chairs (5.5%), 27 department vice-chairs (16%) and 3 engineering department vice-chairs (10%) (THE.FYL.IS., 2003). According to She figures (2018), 11.1% of heads of higher education institutes were women. The share of women among all academic staff, irrespective of grade (35.1%) was among the lowest in the EU (She figures, 2018). The proportion (%) of women researchers among grade A staff, in 2016, were: 16% (Natural Science), 12.3% Engineering & Technology), 27.0% (Medical Sciences), 16.4% (Agricultural Sciences), 26.1% (Social Sciences), 36.1% (Humanities).

In 2005, although women faculty members in Universities made up 27% of the total number of faculty members, there were only 3 women members (out of a total of 62 members) in the National Council for Research and Technology (ESET), where decisions are made on national research policy. In 2014, there was only one female member (out of a total 11 members) in the ESET. 2019 brought brighter prospects, as there were 4 women members (out of a total 11 members) in the National Council for Research, Technology and Innovation (ESETEK).
In Italy, although the number of women in scientific-technological academic courses has increased over the past few years, the imbalance is still very evident. However, the enrolment of women mainly in the Humanities is a phenomenon present not only in Italy but across all the European Union (Cozza, Poggio, 2006). According to the Osservatorio Talents Venture 2019, out of 1000 students graduated in STEM disciplines in Italy, only 12 are women. Female students, however, graduate with better grades than men (103 versus 101) and earlier - in 2017, 46.1% of women completed their studies on schedule against 42.7% of men. The Southern parts of Italy surpass the North, as the average number of women in STEM there is higher there than on the national scale (19.2%). The leading region is Abruzzo. However, only 23% of students, enrolled in engineering courses are women¹.

Figure 10. Percentage of women enrolled at Italian Universities by disciplinary areas (MIUR, DG Studies and Planning)

However, the survey, conducted by Politecnico di Milano, shows that in 2018, 26,202 male and 16,848 female students graduated with a three-year degree in STEM disciplines. 11,456 women and 17,623 men obtained a master’s degree. In total, 28,304 women and 43,825 men graduated in STEM disciplines in 2018. In comparison, the number of women graduated with a three-year degree in 2004 was only 3,398. Hence, the gender balance in the STEM field in the past 15 years has progressively improved.

The employment rate for the STEM graduates is 89.3% (4.1% more compared to non-STEM graduates). However, it’s true for 92.5% of men and 85% of women. STEM graduates from the economics-statistics (94.8%) and engineering (94.6%) fields have higher employment rate than graduates in geo/biological fields (78.5%). 20.4% in these disciplinary fields are self-employed (this is true for 22.8% for non-STEM graduates), but this rate is significantly higher among graduates with diplomas in architecture (50.3%).

Figure 11. Percentage of female researchers in STEM in EU countries (UNESCO Institute for Statistics, June 2019)

Among all European Countries, Italy has a percentage of 35% (See Figure 11) and in general women researchers are less paid than men and they are more likely to leave the job due to factors such as isolation, hostile work environment and ineffective feedback. In the Report “She Figures 2018” prepared by the European Commission on women’s participation in science and research is reported as, in the European context, the increase in the number of women who undertake a university path does not match still a proportional access to academic and research careers. In this scenario it was created the Gender Balance Sheet tool of the Universities with the aim of including gender equality in the development strategy of the Universities, with intervention and investment actions aimed at promoting equality between men and women in all areas: student area, teaching staff, technical-administrative staff.

2 She Figures 2018, European Commission, Directorate-General for Research and Innovation, 2019
In the academic field, underrepresentation of women is a persistent problem. At the outset, women are very much present in the world of research, but many of them disappear along the way due to different reasons such as the lack of support in their careers, problems connected to motherhood, lack of career expectations and some feelings of isolation and exclusion.\(^3\) As it is well known, one of the main bottlenecks for young women at University in Italy is situated at the end of the PhD or Post-Doc grants are completed. At that point the problem of life-choices become central and urgent: the general lack of measures for dealing with life-work balance can bring many young women to give up their academic careers. This constitutes a first strong threat to women. Indeed, the promotion to full professor for women is still complicated. Anyway, looking at the data about the number of full professors in Italy, it is evident that there is a slow progression in the representation of women: between 2012 and 2016, a slight increase occurred across all the disciplines (See Figure 12).\(^4\)

<table>
<thead>
<tr>
<th>Disciplinary areas</th>
<th>2012</th>
<th>2016</th>
<th>Marginal increase of women in full professor rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tot. full professors</td>
<td>% Women</td>
<td>Tot. full professors</td>
</tr>
<tr>
<td>A1 Mathematics and informatics</td>
<td>833</td>
<td>18.0</td>
<td>799</td>
</tr>
<tr>
<td>A2 Physics</td>
<td>471</td>
<td>9.8</td>
<td>475</td>
</tr>
<tr>
<td>A3 Chemistry</td>
<td>563</td>
<td>19.2</td>
<td>534</td>
</tr>
<tr>
<td>A4 Earth sciences</td>
<td>202</td>
<td>16.8</td>
<td>192</td>
</tr>
<tr>
<td>A5 Biology</td>
<td>1037</td>
<td>29.7</td>
<td>931</td>
</tr>
<tr>
<td>A6 Medicine</td>
<td>1831</td>
<td>12.8</td>
<td>1811</td>
</tr>
<tr>
<td>A7 Agricultural and veterinary sciences</td>
<td>691</td>
<td>16.4</td>
<td>675</td>
</tr>
<tr>
<td>A8 Civil engineering and architecture</td>
<td>800</td>
<td>15.1</td>
<td>724</td>
</tr>
<tr>
<td>A9 Industrial engineering and information systems</td>
<td>1358</td>
<td>6.6</td>
<td>1406</td>
</tr>
<tr>
<td>A10 Classical studies, philology, arts and literature</td>
<td>1204</td>
<td>41.3</td>
<td>1041</td>
</tr>
<tr>
<td>A11 History, philosophy and psychology</td>
<td>1148</td>
<td>30.6</td>
<td>1063</td>
</tr>
<tr>
<td>A12 Law</td>
<td>1388</td>
<td>20.6</td>
<td>1429</td>
</tr>
<tr>
<td>A13 Economics and statistics</td>
<td>1351</td>
<td>19.8</td>
<td>1383</td>
</tr>
<tr>
<td>A14 Political and social sciences</td>
<td>365</td>
<td>24.1</td>
<td>336</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13,242</strong></td>
<td><strong>20.3</strong></td>
<td><strong>12,799</strong></td>
</tr>
</tbody>
</table>

\(^3\) Threatened excellence: Reasoning about young women’s scientific and technological careers in Padua University, Italy, Silvana Badaloni, Sonia Brondi, Alberta Contarello, and Anna Maria Manganelli, 2008

\(^4\) The trench warfare of gender discrimination: evidence from academic promotions to full professor in Italy, Marini.Meschitti, 2018
Figure 12. Proportion of women at the full professor level in Italy 2012-2016 (Marini & Meschitti, 2017)
PARTNER COUNTRIES’ STATISTICS OF WOMEN IN STEM IN THE INDUSTRY

In the Spanish work sphere, the presence of women in government, university or public investigation positions (OPIs) is still rare and the glass ceiling remains a huge obstacle in the STEM field since it reaches less than 20% of women in professor chairs at university meanwhile in the investigation body professionals it represents the 25%. Regarding scholarships, the gap is also still present, especially for human resource and projects financed by the State.

The work demand for the STEM professional profiles keeps growing and in the last decade, STEM-related employment has grown three times quicker than general employment, according to a report done by Microsoft.

Figure 13 shows the evolution of population working in high and high-medium technology by sex in Spain and in the EU-28 between 2010 and 2017. We can see that in 2017 only 2.3 of women in the labour market were working in STEM related fields, compared to 5.5% of men.
Figure 13. Evolution of population working in STEM by sex in Spain and the EU, 2010-2017 (Ministerio de Ciencia, Innovación y Universidades, 2018).

Furthermore, in 2017 according to Eurostat data, 12.1% of women were working in knowledge-intensive services (see Figure 14).

Figure 14. Evolution of working population in knowledge-intensive services by sex in Spain and the EU-28, 2010-2017 (Ministerio de Ciencia, Innovación y Universidades, 2018)

Figure 15 shows the percentage of female researchers according to the sector in which they work from 2008 to 2016 in Spain. In 2016, 31% of those researchers were working in the private sector were female, 43% in Higher Education, 48% in the Public Administration and 48% as well in private non-profit organisations.
In Slovenia, the proportion of female and male scientists and engineers among the total labour force in 2017 was 3.4% and 4.5% respectively according to the She Figures study in 2018. Furthermore, the proportion of women in grade A positions between 2013 and 2016 increased by 6.4% in the country (EU 1.6%), in 2014 36% of the organisations in Slovenia implemented plans for gender equality, and during 2010 and 2013 only 9% of women were authors of patent applications, the EU shows a similar low level.

Data from 2018 shows that from the number of researchers in all employment sectors, only 32.5% (5008) of 15,388 were women. And out of 13,078 researchers in natural and technological sciences, only 29.6% (3872) were women. The latter is not enough data to state a firm conclusion, but it seems to point to a decrease in the trend of women engaged in the Slovenian STEM industry.

According to Eurostat (2018), in Greece 39% of scientists and engineers are women. In 2019, among all 105,600 women scientists and engineers, 5% work in high
technology sectors, 4% in manufacturing, 1.3% in high and medium high-technology manufacturing, 92% in services, 83.2% in total knowledge-intensive services and 4% in other NACE activities.

Figure 16. Researchers according to sector and gender (Eurostat, 2018)

Furthermore, among all 537,500 women employed in science and technology, 3.4% work in high technology sectors, 3% in manufacturing, 1% in high and medium high-technology manufacturing, 95.2% in services, 87.9% in total knowledge-intensive services and 1.7% in other NACE activities.

Figure 17. Workers by sector and gender (Eurostat, 2018)
In 2020, females classified as HRST (i.e. having successfully completed an education at the third level or being employed in science and technology) were 44.9% of the total active population aged 25-64, which is close to the 51.7% in EU27 (https://ec.europa.eu/eurostat/).

Although there are not gender differences in computer use (ELSTAT ICT Survey, 2014), women occupy job positions with less creativity and development potential. Also, women occupy only 30% of jobs in new technology sectors. According to Women in Digital Scoreboard (2019), 1.37% of individuals in 20-29 years' age are women STEM graduates (versus 2.04% men); and 0.4% of total employees are women ICT specialists (versus 2.5% men). A significant gender gap is also observed with only 10.9% of employed people in the ICT sector being women (DESI - Greece, 2019).

In 2013, there were 0.23% women (versus 0.36% men) doctorate holders in the working age population aged 25-64 years old (OECD, 2013).

In 2014, women working part-time in education and in research & development activities earned 23.1% less than their male colleagues, while the disparity between the sexes across the Greek economy was in the order of 12.5% (She figures 2018).

In 2015, women researchers made up 38.0% of the total number of researchers which is higher than the EU average (She figures 2018; UNESCO, 2018c). However, the proportion of researchers among male R&D personnel in all sectors of the economy combined exceeded that of women by 13.7% (She figures 2018).

In 2017, 42.3% of women were working in knowledge intensive activities, both in public and private sectors, versus 29.8% of men. (She figures 2018). In 2017, women involved in knowledge related activities in business were also more than men (13.0% of women and 11.5% of men).

Furthermore, the percentage of women researchers was also higher than the European average in both the public sector (43.0% compared to the European average of 42.5%) and the business sectors (27.6% compared to the European average of 20.2%) (She figures 2018). Women researchers were more likely to work in the field of engineering and technology (23.7%), in the field of natural sciences (47%), and in social sciences (44%) (She figures 2018).
In **Italy**, the employment rate for the STEM graduates is 89.3% (4.1% more compared to non-STEM graduates). However, it’s true for 92.5% of men and 85% of women. STEM graduates from the economics-statistics (94.8%) and engineering (94.6%) fields have higher employment rate than graduates in geo/biological fields (78.5%). 20.4% in these disciplinary fields are self-employed (this is true for 22.8% for non-STEM graduates), but this rate is significantly higher among graduates with diplomas in architecture (50.3%). Moreover, permanent employment contracts characterize 55.6% of STEM employees (46.4% for non-STEM employees), with significant gender differences (62.5 against 45.1% for men and women respectively).

Second level graduates in STEM are more frequently employed in the private sector (83.7%); 14.3% are employed in the public sector - with a great prevalence of women - while the non-profit sector absorbs 1.3% of cases. Women are mainly in the education, research and counselling sectors; men mainly in the IT sector\(^5\).

According to Eurostat (2019), 40% of scientists and engineers in Cyprus were women. In 2019 (otherwise stated), among all 11,600 women scientists and engineers, 9% worked in high technology sectors (high-technology manufacturing and knowledge-intensive high-technology services), 10% in manufacturing, 5.5% in high and medium high-technology manufacturing (in 2018), 81.1% in services, 73.8% in total knowledge-intensive services and 8.9% in other NACE activities (See Figures 18 and 19).

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\(^{5}\) Lauree STEM: performance universitarie, esiti occupazionali e gender gap, AlmaLaurea, 2019
https://www.almalaurea.it/sites/almalaurea.it/files/comunicati/2019/cs_almalaurea_lauree_stem_2019_0.pdf
In addition, among all 69,300 women employed in science and technology, 3.5% were employed in high technology sectors (high-technology manufacturing and knowledge-intensive high-technology services), 3.5% were employed in manufacturing, 1.1% were employed in high and medium high-technology manufacturing, 93.2% in services, 79.3% in total knowledge-intensive services and 3.3% in other NACE activities (See Figure 20).
Furthermore, according to the Women in Digital (WiD) Scoreboard (2020)\(^6\), Cyprus ranks 22nd with a score of 43.8 (compared to 54.5 in EU), in terms of women’s participation in the digital economy. Based on the 2020 WiD Scoreboard, 0.72% of individuals aged 20-29 are women STEM graduates (versus 1.28% men); and 1.0% of total employment are women ICT specialists (versus 4.2% men). In addition, 18.3% of ICT specialists are females, while 0.8% of the total female employment are ICT specialists (DESI, 2020)\(^7\).

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POLICIES, MEASURES, INITIATIVES AND SUPPORT

Examples given of impactful actions for the Women-in-Digital consist of teaching methodologies and hands-on experience with STEM; gender bias training for schools’ orientation services for post-secondary education; designing and implementing educational measures (curriculum design, supportive programmes, etc.) to raise awareness of ICT as a career opportunity for girls and women; measures to guarantee equal access to ICT studies for all students early on as early contact with ICT has proven to positively impact girls’ career choices; equal-pay policies for the same job or work of equal value; actions enhancing work-life balance and promoting a work culture of gender equality; including zero tolerance of sexual harassment; promoting shared paternal and maternal responsibility (DG CONNECT, 2019).

The following are different plans and measures that have been identified in partner countries as recommendations on good practices including approaches to deploy for keeping girls and women aware of the challenges encountered in STEM.

SPAIN:
The government has approved the creation of the ‘Women, Science and Innovation Observatory’\(^8\) (OMCI) for gender equality within the Spanish system for Science, Technology and Innovation with the objective of monitoring the situation of female researchers, technologists and innovators, proposing new measures to eradicate persistent gender gaps and guaranteeing the transversal integration of the gender perspective in these fields.

In addition, eligibility requirements for men and women and their work and personal life balance have been improving regarding scholarships and financial support for human resources in R&D in a way that broadens the possibilities of participation of parents that, because of their familiar duties, had to put their scientific activity on hold. New measures have also been implemented regarding the evaluation of entities that request financial support in order to create equality such as the presence of at least one female investigator in the team and, in those cases that need it, the integration of the gender point of view in the content of the research proposal.

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\(^8\) Ministerio de Ciencia e Innovación – Gender politics
https://www.ciencia.gob.es/portal/site/MICINN/menuitem.7eeac5cd345b4f34f09dfd1001432ea0/?vgnextoid=92d6894e42204710VgnVCM1000001d04140aRCRD
Furthermore, in the State amendments against gender-based violence, a new policy has been introduced, focusing on the development, elaboration and revision of protocols for prevention and protection against sexual and sexist harassment in universities and public investigation entities (OPIs), promoting and supporting the development of different measures regarding other kinds of sexual violence.

There are some initiatives coming from private institutions too, such as Fundación Telefonica, which are supported by the government and create a private-public project that encourages workers and institutions to think about the current situation. The aim of this project specifically, is to show that it is crucial that children and young people have female references in the scientific field and that they know that there already are professional women who are leading experts in their fields and that is why we should try to give them the visibility they deserve.

The initiative ‘Mind the Gap: women, science and innovation’\(^9\), is an event that promotes STEM jobs from the gender perspective among women. One of the main goals of this project is the promotion of STEM professions, and also the promotion of women, which are the most under-represented group in that area. These events try to inspire women so that they become referents to create a stable future for all women and even more for girls who are deciding what they want to be in the future.

Fundación ASTI has launched an educational project called ‘STEM Talent Girl’\(^10\) for the development of talent and the promotion of scientific-technological vocations targeted at women with the aim of inspiring and empowering little girls and adolescents to pursue STEM careers with the help of female mentors in this field.

Alternatively, others such as Women who code\(^11\), a non-profit international organization founded in 2011 with head offices in Barcelona and other cities worldwide, which empowers and inspires women to excel in technological careers.

Diversity and women’s presence are key to the development and success of all (scientific) fields, and even more taking into consideration the fact that women tend to have higher work performances, this was communicated with numbers and figures in


\(^10\) [https://talent-girl.com/](https://talent-girl.com/)

\(^11\) [https://www.womenwhocode.com/](https://www.womenwhocode.com/)
a TED Talk by Rocío Lorenzo in 2017\textsuperscript{12}. Equality and diversity not only contribute positively to the economic growth of the industry and the wellness of the country but they also create an inclusive, dynamic, creative and innovative reality in which the capacities of the whole population are greatly valued.

Together, the Law on Equality of 2007, the Law on Universities (LOMLOU) of 2007 and the Law on Science, Technology and Innovation of 3\textsuperscript{rd} Chapter Libro Blanco. Situación de las Mujeres en la Ciencia Española and the White Paper on the Position of Women in Science in Spain (2011), cover the areas on which to base specific measures to eliminate these barriers so that highly qualified human capital is not wasted.

The Women and Science Unit, created in an Agreement ratified by the Council of Ministers in March 2005, is the body responsible for gender mainstreaming in science, technology and innovation in our country. This is the response of the Ministry of Science and Innovation to the mandates of the Amsterdam Treaty and Organic Law 3/2007, of the 22nd March, on the effective equality of men and women. These two legal documents that establish mainstreaming as a principle for political action on gender equality. In this sense, public authorities have to take into account the different impact on the genders and consider measures to actively promote equality between men and women throughout the process of defining, applying and assessing public policies at all stages of their development: legislation, policies, programs, budgets, plans and projects.

The Women in Science Unit\textsuperscript{13} makes proposals and is the driving force behind gender perspective in science, technology and innovation policies that affect gender equality. The aim of this is to promote the presence of women in all areas of science, technology and innovation (according to their merits and abilities), the structural transformation of scientific institutions to modernize human resource management by taking into account the gender dimension and gender analysis in scientific research, technological developments and innovation, as well as specific research in the field of gender and women’s studies.

\textsuperscript{12} Rocío Lorenzo, How diversity makes teams more innovative, October 2017. https://www.ted.com/talks/rocio_lorenzo_how_diversity_makes_teams_more_innovative/up-next

\textsuperscript{13} Women in Science Unit, Ministerio de Ciencia, Innovación y Universidades. https://www.ciencia.gob.es/portal/site/MICINN/menuitem.7eeac5cd345b4f34f09df1001432ea0/?vgnextoid=92d6894e42204710VgnVCM1000001d0410aRCRD
These are only some of the many interesting projects Spain is supporting and organizing to raise awareness about the current situation. With the help of private and public institutions, these and other projects could be applied to different levels of the education system and different working areas, tackling several generations that can benefit from them.

SLOVENIA:
The Slovenian Ministry of Education, Science and Sport, assisted by an expert body, the Equal Opportunities Commission for Science (formerly the Commission for the Promotion of the Role of Women in Science), which has been operating since 2001, supports and promotes equal opportunities in the field of science, following the principle of balanced representation of both genders in the designation of working bodies within the competence of the Ministry and in the preparation of legal acts and other strategic documents in the field of science. The Commission assists the Ministry in collecting and analysing data for the effective formulation of equal opportunity policies in science. The Commission cooperates with the Public Research Agency of the Republic of Slovenia with a view to eliminating discriminatory provisions in obtaining funding for research work or in evaluating applicants during the event of maternity or maternity leave. Different measures of the Ministry of labour, family, social affairs and equal opportunities for parenting leave to foster the integration of professional and private life.

The result of the awareness of all parties about the importance of the equal role of women in science, including in decision-making in science, was the adoption of the regulations of the Public Research Agency of the Republic of Slovenia, which define the gender-balanced composition of permanent and occasional professional bodies.

Awards are also an important segment of equality. That is why the Ministry, together with the Commission, has been working hard in recent years to make state awards and honours in science and technology more balanced. Unfortunately, in this case too, we often encounter a (too) small number of women among the proposed candidates and, consequently, among the winners. One of the most important activities of the commission is the organization of a spring and autumn consultation to encourage debate on the possible causes and obstacles to women’s greater role in science, the broader issue of equal opportunities, and the necessary structural changes to ensure equal opportunities in science.

With the selection of **Female Engineer of the year**\(^{15}\), they present to the public ten interesting female engineers each year - persons who through their personality and work may be able to encourage the young to make out of engineering a professional career. The selection is part of the project “We will be Engineers!” which has been inspiring young people for engineering, science and innovation since 2012.

To rise the share of female researchers in the world, the partners of the national program **For women in science**\(^{16}\) L’Oréal Adria and the Slovenian National Commission for Unesco launched applications for a call for scholarships For women in science in 2020 for the 14\(^{th}\) time. The call was open for young female researchers in the final phase of their PhD studies who develop their research at Slovene research institution and are not older than 35. Partnership L’Oréal – Unesco “For women in science” has been working on international level since 1998, and since 2006 in Slovenia, where scholarships were granted to 37 Slovene grantees. In that way the partners on national and international level award young potential female researchers for their contribution to scientific cognitions and at the same time they try to motivate them and support their scientific career.

The website **“Women in Science with Art”**\(^{17}\), developed by Institute Jožef Štefan for presentation of activities (exhibitions, workshops, conferences, projects, trainings, publications) which take part at the institute and promote women in science, especially in the field of ICT. Institute Jožef Štefan participated in some European projects which tackled the topics of women in science and they implemented a wide range of activities for promotion of this topic in Slovenia. This website also contains a series of web presentations of some leading female scientists in Slovenia who participated in the exhibition Women and Science in Slovenia. These scientists come from different fields of science, mainly the fields where women are underrepresented.

Ljubljana network of info points for youth organised the project Women in science and art, which is targeted at youth from 12 to 14 years. During the project, young participants learn to use video equipment, learn how to prepare scenarios to prepare and conduct interviews with artists who work in the field of science and modern


\(^{17}\)http://sciencewithart.ijs.si/
technology. The goal is to familiarize youth with unusual occupations, performed by the artists.

Many events, dedicated to the topic of women in science, are implemented, such as the international round table “Mind the gap: Women in STE(A)M”, organized by Digital Innovation hub Slovenia (2019); the thematic meeting “Women in science”, organized by EURAXESS Slovenia and Scientific-research centre of the Slovene Academy of Science and Art (2016).

GREECE:
In Greece, the General Secretariat for Gender Equality (GSGE) is the governmental agency responsible to plan, apply, and monitor the implementation of policies on gender equality in all sectors. The GSGE implements co-financed Programmes and Actions through the Coordination, Managing and Implementation Authority of the Ministry of Interior.

The "National plan for gender equity 2016 - 2020”18 (NPGE) aims at gender equality that includes the inclusion of gender in all policies and the implementation of special measures or positive actions to prevent, eliminate and treat any gender inequalities.19

The NPGE’s strategic objectives are:

- Protection of women’s human rights, with emphasis on vulnerable population groups and migrant women and refugee women.
- Preventing and addressing violence against women in the family, work and society.
- Supporting women’s employment and removing the consequence of the reduction of male employment in terms of gender identities and gender relations.
- Promoting equality in education, culture, the media, information and sports.
- The removal of gender inequalities in health.
- Balanced participation of women in decision-making centres.

NPGE’s priority areas follow the European Commission’s guidelines for Member States, tailored to the specific conditions of Greece and relate to the following policy areas: 1) family and professional life, 2) Education, training, culture, sports and media,

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3) Health and 4) Decision making centers. Specifically, Objective 5 aims at ‘Motivating women to use ICT’. Thus, Greece needs the immediate implementation of actions to raise awareness, motivate and train the female population in ICT and digital skills.

The National Action plan for Digital Skills and Jobs in Greece (2018)\(^{20}\) aims at strengthening the participation of women through ICT and enhancing the public debate about the challenges of involving women in new technologies.\(^{21}\)

The specific objectives of the EDSGR Initiative are to foster the dialogue between Greek women and companies by promoting to women the attractiveness of ICT-related careers and strengthening the trust of ICT companies, especially SMEs, in women as employees. The expected result is the increase of the ICT skills of females in order to enable the efficient integration of the female talent into the workforce.

The General Secretariat for Gender Equality (GSGE) of the Ministry of Interior, in collaboration with the European Center for Women in Technology (ECWT) an ecosystem of entrepreneurs, business executives, policy makers, academia and female talents in order to assist females in getting involved in ICT careers.

The Women and Girls Go Digital initiative (WGGD)\(^{22}\), coordinated by the General Secretariat for Gender Equality (GSGE) is a local coalition of stakeholders who will support STEM women through their entire career paths, enhancing their digital skills and jobs' prospects. The WGGD aims to create a Business Innovation Hub that provides Knowledge-transfer based on best practices from the EU. WGGD received the WITSA Global ICT Excellence Awards of the World Information Technology and Services Alliance for its work. Its goals include strengthening women’s digital skills, as well as mentoring and supporting their entrepreneurship.

Since 2014, despite the financial crisis, a number of workshops and concerted actions have been implemented by the involved partners (e.g. the Greek involvement in EU Code Week has been very successful). Since 2015, key partners in WGGD have run the e-Women project. In this framework, the European Centre for Women and Technology provides Knowledge-transfer based on best practices from Norway with the goal to promote in Greece women’s new employability paths through digital skills,

\(^{22}\)http://www.womengodigital.com/welcome.html
support tech startups and launched a new business innovation center in Athens in 2018.

The “Innovation and Employability for Women” (e-Women) project\(^{23}\), in which education programs on entrepreneurship and social media were created and pilot seminars were organized on the latest trends for improving employability of women and female entrepreneurs in the digital economy. It aims at ICT training accompanied by the development of women self-confidence and the breaking of negative attitudes towards computer use. It promotes ICT professions to be made more attractive as a career choice for women, and encourages the strengthening of collaboration across relevant stakeholders.

The women4it project\(^{24}\) goals include the following: i) To create attractive employment opportunities for young people in the digital economy; ii) To provide access to an online employability profiling tool for individual testing; iii) To ensure free and available digital training and opportunity so as to help individuals access a community of leading European digital workforce; iv) To promote IT jobs for women as a source of economic growth and role models. The project addresses the following European challenges: i) Youth unemployment; ii) ICT specialist gap in Europe; iii) Low involvement of women and girls in digital jobs and ICT professions.

The eSKILLS4ALL project\(^{25}\) aims at training unemployed women. The project helps women to upgrade their digital competence. It also helps their employment prospects by creating a network with various stakeholders (i.e. organisations, agencies, public services, etc.) who will offer them guidance and advice.

ITALY:

Italy’s slow performance in STEM is due to several factors but mainly a low level of education among the population. On its part, in recent years the Italian government has tried to support the digitalisation of population, starting from schools, generalising a digital culture for all through national programmes focused on ICT.

In order to attract students to STEM for the job market, the MIUR (Ministry of Education) has promoted the so-called Piano Lauree Scientifiche\(^{26}\), a national plan that supports

\(^{23}\) www.iewomen.eu
\(^{24}\) www.women4it.eu
\(^{25}\) www.eskills4all.eu
\(^{26}\) https://www.pianolaureescientifiche.it/
educational activities directed at encouraging careers in academic studies in the STEM areas, also aiming at promoting gender balance. Universities are developing activities that directly involve high school students in laboratory practice. Another action of the plan aims to introduce innovative approaches for younger students in order to reduce school dropout.

The Ministry of Education has also launched a series of national initiatives as part of the promotion of equal opportunities aimed at tackling gender stereotypes. Worth of mention is the initiative “March: the STEM month”: the initiative aims at promoting STEM disciplines in school at all levels. On the 8th of March, for the International Women's Day, the STEM: Female plural competition is therefore issued, which aims to encourage reflection on the presence of women in STEM disciplines, in order to encourage students to develop a critical reading of prejudices and gender stereotypes regarding science, technology, engineering and mathematics, and to encourage female students to study these subjects.

**Visual summary of initiatives and policies**

According to everything we have seen in this last section, the following chart has been put together, gathering the different measures and initiatives put in place by the different governments in the partner countries:

Figure 21. *Initiatives and measures established for the improvement of women in STEM*
Table 1. **Overview of initiatives and measures established for the improvement of women in STEM in the partner countries.**

<table>
<thead>
<tr>
<th>Type of initiative/measure</th>
<th>Name of initiative/measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiatives promoting women in STEM</td>
<td>Mind the Gap: women, science and innovation</td>
<td>Initiative that promotes STEM jobs from the gender perspective among women</td>
</tr>
<tr>
<td>Initiatives promoting women in STEM</td>
<td>Mind the Gap: Women in STE(A)M</td>
<td>International roundtable organized by Digital Innovation hub Slovenia dedicated to women in science</td>
</tr>
<tr>
<td>Initiatives promoting women in STEM</td>
<td>Women in Science</td>
<td>Thematic meeting organized by EURAXESS Slovenia and the Scientific-Research Centre of the Slovene Academy of Science and Art</td>
</tr>
<tr>
<td>Initiative promoting women in STEM</td>
<td>‘Innovation and Employability for Women’ project</td>
<td>Aims at improving the employability of women and female entrepreneurs in the digital economy and at promoting ICT professions to women</td>
</tr>
<tr>
<td>Initiative promoting women in STEM</td>
<td>women4it project</td>
<td>Promotes IT jobs for women as a source of economic growth and role models</td>
</tr>
<tr>
<td>Initiative promoting women in STEM</td>
<td>eSKILSS4ALL project</td>
<td>Aims at training unemployed women to upgrade their digital competence</td>
</tr>
<tr>
<td>Initiative promoting women in STEM</td>
<td>March: the STEM month</td>
<td>Initiative developed by the Italian Ministry of Education to promote STEM disciplines in school at all levels. It includes the STEM: Female plural competition launched on the 8th of March to encourage reflection on the presence of women in STEM disciplines</td>
</tr>
<tr>
<td>Initiative promoting women in STEM</td>
<td>Fundación Telefónica</td>
<td>Aims at showing that it is crucial for children and young people to have female references in the scientific</td>
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<tr>
<td>Field</td>
<td>Project</td>
<td>Description</td>
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<tr>
<td>Awards for women in STEM</td>
<td>Female Engineer of the year</td>
<td>Slovene award that presents 10 interesting female engineers each year</td>
</tr>
<tr>
<td>Awards for women in STEM</td>
<td>For Women in Science</td>
<td>Awards scholarships to young female researchers in the final phase of their PhD studies who develop their research in Slovenia</td>
</tr>
<tr>
<td>Projects aimed at women in STEM</td>
<td>STEM Talent Girl</td>
<td>Created by Fundación Asti for the development of talent and the promotion of STEM vocations aimed at women with the objective of inspiring and empowering girls and young women to pursue STEM careers with the help of female mentors.</td>
</tr>
<tr>
<td>Projects aimed at women in STEM</td>
<td>Women who code</td>
<td>Aims at empowering and inspiring women to excel in technological careers</td>
</tr>
<tr>
<td>Projects aimed at women in STEM</td>
<td>Women and Girls Go Digital</td>
<td>Initiative developed by a local coalition of stakeholders in Greece who will support STEM women through their career paths, enhancing their digital skills and jobs’ prospects</td>
</tr>
<tr>
<td>Initiatives of women in science and arts</td>
<td>‘Women in Science with Art’</td>
<td>Website developed by Institute Jožef Štefan for the presentation of different activities to promote women in science</td>
</tr>
<tr>
<td>Initiatives of women in science and arts</td>
<td>Women in Science</td>
<td>Project targeted at youngsters between 12 and 14 years old to teach them how to use video equipment and conduct interviews with artists who work in the field of science and technology</td>
</tr>
<tr>
<td>National plans for improving digital skills</td>
<td>National Action Plan for Digital Skills and Jobs in Greece</td>
<td>Aims at strengthening the participation of women through ICT and enhancing the public debate about the</td>
</tr>
<tr>
<td>Laws and National plans for equal opportunities</td>
<td>Women, Science and Innovation Observatory</td>
<td>Created by the Spanish Ministry of Science, Technology and Innovation with the aim of proposing new measures to eradicate gender gaps and to create equality in those entities requesting financial support in R&amp;D such as the presence of at least one female investigator in the team</td>
</tr>
<tr>
<td>Laws and National plans for equal opportunities</td>
<td>Spanish State Amendments against gender-based violence</td>
<td>New policy focusing on the development, elaboration and revision of protocols for prevention and protection against sexual and sexist harassment in universities and public investigation entities</td>
</tr>
<tr>
<td>Laws and National plans for equal opportunities</td>
<td>Women in Science Unit</td>
<td>Aims at promoting the presence of women in all areas of science, technology and innovations</td>
</tr>
<tr>
<td>Laws and National plans for equal opportunities</td>
<td>Slovenian Ministry of Education, Science and Sports along with the Equal Opportunities Commission for Science</td>
<td>Promote equal opportunities in the field of science and also work with the Public Research Agency of the Republic of Slovenia on the elimination of discriminatory provisions in obtaining funding for research</td>
</tr>
<tr>
<td>Laws and National plans for equal opportunities</td>
<td>Regulations of the Public Research Agency of the Republic of Slovenia</td>
<td>Define the gender-balanced composition of permanent and occasional professional bodies</td>
</tr>
<tr>
<td>Laws and National plans for equal opportunities</td>
<td>Nation plan for gender equity 2016-2020</td>
<td>Developed by the Greek Government aiming at gender equality including the support of women’s employment and a balanced participation of women in decision-making centres</td>
</tr>
<tr>
<td>Laws and National plans for</td>
<td>Piano Lauree Scientifique</td>
<td>National plan developed by</td>
</tr>
</tbody>
</table>
equal opportunities

the Italian Ministry of Education supporting educational activities aimed at encouraging STEM careers and at promoting gender balance

IO1-T1. Capturing women’s experiences, practices and challenges in HE and industry bottom-up

The methodology applied will be a bottom-up approach in order to investigate the everyday lived experiences and practices of women in HE and industry. To this aim, each partner established a national STEM MAKER TEAM which included 2-5 HE academics working in STEM-related departments and 5-8 motivated STEM students (male and female) who will work at the project in all its different phases. The two partners in Cyprus will cooperate and work together.

In order to form this team, academics and students who want to be part of the STEM MAKER TEAM were invited to express their interest by filling in an application form (Annex I) and express their commitment to work closely throughout the duration of the project for its completion.

After the STEM MAKER TEAMs have been formed, the partner organisations worked with them to recruit a diverse range of participants to sum a total of 7 to 13 per partner. Participants were informed about the project, its goals, and the activity they need to perform. If they agree to participate, they will need to sign a consent form in line with GDPR regulations (Annex II).

Once participants have signed the consent form, the partners ensured that participants had access to a video-recording device: compact cameras, mobile with camera, DSLRs, medium format cameras, etc., and the partner organisation provided a recording device if requested by the participant. Each participant was required to
capture certain experiences of their lives for 5-10 consecutive days. The participants were then required to use those photos and prepare a short video about how they live as women in a HE environment. They were encouraged to share their experiences and stories, their challenges, give advice to other women, show some of their favourite places to visit, as well as any other information they want to share in order to capture their everyday experiences.

Partners provided to the members of the STEM MAKER teams with an information sheet explaining the project, its goals, and what is expected from them. Participants were asked to talk about different issues such as: their experiences, the challenges they face, their day-to-day activities and life, the support they find or lack, the obstacles they face, and good practices they want to share. A set of eleven prompts was provided to the members of the STEM MAKER teams (see Table 1) and participants were requested to select and capture their experiences for at least three prompts.

Table 2. Card prompts provided to the members of the STEM MAKER teams.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>This is my area of study</td>
</tr>
<tr>
<td>2.</td>
<td>These are my five favourites places to visit</td>
</tr>
<tr>
<td>3.</td>
<td>These are the reasons for choosing this area</td>
</tr>
<tr>
<td>4.</td>
<td>This is the best part of my week</td>
</tr>
<tr>
<td>5.</td>
<td>This is the least favourite part of my week</td>
</tr>
<tr>
<td>6.</td>
<td>This is the most difficult part of my week</td>
</tr>
<tr>
<td>7.</td>
<td>This is teamwork time</td>
</tr>
<tr>
<td>8.</td>
<td>This is individual study time</td>
</tr>
<tr>
<td>9.</td>
<td>The five biggest challenges for women in my field</td>
</tr>
<tr>
<td>10.</td>
<td>The five biggest challenges for men in my field</td>
</tr>
<tr>
<td>11.</td>
<td>These are my role models in my field</td>
</tr>
<tr>
<td>12.</td>
<td>This is my five top pieces of advice to men and women in my field</td>
</tr>
<tr>
<td>13.</td>
<td>These are the five more important actions needed for increasing the number of women participating in this field</td>
</tr>
<tr>
<td>14.</td>
<td>My personal motto</td>
</tr>
</tbody>
</table>

If participants have a limited knowledge of video editing, they may require the help of the partner organisations, who can work with the participants and help them create their videos. Partners organisations provided staff that can work with video editing software and help the participants, in order to facilitate this task and prevent drop-outs due to technical difficulties and frustration of the participants.
In order to make more appealing the participation and collaboration of both the STEM Makers and the participants, all partner institutions were encouraged to offer something in return for their participation depending on the means available to them. This compensation cannot be economical. Each organisation can decide what to offer. Some of the possible compensation options can be a diploma or award, to be credited on the website project and dissemination materials, a badge, a notebook and pen, a pen drive, a bag or any other materials or award offered by the institutions.

Table 3. Summary of STEM MAKER team members per partner institution.

<table>
<thead>
<tr>
<th>Country</th>
<th>HE students</th>
<th>HE academics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyprus</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Slovenia</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Spain</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Greece</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Italy</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

VIDEOS
From the videos shared by partners we can gather the following findings regarding the challenges of men and women. Women are motivated to followed a career at STEM because they feel they can do innovative things, always moving ahead and with a wide range of career options and opportunities. But, despite this motivation and the number of women that study some of the STEM careers, when looking at important positions (in professional activities or teaching at university), they find that they are mostly men. Surviving and thriving in a man’s STEM world is hard, constantly facing more challenges, difficulties and obstacles, just for being women. Not having many women role models to look up to usually makes them feel isolated too, and discourage students from developing a career in this field.

For women, the main challenges they have to face in HE, e.g., in their faculties, is socialising with others. This challenge showcases the difficulties of women in engaging with other classmates, probably because the majority of them are men. One of the
participants also highlights that they have to look pretty, which is directly linked to the stereotypes to which women are constrained, and that have been mentioned several times during this report. For men, these challenges are nowhere close, as they are only linked to personal care like staying healthy or taking care of themselves. Other challenges mentioned in the videos were to be undervalued, the struggles to enter the labour market and the gender gap.

Participants suggested that, in order to increase the number of women participating in the field, some actions are needed, such as more events mentoring women in STEM, sharing their experiences and the creation of communities of women in this field to support each other and grow. Also, many participants mentioned that the development of policies and tools to foster conciliation will help considerably. But, mostly, participants consider that a positive attitude and perseverance will help anyone achieve their goals.

Another participant recognises that the main input to get involved in the STEM field was the opportunity to create her own VR games and go to events and conferences relating to these matters. She also portrays two role models: her current PhD moderator and Kamala Harris, the next vice-president of the United States. She likes to go to conferences where she can present her projects and learn from the projects of others.

O1-T2 ONLINE SURVEYS AND INTERVIEWS
SUMMARY OF FINDINGS THROUGH INTERVIEWS

The data gathered from the Spanish interviews in high education shows that women in STEM face some challenges that hinder their development in this field. First, the interviewees acknowledge that some male colleagues use paternalistic behaviours and show inappropriate attitudes towards their female colleagues. Also, most of them receive lower salaries because they are not able to reach higher positions, as there is still the figure of the glass ceiling which stops them from reaching these positions.
Another main challenge for these women is the difference due to gender stereotypes that they encounter in these fields. Some of the interviewees reckon that they for sure face the same challenges as women in other fields, but sometimes they also face additional challenges due to being involved in fields of work that are male dominated. In these spaces, men tend to see women as outsiders, and this may lead to these women to feel discouraged and uncomfortable. One interviewee said on this regards that women face:

All the challenges that entail being a woman. Also, prejudices of “being less capable in scientific matters”, or that they are going to underperform because they have to take care of the domestic affairs, or that if they work with other women they get distracted by talking and if they work with men, the latter get distracted by them.

Also, they face lesser expectations than men, because they are seen as less capable and able, but due to this reason they have to work twice harder than men in their same positions. This puts a special pressure on them, overloading them with work and making them put an extra effort on their daily work. According to the interviewees, there are no measures in place to make their inclusion on this field easier, or to soften the process.

For this exact reason, one of the main needs of women in STEM is, first, to break with these stereotypes based on gender and social constructs that hinder their progress in their working life. Education is the core of this issue, as this is the only way to avoid these conceptions and gender stereotypes that affect both men and women. Schools should invest in promoting women in science in the classrooms, so young girls have role models to look up to. Then, Governments also need to make an effort to foster initiatives and measures to soften the inclusion of women in STEM. Some of the suggestions provided in the interviews are, for example, financing those companies...
that hire women or that include women in their staff, promoting their inclusion in this sector.

The Italian context showed the following findings. From the industry, the main challenge is finding a balance between their personal and professional life with the lack of possibilities that the companies offer, achieving that their motherhood or their care for their families does not interfere in their careers.

In my experience, here, in the public sector, after a woman goes on maternity leave, she can sort of be professionally penalized. Job assignments in our sector depend on the internal politics, and the “politicians” are mostly men. They assign work assignments and promotions based on suitability, not on competence level. And these so-called workplace male politicians prefer male employees.

Most of the interviewees recognize that there are not so many challenges in the academic environment, as in when they are studying; but that the challenges become very evident when women move to the working environment.

Nevertheless, when I started to work full time, discrimination towards women was much more obvious. When you look up the career ladder, there are much more men than women on the top.

Another big challenge encountered is the fact that they are not taken seriously by their male counterparts, even though they may have great and innovative ideas. Most of the interviewees believe that for this exact reason, and being surrounded by men primarily, they face additional challenges apart from those that all women face in general. However, these additional challenges vary depending on the job position and the context in which the woman finds herself, as not all positions imply the same.

Another challenge that we encounter is that, according to the opinions of those who participated in the interviews, women do not support each other as much as they could. Some comment that, especially in these fields, if a woman is successful other women tend to look at her with envy, instead of being happy for her accomplishments.
One of the main needs specified from those from the industry that answered the Italian interviews is that mothers have longer maternity leaves without pay cut, allowing them to balance keeping their work and also spending time with their new-born child and allowing themselves enough time to recover. These measures should be compensated also from the government, not only from their companies. Economic support is then one of the greatest needs. Also, the responsibility of taking care of children should be balanced between both parents, so paternity leave is also a possibility and it’s not just the mother who has to make sacrifices regarding her career.

Moving to those interviewed that came from academia, they believe that the main challenge of women is, once again, to achieve the most in their professional life without having to sacrifice their personal life, or the other way around. For one of the interviewees, there are still very few women in STEM fields as professors in university, which showcases the lack of visibility of women in these environments, and the difficulties they face. For these respondents, women also face additional challenges due to being surrounded by men, who may not be in accordance with their presence there or have inappropriate behaviours towards them. Respondents also acknowledge that women everywhere, but specially in these fields, must work harder than men to prove they are capable of the same things. This puts a special pressure on them, which makes their job even more difficult and consuming.

The main need identified by these interviewees is to introduce measures that help balance the responsibility in childcare, so women do not see themselves forced to choose between their families and their careers. Also, kindergarten programmes and services should be implemented, to make the task of taking care of small children
easier for those parents who are not able to leave their kid with anyone else. Reconciliation measures are, thus, one of the main needs for this group. Many women interviewed believe that their colleagues have to become aware of the importance of their independence when it comes to family matters, something that may be difficult due to their culture. This notion of them being in charge of taking care of their families sometimes puts them in a position in which, if the situation is presented, they will choose their family life over their professional career. Following this line, economic resources are also identified as main needs for women that are working on STEM, as this would help them compensate for the differences between becoming mothers and still achieving great things in their professional lives.

In Cyprus, the situation is also quite similar to the other national contexts. From those answers received from people in academia, the main challenge faced by women is that STEM fields are still run by older generations, which still have strong stereotypes and prejudices regarding women and their abilities. These stereotypes are passed on from an early age, as one of the respondents states:

STEM was never a field that attracts the interest of Women. Through my experience this is a general phenomenon in Europe and in Cyprus its even worst. I remember myself at school years expressing interest in Computer Science and many people use to say that there is no space for women in this field. Even in my class at University at 2005, among 120 students we were only 20-25 girls”

This may be the reason behind the lack of hiring of women in higher positions in companies. Some of the interviewees highlight that the challenges are not so obvious in the academia environment, as things are easier and they have more possibilities in terms, for example, of paid maternity leave or some concessions linked to family balance.
One of the identified needs would be to launch some initiatives and programmes to increment and foster the inclusion of women in STEM fields, giving visibility to their work and career paths. These would increase the trust of society in women in these fields, making them feel more confident and more eager to embark themselves in these paths.

From those who answered from the perspective of someone working in the industry, women do not face any additional challenge that they do in other fields, in this is quite significantly as it differs from what happens in other countries. Although there is a respondent that agrees that STEM fields tend to be male dominated, they all acknowledge that this does not suppose any additional challenge to be faced. Again, they face stereotypes regarding their gender, and they must work harder to be taken seriously in these contexts, as some people may not trust their abilities or judgement for some tasks. Another challenge is directly connected with a relevant topic that has already been highlighted in previous paragraphs: not having enough time to focus and invest in their careers, because they have family matters to attend that do not allow them to do so.

As stated by one of the respondents, STEM careers do not attract women at the moment, so organisations from the EU and national governments should set up plans that rewards companies that have the same amount of men than women, promoting thus their hiring and fostering that more women feel attracted by these careers in the future. The main needs of women in the Cypriot context would be a bigger understanding from companies to family and personal regards, knowing that women may need more time off after giving birth, for example, or giving more possibilities to both parents to take care of their children, so the responsibility does not only fall into the mothers. As stated before, the situation in the academic environment is slightly better in these regards.
In Greece, those who come from academia observe that the main challenge is erasing stereotypes in regard to STEM fields, in which young girls and women believe they are not skilled enough to involve themselves in this kind of careers. This conception that women are less capable is rooted in society, and inherently affects women inclusion and performance in these fields. Also, the fact that these fields are mainly male dominated does not help either, as discriminatory situations take place sometimes in some environments that leave women feeling uncomfortable. There is also a feeling of extreme instability that directly affects women and their careers, as they are not able to fix themselves in the future.

From the perspective of those who are working in the Greek industry, we can gather that one of the main challenges women have to face in STEM is the stereotypes set for early stages in life, which determine their future and the paths they choose to follow. These stereotypes affect in such a way that STEM fields are nowadays male dominated. From this situation, discriminatory situations arise, which may make women feel uncomfortable and discourage them from working in such a field; and, derived from these women have to work harder than their male counterparts, to prove themselves able. There is also an acknowledgement of the instability that STEM careers suffer, which also affects primarily women.

In terms of needs, the main one is that educational institutions focus and implement measures to tackle gender bias and put an end to the dominant gender-related stereotypes that are present in society, especially regarding STEM. This would erase certain stereotypes not only from children, who are the recipients, but in the rest of society, adults included, who would be more familiarised with women in STEM fields.
From the experiences of those who work in academia, we can gather that the main challenge that women face is to be taken seriously and to be heard among their male colleagues, especially when they are young and inexperienced. Then, they also believe that women face additional or more challenges than those who work in other fields, especially because they are surrounded mainly by men. However, all of them agree that women are as skilled as men when it comes to STEM related tasks and competences.

The needs identified by this specific group are initiatives coming from the government that should be implemented to ensure equity in opportunities for both men and women both in training and education. Moreover, one respondent suggests that “employers must focus on diverse hiring, give equal opportunities for the promotion of women and strive to eliminate the gender bias and gender pay gap”.

Educational institutions should also reinforce the notion of equality, avoiding the spread of stereotypes that can affect future decisions of children. Some respondents believe that this reinforcement should focus especially on rural areas, which are sometimes forgotten and not made a priority. Ending these stereotypes would, according to the interviewees, put an end to the male domination in STEM careers, as more women and girls would feel encouraged to engage in these educational paths.

In the Slovenian context, those who belong to academia recognise that the main challenge is to reconcile themselves with their family life. This comes within the context of accessing leadership positions, which is not just an 8-hour job, but rather requires more effort, spending more hours and balancing their personal and professional life. Women also have to face double standards, and they have to work harder to reach the same point that men.
It is a great challenge to reconcile family life with work obligations, this applies to both sexes, but even more so to women; women face double standards, women's achievements are viewed differently, expectations of women are different from those of men; reaching the highest positions of women (glass ceiling or linking pipeline), men choose their successors, similar to themselves, women are not let near, sometimes even insidious games in the background, women sometimes are not willing for that and prefer being no. two, e.g. assistant of director, to avoid “spot-light”.

Some of the interviewees recognise that there are still some inappropriate behaviours that women have to suffer and that affect the way in which they work and feel in the working environment. Also, the fact that STEM fields are male dominated adds extra challenges for them, apart from those who they encounter in every other job position and environment. Finally, another great challenge identified by these groups is that research nowadays offers very precarious opportunities, which affects both sexes. However, women are the ones that tend to opt for less prestigious positions because they are more stable and allow them more time to spend with their families.

The main need specified is the need of having more women in the sector, establishing some quotas to make sure that women are represented in the same amount that men are. There is also a necessity of giving visibility to women through initiatives like the FeSTEM project or other initiatives that show that women are equally capable of participating in STEM careers as men. Gender measures and regulations should be implemented to ensure that women have the same opportunities in the labour market, specifically in these fields. Others even suggest financial incentives for those employers who promote a family-friendly company, not only for women, but also for men, so both parents share the responsibility. Finally, some interviewees complain that the impostor syndrome is still present among women in STEM, so education is a
great need for them to feel secure and confident in their own capacities, also putting an end to gender stereotypes that have nothing to do with reality.

When talking about the industry, some of those interviewed recognise that there are no greater challenges in Slovenia, because now women are represented in the field more than ever, working hand in hand with their male counterparts. However, other respondents in the industry recognised that they do not know cases of women in higher positions in these fields, so they would say that this representation is not as common as others would reckon. The main challenges experienced by these, is that they have to assert themselves and be more professional to be taken seriously and opt for promotions.

The main needs specified from their part is educational: men need to erase stereotypes against women, recognising they are just as capable of doing certain tasks as men are. Also, the necessity of measures and regulations for reconciling personal and professional life, as many women are still constrained by their contracts to not get pregnant or are asked about these regards when interviewed for a job position. Some interviewees highlight the importance of institutions like Ministries and Commissions to establish some measures and financing programmes aiming at the inclusion and promotion of women in the STEM field.

Finally, we wanted to acknowledge all the examples of inspirational women mentioned in the interviews, to give them more visibility.

- Marie Curie, French-Polish physicist and chemist
- Margarita Salas, Spanish chemist
- Lin Margulis, American biologist
- Rosalind Franklin, English chemist
- Katherine Johnson, American physicist
- Lise Meitner, Austrian-Swedish physicist
- Maria Goeppert Mayer, German-born American theoretical physicist
- Ilaria Capua, Italian researcher and virologist
- Rita Levi-Montalcini, Italian Nobel laureate for her work in neurobiology
- Margherita Hack, Italian astrophysicist
- Fabiola Gianotti, Italian physicist and first woman to be Director-General at CERN
- Zaha Hadid, British Iraqi architect
- Katie Bouman, American computer scientist
- Dr. Marlen I. Vasquez, D. in Environmental Engineering in Cyprus University of Technology
- Dr. Despo Fatta-Kassinos, Associate Professor in the Department of Civil and Environmental Engineering and Director of Nireas-International Water Research Centre, at the University of Cyprus
- Professor Maria Loizidou, Head of the Unit of Environmental Science and Technology at the National Technical University of Athens
- Christine Lagarde, President of the European Central Bank
- May-Britt Moser, Norwegian psychologist awarded with the Nobel Prize in Physiology or Medicine in 2014
- Idun Reiten, first female professor at IE NTNU
- Isabelle Ringnes, co-founder of TENK, the Technology Network for Women
- Grace Hopper, American computer scientist
- Violeta Bulc, Slovenian politician who served as the European Commissioner for Transport from 2014 to 2019
- Tatjana Fink, Slovenian businesswoman and head of the commercial sector of Trimo since 1992
- Sonja Gole, CEO at Adria Mobil Doo
- Iza Login, Slovenian entrepreneur
- Dr. Jožica Rejec, President of the Management Board at Domel
- Aleksandra Kornhauser, Slovenian chemist
- Vera Cooper Rubin, American astrophysicist
- Jocelyn Bell Burnell, astrophysicist from Northern Ireland
- Catherine Cesarsky, French astrophysicist
- Medeja Lončar, CEO of Siemens Slovenia
- Aida Kamišalić Latifić, Assistant Professor at the University of Maribor and Slovenian Woman Engineer of the Year in 2019
- Borka Jerman Blažič, Slovenian Internet pioneer and the President of the Internet Society - Slovenia
- Saša Novak, Associate professor at Jožef Stefan International Postgraduate School
- Andreja Gomboc, Slovenian astrophysicist
- Gabrijela Zaharijaš, Slovenian astrophysicist

ONLINE SURVEYS

In the framework of “FeSTEM - Female Empowerment in Science, Technology, Engineering and Mathematics in Higher Education” project partners have conducted an online survey of 15 to 25 key stakeholders divided in three profiles: 1. Teachers and academics, 2. Students and 3. Professionals or entrepreneur women working in the STEM sector. In this section, data from the surveys conducted by all partners in their different national countries will be analysed to draw conclusions on
the findings. This section will map the challenges and expectations of women in the STEM field, seen from the academic and industrial perspective.

ITALY

CESIE collected 15 replies from the participants of the study. The majority of them are originally Italian, and only one participant is from Germany, but currently resides in Italy. The participants of the study were found through CESIE’s list of local stakeholders, university and public office contacts, as well as personal contacts of their staff. The major part of the respondents (73%) were women. 20% were men, 6% preferred not to specify their gender.

The age of the participants of the survey varied from 26-35 years (40% of participants) to 51+ (13,3%) (See Figure 22).

Figure 22. Showing the ages of the participants of the Italian survey

The majority of participants (87%) stated that they work in a STEM related field; 13% of participants work in other fields.

- 8 participants (53%) are professionals;
- 20% are students;
- 20% are professors;
- 1 participant is in a managerial position.

Participants from the academic field stated that 20% of them are professors, 13% are students and postdocs. Out of the number of students, 27% respondents have a Master Degree and 13% have a Bachelor Degree.

The respondents who stated that they are professionals, are working as:

- Managers – 20% (out of the total amount of the participants);
- Administrative support – 13%;
- Technical support – 13%;
- Engineers – 6%;
- Teachers – 6%.

Figure 23 shows that 50% of the respondents who stated that they are currently studying, are pursuing a Master Degree; one participant is involved in a PhD program; the other 38% of respondents is not studying for a degree currently.

![Pie chart showing the distribution of degrees pursued by respondents.](image)

Figure 23. **Studies being pursued by respondents**

27% of respondents affirmed that the condition of women in STEM in Italy is actually sufficient; at the same time, 27% of respondents claimed that the conditions are very
bad. In total, about 60% of the respondents are not satisfied with the representation of women in STEM in Italy (See Figure 24).

![Pie chart showing the opinion of respondents on the current status of women in STEM in their country.](image)

**In your opinion, what is the current status of women in STEM in your country?**

- **Great, there are a lot of women in STEM and they're clearly represented** (13%)
- **Good, the presence of women in the STEM is visible and they are represented** (27%)
- **OK, women are not uniformly represented** (27%)
- **Sufficient, women are not uniformly represented** (13%)
- **Poor, women are somehow underrepresented.** (20%)
- **Bad, women are clearly underrepresented in STEM.** (20%)

**Figure 24. Opinion of respondents on the current status of women in STEM in Italy**

At the same time, 53% think that there are no subjects that men are studying more than women (See Figure 25).

![Pie chart showing the opinion on whether there are subjects that men are more prone to study than women.](image)

**Figure 25. Opinion on whether there are subjects that men are more prone to study than women**
Out of 47% who replied “Yes” to the previous question, the majority thinks that male students are more inclined to study subjects such as engineering, IT, physics or mathematics (See Figure 26).

![Pie Chart: If yes, which subjects are?]

**Figure 26. Subjects that according to respondents, men are more prone to studying than women**

In their opinion, it happens because due to the following reasons (See Figure 27):

![Bar Chart: Reasons for male students to study more technical careers]

**Figure 27. Reasons for male students to study more technical careers**
71.4% of all the respondents, however, think that this should change, while the remaining 28.6% say that they do not know.

When asked whether, in their opinion, there are subjects in which female students study more than male students, 60% of the respondents stated that they don’t think so (See Figure 28).

![Figure 28. Opinion on whether there are subjects that female students tend to study more than their male counterparts](image)

The remaining 40% think that female students are more inclined to study subjects such as communication, social sciences, languages (See Figure 29).

![Figure 29. Subjects that according to respondents, women tend to study more than men](image)

They feel like this phenomenon can be explained by the different influences of society, friends, teachers (See Figure 30).
Figure 30. **Reasons for women to study different subjects as their male counterparts**

50% of the respondents feel like this should change, 36% had no answer to this question and 14% gave a negative answer.

Respondents claim they witnessed different attitudes towards women in university, either occasionally (53%) or frequently (20%). The remaining 27% have never witnessed different attitudes towards women (See Figure 31).

Figure 31. **Data on whether respondents had witnessed different attitudes towards women at university**

The main discriminations towards women – according to the respondents – are:

- Tasks and assignments of lower importance – 42%;
- Being rejected for a job – 19%.
- Negative performance evaluation – 16%.
- Biased treatment – 15%.

60% of respondents claim that women are not hired for higher-level positions in some fields because of being women very frequently; 20% of them think that this happens “occasionally”. Only 1 participant chose “never” (See Figure 32).

![Figure 32. Respondents’ opinion on the frequency women are not hired for higher-level positions due to their gender](image)

Figure 33 shows that 40% of respondents stated that some employers in Italy offer equal opportunities to women; on the other hand, 27% state that it’s the case for “very few employers”.

![Figure 33. Proportion of employers in Italy who offer equal opportunities to women according to respondents](image)
According to respondents, the main social barriers women face in their professional career are: negative stereotypes (47%), male-dominated field (27%), lack of support (13%) and mentors (6%), as well as long working hours (6%) (See Figure 34).

Figure 34. Main social barriers women face in their professional careers according to respondents

The majority of respondents claim that the main reasons for the small number of women in management are: biased attitude for promotion of women (67%), women being discouraged from the managerial positions (40%) and long working hours (27%) (See Figure 35).
Figure 35. **Reason for the small number of women in management according to respondents**

53% of respondents claim that the situation of women in STEM has improved a bit; 33% claim that it has improved enough in the last few years (See Figure 36).

![Pie chart showing the distribution of responses to the question of whether the situation of women in STEM has improved](image)

Figure 36. **Opinion of respondents on whether the situation of women in STEM has improved in the last few years**

When asked about the extent to which gender bias and stereotypes play a part in this issue, 53% of respondents stated that there are stereotypes and that they play an important role in this problem (See Figure 37). 40% of participants stated that there are some stereotypes; 7% of respondents said there are few stereotypes.

![Pie chart showing the distribution of responses to the question of whether there are stereotypes or gender bias](image)

Figure 37. **Representation of participants’ opinions on whether there are stereotypes or gender bias and if they play a role in the situation of women in STEM**
53% feel like women’s achievements in science are not celebrated enough (or at all). At the same time 47% stated that they are celebrated, but only a bit (See Figure 38).

According to the respondents, the main challenges faced by women in STEM are:

- Being forced to choose between family and career – 73%.
- Gender stereotypes – 60%.
- Less interesting assignments and roles – 40%.

See Figure 39 to see the number of replies for each answer.

Figure 38. Respondents’ opinion on whether women’s achievements in science are celebrated

Figure 39. Main challenges that women face in STEM according to our survey
53% claim that women face more difficulties in STEM than in other fields. 20% claim they have the same difficulties in STEM as in other fields. Only 2 participants (13%) stated that they don’t know about any additional difficulties.

When asked “Do women have more difficulties in the STEM field or it is the same situation than in other fields?”, 53% stated that they have the same skills and knowledge than men. 13% claims they have more skills and knowledge than men. One participant claimed that women do not have the same skills and knowledge than men.

At the same time, 40% of respondents claim that expectations for men and women are the same; 27% of respondents think that women face higher expectations; 13% think that women face lower expectations than men (see Figure 40).

![Figure 40. Expectations of women as compared to men](image)

46% replied that celebration of dates such as the United Nations-declared International Day of Women and Girls in Science are very important. 47% stated that it is important to a considerable extent (See Figure 41).
Figure 41. Respondents’ opinion on the importance of the celebration of days such as the International Day of Women and Girls in Science

60% are not aware of any public measures, activities or funding programmes directed at improving the situation of women in STEM. 40% are aware of such measures.

The main motivation for women to pursue a career in STEM – according to 80% of respondents – is personal interest; the remaining 20% claims “high level of demand for qualified employees” (See Figure 42).
Figure 42. Reasons for women’s motivation to pursue a career in STEM according to FeSTEM’s survey

The respondents were asked to list things that can be done in order to empower women in STEM. You can see the responses illustrated in Figure 43.

![Figure 43. Measures to empower women in STEM according to respondents](image)

Measures to empower women in STEM according to respondents

43% of respondents feel like women working in STEM support each other quite enough; 29% claim they support each other a bit; 14% says “a lot”. Just 2 participants stated that women in STEM do not support each other at all (See Figure 44).
53% of the respondents think that interventions from industries (e.g. employers who recruit women more actively) would increase female participation in STEM fields. 47% replied “maybe”.

Among some of the ideas for such interventions, the participants named the following:
- Promote projects at school in other contexts in order to overcome cultural stereotypes to enhance the concept of diversity as an inclusive resource in society and the family;
- More social support;
- More women in management positions;
- Pay attention to women's needs;
- Provide public kindergartens, bonus for children, equal pay for women and men, open applications for Director or Rectors positions for women;
- Specific training.

**When asked to name inspiring women, the respondents mentioned:**

- Rita Levi Montalcini – 20%;
- Marie Curie – 13%;
- Margherita Hack – 13%;
- Fabiola Gianotti – 13%;
- Samantha Cristoforetti – 13%;
- Maria Ines Colnaghi – 6%;
- Ilaria Capua – 6%;
- Sheryl Sandberg – 6%;
- Mayim Bialik – 6%;
- Greta Thunberg – 6%.

Overall, most of the participants of the study feel like there is a difference in treatment and access to opportunities both in academic and industrial sectors. At the same time, in the respondents’ opinion, the reason for this is mostly gender bias and obstacles, related to it.

**SLOVENIA**

The online survey was active for completion from 2.4.2020 to 9.11.2020. A total of 13 respondents duly completed the survey.
All (100%) respondents stated that they have read the foregoing information, or it has been read to them. They have had the opportunity to ask questions about it and any questions they have had have been answered to their satisfaction. They consent voluntarily to be a participant in this study.

Majority of respondents (85%) work or study in a STEM-related discipline (chemistry, computer and information technology science, engineering, geosciences, life sciences, mathematical sciences, physics and astronomy, anthropology, architecture, economics, psychology, sociology, health sciences, STEM education and learning research) (See Figure 46).

All respondents work or study in Slovenia.

Among the respondents 54% of them are male and 46% female.
Figure 47. **Gender of the respondents of the Slovene survey for FeSTEM**

Regarding the **age range** of the respondents, the majority is +50 (38%), followed by age group 36-50 (31%) and other age groups with 15% each.

![Gender of respondents graph]

Figure 48. **Ages of the respondents of the Slovene survey for FeSTEM**

When indicating the **participants’ profile**, 31% answered they are higher education lecturers/instructors, 23% of participants are higher education students, 8% entrepreneurs and 38% answered “other” (See Figure 49).

![Participants' profile graph]

Figure 49. **Participants’ profile of the Slovene survey for FeSTEM**

Those who answered they are **academics**, 57% of them are lecturers, 14% associate professors and 29% belong to another category not mentioned.

Those who answered they are **students**, 33% hold bachelor’s degree, same percentage master’s degree and other.

Those who answered they are **entrepreneurs**, 25% are management, 13% administrative support and 63% other.
When describing the **current state of women in STEM** in their country, majority or 36% of respondents said the state is OK, women are not evenly represented, 27% said the state is not good at all, women are clearly underrepresented, 18% said the state is good, the presence of women in STEM is visible and they are represented, the same percentage (18%) replied that the state is very good, there are many women currently in the STEM industry and they are clearly represented (See Figure 50).

![Figure 50. Current state of women in STEM in Slovenia according to respondents of the Slovene FeSTEM survey](image)

91% of respondents think that there are **subjects that boys study more than girls** (See Figure 51).

![Figure 51. Respondents opinion on whether there are subjects that men tend to study more than women](image)

Among the **subjects that boys study more than girls**, the highest percentage goes to technologies (69%), engineering (62%) and physical sciences (54%), computer sciences (38%), mathematical sciences (31%), architecture, building and planning...
(15%), arts (8%), business and administrative studies (8%) and education again 8%. Other subjects received zero replies.

Among the **reasons that there are subjects that boys study more than girls**, the highest percentage replied: the influence of society in general (46%), followed by mother’s influence and father’s influence (38% each), friends influence and role models influence (31% each), career’s counsellors influence, extended family influence and greater chance of employability in related fields for males (23% each). Other options received up to 15% of replies each, some options received zero percentage. Among “other”, the respondents named: more complex social reasons and because men and women have basically different interests (human nature).

45% of respondents think that this **should change**, 27% are not sure and some (27%) think this should not change (See Figure 52).

![Figure 52. Slovene participants' opinion on whether the fact that there are fields that men tend to study more should change or not](image)

91% of respondents think that there are **subjects that girls study more than boys** (See Figure 53).
Among the **subjects that women study more than men**, the highest percentage goes to linguistics, classics and related subjects, European languages and literature, business and administrative studies and education (54% each), social sciences (46%), law, mass communication and creative arts and design (31% each). Physical sciences, computer sciences, mathematical sciences and technologies received zero replies on this question.

Among the **reasons that there are subjects that girls study more than boys**, the highest percentage replied: influence of society in general and father’s influence (46% each), followed by mother’s influence, friends’ influence, role models influence and greater chance of employability in related fields for females (38% each), extended family’s influence and teacher’s influence (31% each), school/college/university/mates’ influence and career’s counsellors influence (23% each). Among “other”, the respondents named more complex social reasons.

45% of respondents think that this **should change**, 36% are not sure and 18% think this should not change (See Figure 54).
Figure 54. Slovene participants’ opinion on whether the fact that there are fields that women tend to study more should change or not

When asked if they have experienced or witnessed differentiated attitude/behaviour in their organization or environment towards women, 27% replied very rarely and same percentage never, followed by yes, occasionally, and rarely (18% each). 9% replied yes, frequently (See Figure 55).

Figure 55. Frequency in which respondents have experienced or witnessed differentiated behaviour/attitudes in their organization or environment towards women

Among those, who replied yes, the most answered as allocated unimportant work (38%), biased treatment and being rejected for a job (23% each) and given fewer assignments (15%). Two answers received zero replies (being written up or disciplined for something that others of a different sex do all the time but never get punished for; forced out on leave).
Figure 56 shows that 45% of respondents think that some women are not hired for upper level positions in some fields because of being a woman occasionally, 27% very frequently, 18% rarely and 9% very rarely and none said never.

Figure 56. Participants’ perception of the frequency in which some women are not hired for upper level positions in some fields due to their gender

55% of respondents think that some employers in their country give equal opportunities to women, 27% very few employers do and 18% most employers do, none of them replied that all employers and no employers do (See Figure 57).

Figure 57. Participants’ perception on the number of employers in Slovenia that offer equal opportunities to women

Among the social barriers women face in their professional career, the most respondents stated negative stereotypes (77%), followed by long working hours, male-dominated field and no supportive facilities (23% each) and no mentoring models (15%).

The question about the major reasons behind less number of women managers showed most replies in biased attitude for promotion of women and discouraged from
seeking management job (38% each), followed by long working hours (23%) and 15% replied other (women character - I don’t want to have a woman director as you cannot agree on anything). None replied that women are not as qualified as men.

33% of respondents think that the situation in their country has improved a lot in the last few years and there is now a greater number of women in the STEM industry and the same percentage thinks the situation has improved a little. Other options received 11% each (the situation has not improved; it is worse than before and it has improved a great deal) (See Figure 58).

![Figure 58. Respondent’s opinion on whether the situation of women in STEM in Slovenia has improved in the last few years](image)

40% of respondents replied that there is gender bias and the stereotypes play part in this issue to a considerable degree – there are some stereotypes and they do play a part, 30% replied to a great extent – there are stereotypes that perpetuate gender biases and stereotypes play a big part and also 30% replied somewhat – there are a few stereotypes, but they do not really play part in this issue.

The question on the extent of celebrating women’s achievements in science has majority answers as somewhat (60%), followed by very little (30%) and to a considerable extent (10%). Other possible answers received no replies (See Figure 59).
Among the **main challenges that women face in STEM**, the majority replied stereotype threat/gender stereotyping and being forced to choose between having a family/maternity and their career (46% each), women are forced to take more passive roles (38%), income inequality (31%), harassment in the workplace (23%), other possible options received up to 15%.

Most respondents think that **women have about the same difficulties in STEM as in other fields** (50%), 40% think they have a bit more difficulties, 10% think they have less difficulties. Other answers did not receive any replies.

Most respondents (70%) think that **women have about the same technical, scientific and mathematical skills or knowledge than in other areas**, 20% think they generally have more skills in these areas and 10% think they have less skills in these areas (See Figure 60).
Figure 60. Participant's perception on whether women have the same technical, scientific and mathematical skills as in other areas

When it comes to facing expectations from peers/professionals/general public, most of the respondents think that women have to face about the same expectations (67%), 22% think they have to face higher expectations and 11% replied they have to face lower expectations (See Figure 61).

Figure 61. Women’s expectations from peers/professionals/general public according to respondents of the Slovene survey for FeSTEM

The question about celebrations dates like the UN declaration of the International Day of Women and Girls in Science shows that 40% of respondents think they are a little bit important and 30% to a considerable extent, 20% not at all and 10% somewhat important. No one replied they are important to a great extent (See Figure 62).

Figure 62. Importance of the celebration of dates like the International Day of Women and Girls in Science according to the respondents

A vast majority of respondents do not know any public measure, activity or funding directed at improving the situation of women in STEM (90%), only 10% said that
they know them and they stated “gender equality orientation within EU calls” (See Figure 63).

Figure 63. Participants perception of public measures, activities or funding aimed at improving the situation of women in STEM

Regarding motivation of women to pursue a career in STEM, majority think it is personal interest in STEM aspects (69%), other options reached 8% each.

Among possible answers on what do the respondents think could be done to empower women in STEM, 38% stated eliminating the gender gap, same percentage goes for improving measurement and management of gender equality in STEM and working to tackle and eliminate harmful stereotypes and misconceptions. Promoting women scientists’ participation in policy making processes reached 31% and other answers up to 23% each. Among “other”, they stated: mandatory establishment and implementation of gender equality politics in all organizations (at least public) and I don’t support forced employment of women in STEM.

40% of respondents think that women who work in STEM support each other to a considerable extent, 30% somewhat, 20% very little and 10% not at all (See Figure 64).
Figure 64. **Respondents’ perceptions on whether women in STEM support each other**

Most respondents (44%) think that **university interventions** would maybe increase female participation in STEM fields, 22% said no and don’t know and 11% yes (See Figure 65).

Figure 65. **Respondents’ perception of a possible increase of women in STEM with university interventions**

When asked whether **industrial interventions** for increasing female participation in STEM fields would be beneficial, 30% said yes, maybe and I don’t know each and 10% replied no (See Figure 66).

Figure 66. **Respondents’ perception of a possible increase of women in STEM with industrial interventions**
When asked about what society and government, enterprises and schools can do in order to proactively increase the number of women in STEM, the respondents listed: nothing, public recognition for women in this field, what for?, introduction of STEM subjects in lower grades of primary school and in gymnasium programmes (programming, scientific experiments…).

When asked to give some examples of inspirational women/actions in these fields in your country or abroad, they listed: meeting of female entrepreneurs under institution Znanje in Grosuplje.

**SPAIN**

Magenta collected 55 answers from the surveys, 34 of them being women and 21 of them being men. Their ages ranged from 18 (the vast majority with a 50.9%) to more than 50 years old (16.4%), as Figure 67 shows:

![Figure 67. Ages of the participants of the Spanish survey for FeSTEM](image)

All the participants belonged to the STEM field, either being university students (30.9%) or professionals in the field (38%). Other profiles are represented in Figure 68:
Figure 68. Profiles of Spanish respondents for the FeSTEM survey

83.3% of respondents who stated that they are currently studying are pursuing a Bachelor’s Degree, and a 11.1% say that they are studying a Master’s Degree. The rest of the participants are either taking their PhD course, or are involved in secondary education (See Figure 69).

Figure 69. Profiles of those respondents who are currently studying

33.3% of respondents who stated they are teaching in universities have a professor position; 33.3% of them are assistant professors; another 16.7% are auxiliaries and the other 16.7% declared to be lecturers (See Figure 70).
When asked about their professional category, most of the respondents (73.7%) answered they are in intermediate or administrative positions, while 10.5% stated they are managers (See Figure 71).

Regarding the field of study of the participants of the survey, the majority of them (83.7%) agree that they are involved in fields relating to sciences, physics, engineering, mathematics and/or informatics (See Figure 72).
When asked about the situation of women in the STEM field in Spain, a great majority of respondents (47.3%) said that it is quite poor, as they are quite underrepresented in this field, while 16.4% of the answers state that the situation is really bad, as women are clearly underrepresented. However, 20% of them say that the situation is just okay, and 14.5% say that the situation is good, as women are visible, and they are represented (See Figure 73).

Figure 73. Women’s representation in STEM according to respondents
When asked if they are any subjects that boys study more than girls, all respondents agree that yes, they are (See Figure 74).

![Figure 74. Participants’ perception on whether there are subjects that boys tend to study more than girls](image)

In regards to any experience (or witnessing) of differentiated attitude/behaviour in your organisation towards women, opinions are quite mixed. 29.1% of the respondents say that they have occasionally witnessed or experienced it, while 12.7% state that they have seen it happening quite usually. Then, 45.5% say that they never or rarely have seen it (See Figure 75).

![Figure 75. Experience of differentiated attitude/behaviour in organisation towards women](image)
Regarding their opinion whether they think that women are not hired for upper-level positions in some fields because of being a woman, 43.6% say that this is something that happens frequently, while 41.8% say that they believe this is something occasional. However, it is seen that the opinion of the respondents is clear: this is a problem that still exists (See Figure 76).

Also, when asked if they believe that employers in Spain give equal opportunities to men and women, 43.6% say that some do; 30.9% say that the majority of employers do; and 20% of them say that very few employers do (See Figure 77).
Figure 77. **Participants' perception of Spanish employers giving equal opportunities to women**

Figure 78 shows that 52.7% of participants believe that there is gender bias and stereotypes that play part in this matter, while 23.6% that they do play a very important role in these regards.

Figure 78. **Participants' perception of a gender bias and stereotypes playing a part in the situation of women in STEM in Spain**
23.6% believe that women’s achievements in science are celebrated to a considerable extent, while 36.4% believe that they are somehow celebrated. In general, the respondents believe they are not really celebrated (See Figure 79).

![Figure 79. Respondent’s opinion on whether women’s achievements in science are celebrated enough](image)

63.6% of respondents think that they have some difficulties in the STEM field, while 20% believe that they have the same difficulties as in other fields (See Figure 80).

![Figure 80. Respondents’ perceptions on whether women have more difficulties in the STEM field compared to other fields](image)
When asked if they believe women have fewer technical, scientific and mathematical skills or knowledge than men, the response is clear: 89.1% said that both men and women have the same skills, and that it does not depend on gender but on the personal competences of each person (See Figure 81).

![Figure 81. Participants' opinion on whether women have fewer technical, scientific and mathematical skills than men by number of responses](image)

In brief, 48.1% of the interviewed believe that women have to face higher or much higher expectations than those that are applied to men. However, 13% believe that women are faced with less expectations than men, because people tend to believe that they are less capable (See Figure 82).
Figure 82. Respondents’ perceptions of the expectations that women face compared to men

When it comes to assessing the importance of celebration days such as the International Day of Women and Girls on Science are important for the visibility of women in science and other STEM fields, 76% of respondents give much credit to these events, considering it as very or quite important for visibility matters (See Figure 83).

Figure 83. Participants’ perceptions of the importance of celebration days such as the International Day of Women and Girls in Science
When asked about their knowledge on any public measure, activity or funding directed at improving the situation of women in STEM, a high percentage (51%) recognised that they did not know any, while 33% of the respondents said they knew about some, but could not name any at that moment (See Figure 84).

Figure 84. Participants’ perceptions of public measures, activities or funding directed towards improving the situation of women in STEM

From those who said that they knew public measures, activities or funding directed towards improving the situation of women in STEM, we highlight the following:

- Activities to improve the situation of women in ICT such as DEF CON or Django Girls’ workshops.
- Talks with scientists at schools and centres for the International Day of Women and Girls in Science and for the International Day of Women to give visibility to women in science, as well as measures such as those of the International Astronomical Union that makes it compulsory for some meetings to achieve an equal participation of men and women
- -Quotas and scholarships for women
- -Lowering the minimum grade at Spanish Public Universities
- -Womementech makers
To keep on fostering an education that offers equal opportunities for boys and girls, men and women so they choose freely the career they are more passionate about.

In the respondent’s opinion, what motivates women to pursue a career in STEM is, majorly, their personal interest in the aspects related to these areas of study, as 87.8% answered. 12.2% of respondents said that their motives were the high demand for this kind of workers and positions (See Figure 85).

![Figure 85. Motivations for women to pursue a career in STEM according to Spanish respondents](image)

40% of respondents believe that women in STEM support each other quite often, along with a 29.1% that think that they do a lot. On the contrary, another 29.1% think they support each other just enough (See Figure 86).
For 53.7% of respondents of the survey, university interventions (e.g., gender-sensitive instruction which integrates the gender dimension into teaching) would highly increase female participation in STEM fields, while only 9.8% of them say that this would not be efficient. 26.8% of respondents are not sure and think that it may work (See Figure 88).

Then, when asked about if they believe industrial interventions (e.g., employers scouting women more actively) would increase female participation in STEM fields, 53.7% think that yes, it would increase their participation; while 24.4% think that maybe,
and 12.2% think that this would not work in the process of increasing female participation (See Figure 89).

![Figure 89: Respondents' opinion on whether industrial interventions would increase female participation in STEM fields](image)

**GREECE**

46 people completed the Greek survey, 4 of them being men, 41 women and 1 person preferred not to say. Their ages ranged from 18 to more than 50 years old, but the majority, 69.56% belonged to the 18-25 age group (See Figure 90).

![Figure 90: Age of the participants of the survey conducted by UOM in Greece for FeSTEM](image)
Regarding their background, 67.39% of the participants in the survey were Higher Education students, 19.56% were professionals and 13% were Higher Education academics (See Figure 91).

The people surveyed were optimistic about the current state of women in STEM in Greece. Only an 8.57% believe it is a bad state, thinking women are somewhat underrepresented, while 40% believe it is okay, with women evenly represented, over the 37.14% that think the situation is good with women in STEM being visible and represented and the 14.29% that consider the situation very good with many women in STEM (See Figure 92).
Interestingly, when asked if they considered that there were subjects that boys studied to a greater extent than girls, 80% affirmed that there are. In fact, all respondents agreed that boys studied STEM more than girls, and when asked about which subjects those would be only 14.29% of the respondents mentioned subjects from the social sciences. Among the reasons shown in the survey as to why there are subjects that boys study more than girls do, most answers received (97.14%) considered that the influence of external factors, such as are family, parental figures or role models, teachers, friends and classmates as the most important reason, but reasons such as the higher pay in the STEM field and a more suitable work environment for males were also mentioned in 11.43% of the answers.

On the other hand, there is also a general agreement (100%) that there are subjects that are studied more by girls, which are from the social sciences, arts, and humanities. In this case, the external influence was mentioned by everyone (100%), but it was also mentioned a more female-suitable work environment (50%) and an inherent interest or passion (75%).

Another interesting fact is that, when asked if these situations should change, answers differ when it was asked if it was the boys’ or the girls’ situations. When it came to boys, 71.43% of the respondents stated that this situation should change, 20% stated the opposite and 8.57% were not sure. On the other hand, 60% of the respondents stated that girls’ situation should change, 2.86% stated that it should not change and 37.14% were not sure (See Figure 93).
Figure 93. Participants’ opinion on whether the fact that there are subjects that boys study more than girls or vice versa should change

When asked if they had witnessed differentiated attitude/behaviour in their university towards women, 54.29% said never, 42.86 rarely or very rarely, but 14.29% answered occasionally and 2.86% frequently. From those who said that they had witnessed these attitudes or behaviours towards women, 27.27% stated that it consisted of the assignment of fewer or less important tasks and another 27.27% mentioned that women were wrongly punished or evaluated.

When it comes to the question that women are not hired for upper-level positions in some fields because of being a woman, 5.71% of the respondents said never, 37.14% said rarely or very rarely, while the answers “occasionally” and “very frequently” got 42.86% and 14.29% respectively. Interestingly enough, when asked if they think that employers in Greece give equal opportunities to women, 42.86% answered that most employers do, 45.71% that some do and 11.43% that very few do.

57.14% of the respondents think the situation in Greece has improved a lot in the last few years and that there is a greater number of women in the STEM industry and 11.43% believe that at least the situation has improved a great deal, while 31.43% still believe that it has improved just a little or nothing at all. With regard to the question to what extent they believe that there is a gender bias and the stereotypes play...
a part in this issue, 62.86% considered that they do play a part to a considerable degree, 17.14% to a great extent and 20% answered that somewhat or not much.

On the other hand, most participants (60%) consider that women’s achievements in science are celebrated, and 20% to a great extent, while 20% think that only somewhat or very little.

When asked about the main challenges that women face in STEM, 80% of the respondents consider that women have to choose between having a family and their careers, and in the 14.29% of answers this is the main and only problem. Also, 75% think there is a general perception that they are not qualified enough and that they are suffering from different forms of gender stereotypes and biased treatment.

Actually, most respondents (60%) believe women face more difficulties in STEM than in other fields, and the 40% remaining thinking they have the same, but, interestingly enough, 94.29% believe women have about the same technical, scientific and mathematical skills or knowledge than men, at the same time that 5.71% think women have even higher skills than men (See Figure 94).
In the opinion of the participants, the social barriers women face in their professional career in STEM are mainly that it is a male-dominant field (71.53%), and that women have to face negative stereotypes (51.43%). Also, 22.86% of the answers listed long working hours as a problem.

Respondents agree with the importance of celebration dates like the United Nations declaring the International Day of Women and Girls on Science, with a 28.57% of them believing it is important to a great extent, 37.14% to a considerable extent, 28.57% thinking is somewhat important, and 5.72% thinking it is not at all. When asked about any public measure, activity or funding they knew that was directed at improving the situation of women in STEM, 42.86% said yes, but only 5.71% of those could mention one.

Among the reasons of what motivates women to pursue a career in STEM, most of the participants (77.14%) mentioned personal interest in the field, before the high demand of employees (15.29%) and the reputation of this field (8.57%) (See Figure 95).

All respondents agree that, to empower women in STEM, different measures should be taken to promote women scientists’ participation in policy making processes, eliminate harmful stereotypes and improve their success opportunities.
All of those surveyed think that women who work in STEM support each other even though the extent to which they do so varies. 8.57% state that they do while 54.29% affirm that they do so to a considerable extent, and the remaining 37.14% think they somewhat do.

When asked if they think external intervention would increase female participation in STEM fields, 22.86% answered yes, 20% no and 57.14% didn’t know or weren’t sure when the intervention came from university. When they were industrial interventions, 37.14% said yes, only 2.86% answered no, and 60% weren’t sure (See Figure 96).

![Figure 96. Participants’ opinion on whether university/industrial interventions would increase the participation of women in STEM](image)

On the other hand, the general opinion of all participants (100%) about what society, government, enterprises and schools do, in order to proactively increase the number of women in STEM, was that fighting against stereotypes was what it was needed to do.

**CYPRUS**

62 people completed the Cypriot survey, 24 of them being men and 38 women. Their ages ranged from 18 to more than 50 years old, but the majority, 43.5% belonged to...
the 18-25 age group (See Figure 92). Furthermore, 35% of the respondents belonged to the industry, 34% were Higher Education students and 31% were Higher Education instructors (See Figure 97).

Figure 97. Age of the respondents of the Cypriot online survey for the FeSTEM project

Figure 98. Profile of the Cypriot online survey respondents for the FeSTEM project

To the question of what the current state of women in STEM in Cyprus is, a 16% of the respondents answered that it is a poor one, with women somewhat unrepresented. 37% said it was just OK, with women not evenly represented, 33.8% believe the situation is good, with a visible presence and representation of women in
STEM, 9.7% think the situation is very good and the remaining 3.2% think that the situation is not good at all (see Figure 99).

Interestingly, when asked if they considered that there were subjects that boys studied to a greater extent than girls, 90% affirmed that there are, with Engineering and Computer Science mentioned 59 and 51 times respectively (See Figure 95). Among the reasons shown, most participants (63%) consider the influence of society in general as the main reason for this distinction, but other reasons such as the influence their family, parental figures or role models, teachers, friends and classmates, as well as the higher pay in the STEM field and a more suitable work environment for males (See Figure 100).

**Figure 99. State of women in STEM according to Cypriot’s participants**

**Figure 100. Subjects, that according to respondents, boys tend to study more than girls**
Figure 101. Reasons that influence boys to choose the abovementioned subjects according to the Cypriot online survey

On the other hand, there is also a general agreement (90%) that there are subjects that are more studied by girls, which are from the social sciences, arts and humanities. In this case society’s influence was mentioned by most participants (59%), but the mother or role models’ influence were also the most mentioned reasons for this (See Figure 102).

Figure 102. Subjects that girls tend to study more than boys according to respondents
Figure 103. Reasons for girls to choose certain studies according to respondents

When asked if these situations should change, answers differ a little when it was asked if it was the boys’ or the girls’ situations. The first one got answered with a 73% of yes, it should change, 7% of no, it shouldn’t, and 20% were not sure. The second one got a 63% of yes, a 7% of no and a 30% of not sure.

When asked if they had experienced or witnessed differentiated attitude/behavior in their university/organization towards women, a 33.8% of respondents said they never had, a 39% answered that rarely or occasionally, 14.5% said that this occurred frequently and the remaining 13% stated that very rarely had they experienced or witnessed this kind of behaviour towards women in their university or organization. The most common behaviour mentioned by 17 people was biased treatment, followed by being allocated unimportant work or being given fewer assignments mentioned by 10 respondents. Other behaviours mentioned were being rejected for a job, receiving a negative performance evaluation or even being bullied or assaulted (See Figure 104).
Regarding other forms of discrimination, 28% of respondents think it is frequent that some women are not hired for upper-level positions in some fields because of being a woman, 40% think that this happens occasionally. 16% believe this happens rarely and 8% that this very rarely or never happens. Interestingly enough, when asked if they think that employers in your country give equal opportunities to women, 6.5% answered that they do not, 58% that some employers do, 22.5% that most of them do and an 13% that very few do. 43.5% of participants believe that gender bias and stereotypes considerably play a part, 27.5% think they do play a part to a greater extent, 24% that they somewhat play a part and only 5% of the respondents think that they do not have much to do with it.

To the question of to what extent they believe that women’s achievements in science are celebrated, 43.5% stated that to a considerable extent, 34% said that somewhat, 14.5% stated that they believe they are not really celebrated and the remaining 8% that this is done to a greater extent.

It is believed by most of the participants that one of the main challenges that women face in STEM is being forced to choose between having a family/maternity and their career, as well as gender stereotyping, the lack of recognition or a general perception...
that are not qualified enough (See Figure 105). In fact, only 28.57% of respondents think that women **have to face the same difficulties in STEM than in other fields**, with a majority of 60% believing they have to face more, and just an 11.43% thinking they have to face less.

![Figure 105. Main challenges that women face in STEM according to respondents](image)

On the other hand, 11% of the participants **think that women have fewer technical, scientific and mathematical skills or knowledge than men**, and 81% think they have the same skills as men, and 8% think they have, in fact, more. Interestingly enough, only half of the respondents (42%) **believe women have to face the same expectations from peers/professionals/general public**, with 51% thinking they have to face higher expectations and just 7% that they have to face lower ones.

To the question of **what are the social barriers women face in their professional career**, most answers listed negative stereotypes, long working hours and no supportive facilities as the main social barriers, but the male-dominance of the field and no mentoring models were also mentioned (See Figure 106).
Figure 106. **Main social barriers women face in their professional careers**

When asked about the importance of celebration dates like the United Nations declaration of the International Day of Women and Girls on Science, 32% answered that they are important to a great extent, 32% that they are important to a considerable extent, 22.5% that they are somewhat important, 10% that they are not really important and the remaining 1.5% not important at all. On the other hand, when asked about any public measure, activity or funding directed at improving the situation of women in STEM they knew about, only 37% answered affirmatively, but they couldn’t name one. To the question of what could be done to empower women in STEM, most respondents answered that they should promote women scientists’ participation in policy making processes and improving the measurement and management of gender equality in STEM (See Figure 107).
Figure 107. **Actions to empower women in STEM**

On the other hand, 53% of participants think that **women in STEM** do **support each other**, with 39% thinking that they do so to a considerable extent, and only a 1.6% think women don’t support each other at all.

Participants have the same answers when asked about if they think that university interventions would increase female participation in STEM fields. 50% said yes, 42% said maybe, and 5% answered no, with the remaining stating that they did not know. When asked about industrial interventions the answers do not differ that much, with 62% stating that they would help, 33% saying maybe and 5% did not know or said no.
O1-T3. ANALYSIS OF SURVEYS AND INTERVIEWS

This final chapter includes a summary of the situation of women in STEM environments and how to improve it. The information here displayed is meant to serve as a tool to understand and then solve the social problems women face.

Once scoped this report, we can infer that regarding gender differences in STEM careers we should take into consideration several aspects of the situation, such as; gender differences in scientific productivity, gender differences in professional success (promotion), science institutions and gender differences and impact of family life on science careers. Thus, this issue has many layers that should be analysed and given the relevance they have.

Regarding the positive aspect of the current situation, we should focus our attention on the several measurements governments are taking action in order to raise awareness within the population and are being implemented to understand gender equality and how they benefit not only women but also the whole society.

Although women have advanced their position in STEM professions, there is still much space for improvement. Low number of women at decision-making positions in science and technology is a neglect and loss of talents, which European countries should not afford. That is leading also to loss of professional potentials of many best-educated citizens, in this case especially female citizens. Active support to gender equality will enable also the industry access to a wide spectre of human resources. Integration of perspective of both genders in research themes with bigger involvement of women in research and innovation will improve quality, objectivity and relevance of knowledge, technologies and innovation (European Commission 2013).

Science and gender equality are both vital for the achievement of the internationally agreed development goals, including the 2030 Agenda for Sustainable Development or the International day of women and science, which is celebrated on the 11 of February and every year is more well-known. Besides, civil, political individuals and organizations should work together on this topic in order to raise awareness and support this laudable cause. Finally, yet importantly, bigger participation of women in science and technology will contribute to social progress. Provision of equal opportunities of women and men is also a question of justice in a society. Studies show that countries, which have high levels of equality are more successful and rank higher.
on scales of well-being, social connectedness and integration. Among consequences of inequality, we can count unemployment, criminal and poor health conditions (European Commission 2011).

Some actions that can be taken (and are being carried out already) to increase the participation of women in STEM are:

- Raise public awareness on gender issues;
- Conduct media campaigns on women achievements in STEM;
- Familiarize girls with STEM from a young age;
- Inspire girls with successful women in STEM role models;
- Educate parents regarding the girls’ opportunities in STEM professions;
- Activate teachers regarding girls fit in STEM;
- Redesign school books with women role models & examples;
- Increase women self-efficacy and attitude towards STEM;
- Raise awareness on employers in hiring women in STEM jobs;
- Identify and fight barriers preventing women from entering and advancing in STEM professions.
- Promote the image of STEM female leaders in high rank positions both in public and private organizations;
- Promote the image of STEM female researchers;
- Provide mentoring and coaching to young women entering the STEM profession;
- Empower women with lifelong training on STEM knowledge & skills;
- Present the variety of opportunities in STEM professions;
- Advertise/Award best practices/cases of integrating women in STEM professions;
- Develop peer support network of STEM women;
- Legislate policies supporting women (e.g. maternity leave, childcare systems);
- Support young women entering in STEM careers;
- Provide networking opportunities to women in STEM and STEM research (e.g. conferences, seminars);
- Monitor the gender issues in STEM education, research, jobs, etc.;
- Awards to women STEM talents (students, PhD thesis, researchers, innovators, entrepreneurs etc.).
➢ Develop and implement monitoring tools to track women position in STEM;

Similarly, some STEM gender gap indicators that can be monitored (and are monitored by some countries) are the following:

➢ PISA average scores in mathematics, science & informatics by women;
➢ Women attitudes towards STEM;
➢ Number of women STEM mentorship programs;
➢ Number of women participants in STEM mentorship programs;
➢ Number of Gender Equality Training programs
➢ Number and percentage of women participants in Gender Equality Training programs
➢ Number and percentage of women participants in STEM training programs;
➢ Number and percentage of women participants in University STEM departments;
➢ Number and percentage of women participants in University STEM MSc programs;
➢ Number and percentage of women PhD candidates in STEM;
➢ Number and percentage of female professors in University STEM departments;
➢ Number and percentage of department chairs held by women in University STEM departments;

➢ Number of Networking events connecting young and advanced women STEM scientists, entrepreneurs, leaders, sharing knowledge, opportunities and experiences; connecting women and mean;
➢ Women participants in such Networking events;
➢ Number of scientific conferences/workshops on gender issues;
➢ Number and percentage of women participants in such conferences/workshops;
➢ Number of papers by Greek researchers in gender issues in STEM;
➢ Percentage of women authors of such papers;
➢ Number of unemployed tertiary educated women;
➢ Number of unemployed STEM tertiary educated women;
➢ Unemployment rate of tertiary educated women;
➢ Unemployment rate of STEM tertiary educated women;
➢ Number of tertiary educated women working as STEM professionals;
▸ Distribution of women researchers working in STEM in higher education, government, and business/industry sectors;
▸ Number and percentage of women earned a MSc degree in STEM per year;
▸ Number and percentage of women earned a PhD degree in STEM per year;
▸ Number of part-time women STEM researchers in higher education;
▸ Number of full-time women STEM researchers;
▸ Number and percentage of women in STEM business/industry director boards;
▸ Number and percentage of women in STEM public high rank committees;
▸ Average (min, and max) salary of women in STEM professions

After carrying out several online surveys, the partnership can conclude the following findings on public and private recommendations for gender-approach measures to be implemented in order to tackle inequality among men and women in the STEM field, and to achieve the inclusion of women in these careers.

In order to empower women within the STEM industry, those surveyed recognise that the most important measures to take would be promoting women scientists’ participation in policy making processes, setting specific measures to make sure having a family or expecting to create one is not a discriminatory factor for women, and working to tackle and eliminate harmful stereotypes and misconceptions. In addition, building platforms that celebrate accomplished women in STEM is a great initiative to make women aware of different role models, as well as recognising the work and effort of those who are already involved in the field.

Improving the measurement and management of gender equality in STEM, eliminating the gender gap and fighting firmly against harassment were also mentioned, mostly among those coming from the academia, which shows a gap and necessity in this environment that needs to be filled. Finally, they remark that governments should invest in I+D, ensuring appropriate working conditions in the field, whether men or women.
The following graphics show that the majority of the surveyed believe that interventions, both coming from the industry and from the University, would improve women’s participation in STEM fields.

![Pie chart showing responses to Would University interventions improve women participation in STEM?](image1)

![Pie chart showing responses to Would professional interventions improve women participation in STEM?](image2)

Figure 108. Participants’ opinion on whether university/industrial interventions would improve the participation of women in STEM

Looking at possible intervention on the side of Universities, surveyed believe that installing gender-perspective approaches in lessons, classrooms and curricula could not only improve the promotion of these careers, but it would also spark curiosity from women in and young girls, that might feel attracted to STEM itineraries. Some of the measures proposed were organizing roundtables, talks, inviting more prominent women, advertise their STEM degrees to all genders, tackling discrimination based on gender that come up in lectures, and all kind of initiatives to promote and inform students about their possibilities in the field. Moving to the interventions possible from the industry, surveyed agree that installing measures that keep the gender of the applicant concealed until the hiring decision could be a great recommendation, thus avoiding possible unconscious or direct biases. Also, promoting more interviews with women to upper-level positions.

Other recommendations gathered from the surveys included implementing gender perspective and feminism in the educational system –from the early years onwards–, in order to create a more equal and inclusive society that would be less subjected to harmful stereotypes about genders. Encouraging girls to study STEM degrees and give more visibility to women in STEM were also mentioned; as well as making STEM
women visible, which would encourage girls to follow their steps. In order to do this, informative talks, roundtables, etc. in which expert women participate (at least, in equal proportion to men speakers and, at least, with equal speaking time) would improve women’s participation in STEM. There was also an emphasis on the need to tackle the pay gap, so measures to ensure that both men and women in the same positions are paid the same amount should be installed. There was also a mention to the need to tighten laws on sexual harassment (or any kind of harassment) at the workplace, as women in the field of STEM tend to work in male-dominated field where they may feel threatened.

Surveyed also mentioned the importance of promoting a work-life balance in both genders to prevent employers from thinking that hiring a woman is different from hiring a man in terms of the time they will “lose” caring for their family. They think it is also important to secure equal access to research grants and responsibility positions as well as parity in awards and other recognitions. Along these measures, there was also a mention to the importance of fighting the glass ceiling, tighten up the law concerning workplace harassment and promote work-life balance.

Table 4. Summary of the measures proposed by respondents on what society, the government, companies and educational centres could do to improve the current situation of women in STEM.

<table>
<thead>
<tr>
<th>Group that proposed the measure</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students, Academics, Professionals</td>
<td>Implementing the gender perspective and feminism in the educational system</td>
</tr>
<tr>
<td>Students</td>
<td>Encouraging girls to study STEM degrees by giving more visibility to women</td>
</tr>
<tr>
<td>Students</td>
<td>Tackling the gender pay gap</td>
</tr>
<tr>
<td>Students</td>
<td>Tighten up the law concerning workplace harassment and gender-based violence</td>
</tr>
<tr>
<td>Academics</td>
<td>Promotion of interest in girls by giving visibility and a platform to women in STEM</td>
</tr>
<tr>
<td>Academics</td>
<td>Secure equal access to research grants and responsibility positions</td>
</tr>
<tr>
<td>Professional</td>
<td>Fight the glass ceiling</td>
</tr>
</tbody>
</table>
1 O1-T4. Executive report and summary

INTRODUCTION

According to the Declaration on the Digital Day 2019 ([1]) for the commitment on women in digital “the EU is facing an unprecedented shortfall of Information and Communication Technologies (ICT) professionals. Women account for 52% of the European population yet hold only 15% of ICT-related jobs. Women constitute only one in six of the ICT specialists in the EU and only 1 in 3 of the Science, Technology, Engineering and Mathematics (STEM) graduates”. Only 33% of the workers in the scientific community are women and only 30% work in computing engineering. These numbers represent the same percentage in the technological field and the gap between men and women remains constant. It is essential to integrate awareness of gender bias across all relevant sectors including in the initial and continuous training of teachers; address structural barriers such as work conditions and culture, which hinder girls and women to enter a predominantly male-dominated field; and increase the visibility of insufficiently valued role models to inspire women and girls [1].

This study is part of a European project, namely FeSTEM (Female Empowerment in Science, Technology, Engineering and Mathematics in Higher Education) which aims to promote an innovative method and pedagogy that will allow Higher Education (HE) students to use traditional and computationally-rich media to create meaningful, shareable exhibits that will act as mentoring models for encouraging girls and women to remain active in STEM.

The study will provide an overview of the status of STEM women in five European countries (Cyprus, Greece, Italy, Slovenia, and Spain) in Higher Education and the industry. Furthermore, it will provide recommendations on good practices, including approaches to deploy for keeping girls and women aware of the challenges encountered in STEM. Findings indicate that the glass ceiling is still prominent in STEM careers; whilst the gender gap is also present in Research and Development projects.

2 METHODOLOGY

The desk research aimed at providing the status of women in STEM in Higher Education and in the industry by collecting relevant information through official reports, referendums and relevant reviews. The data collection process ran from February 2020 to December 2020 resulting in the collection of different types of reports and reviews that inform the status of STEM women in five European countries.
3 RESULTS

3.1 Status of women in STEM in Higher Education in Cyprus, Spain, Slovenia, Greece and Italy

The state of the art in the different countries analysed, as it will be shown below, is quite similar, with several factors that affect all of them equally. First, the Spanish context showcases that there is still a scarce presence of women in Government positions; the glass ceiling is still prominent in investigation careers, explained by the under-representation of women in leadership positions while there is gender balance in the rest of the research categories; and the gender gap is also present in Research and Development (R&D) projects, with only 48% of women researchers in Public Administration and 43% at universities ([2]). Furthermore, when comparing men and women of the same age, with the same amount of time elapsed since the completion of their PhD, the same field of knowledge and recent academic production, as well as directed dissertations, the probability of a Spanish male Associate Professor being promoted to Full Professor is 2.5 times higher than that of a woman with similar characteristics ([3]). However, there are also different measures and initiatives that are nowadays working towards ending that gap, and providing women a clear view of what being involved in STEM means, in order to achieve their inclusion in the field and a proper balance between male and female representation in STEM careers.

In Cyprus we can observe that more women are graduating from HE than men ([4]), but that these numbers are not then reflected in the employability and presence of women in the STEM fields in the industry. As it was the case of Spain, Cypriot government and organisations are also trying to fight this imbalance with initiatives and projects aiming at women. Cyprus is a member of the European Institute for Gender Equality, a European Union-initiated body dedicated exclusively to gender equality. Until October 2015, no stimulatory initiatives specifically dedicated to mainstreaming gender in research have been put in place ([5]). In Cyprus, girls are outperforming boys in school assignments, according to the international PISA 2015 survey. Cyprus ranks high (top 5 countries in the EU) in female ICT students, yet the figure is far from impressive if we consider that 26% ICT students are women and 74% men ([6]). Noticeably, a little less than 15% are later employed in the same field ([7]). This data shows that there is still a gender gap that needs to be solved and overcome in the matter we are analysing in this study. Few women hold permanent positions in higher education, whilst women are also under-represented in Decision-Making Centers in administrative and academic positions.
This last problem is also observed in Slovenia, where although the number of female Ph. D. is almost equal to the number of men Ph. D., the number of women decreases to around 17% of women pursuing STEM studies. Many stereotypes regarding gender roles and the innate talent each gender holds persist in the Slovenian society, preventing a lot of girls and young women from pursuing scientific and technical sciences. The Slovenian Ministry of Labour, Family and Social Affairs along with the Ministry of Science is trying to create an encouraging, inclusive and ethical research environment.

Although in the last years, the number of women in the engineering profession has increased (Technical Chamber of Greece), Greece still falls behind in comparison to the rest of the European Union, with only 37.7% of women researchers. In 2013, there were 0.23% women (versus 0.36% men) doctorate holders in the working age population aged 25-64 ([8]). In 2015, women researchers made up 38% of the total number of researchers in Greece which is higher than the EU average ([9]; [10]). However, the proportion of researchers among male R&D personnel in all sectors in the economy combined exceeded that of women by 13.7% ([9]). When it comes to the salaries, She Figures ([9]) states that in 2014 women working part-time in education and in R&D activities earned 23.1% less than their male colleagues, while the disparity between genders across the Greek economy was in the order of 12.5%. For these matters, the Greek government is working on improving this situation, avoiding differences between men and women, and working for equal opportunities for both of them through the incorporation of the European Directives 2000/43 / EC and 2000/78 / EC in the Law 3044/2005 (concerning the fight against discrimination).

When it comes to the situation in Italy, we can observe that the gender gap in the IT sector in Italy is one of the highest in Europe: only around 30% of the total graduates in IT are women, as there is still a mislead conception that there are careers made for men, and careers made for women ([11]). There is also a low engagement in the field of STEM when it comes to people, especially women, choosing this path as their careers. However, when women graduate in these disciplines they do so with better results: they have a higher average grade and show greater regularity in their studies when compared to men ([12]). Although when it comes to employment, they have fewer opportunities of finding a job 5 years after the completion of their course than their counterparts ([13]). According to UNESCO ([14]) 35% of Italian researchers are women and in general they are paid less than male researchers and are more likely to leave the job due to isolation, hostile work environment and ineffective feedback. Thus, in Italy we see the same difficulties and challenges as in the rest of the participant
countries, in which women may have the skills and abilities to follow STEM careers, but they are not doing so.

There is a clear observation to be made: although women are very present in Higher Education studies, and they perform quite well as some studies show ([15]), they are not engaging in the STEM field as much as they could, and they are still falling behind when it comes to comparison to their male counterparts. Eventually, there seems to be an underrepresentation of women in all countries analysed. This means that they are not visible, although many of them choose these paths as their careers, later on many of them disappear due to different reasons such as the lack of support in their careers, problems connected to motherhood, lack of career expectations and some feelings of isolation and exclusion ([16]). The lack of conciliation in the field, which pushes women to abandon their academic careers in order to be able to have a family, something that does not happen in the case of men.

3.2 Status of women in STEM in the industry in Cyprus, Spain, Slovenia, Greece and Italy

When moving to the industry, we can observe that in Spain, there is a similar situation as in the academic field, with still an imbalance between men and women. The presence of women in the Government, at universities or in OPIs is still rare. According to Puy. A. ([2]) in 2017 only 2.3% of women in the labour market were working in STEM related fields (compared to 3.3% in the EU-28), compared to 5.5% of men. Furthermore, when it comes to research in the private sector, women account for 31% of them, they also account for 48% of those working in private non-profit organizations and according to Eurostat data, 12.1% of women were working in knowledge-intensive services (compared to 13.6% in the EU-28) in the same year. However, there are various measures and plans being implemented by private companies and forced by the government to ensure equal opportunities for both men and women, and also to foster the inclusion of women in STEM careers.

In the Cypriot industry, only 4% of members of boards in the largest quoted companies, supervisory board or board of directors are women ([17]), although it has been proven several times that having women among these groups improves the quality of the decision-making processes and other tasks that need to be carried out. In these fields, family planning still impacts harder on women than it does on men, taking time from their work and hindering their careers. According to Eurostat ([18]), 40% of scientists and engineers in Cyprus were women. In 2019 (otherwise stated), among all 11,600 women scientists and engineers, 9% worked in high technology sectors (high-technology manufacturing and knowledge-intensive high-technology services), 10% in
manufacturing, 5.5% in high and medium high-technology manufacturing (in 2018), 81.1% in services, 73.8% in total knowledge-intensive services and 8.9% in other NACE activities. In addition, among all 69,300 women employed in science and technology, 3.5% were employed in high technology sectors (high-technology manufacturing and knowledge-intensive high-technology services), 3.5% were employed in manufacturing, 1.1% were employed in high and medium high-technology manufacturing, 93.2% in services, 79.3% in total knowledge-intensive services and 3.3% in other activities. Furthermore, according to the Women in Digital (WiD) Scoreboard ([19]), Cyprus ranks 22nd with a score of 43.8 (compared to 54.5 in EU), in terms of women’s participation in the digital economy. Based on the 2020 WiD Scoreboard, 0.72% of individuals aged 20-29 are women STEM graduates (versus 1.28% men); and 1.0% of total employment are women ICT specialists (versus 4.2% men). In addition, 18.3% of ICT specialists are females, while 0.8% of the total female employment are ICT specialists ([20]).

The Slovenian industry also shares a similar situation as both countries previously mentioned. According to the study She Figures ([9]) the proportion of female scientists and engineers among the total labour force of Slovenia was 3.4%, whereas for the European Union this figure falls to 3.1%. This situation can be explained by the constraint that women face due to family matters and because they have more difficulties when accessing higher positions in companies. However, the Slovenian government is trying to implement several measures to ensure equal opportunities for both genders, which has already proven successful in the balanced representation by sex in some bodies of the Public Research and Development Agency of the Republic of Slovenia, as mentioned by Dr. Andreja Gomboc, the president of the Equal Opportunities Commission for Science in the country. Moreover, there are several private awards and initiatives that promote the inclusion and the attraction of women towards STEM careers such as: the award Female Engineer of the year, which is a part of the “We will be Engineers!” project, the For Women in Science, a national programme between L’Oreal Adria and the Slovenian National Commission for UNESCO granting scholarships to female researchers in the final phase of their PhD studies in Slovenian research institutions.

According to Eurostat ([21]) in Greece 39% of scientists and engineers are women. In 2019, among all 105,600 women scientists and engineers, 5% work in high technology sectors, 4% in manufacturing, 1.3% in high and medium high-technology manufacturing, 92% in services, 83.2% in total knowledge-intensive services and 4% in other NACE activities. In 2020, females classified as HRST (i.e. having successfully completed an education at the third level or being employed in science and technology)
were 44.9% of the total active population aged 25-64, which is close to the 51.7% in EU27 ([22]). Furthermore, women occupy only 30% of the jobs in new technology sectors ([23]). In 2017, 42.3% of women were working in knowledge intensive activities, both in public and private sectors, versus 29.8% of men. ([9]). In 2017, women involved in knowledge related activities in business were also more than men (13,0% of women and 11,5% of men). However, there are actions to foster gender mainstreaming, as well as enhance and advocate gender balance in computer-related scientific fields and professional sectors in Greece, such is the vision of the Greek Chapter of the ACM-W ([24]). Moreover, Law 4097/2012 on the application of the principle of equal treatment of men and women in the exercise of independent professional activity aims at harmonizing the legislation with Directive 2010/41 / EU in order to ensure the implementation of the principle of equal treatment of men and women who practice self-employment or contribute to the exercise of such employment.

In Italy, the average employment rate of male STEM graduates five years after graduation is 92.5% compared to 85% for women. Moreover, permanent employment contracts characterize 55.6% of STEM employees with significant gender differences (62.5 against 45.1% for men and women respectively. Second level graduates in STEM are more frequently employed in the private sector (83.7%); 14.3% are employed in the public sector - with a great prevalence of women - while the non-profit sector absorbs 1.3% of cases. Women are mainly in the education, research and counselling sectors, whereas men are mainly in the IT sectors ([13]). Since women are underrepresented in the STEM field, we encounter several initiatives that foster the inclusion of women in these careers, to compensate for the lack of women in these job positions in Italy such as the National Plan for Digital Education launched by the Italian Ministry of Education in 2015, the Piano Lauree Scientifiche, a national plan that support educational activities directed at encouraging careers in STEM as well as promoting gender balance. The government has also launched several measures to ensure that women get enough financial resources to be able to follow their career as well as becoming mothers if they want, such as the Budget Law in 2017 that extended compulsory paternity leave and included vouchers for babysitting services and financial support to households for childcare services ([25]).

With all the information gathered above about the women in the industry of STEM, what this paper can conclude is that women are still subjected to family matters in the majority of the countries, and that they still have to face the challenge of earning less than their male counterparts. The reason for this may lie in the fact that they are not able to reach leadership positions that are only available for the men in the company. Comparing this with the academic challenges, we can see that the situation is quite
similar and that women in the STEM industry face the same challenges in the academic field as they do when they are working in the industry.

3.3 Good practices for women in STEM in Higher Education in Cyprus, Spain, Greece, Slovenia and Italy

This section highlights good practices identified in Higher Education from the state-of-the-art review in Cyprus, Greece, Italy, Slovenia, and Spain. These initiatives include either research actions funded from the government or university projects funded by the European Commission.

The Spanish Government has created the ‘Women, Science and Innovation Observatory’ (OMCI) ([26]) with the objective of monitoring the situation of female researchers, technologists and innovators and proposing new measures to eradicate the gender gap. Additionally, eligibility requirements for grants in R&D to broaden the possibilities for those who had to put their scientific activity on hold because of their family duties.

Fundación ASTI launched an education project in Spain called ‘STEM Talent Girl’ for the promotion of scientific-technological vocations aimed at women to empower girls and young women to pursue STEM careers with the help of female mentors ([27]).

The Equal Opportunities Commission for Science of Slovenia along with the Public Research Agency of the Republic of Slovenia aim at eliminating discriminatory provisions in obtaining funding for research or in evaluating applicants during maternity or maternity leave. This Commission also organizes biannual consultations to encourage the debate on the possible causes and obstacles to women’s greater role in science, equal opportunities and the necessary structural changes to ensure this in science ([28]).

L’Oreal Adria and the Slovenian national Commission for UNESCO launched for the 14th time in 2020 the For Women in Science scholarship targeted at young female researchers in the final stages of their PhD studies to award them for their contribution to scientific cognitions and to motivate and support them in their scientific career ([29]).

The Italian Ministry of Education has promoted the Piano Lauree Scientifiche to encourage careers in STEM and promote gender balance. They have also developed the initiative ‘March: the STEM month” that aims at promoting STEM disciplines in school at all levels and on the 8th of March the STEM: Female
plural competition is issued to encourage reflection on the presence of women in STEM disciplines and to encourage female students to pursue this field ([30]).

The University of Cyprus established the UNESCO Chair on Gender Equality and Empowerment in 2009 ([31]). The UNESCO Chair on Gender Equality and Empowerment aims “to provide a new paradigm on how common problems faced by the populations of the region can be addressed through the gender perspective. To achieve its objectives, the Chair undertakes an integrated system of research, training, information and documentation activities in the field of women and gender studies” ([31]).

The Cyprus University of Technology (CUT) developed a Gender Equality Plan for 2014-2020, under a Rector’s Council’s decision. The plan pertains to the university as a whole -including all departments, members of the academic and administrative staff, as well as students. The University has set up a plan for promoting actions related to gender equality such as training for promoting expertise on gender equality and development of procedures to combat sexual harassment. Specific actions proposed by the Committee for Gender Equality at the CUT have included flexible working hours, the creation of a childcare facility and offering the possibility of working from home to promote the reconciliation of family and working life ([5]). Recently, the CUT Rector’s office has announced the University’s alignment with the UN sustainable development goals on achieving gender equality -UN Sustainable Development Goal 5.

The Cyprus Institute of Neurology and Genetics has announced its plan to execute gender equality actions ([5]).

Gender-SMART ([32]) is another initiative implemented by the Cyprus University of Technology aiming to tackle the following areas of actions: Building a Gender Equality Culture; Developing equal career support measures; Reshaping decision-making and governance; Integrating gender in funding, research and teaching.

Ed.G.E - Educating girls and boys for Gender Equality ([33]), a project implemented by CARDET in Cyprus. The aim of the project is to enhance the education and awareness of girls and boys through the implementation of an educational methodology based on creative art/cultural practices, so that they can challenge social norms, gender stereotypes and roles that encourage or condone violence and promote gender equality and respect for others.
3.4 Good practices for women in STEM in the industry in Cyprus, Spain, Greece, Slovenia and Italy

This section highlights good practices identified in the industry from the state-of-the-art review in Cyprus, Greece, Italy, Slovenia, and Spain.

The initiative ‘Mind the Gap: women, science and innovation’ is an Spanish event that promotes STEM jobs from the gender perspective among women in order for them to become referents and create a stable future for all women ([34]).

Women who code is a non-profit international organization founded in 2011 in Barcelona to empower and inspire women to excel in technological careers ([35]).

The Women in Science Unit created by the Spanish Government aims at promoting the presence of women in all areas of science, technology and innovation according to their merits and abilities ([26]).

The adoption of the regulations of the Public Research Agency of the Republic of Slovenia define the gender-balanced composition of permanent and occasional professional bodies ([28]).

In Greece, the General Secretariat for Gender Equality is responsible to plan, apply, and monitor the implementation of policies on gender equality in all sectors. The ‘National Plan for Gender Equity 2016-2020’ aims at a balanced participation of women in decision-making centres as well as at supporting women’s employment in terms of gender identities and relations ([36]).

The National Action plan for Digital Skills and Jobs in Greece ([37]) aims at strengthening the participation of women through ICT and enhancing the public debate about the challenges of involving women in new technologies. The expected result is the increase of the ICT skills of females in order to enable the efficient integration of the female talent into the workforce ([38]).

The Women and Girls Go Digital initiative (WGGD), coordinated by the Greek General Secretariat for Gender Equality (GSGE) is a local coalition of stakeholders who will support STEM women through their entire career paths, enhancing their digital skills and jobs’ prospects. The WGGD aims to create a Business Innovation Hub that provides Knowledge-transfer based on best practices from the EU. WGGD received the WITSA Global ICT Excellence Awards of the World Information Technology and Services Alliance for its work. Its goals include strengthening women’s digital skills, as well as mentoring and supporting their entrepreneurship ([39]).
The ‘Innovation and Employability for Women’ (e-Women) project organized seminars on the latest trends for improving women and female entrepreneurs’ employability in the digital economy ([40]).

The women4it project includes among its goals the promotion of IT jobs for women as a source of economic growth and role models ([41]). Furthermore, the eSKILLS4ALL project aims at training unemployed women to upgrade their digital competence ([42]).

The website ‘Women in Science with Art’ developed by Institute Jožef Štefan contains a series of presentations of leading female scientists in Slovenia for the promotion of women in science ([43]).


The Slovenian award Female Engineer of the year is part of the project ‘We will be Engineers!’ to encourage youngsters to pursue a career in engineering ([44]).

The ACM-W-Cyprus chapter which aims to support women in computing by celebrating the engagement of women with the computing community locally, but also as part of ACM-W in Europe and internationally. ACM-W brings together women from the area of computing in order to enhance a higher level of commitment and understanding. All these initiatives are considered an important step to creating gender equality in the field of computer science and engineering in Cyprus and encourage women in STEM to become active role models in the field ([45]).

Several EU projects have been implemented in Cyprus either by HE institutions or NGOs with an eye to encourage the participation of women in STEM. The Womenpower project (2014-2015) was funded by UNDP and implemented by the Cyprus University of Technology aimed at linking women mentors and mentees together through an online community platform to be developed following a user-centered approach. More specifically Womenpower aimed at helping young women to receive support and advice in regard to self-improvement, in order to increase their self-esteem, personal and social power and solidarity. The project provided women with practical advice on how to deal with difficulties in their personal and professional life in order to overcome the glass-ceiling effect and promote gender equality. Moreover, the platform also allowed its members to organize local WE-ME Mentoring/supporting- meetings,
seminars and/or fairs and a yearly WE-ME Mentoring-conference in Euro-Mediterranean region ([46]; [47]).

In the Cypriot Context, the Mediterranean Institute of Gender Studies also puts forward actions and projects that aim at tackling gender equality. Amongst the projects implemented by MIGS are FEM-UnitED to prevent Femicide in Europe, ARTEMIS aiming to increase the level of awareness of the European Protection Order (EPO) among European citizens, lawyers and the personnel of NGOs and CSOs. Play 4! is another project aiming to foster critical and creative use of social media amongst young people to fight gender-based stereotypes, discrimination and sexist hate speech ([48]).

4 CONCLUSIONS

This study aimed at providing an overview of the status of STEM women in five European countries (Cyprus, Greece, Italy, Slovenia, and Spain) in Higher Education and the industry. Our findings demonstrate the need to develop measures that will ensure the increase of women in STEM and the number of women in higher positions, in both academia and the industry. The Women-in-Digital declaration signed in 2019 by the EU28 recognises the same issues that have been shown in this report, namely lower salaries for women in ICT sectors, the underrepresentation of women in leading positions in the digital sector, gender stereotypes and cultural discouragement as well as a lack of awareness and promotion of women in STEM lead to a negative effect on women's opportunities in STEM.

That is why measures such as those already being implemented by the Governments of Spain, Cyprus, Greece, Italy and Slovenia on equal opportunities in the labour market, strategies to increase the digital skills of unemployed females or private initiatives for the promotion of role models in STEM or to increase the motivation of girls to explore these fields have been proven as needed. Furthermore, the EU should encourage measures –both economic and social– to ensure equal opportunities for both men and women and make sure that women are not discriminated against due to gender reasons, like the possibility of becoming a mother or the misconception that they will be more focused on their families instead of on their jobs. Moreover, an equal allocation of resources and funding is fundamental to see successful female researchers and entrepreneurs in the digital sector.

Only through education and awareness, can women achieve an adequate situation to feel encouraged to engage themselves in STEM careers and not drop it along the way. More efforts are needed to break the glass ceiling in academia, where the gender gap
is wider due to gender stereotypes and measures for conciliation should be adopted, allowing women to pursue their careers without having to renounce to their family if they wish to have one.

ACKNOWLEDGEMENTS
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ANNEX I. Application form for STEM MAKER

FeSTEM STEM MAKER team
Application form for STEM MAKER team members – STEM high education academics and STEM students

About the FeSTEM project
The FeSTEM project promotes women’s empowerment in science, technology, engineering and mathematics (STEM) in higher education. The main objective of the project is thus to promote and innovate methodology that will allow students in post-secondary programs to use traditional and computer rich media to create meaningful exhibits that will act as a mentor model to encourage girls and women to remain active in STEM.

Role of STEM MAKER teams and benefits for participants
Composition of STEM MAKER teams: HE academics working in STEM-related departments and motivated STEM students (male and female). STEM MAKER teams will participate in all phases of the project, especially in piloting and evaluation of project outputs.

Benefits of cooperation in STEM MAKER teams:

- possibility to evaluate developed projects outputs and contribute to their improvement/adaptation to real needs
- expanded knowledge on innovative STEM teaching methodologies
- professional networking possibilities with colleagues from other EU countries
- public promotion of individuals’ participation on the official project website (published bios and/or CV)

It is expected that an individual participant will cooperate with approximately 10 hours of his/her work time.

Application form
Please fill in the following data:

First Name(s): ________________________________________________
Surname: _________________________________________________________

Nationality: ___________________________________________________
Age range:
18-25
26-34
35-45
45-55
+56
Country of work/studies: _______________________________________
Telephone: ____________________________________
E-mail: __________________________________________
Participation in STEM MAKER team as (circle one option):
  ➢ STEM academic
  ➢ STEM student

Name of organization of work/study: __________________________________________
Key knowledge/expertise: _____________________________________________________
Position: __________________________________________________________________
Web page of the organization: _______________________________________________
Department: __________________________________________________________________
Subject you teach/Programme of Study: __________________________________________

Please specify the activities in which you would be interested to participate (You can choose more than one option) *

  ➢ Mapping the challenges and expectations of women in STEM: online survey and interviews
  ➢ Development of a toolbox with traditional and digital materials for constructing gender-sensitive exhibits: creative workshop activities for identifying the best possible tools and materials for the toolkit
  ➢ Development of gender-sensitive curriculum: evaluation of the gender-sensitive methodology
  ➢ Pilot and evaluation of the gender-sensitive curriculum: use of developed materials and tools, evaluation of the methodology implementation
  ➢ FeSTEM Online Learning Unit: informal evaluation of the Online Learning Unit
FeSTEM MAKER team members will receive a certificate of membership whereas you will receive public credit on the official project website (published bios and/or CV).

I, the undersigned, confirm my interest and willingness to participate in the FeSTEM project and be part STEM MAKER TEAM my interest and I am aware that the information collected in the Application form is used solely for the purpose of my participation in STEM MAKER team, for the purposes of monitoring, reporting, evaluating, controlling and keeping records of project activities and other legal obligations of the partner organisation. Activities are carried out in accordance with the Personal Data Protection Act and the General Data Protection Regulation.

When conducting implementation of STEM MAKER team activities, photographs and videos can be taken for the purpose of promoting and managing project documentation. These photos and videos can be posted on the website of the project, in the media and on websites and social networks of the partner organisation.

You are entitled to obtain confirmation of how your personal data is being process, you have the right to access them, rectify any errors or request their removal from the database when they are no longer needed.

Place and date: _________________________________Signature: __________________
ANNEX II. Consent form

CONSENT FORM FOR PARTICIPANTS

FeSTEM - Female Empowerment in Science, Technology, Engineering and Mathematics in Higher Education

Erasmus+ Programme KA2 [2019-1-CY01-KA203-058407]

Dear participant:

Thank you for your interest in participating in the FeSTEM project and filling out our contribution form.

The FeSTEM project promotes women's empowerment in science, technology, engineering and mathematics (STEM) in higher education.

By signing this form, I agree to participate in the project FeSTEM Erasmus+ project which is currently being developed by the FeSTEM partnership

I hereby declare that:

1. I have been informed about the FeSTEM project and I have understood what the project is about and what it aims to achieve.

2. I accept to take part in the project.

3. I authorize the capturing of images and photos.

4. The images captured in the scope of the project may be used only in the scope of the FeSTEM project, as a way of dissemination through the adequate channels of the project’s partners (websites, social media, resources platform), renouncing in advance to any rights or compensation that may eventually result from such use.

5. In case of the production of video, the recording will serve for research purposes only and will be used by the researchers and staff to facilitate recording and analysis of the relevant information. The recordings will be kept at the responsible organisation.
Findings will be recorded anonymously and nobody will be able to identify you in the research reports, scientific articles or via any information held on computers.

6. The anonymised data from interviews, videos and surveys will be kept at the responsible organisations for research purposes only.

7. The information provided shall only be used for this project.

I __________ [name and surname] ____________________________, Holder of ID Number ______________________________, therefore authorize __________ [partner] _________ to use my personal data in the framework of the FeSTEM project. This data will not be transferred to third parties except in cases where there is a legal obligation. I also expressly authorise this company to take photographs, record videos and publish images to promote the project and its activities on social networks, newsletters or websites. The authorisation granted in this contract is free, indefinite and revocable at any time by the signatory.

You are entitled to obtain confirmation of how your personal data is being process, you have the right to access them, rectify any errors or request their removal from the database when they are no longer needed by writing to _____ [contact details] _______.

Place and date: _________________________________Signature: __________________________
ANNEX III. Welcome letter

Welcome to the participants

Dear STEM MAKER team member,

Thank you for your interest in participating in the FeSTEM project and filling out our application form.

The FeSTEM project promotes women’s empowerment in science, technology, engineering and mathematics (STEM) in higher education.

We are happy to see that you are interested in participating in our national STEM MAKER. Your role helps us ensure that our project and its products are designed in a way that addresses the needs of its various users, allowing it to reach its full potential.

Please note the project is currently in progress and we expect to have its first outputs by the end of September 2020. During this phase, we may approach you from time to time with some questions to help better understand and address your needs.

If at any point you are no longer interested, you may inform us to be unsubscribed at any time.

On behalf of the FeSTEM project, we thank you for taking the time to contribute to this initiative. You can stay in touch with our news and progress through Facebook, Twitter and Website, as well as Instagram and Linkedin. Please let us know if we can be of further help.

Best regards,

FeSTEM team
ANNEX IV. Methodology

METHODOLOGY FOR THE INTERVIEWS AND ONLINE SURVEYS

THE PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide a guide and method to facilitate the gathering of the information needed in the beginning of the project through the interviews and online surveys envisaged in the first stage of the project. The interviews and online surveys aim more specifically to gather the opinion of the key stakeholders of the project: male and female teachers, academics, students and entrepreneurs.

Carrying out these interviews and surveys is essential to gain insights into the needs of the women in STEM, as well as regarding specific problems and challenges that they suffer, and to provide a sound base for the design of the different resources that this project aims to develop.

The objectives are:

- To discover the present the current state-of-art in each country;
- To gain insight into the needs of the target groups;
- To identify gaps, challenges and problems.

IMPLEMENTATION OF THE INTERVIEWS AND ONLINE SURVEYS

The interviews and online surveys will take place in the following countries: Slovenia, Spain, Cyprus, Greece and Italy.

Each partner will organise 3 to 8 interviews with key stakeholders and/or will send 5 to 10 online surveys in order to gather the corresponding information.

In the case of the interviews, if possible at least two professionals or staff members of each participating institution will be present during the interviews. The interviews can take place in a formal or informal setting (face-to-face/skype/telephone) but always professionally and respectfully. Some guidelines to have in mind some are:

- invite the interviewee using the template included below;
- start the interview by informing the interview about the project, its goals, the production of IO1 and how the information will be used and analysed;
- remind the interviewee that there are no right or wrong answers, only different points of view; free expressions and opinions are welcome;
- record the audio (if possible and agreed by the interviewee) in order to facilitate the transcript of the information;
- if possible, take some pictures, but make sure the interviewee agrees beforehand by signing the consent form stated in Annex II;
involve at least two staff members of the organisation: one taking notes, the other asking the questions.

- Ask them to sign a participant list showing: date and place of the interview, name, surname, organisation (if applicable), email and signature, as well as the project name, EU logo and disclaimer

In the case of the online surveys, make sure to contact the key stakeholder and inform them about the project, its goals, the need of filling in an online survey, the production of IO1 and how the information will be used and analysed.

PARTICIPANTS AND TIMEFRAME

The interviews and online surveys will be carried out during the months of February-May 2020. They will be aimed at key stakeholders of the project: male and female teachers, academics, students and entrepreneurs. The partner countries will contact stakeholders in their countries in order to gather information from them through personal interviews (face-to-face/skype/telephone) or online surveys. Each partner organisation will interview 5 to 8 stakeholders and send an online survey to 15 to 20 key stakeholders in their own countries per profile. The stakeholders have been divided for this purpose in three profiles: 1. Teachers and academics, 2. Students and 3. Professionals or entrepreneurs. The two partners in Cyprus will cooperate and work together.
Annex V. Invitation letters

INVITATION FOR THE INTERVIEWS

Dear xxx,

I would like to invite you to take part in an interview on (insert date, time and location) about the challenges and expectations of women in Science, Technology, Engineering and Mathematics (STEM). This should last no longer than 30 minutes.

The interview is being organised as part of the FeSTEM project. More specifically, the FeSTEM project aims to promote an innovative pedagogical approach that will enable Higher Education students and academics to use traditional and computationally rich tools to create common exhibits that will serve as mentoring models to encourage girls and women to remain active in the fields of science, technology, engineering and mathematics (STEM). Your views will be used to help us portray the current situation for women in STEM in academic and industry.

If you would like to take part in the interview, please let us know by replying to this email. Your contribution will be highly appreciated.

Kind regards,

INVITATION FOR THE ONLINE SURVEYS

Are you in STEM? FeSTEM wants to hear from you!

Dear xxxx,

Are you a Higher Education Student, Instructor or Professional in the field of Science, Technology, Engineering and Mathematics (STEM)? The FeSTEM project is keen to understand the needs, challenges, difficulties and expectations of women in STEM in Higher Education and industry in order to make recommendations as to how women can be encouraged to remain active in STEM.

FeSTEM has put together a survey about various aspects of experiences and challenges of women in STEM. You have been invited because you belong in STEM
and your experience would be valuable for our project. The survey should take approximately 10-15 minutes to complete.

The survey is completely anonymous and individual responses will be kept confidential. Any papers or conference presentations will be based on the aggregated statistics without direct links to an individual survey response.

**Take the survey!**

*Who is eligible to take part?*
FeSTEM is especially interested in hearing from Higher Education Instructors, Students and professionals in the field of STEM.

*About FeSTEM*
Female Empowerment in Science, Technology, Engineering and Mathematics in Higher Education [FeSTEM 2019-2021; Grant No: 058407]. The core objective of this project is to promote an innovative method and pedagogy that will allow HE students to use traditional and computationally-rich media to create meaningful, shareable exhibits that will act as mentoring models for encouraging girls and women to remain active in STEM.

Thank you,
Annex VI. Surveys

Online surveys

https://forms.gle/C8FfpViEnMxu6Bms6

Project Title: Female Empowerment in Science, Technology, Engineering and Mathematics in Higher Education Erasmus+ Programme KA2 - (Project number 2019-1-CY01-KA203-058407)

INFORMATION SHEET FOR PARTICIPANTS

Thank you for your interest in this project. This study is part of a funded project under Erasmus KA2 (find out more about the project and the research team here: https://festemproject.eu/).

Answering this questionnaire should require you about 10-15 minutes. All responses are anonymous and confidential. Be sure to click “Submit” at the end of the survey, in order for your responses to be saved.

Thank you for your time.

Research Team

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Magenta Consultoría Projects SLU (Spain)
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ARIS - A Really Inspiring Space Ltd (Cyprus)

What Is STEM?

The question of what is meant by the term “STEM” has been discussed in various reports and research studies. The acronym STEM is used as an aggregate term, denoting interdisciplinary or multidisciplinary and refers to integrated academic or educational treatment of the four knowledge branches (Science, Technology, Engineering and Mathematics). Yet, in some cases, the term STEM is widely utilized in order to include psychology and social sciences (Gonzalez & Kuenzi, 2012; Moon & Singer, 2012; Corlu et al., 2014). Some STEM education analysts claim that the commitment to certain knowledge fields is very static and that these fields should focus...
on a set of practices and processes that cross their boundaries from which the distinct knowledge and education will emerge (Moon & Singer, 2012; Granovskiy, 2018, p. 2). The lack of a common definition for STEM has contributed to confusion in both academia in funding bodies. The Standard Occupational Classification (SOC) Policy Committee (2012) recommended that STEM occupations fall into two domains:

1. Science, Engineering, Mathematics, and Information Technology (includes two subdomains: a. life and physical science, engineering, mathematics, and information technology occupations, and b. social science occupations), and

The consortium of this project adopts a broader definition for STEM: STEM implies bringing together the different components from science, technology, engineering, and mathematics in order to identify and address social and scientific challenges.
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