There Is Not Enough Women

The impact of specific organisational policies on reducing gender imbalance at CERN and UiA

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For all the women who have ever wondered what would become of the little girls they once were if they had played with Lego.

Summary

Det er stor etterspørsel etter ansatte innen naturvitenskap, teknologi, ingeniørfag og matematikk (STEM). Samtidig er kvinner enormt underrepresentert på mange av disse feltene. Bedrifter og organisasjoner har forsøkt å snu denne negative trenden det siste tiåret. Mange introduserte dedikerte rekrutteringsstrategier for å inkludere flere kvinner i STEM. I denne masteroppgaven forsket jeg på to pågående rekrutteringsstrategier for å forbedre kjønnsbalansen innenfor en spesifikk kontekst av European Council for Nuclear Research (CERN) og Universitetet i Agder (UiA). Den kvinnelige representasjonen i disse organisasjonene har vært stillestående det siste tiåret. Eventuelle tidligere intervensjoner for å forbedre situasjonen var ikke vellykket nok siden endringstakten var for lav. Disse dedikerte rekrutteringsstrategiene har flere mål, men fokuset i denne masteroppgaven var høytidelig på kjønnsbalansen. CERNs spesifikke rekrutteringsstrategi *25 av '25* ble foreslått i 2021 for å øke gjennomsnittlig antall kvinnelige ansatte i hele organisasjonen til 25 % innen 2025. UIAs *Handlingsplan for likestilling, inkludering og mangfold* for 2021-2024 har som mål å oppnå en kjønnsbalanse på 40 % og 60 % i hele organisasjonen. Når det gjelder UiA, fokuserte jeg spesielt på den kvinnelige representasjonen på professornivå ved Fakultetet for teknologi og realfag. Gjennom den kvalitative forskningen basert på ti semistrukturerte intervjuer (fem intervjuobjekter fra CERN og fem fra UiA), ønsket jeg å bedre forstå disse spesifikke organisasjonspolitikkene og deres effekt på å redusere kjønnsubalansen. Mitt konkrete forskningsspørsmål var hvordan disse nye rekrutteringsstrategiene kunne bidra til å forbedre kjønnsbalansen og dermed forbedre den generelle likestillingen i disse organisasjonene. Selv om CERN og UiA brukte noe forskjellige tilnærminger, bekrefter hovedfunnene noen samlende faktorer. Strategiene, selv om de er ledelsesledet med et overordnet fokus på mangfold og likeverd i hele organisasjonen, må de implementeres nedenfra og opp basert på den individuelle situasjonen i mindre organisasjonsenheter.

Acknowledgement

My big thanks go to my university for the bold choice of this field of study. This master's degree programme is one of the essential education in my life. I want to thank all the professors who have participated in it. Although I focus on gender and science, technology, engineering, and mathematics in my thesis, history, literature, philosophy, and other liberal sciences are equally important. They are crucial in developing today's complex technologies and making choices in their creation and implementation. I want to emphasise the importance of liberal sciences that help us understand the context of our technologies, and I am thrilled this master's programme covered it from different angles. At the beginning of the programme, we were promised to become better people by my professor of philosophy- Einar Bøhn. Einar, you were right, I have become a better person, and I want to thank you.

The interdisciplinary study has been challenging, and the topics covered were thought-provoking. One of the most eye-opening courses was the Gender and Technology course. Therefore, thank you to the course teachers and supervisors for this thesis, Professor Hanne Haaland and Hege Wallevik. I want to thank you for your work. Thank you from my heart for what you have done for me.

A big thank you and appreciation go to the European Council for Nuclear Research (CERN), the University of Agder (UiA), and the Centre for Gender and Equality at UiA for your participation and support of my research. I am so glad to see your progressive work for a better gender balance in STEM. I want to thank all the interviewees for their input, honest answers, willingness to participate, and contribution to faster progress.

Furthermore, my thanks go to my family and most to my husband. You know that I would not be who I am today without your lifelong support. Thank you for enabling me to study and stay on track. Finally, I want to thank my three boys. You are the mainstay for me and what I want to do in my life. This work is also for your future, intending to improve the society you will be living in as adults. I hope you are proud of your mom; it means the most to me. Even at times when you think I am just a troublesome parent.

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1 Presentation

Equality is one of the fundamental human rights inherent to all human beings (United Nations, Universal Declaration of Human Rights, 2021). Furthermore, all people are entitled to equal treatment without distinction. The European Union defines gender equality as a core value of the EU, the fundamental right of its citizens, and the European pillar of social rights. Gender balance is pronounced as "a reflection of who we are. It is also essential for an innovative, competitive, and thriving European economy. In business, politics, and society, we can only reach our full potential if we use all of our talent and diversity" (European Commission, 2022). This master's programme shed light on the importance of technology in our society, which is undeniable, but so is society's influence on technology. Modern technology has become closely tied to people who design, create, or participate in its development and production.

In his book *Technology: Critical History of a Concept,* Schatzberg describes the history of the concept of technology and the development of a definition of technology as messy, confusing, often contradictory and with multiple meanings. Through different views and descriptions of technology, he defines technology as the practices humans use to transform the material world, practices involved in creating and using material things" (Schatzberg, 2018, p. 2). Schatzberg rejects seeing technology as solemnly instrumental and insists that technology is also an expression of human culture and, indeed, all humans, not just elites. In the instrumental view of technology, technology serves only as a means to a predefined end. But for Schatzberg, technology is a product of our minds and hands. He points out that we should focus more on a cultural rather than an instrumental approach to technology. He believes this changed understanding of the concept of technology would help us to have more conscious control over future technological developments (Schatzberg, 2018).

I could not agree more with Schatzberg, and through my studies, I understood that technologies have shaped our history and who we are today. But we have also shaped technologies and what they have become. They have been socially created (for better or worse) and can be socially transformed (Heidegger, 2014, Hareide, 2020, Schatzberg, 2018). I agree that technology should be a legacy of all people, and we should all have the opportunity to participate in its design, development, implementation, and use.

According to the Global Gender Gap Report 2020 (GGGR), women continue to be underrepresented in science, technology, engineering, and mathematics (STEM), even though gender parity in education has been achieved in 35 countries worldwide (World Economic Forum, 2021, p. 5). The total global gender gap in educational attainment is low compared to the gender gap for economic participation and opportunity and political empowerment.

The GGGR reports on the future of gender parity and concludes that structural changes to the labour market might threaten many jobs, leading to a shift from closing the gender gap to widening it again. Women are strongly underrepresented in professional clusters with the most increased employment, such as data and artificial intelligence, engineering, and cloud computing. These professions are considered in high demand in the future (World Economic Forum, 2021). Therefore, it is essential to understand this under-representation of women in occupations within STEM and create solutions for women's inclusion. Thus, my thesis concentrates on gender representation in STEM within two specific institutions, the European Council for Nuclear Research (CERN) and the University of Agder (UiA).

The main goal of this thesis is to contribute to increased knowledge and understanding of the challenges these organisations face when it comes to recruiting women to STEM. I also hope the findings will contribute to implementing inclusive recruitment strategies, which again may help recruit and retain more women in STEM.

1.1 Theme

I have chosen for this thesis to look at two institutions: the European Council for Nuclear Research (CERN), which is one of the top scientific and technological institutions in Europe with a long history and the University of Agder (UiA), which is one of the younger educational and scientific institutions in Norway, both with the possibility and desire to close the gender gap within the STEM. Today, these institutions are in the active process of recruiting more women to the STEM fields.

My primary focus was on their strategic equality plans with dedicated recruitment strategies to minimise this gender imbalance:

1) CERN: *25 by '25*- a strategic plan to increase the overall female staff to 25% by 2025

2) UiA: *An action plan for equality, inclusion, and diversity for 2021-2024* – a strategic plan with a focus on gender balance among staff and students

I chose these two institutions based on four aspects:

1) Socio-cultural: Their primary mission is to educate and train future generations.
2) Political: Both institutions participate in European Commission's funding programme for research and innovation - Horizon Europe. According to Horizon Europe, the gender equality plan is a prerequisite and eligibility criterion for applying for and receiving funding for research and innovation from the EU Commission.

"…having a Gender Equality Plan (GEP) will be an eligibility criterion for all public bodies, higher education institutions and research organisations from the EU Member States and associated countries wishing to participate in Horizon Europe" (European Commission, 2021).

3) Organisational: The cornerstone of these organisations is the transfer of knowledge. The shared transfer of knowledge is not limited to technology and science. Knowledge transfer also has a social and societal impact. Knowledge exchange can consequently contribute to the successful implementation of these recruitment strategies.
4) Personal: I am involved in both institutions, which gives me an important insight. I am a master's student at UiA, and while writing this thesis, I was admitted to the administrative student programme at CERN. In February 2022, I started to work in a support position for technical documentation in one of CERN's technical departments.

1.2 Research Question

In the course "Gender and Technology", we widely discussed gender stereotypes, recruitment, and retention of women in science and technology. This topic evoked an immense interest in me, and my focus on gender and technology is without classifying technology as either feminine or masculine (Sørensen, Faulkner, & Rommes, 2011).

My primary motivation is my passion for technology, and my overall goal is to help empower women in the STEM fields. My family moved to the Geneva area because of my husband's employment at CERN. For the past six years, I have been close to CERN and those who work there. Hence my choice of CERN as one of the two institutions. The second case is my alma mater - the

University of Agder (UiA). In general, Norway scores high on the gender equality index. Still, according to the theory of the gender-equality paradox, it struggles to recruit women to STEM, and so does my university. As mentioned above, the focal point for these two institutions is education and training. They also face similar challenges in recruiting employees in STEM fields. Therefore, the overall problem statement for my thesis concerns the impact of particular organisational policies on reducing gender imbalance within organisations, and my specific research question is:

How can the new recruitment strategies of CERN and UiA contribute to improving the gender balance and consequently improving the overall gender equality in these organisations?

1.3 The Framework of the Thesis

In my work, I decided to look at the specific policies within which organisations induce change and possibly curb the gender imbalance. I researched two dedicated plans to increase gender equality with recruitment strategies in focus. These specific recruitment strategies are the first steps in implementing executive intent to mitigate the gender imbalance. The framework for my thesis is linked to two institutions that experience similar challenges in recruiting women to STEM fields.

1.3.1 European Council for Nuclear Research (CERN)

After World War II, Europe experienced a brain drain. Many physicists and engineers escaped from Europe to the United States during the war and post-war. The States became a leading country in fundamental physics, while Europe had to be rebuilt from the dust after the devastation of war. During World War II and the Cold War, science gained enormous interest and prestige. The success of the Manhattan Project in creating the atomic bomb and the vast credit given to physics for the Allied forces' success had led to increased support for basic research. This environment created favourable circumstances for the founding of the European Physics Laboratory. In July 1953, the CERN Convention was established and ratified by 12 founding member states: Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom, and Yugoslavia. And on September 29, 1954, the European Organization for Nuclear Research was born (CERN, 2004, Govertsen, 2020).

Today's CERN is an international laboratory providing accelerator facilities to researchers worldwide. It also conducts its research in fundamental physics and creates a bridge between science and technology. Many technologies and scientific discoveries have been used in other technological developments worldwide. It unites researchers with the focus on transferring knowledge to benefit society and solve many problems of humankind. CERN's technologies and expertise have been used for environmental improvements, biomedical treatment such as cancer diagnostics and treatment, cultural heritage restoration, aerospace applications, and collaboration in new emerging technologies (CERN, 2022).

As mentioned above, CERN is hugely dependent on collaboration around the world. Diversity is one of its core values. Being an international organisation based on the membership of many countries in Europe and collaborating with many worldwide, the value of diversity has stood out. According to CERN's personnel statistics, the total percentage of female staff and fellows has been around 20% for the last ten years (CERN, 2022). Following this recognition, CERN has approved its first strategic plan to increase diversity within the staff and fellowship programmes, focusing on better representation based on nationality and gender. This strategy introduces the programme *25 by '25* to achieve 25% female employees by 2025.

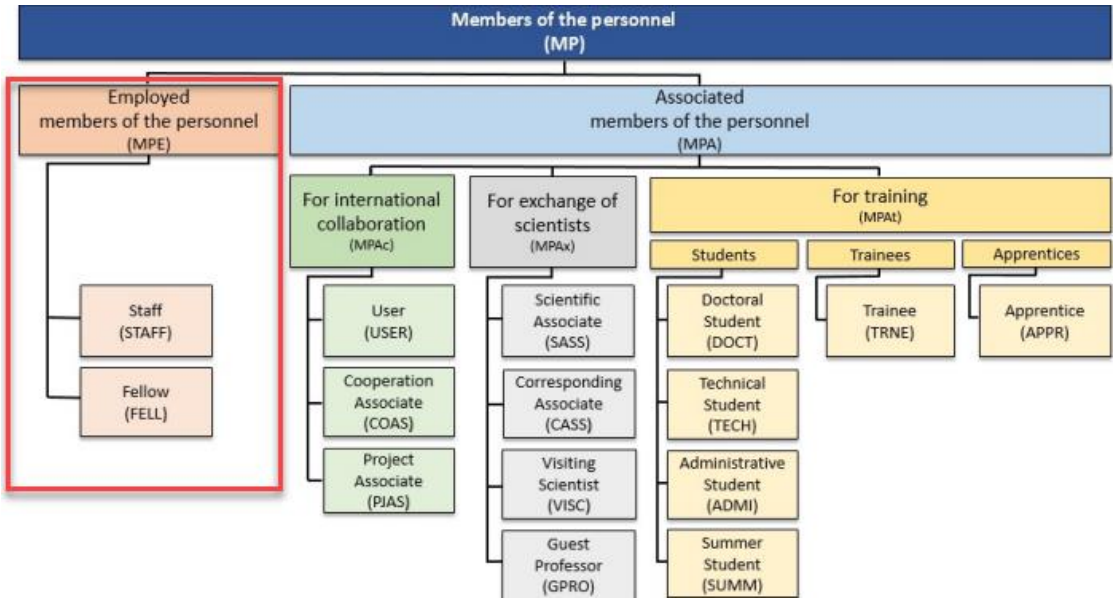


Figure 1 Grouping of the personnel (CERN, CERN Personnel Statistics 2020, 2022, p. 53)

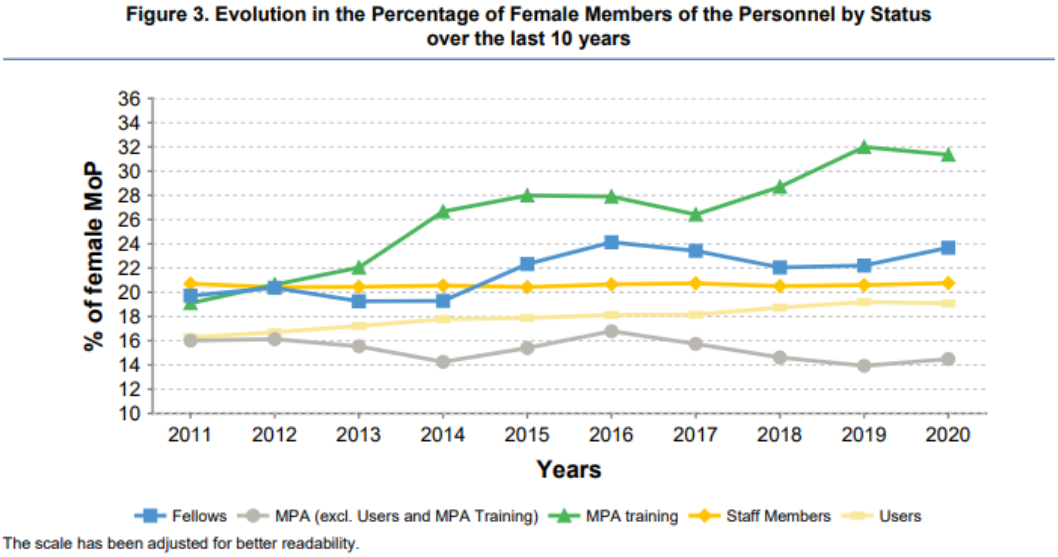


Figure 2 Evolution of female members over the last ten years (CERN, 2022, p. 7)

1.3.2 University of Agder (UiA)

The University of Agder (UiA) is one of the youngest universities in Norway. Although its existence spans over 190 years, it was not until 2007 that UiA was accredited and became a university. There are two campuses with six faculties and a teacher education unit. In the autumn of 2020, 13,690 students, 58% women and 42% men were registered. There are also several PhD programmes with as many as 388 PhD students (autumn, 2020). The entire staff at the university is composed of 1504 employees, with 543 administrative and 961 academic positions (University of Agder, About UiA, 2022).

Today's university is an international institution with the vision of co-creating tomorrow's knowledge. The university is committed to being an open and inclusive university with a culture of cooperation and international cooperation. It aims to be on the edge of innovation, education and research (University of Agder, About UiA, 2022). UiA introduced a second action plan for equality, inclusion and diversity in 2021. One of the main goals of this action plan is to achieve a gender balance of 40% / 60%. Both sexes should be represented by at least 40% within each unit (be it a faculty, department or administration unit) (University of Agder, UiA og likestilling, 2021).

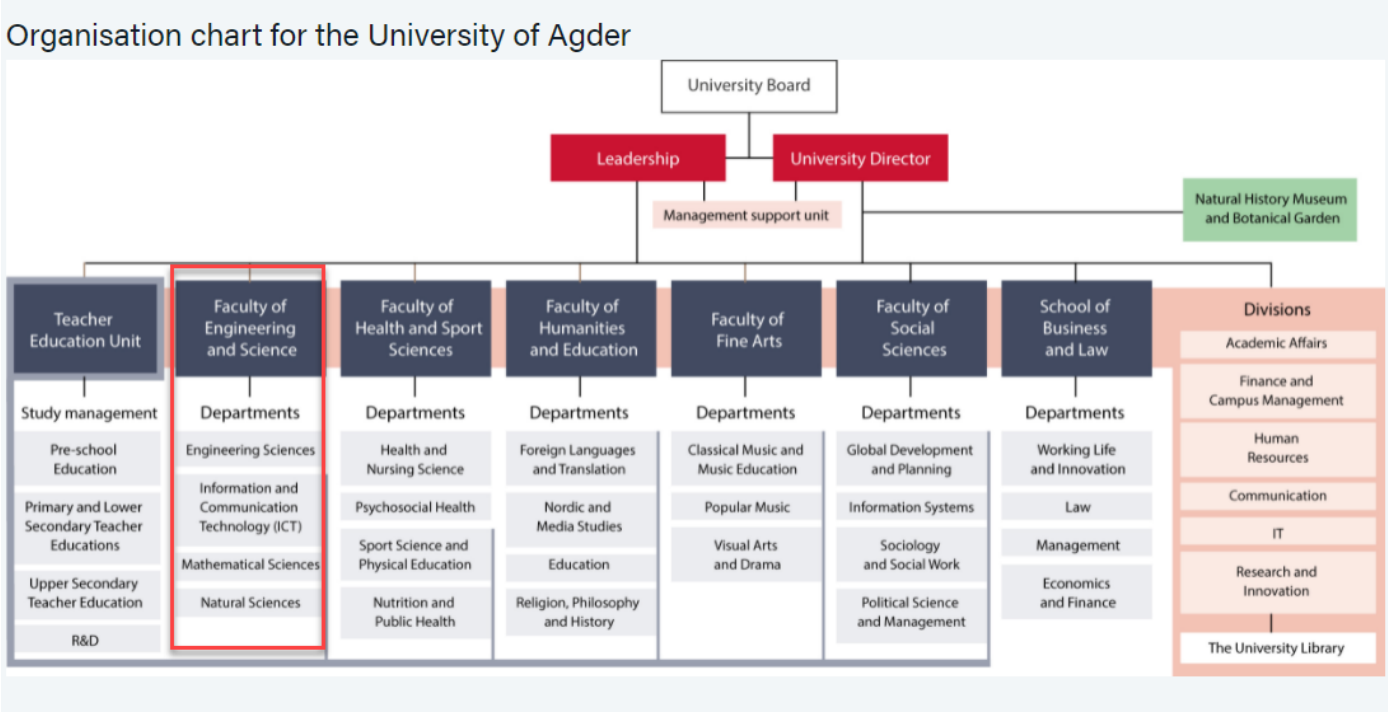
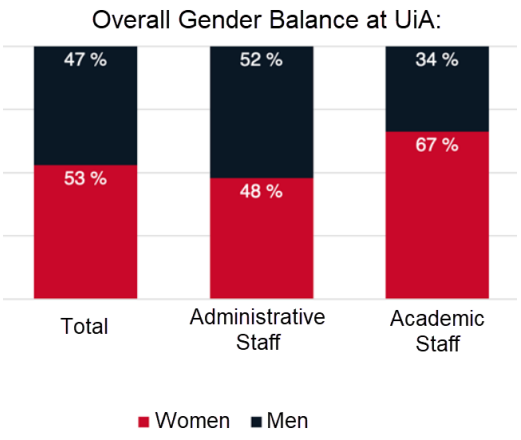


Figure 3 Organisation chart of UiA (University of Agder, About UiA, 2022)



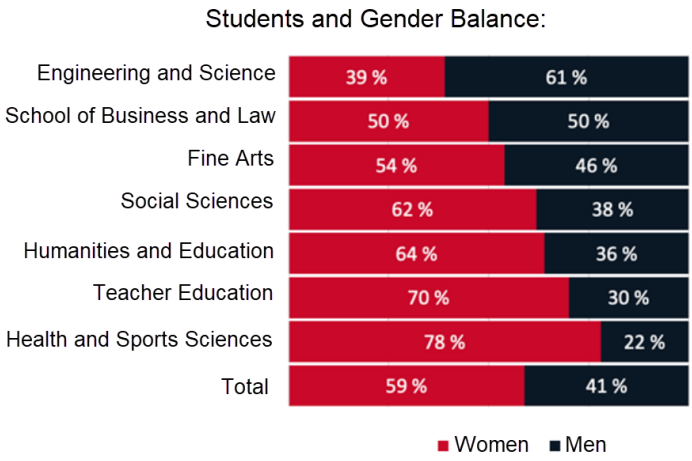


Figure 4 Overall gender balance for university staff (University of Agder, UiA og likestilling, 2021)

Figure 5 Overall gender balance for students (University of Agder, UiA og likestilling, 2021)

Like CERN, UiA also acquires challenges in recruiting women into scientific/academic positions. The most problematic recruitment is at top academic posts, especially in STEM. The same applies to students in the STEM field, even though the 40% / 60% principle is almost achieved. On the

contrary, recruiting female PhD students in STEM still faces difficulties, and women are hugely under-represented. This can be compared to the recruitment of staff and fellows at CERN.

2 Literature Review

I want to contribute to a comprehensive knowledge of the STEM fields' situation and the organisations' challenges in recruiting women. I want to focus on specific cases and real-time difficulties to understand the actual situation within the particular context. As far as I know, no empirical research had been carried out specifically related to these two institutions. Since both institutions are similar in their dedication to education, research, and knowledge transfer and both struggle with recruitment in the STEM fields, I have directed my search for theories that can help explain why there are not enough women.

There are many theoretical perspectives and literature that, to some extent, can explain the existing conditions, circumstances, and challenges in terms of why there are not enough women in the STEM fields and academia. There is also literature that proposes many solutions.

With the inspiration from the title of this thesis, I chose to look at literature from these three angles:

1) There is not enough women, which means there are not enough applicants. This problem is much more complex and goes far down the ladder, suggesting a gender-equality paradox and a leaky pipeline problem. These theories indicate that countries with high gender equality experience a higher gender gap in STEM and a declining number of women at each stage of their academic progress.
2) There is not enough women, which means there is insufficient focus on gender balance during recruitment in male-dominated environments within the STEM fields. Historically, women faced challenges competing against men, and I wanted to understand these challenges better. According to feminist scholars, this exclusion of women can be linked to the dominance of Christian clerks in science and higher education institutions only for men during the last millennium (Sørensen, Faulkner, & Rommes, 2011). This long-lasting status quo profoundly influenced the organisations' structure and culture. In the 21st century society, the structure with the quantitative gender balance together with the qualitative culture of the organisation plays a significant co-role – as both structure and culture influence each other.

The structure of the organisation, which is strongly male-dominated, consequently affects the culture, which becomes masculine and might be discouraging to women. There are essential theories that discuss chilly culture within STEM and academia, which possibly influences women's recruitment and retention.

3) Due to the context of writing this thesis in the middle of the Covid-19 pandemic, it was essential to look at the literature concerned with how the ongoing pandemics affected the already existing gender gap in STEM and academia and possibly reinforced the gender imbalance.

Based on the above, the complexity of this topic also influenced my choice of literature. And although the literature is extensive, I was most inspired by these theories and earlier research:

1) The gender-equality paradox

The *gender-equality paradox* claims that gender differences are higher in more gender-equal and wealthier countries, with Norway among these countries (Stoet & Geary, 2018). Stoet and Geary point out that the main reason for this imbalance is that there is no pressure on girls and women to choose STEM subjects in these highly developed countries. Women have more opportunities to choose what they want to study and what they want to do in life. And they prefer to select other fields over STEM. This theory I examined as the background and possible explanation for the status-quo of gender imbalance in STEM at UiA and CERN.

2) The gender stereotypes

In 2020, new research challenged the reasons for the gender-equality paradox. The work *Gender stereotypes can explain the gender-equality paradox* by Breda, Jouini, Napp, & Thebault (2020), suggests that it is the gender stereotypes that can explain the gender-equality paradox. Examples are drawn of stereotypes such as mathematics being for men, which are more robust in more developed countries with a high level of egalitarianism. This theory explains more the issue of stereotypes, which might profoundly influence both the recruitment process and the organisation's culture.

3) The leaky pipeline

Even though the number of female graduates has increased, and more women are graduating from universities, there is no significant growth in STEM graduates. The term *leaky pipeline* has been used in two ways. Firstly, women often experience the STEM environment as unwelcoming, so they do

not progress or retain in the STEM fields. Secondly, it is connected to the actual recruitment of women and why women are hesitant to enter the STEM fields (Sørensen, Faulkner, & Rommes, 2011, Whitelegg, Hodgson, Scanlon, & Donovan, 2002).

4) The gender gap in academia

With a specific focus on academia, the research shows that even though more and more women graduate from universities and more women obtain postgraduate (PhD) degrees, the number of women in academia and STEM faculties remains unchanged. Casad et al. (2020) point to three possible factors contributing to this situation: a) numeric underrepresentation and stereotypes, b) lack of social networks supportive of women, and c) chilly climate of STEM.

5) Solutions to attract women to STEM and academia

Many researchers focused on finding solutions to improve the situation within STEM. Improvement and possible knowledge transfer between the organisations are also the focus of this thesis. Therefore, I paid particular attention to the literature covering inclusion ideas for recruiting and retaining women in STEM. The gender gap in STEM must be seen in a complex view. The action strategies to address the gender gap must start early. Research suggests that young girls must be supported as early as their primary school years before entering high school. Then continuously through their academic journey at the universities. There are also actions that organisations and governments can take, such as recruitment of diverse candidates, mentoring and professional development and improving organisational climate (Burke & Mattis, 2007, Casad et al., 2020, Sørensen, Faulkner, & Rommes, 2011).

6) The pandemic and acceleration of work-family conflict

Several publications focused on pandemics and how academia coped with this situation in the last two years. More than fathers or childless men and women, mothers were more affected by these challenging times. The conflict between their work and family roles was intensified. Their priorities changed as the academic work (both teaching and publishing) was practically incompatible with the care of children. According to this research, many academic mothers stopped their research and only postponed publishing in the best case (Minello, Martucci, & Manzo, 2021).

By placing these theories in the context of actual strategic plans for recruiting women within STEM at CERN and UiA, I wanted to understand better the challenge of recruiting women from the

perspective of two specific organisations. The major challenges for my research were the scope of this thesis and the complexity of the topic.

The practical implications of recruitment policies focusing on gender balance also depend on understanding the broader context. By investigating and evaluating theories and previous research, I wanted to contribute to the knowledge that could be utilised in the practical methodological approach of CERN, UiA and similar organisations. Finally, the main goal was to contribute to the overall gender balance at CERN and UiA.

3 Theoretical Framework

As described above, I was mainly inspired by the theories of a possible explanation for this gender gap, the reasons for its existence in academia and STEM fields in particular and possible solutions to improve this situation. I elaborate on this further in the following section, as it will also serve as an essential framework for analysing my findings.

3.1 The Gender-equality Paradox

In my literature review, I showed that there is a significant interest in mapping and understanding the under-representation of women in STEM and how to increase female participation. If we can clarify the reasons for this state, we can also find solutions for the inclusion of women within STEM. According to the *gender-equality paradox,* the under-representation of women in STEM is more pronounced in highly developed and egalitarian countries. It is a paradox that more gender-equal countries with more educational and career opportunities, where women's engagement in STEM is generally supported, are the countries with the least women in STEM. This state has remained unchanged for decades.

Stoet & Geary (2018) call it an educational gender-equality paradox. They found that the countries with the highest level of gender equality have the most significant gender gap in STEM in secondary and higher education. According to them, there are two possible explanations.

1) Students choose their academic path based on their strengths. It is also common for teachers and school counsellors to advise students to select the education based on their strengths and

enjoyment. And although girls show the same qualities in STEM subjects as boys, they show even more strength in reading, so their choices fall on education concerning language instead of mathematics.

2) Broader social factors might influence the choice of STEM fields. These are students' utility beliefs and the expected long-term value of an academic path. This means that in countries with fewer economic possibilities and high economic risks, STEM occupations are relatively well paid with lower risk. This might contribute to this educational gender equality paradox as the general risks are lower in more gender-equal countries, resulting in greater opportunities to choose other academic paths (Stoet & Geary, 2018).

3.2 Gender Stereotypes

Breda, Jouini, Napp, & Thebault (2020) see this under-representation as a severe problem contributing to gender inequality in the labour market and the loss of talent. Employing more women may help to solve the problem of the increasing demand for employees in STEM fields. Compared to Stoet & Geary (2018), their possible explanation for the gender-equality paradox is based on the fact that more developed and egalitarian countries may have stronger gender norms as well as gender differences, such as a female representation in the STEM fields.

Furthermore, they focus on the critical role of stereotypes such as mathematics being a male domain and differences in subjective norms for girls and boys even when they have similar mathematical abilities. Another explanation of the gender-equality paradox could be that the egalitarian countries "have also developed more emancipative, individualistic and progressive values" (Breda, Jouini, Napp, & Thebault, 2020, p. 31066). And it is these values that greatly emphasise self-realisation and self-expression.

Breda, Jouini, Napp, & Thebault's research resulted in these three explanations for the gender-equality paradox:

1) Mathematics has less value in egalitarian and wealthier countries, as it is not needed to have good career opportunities. In these countries, girls and boys can express themselves freely, and their career choices allow them to express their gendered selves.

2) In highly developed egalitarian countries, the level of mathematical performance is higher, which can be associated with the higher gender stereotypes in STEM.
3) Parents in these countries spend more money and time on more stereotypical activities for their children. Parents are more involved in their children's educational and career choices. This results in the gender stereotypes being transferred earlier and more significantly to young boys and girls, contributing to the more prominent gender stereotypes within the STEM fields (Breda, Jouini, Napp, & Thebault, 2020).

Breda, Jouini, Napp, & Thebault (2020) conclude that instead of focusing on deeply rooted gender differences freely expressed in the more egalitarian and prosperous countries, we must focus on these mild economic constraints which allow more room for gender stereotypes. According to them, this reinforcement of gender stereotypes consequently influences career choices within the STEM fields. Gender segregation does not disappear by itself and is a product of the new norms for gender differentiation, which replaced male supremacy within the STEM fields. They suggest that countries and societies implement dedicated policies to change or limit this trend in the labour market.

3.3 The Leaky Pipeline

While the gender-equality paradox and gender stereotypes describe possible explanations for women not entering the STEM fields, the leaky pipeline describes a progressive loss of women from the senior roles in the STEM fields (Resmini, 2016).

Whitelegg, Hodgson, Scanlon, & Donovan (2002) focused on the career experiences of female scientists and how they perceived the climate of science and academia. According to them, the "pipeline approach" concentrates mainly on the supply of female scientists and technologists to the STEM fields, and such an approach is not exhaustive and very limited. Its main characteristic is that if enough women are encouraged to enter the STEM field, the gender gap naturally disappears. However, this issue is more complex, influenced by many obstacles or hurdles, as the authors call it, that contribute to the leaky pipeline. They specifically focus on the women's perceptions of the culture and atmosphere of their workplace, which supports the importance of emphasizing the perspective of a marginalised group.

The “lads” culture, typically meaning the culture of going out for a beer on Friday afternoon to discuss work and chill out, was very prominent. Many women felt like they needed to participate in these events to progress their careers. The fit-in culture and “being more male in the scientific environment” were prerequisites for being one of them, for adapting to the system rather than changing it. Women in male-dominated science started getting used to this environment. More women in the workplace usually reduce the male atmosphere but being a minority could also be good. It gave women more visibility and could be beneficial for a woman to stand out from the crowd (Whitelegg, Hodgson, Scanlon, & Donovan, 2002).

In conclusion, although the pipeline model aims to increase the numbers of women in STEM, it is not a solution alone. The pipeline hypothesis counts neither for organised resistance nor the persistence of entry barriers or further female progression within their careers. The increased numbers also increase the risk of greater resistance to change. It is not just the numbers that need to change. They need to be supported by the changing institutional structures that support women in developing their careers in STEM. At the same time, these structures must adapt to a modern lifestyle and support family life (Whitelegg, Hodgson, Scanlon, & Donovan, 2002).

3.4 Gender Gap in STEM and Academia

Casad et al. (2020) directed their research on the reasons for the female under-representation in STEM and academia. According to them, there are three causes for the current situation:

1) The under-representation of women due to pervasive negative gender stereotypes can negatively affect their recruitment and opportunities to advance in their careers.

Casad et al. (2020) suggest that this under-representation is an attribute of disadvantages rather than merit, such as STEM departments favouring men due to gender stereotypes. They describe stereotypical characteristics, where the masculine ones such as competitiveness and independence are more valued than feminine ones such as nurturing and collaborative thinking. These masculine characteristics are perceived as better suited for leadership positions, hence disadvantaging women, where women have fewer opportunities for their career advancement and making these jobs less attractive to women. Further, women are two times more likely to leave academia than men.

Multiple factors contribute to this turnover rate: higher expectations placed on women in STEM, women are often assigned higher teaching loads and mentoring obligations, and students perceive women as more approachable and, hence requesting more favours. Further on, women are given more service activities, which can burden them, resulting in less time to conduct research, publish more, obtain grants and consequently advance in their careers.

2) Women in STEM have lower social capital, such as support networks, which influences their opportunities to earn tenure and fund their research.

According to Casad et al. (2020), male researchers have more extensive established networks, many research collaborators, more knowledge regarding funding opportunities, and therefore more likely are better equipped to achieve tenure and be promoted. On the other hand, low social capital contributes to further isolation and harms co-worker relationships. To sum it up, there is a lack of formal mentoring, limited network and collaboration opportunities for research projects, lack of guidance and a feeling of isolation and exclusion from “power cycles”.

3) Women in STEM may perceive the academic climate as unwelcoming and hostile; this includes sexual harassment and discrimination, but milder expressions may also influence the sense of not belonging in STEM.

This climate being perceived as either chilly or supportive is influenced by many factors beyond sexual harassment and discrimination, such as subtle masculine details, including physical spaces decorated with stereotypical posters and “geeky” references or reading material targeting a male audience. Further on, the language used might have an exclusionary form.

Further on, the academic climate also faces a stereotype threat, characterised by fear and anxiety of marginalised group members when they worry about confirming a negative stereotype about their gender or race. The stereotype threat can lead to multiple negative outcomes for female employees, including reduced leadership aspirations, feelings of incompetence, lower perceived acceptance, mental fatigue and burnout (Casad et al., 2020).

3.5 Solutions to Attract Women to STEM and Academia

Many social scientists tried to understand and find possible ways to solve this under-representation of women in STEM and academia. Windsor, Crawford, & Breuning (2021) describe progression in academia as "a game of chutes and ladders". According to them, academic success, which means progression from a position as a doctoral student to a full professorship, depends on the knowledge of the "game".

Instead of a leaky pipeline, the gap in academia is changing very slowly due to unfamiliarity with a hidden set of rules, norms, and shortcuts rooted in traditional academic advancement paths. This hidden curriculum benefits men disproportionally more than women. Academic careers do not always follow a linear course, and such a distinctive path can strengthen gender inequality so that female academics remain in untenured positions or leave the profession. Chutes take the form of unpredictable circumstances and changes in personal life such as pregnancy, the struggle with infertility, bias in hiring decisions, parenting challenges, gender-based harassment and other micro-aggressions, and insecure hiring for short-term positions. These conditions and circumstances often affect and influence more women's pursuit of academic careers than men's. They suggest that:

"Those who enter the profession with an awareness of - and access to - informal networks, resources to support research, and myriad other advantages can ascend the ladders more quickly and avoid the chutes more deftly" (Windsor, Crawford, & Breuning, 2021, s. 510).

Windsor, Crawford, & Breuning (2021) suggest three main changes that should take place:

1) Universal, transparent and fairly applied policies and guidelines for parental leave where parental leave is not a "woman's issue".
2) Men need to be more involved in formal and informal mentorship, where male colleagues share information and networks with their female colleagues.
3) Support for academics in contingent positions, the "essential workers", whose focus is on teaching and supervising rather than publishing. The competitive culture of "publish or perish" is unsustainable and gender-biased.

Resmini (2016) also points out that the current environment in academia favours metrics such as grant income and the number of published articles. For her, the recognition of supervision plays a significant role in patching the leaky pipeline. It is a coordinated effort that includes structured initiatives and cultural changes that must take place to accelerate this change.

Finally, Casad and colleagues (2020) suggested some changes which could help to attract more women to the STEM fields and academia. Being aware of the complexity of the reasons for the under-representation of women in STEM and academia, they focused on systemic issues and the academic cultural change to better integrate women in STEM. They looked at the National Science Foundation (NSF) ADVANCE programme, a grant mechanism that aimed to find new ways to promote equality in STEM and academia. According to Casad et al. (2020), they chose this grant mechanism because it focused on testing the effectiveness of interventions, implementing the changes at the university level, making systemic policy changes and institutionalising these organisational changes. The main goal of the ADVANCE program was through evidence-based practices, which included specific interventions, to educate and empower women and men. They summarised effective interventions to address the under-representation of women in STEM and academia. These interventions focused on:

1) Improvement and modification of recruitment strategies, where recruiting should focus on a more diverse applicant pool. Also, the search committees needed to be trained to reduce the implicit biases in the selection process.

Additional forms of interventions included focus groups, diversity statements, video interventions, and interactive theatre workshops. Examples of interventions suggested by the focus groups included an active search for women from high-quality institutions and highlighting the hosting institution as a potential employer. Other interventions were to identify the bias in the recruitment process, including a diversity statement in the application process and communicating the organisation's commitment to fostering diversity (Casad et al., 2020, pp. 16-18).

2) Mentoring, supervision, networking and professional development

Extending the interventions beyond recruitment and focusing on retaining women in STEM should be prioritised. The ADVANCE interventions, according to Casad et al. (2020), had a different approach compared to standard practices of mentoring at universities. These were formal and structured, focusing on female academics in male-dominated disciplines considering their specific

needs. Special attention was placed on inclusion and reinforcement of a sense of belonging. Further on, mentors helped create networking opportunities for their female colleagues and women were offered leadership development programmes to prepare them for the future roles of leaders at universities.

3) Improvement of academic climate through development courses and education on gender bias in the entire organisations

One of the interventions to improve the academic climate was active learning of faculty members about gender bias, how they affect decisions, and how to share a collective responsibility for reducing these biases (Casad et al., 2020, p. 19).

3.6 Gender Gap in Times of Pandemic

While writing this thesis in the middle of pandemics, I was made aware of many researchers who immediately researched the effects of pandemic Covid-19 on the life of academics. They could see that the existing gender imbalance was reinforced and even exacerbated during pandemics. Increased family obligations were stereotypically more imposed on women than men and more on academics with children than childless scholars.

In their research project, Minello, Martucci, & Manzo (2021) explored the effects of the Covid-19 pandemics on female academics with young children working from home. The main finding was that all work activities focused on online teaching. Teaching became the primary choice and priority over research and publication at the university level. Online education requires the preparation of online courses, various online materials and students' supervision. These activities were time-consuming, but they also needed some technical and technological skills that academics in the study were not prepared for nor received guidance. Their research had to be postponed or rejected, which had clear consequences for their careers and influenced their perception of the future. They feared that reducing research would affect their academic careers.

Deryugina, Shurchkov, & Stearns (2021) analysed research surveys related to how the academics used their time before and after the Covid-19 pandemics. They found that all respondents with children had to reduce the time devoted to research. Female academics, especially those with young children, were the ones who were most impacted by pandemics as they had to spend significantly

more time on childcare and housework. Their principal findings confirmed that the pandemic reduced daily work hours by one hour, where most of the time cuts fell on research activities. This is consistent with Minello, Martucci, & Manzo's (2021) findings that academics had to prioritise teaching and supervision activities over research.

Minello, Martucci, & Manzo (2021) suggested that one of the possible solutions is a change in career organisation in the form of different path evaluation, which emphasises teaching. Such intervention could help solve some of the issues mothers and parents in academia face.

4 Research Method

As portrayed in the theoretical framework, this thesis covers a complex topic. Improving the gender balance in an organisation requires dedicated recruitment strategies and their application in the day-to-day running of the respective organisation. These recruitment strategies dedicated to gender balance are the focus of this thesis. Furthermore, there is a widespread need for overall retention strategies, possible organisational cultural changes and leadership qualities to lead a diverse workforce, which influences the success of recruitment strategies. Recruitment strategies with a dedicated approach are the first step. How they are translated into the organisational processes and the general operation of the organisation is the next step.

The methodology of this thesis builds on three pillars, which allow me to go deeper into understanding recruitment strategies to address the gender imbalance. These pillars are:

1) Empirical data source- qualitative data
2) Research strategies- case studies
3) Collection methods- semi-structured interviews (Yin, 1981)

In addition, qualitative data collected through interviews (my primary data) are supported by secondary data previously collected by CERN and UiA. These come from organisational documents, publications, reports and statistics.

4.1 Empirical Data Source - Qualitative Data

Orlikowski and Basroudi (1991) illustrate and discuss three approaches researchers might adopt when conducting the research - interpretive, critical or positivist. The research question and the nature of the phenomenon define which approach the researcher chooses. For my research method, I decided on an interpretive perspective. This perspective allows me to assert reality and knowledge as a social product that is impossible to understand independently of social actors, including myself.

Figure 6 Underlying philosophical assumptions for qualitative research (Myers & Avison, 2002, p. 6)

Further on, my research derives from a feminist standpoint theory. Bowell (2022), in the *Internet Encyclopedia of Philosophy,* summarised three principal points of feminist standpoint theorists:

1) Knowledge is socially situated
2) Marginalised groups are socially situated, and therefore they are possibly more aware of things than non-marginalised
3) The research should start with the lives of the marginalised

Therefore, I chose to explore the phenomenon from a feminist point of view, focusing on the perspective of the marginalised women in STEM

When it comes to research methods, these are commonly categorised into two main groups: quantitative and qualitative. Quantitative methods were initially developed in the natural sciences to study natural phenomena and later implemented in the social sciences. Qualitative methods were developed in the social sciences, and their main concern was to explore a social and cultural phenomenon. Therefore, the choice of methodology for this thesis is the qualitative method, as its primary goal is to understand better people and organisational processes in a social and cultural context.

I also chose to add the secondary quantitative data to support my primary qualitative data. To a certain extent, statistical data from surveyed organisations supported the claim that there was a gender gap, meaning a much lower proportion of women than men. But they did not explain the gap in detail. Therefore, my main focus was on qualitative research, researching a specific social phenomenon in the context of these two particular institutions.

4.2 Research Strategy - Case Study

Robert K. Yin (2009) defines a case study as: "An empirical inquiry about a contemporary phenomenon (e.g. a case), set within its real-world context – especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2009 in Yin, 2012, p. 4).

According to Breda et al. (2020), a dedicated approach is needed to address the gender gap in STEM. Therefore, a detailed case study of CERN's *25 by '25* recruitment strategy and UiA's *Plan of Action for Equality, Inclusion and Diversity 2021-2024* is at the heart of this thesis. The strength of the case study is that it allows a researcher to study a contemporary phenomenon within a real-life context (Myers, 2021), which is the case for my research. The gender gap in STEM and recruitment strategies to address this issue is a contemporary phenomenon that I have researched in the real-life context of CERN and UiA. The boundaries of the actual phenomenon and context are not necessarily evident either. Since the phenomenon exists and can be observed, the context answers questions about where, who, what and possibly when and why. The context can be defined as the phenomenon's circumstances (Ritchie & Lewis, 2003).

4.2.1 Strengths of the Case study

There were two main advantages of utilising the case study methodology:
First, there is a gain of actual knowledge of the phenomena at CERN and UiA. This specific research gives us concrete examples of the production of knowledge that can be useful for other institutions and in different contexts.

Secondly, the case study allowed me to compare existing theories with empirical knowledge gained through interviews. The interviews were the primary sources of information, and the interview guide

had the character of semi-structured questions. This structure allowed the interview participants to answer according to their views, attitudes, and perspectives independently of the questions asked.

4.2.2 Limitations of the Case Study

Case studies are not without limitations. They cannot tell us precisely what to do in a particular situation, but they can help us connect a researched phenomenon with a real-life experience, which can help us make an informed decision (Breslin & Buchanan, 2008).

In qualitative research, validity and generalisation are usually the most challenging aspects. The number of my cases is limited to two institutions. In addition, the number of interview participants is limited to five per institution. To strengthen the validity, I have focused on the role of theory and decided to test the theory against empirical knowledge in a specific context. The main goal of my research was not to generalise the findings but to gain more understanding of ongoing processes and challenges related to the recruitment of women within the context of two specific organisations.

4.3 Data Collection - Interview

4.3.1 Position of the Researcher

According to Orlikowski and Baoudi, "the interpretive research approach towards the relationship between theory and practice is that the researcher can never assume a value-neutral stance and is always implicated in the phenomena being studied" (Orlikowski & Baroudi, 1991, s. 16).

Researchers further need to acknowledge their position in their research, the perspective they adopt, the issues they pay attention to and the biases of their perception of the studied phenomenon. (Orlikowski & Baroudi, 1991). In my case, I have been living close to CERN for the past six years. I am very interested in the technologies of CERN, and I have become friends with many scientists and engineers working there. As mentioned in the introduction, my husband has a staff position at CERN, and I have been actively applying for both student and staff positions for the last six years. While writing this thesis, I have been accepted to the administrative student programme at CERN as of February 2022. When it comes to UiA, the university is my alma mater, and hence I am known to both people and the organisation. My position as a student influences my view of my university.

Because I am a student at UiA, people involved in the interview process might have been more open to participating in this study than otherwise.

My perspective of the phenomenon is influenced by my application process and my friendship with some of the participants involved in this study. Having a personal connection to both organisations and being a part of the context allows me to go deeper into the researched phenomena. Being a woman who has worked for many years in the STEM field, being part of these two particular organisations and seeing changes in real-life affect my perceptions and what I emphasise in my analysis.

4.3.2 Interviewees

To gain as much knowledge and understanding as possible, research the phenomenon from multiple angles, and incorporate varying views on these recruitment strategies, I selected interviewees with different positions within CERN and UiA. The interviewees in my research were divided into three groups based on their role in these organisations.

1) Group1: Interviewees directly involved in coordinating and implementing these strategies. Their job was to coordinate and carry out the activities to improve the gender balance in CERN and UiA. Their position was a dedicated position, delegated from top management, and a paid position.
2) Group 2: Interviewees who used or evaluated the interventions directly in recruitment.
3) Group 3: One interviewee who followed the PhD programme at UiA and one interviewee in a fellow position at CERN.

Due to the scope of this master's thesis, I was unable to recruit participants from STEM departments at CERN or the Faculty of Engineering and Science at UiA. There is a need for more detailed research within the faculty and specific STEM departments to understand the challenges and particular measures planned and implemented by them.

4.3.3 Semi-structured Interview

According to Kendall (2008), semi-structured interviews differ from structured interviews such as surveys and questionnaires characterised by strict form and no room for flexibility. For Kendall,

qualitative (semi-structured) interviews provide an opportunity to explore the meaning constructed by the participants. With additional questions, follow-up questions and more open dialogue, the interview opens up for the researcher to better understand the interview participants, the participants' perspectives and the context of their responses.

Therefore, I chose a semi-structured interview to collect my empirical material. The semi-structured interview allows the informants to answer questions outside the context of the question. It provides an opportunity to gather participants' perspectives regarding an experience of the topic being researched (McIntosh & Morse, 2015). I conducted five interviews with participants from CERN and five from UiA. Their background varied according to their position in the organisation. I included participants directly responsible for implementing recruitment strategies and managers who performed the actual implementation. Due to the ongoing Covid-19 pandemics and the geographical distance, the interviews were conducted through videoconferencing platform Zoom and, when possible, in person. Collected data were transcribed, then analysed and compared.

4.3.4 Interview Guide

I created two slightly different interview guides based on the framework for developing a qualitative semi-structured interview guide.

Kallio, Pietilä, Johnson, & Kangasniemi (2016) describe five development phases for a semi-structured interview guide. Following their suggestions, in phase 1, identifying the prerequisites, I chose the type of semi-structured interviews to be descriptive/interpretive with the aim of better understanding the phenomenon of the gender gap in STEM and the actual implementation of recruitment strategies to minimise this gap. The focus was on what was accomplished and implemented in the real-life context of these organisations. The perspective of different participants was considered, and thus two different interview guides were produced. In phase 2, retrieval and utilisation of prior knowledge, I reviewed the literature and collected information about CERN and UiA, mainly from their websites and public documents. In phase 3, formulation of the preliminary interview guide, I developed the themes for the interview guide, which I divided into four groups: the interviewees' role and the context of the phenomenon, actual recruitment strategies, their implementation, and what we could learn from the process. In phase 4, pilot testing, the interview

guide was discussed with my supervisors and fellow students at the seminar meeting. Their input and suggestions for improvement were evaluated and implemented where applicable. And finally, in phase 5, the presentation of the final interview guide, the interview guides were sent to the interviewees one week before the interview.

For the detailed Interview Guide, please, see Attachment 1.

4.3.5 Secondary Data Collection

Secondary data was collected by reviewing supporting documents, public records, publications, meeting reports, websites, and statistics from CERN and UiA.

4.3.6 Technology Applied in Data Collection

Due to Covid-19 pandemics, the qualitative data collection through the collection method of semi-structured interviews would not be possible if it was not for the advanced web conferencing technology.

According to Mandy M. Archibald et al. (2019), using digital technologies in data collection have multiple advantages. Among them are improved Internet and digital devices access worldwide – CERN is known for its worldwide web invention. CERN also connects collaboration teams of researchers worldwide. Due to challenges related to Covid-19 pandemics, UiA had to transform its education system into an online environment by using Zoom for lectures. This created an advantage for using Zoom for conducting my interviews. There was more or less unlimited Internet access and good knowledge of the platform Zoom in both organisations. The convenience and cost-effectiveness of web-based methods are very advantageous, especially in the case of geographically spread organisations and interviewees. Conducting the interviews was also much more convenient in terms of time, with no additional time required for preparation, travel time, booking of location for interviews, etc.

Zoom allowed me to conduct real-time interviews, which were convenient and efficient. I have not experienced problems related to the Internet connection, which could have affected the interviews. But it also created some challenges in the form of impersonal attitude, strict planning, and sticking to

the timeline even in cases where more time and exploration in more depth would contribute to the understanding of the phenomena.

4.3.7 Transcription

Interviews were recorded, transcribed, analysed and further evaluated. The duration of each interview was estimated at one hour, and they were also completed within one hour.

I transcribed the interviews within a week after conducting the actual interview. I worked on transcriptions by playing the interviews in short paragraphs and transcribing them in text. The limitation of my transcription of the interviews was that they were conducted in English and Norwegian. All direct quotes from interviews in Norwegian are my own free translation, which may vary slightly according to what was said in the original language. I evaluated which parts would be used either as a direct quote or my perception of what was said. Each interview had between 50 and 80 pages of transcribed text. I first included material from interviews, which I found interesting, in the analysis section. This selection resulted in around 30 pages of direct quotes. Then I went back to the theoretical framework of this thesis and connected the analysis with the theory. I focused on existing literature and previous research and compared it with the actual context of CERN and UiA. Based on that, I have then re-evaluated and selected the empirical material from the interviews presented in my analysis.

5 Research Ethics and Privacy

In my thesis, I followed the requirements of the General Data Protection Regulation (GDPR) and the guidelines of the National Committee for Research Ethics in the Social Sciences and Humanities (NESH). Based on these, I was obliged to obtain consent from the interviewees. All interviewees were informed about what data was collected and for what purposes. An application for my research and processing of personal data was sent to NESH. After approval of the processing of the personal data for my research, the information letter, which was part of the NESH application, was sent out together with the interview guide one week before the actual interviews. The interviewees were informed of their opportunity to withdraw their consent. No such request was received before the submission of this thesis.

To preserve and protect the informants' privacy, all informants agreed to and accepted the recording and further processing of the interviews. The data collected was used only for this master's thesis. All personal information was used confidentially. The results were presented anonymously in cases where there was no need to disclose any personal information. In some interview parts, the interviewee's actual professional position might be revealed, and approval from the affected persons was received. All personal information was stored on a private computer and deleted after submitting this thesis (The Norwegian National Research Ethics Committees, 2021).

For more information and an approval letter from NESH, please, see Attachment 2.

6 Empirical Data Analysis and Discussion

The focus of this thesis was on the empirical findings concerning the actual ongoing recruitment strategies at CERN and UiA.

As stated in the introduction, my focus has been on the following four topics, and I present them accordingly:

1. Mapping and understanding the actual context of the recruitment strategies. The general gender balance at CERN and UiA.
2. Explore in detail these dedicated strategies for improving the gender balance.
3. Describe specific interventions that were applied at CERN and UiA.
4. The importance of knowledge transfer. What can be learned from these organisations, and what knowledge could be passed on to other organisations that face similar challenges.

6.1 The Context of the Strategies

Better understanding the context of these strategies plays a vital role in understanding the strategies themselves and, consequently, their implementation. It was an important starting point for my research. As previously described, there are similarities between CERN and UiA, but there are also differences. In the following section, I mainly focused on what I knew from my personal experience

about CERN and UiA, my connection to both, and this thesis's topic and research questions. The list is not exhaustive.

CERN is an international organisation with its own rules and governance, which does not fall under the regulations of any specific country. It is funded through contributions from member states, mainly from Europe, including some associate members outside Europe. There are about 2600 employees and fellows. In addition, there is a significant number of affiliated partners and students, up to 17,000 people at any time. The international collaboration with universities worldwide characterises CERN, and there are various programs available for students and young professionals to join CERN's workforce. The typical possible professional progression is to start as a student, go on to a fellow position, receive a staff contract and finally, an indefinite contract. Although not mandatory, this path is only a progressive view of positions, and one can enter CERN at any time as a student, fellow or staff employee. Personnel and fellowship programs have a limited duration; typically, a scheme of five + three years for a staff member. After this period, either an indefinite contract is considered, or the employment relationship is terminated. The hiring scheme for a fellowship programme is two years + up to one year prolongation.

UiA is a younger university in southern Norway and is strongly influenced by the national context. The university must follow national regulations focusing on the specific guidelines and requirements for employment within academia. There are approximately 1600 employees and 13,000 students at any time. Although it is open to international students, there is a limited number of international students as the focus is on Norwegian students within the Norwegian higher education system. The university is open to international collaboration with other universities worldwide and local collaboration with industry and businesses in the Agder district. The university focuses on diversity for all academic positions, emphasising the under-represented gender within each faculty and its smaller units. Standard PhD programmes usually last three years; typically, the university pays a salary if the university announces the programme, but without any guarantee or obligation to employ the doctoral students after graduation. These positions can be qualified as temporary within academia. For professorships, a PhD degree and five years' experience are required, and then there is the opportunity for the professional competence assessment to proceed to the professorship.

Norwegian law introducing a radical quota system to improve the slow pace of change of female representation at a board level of public limited companies was passed in 2005. Female representation was determined to be 40% or more (Birkvad, 2016). In general, radical gender quotas are not permitted for employment in Norway. If there are applicants with equal qualifications, the under-represented gender should be selected. The liberal quota system became more common in Scandinavia, and this type of measurement was implemented to a greater extent in the Norwegian system than elsewhere in Europe. Both CERN and UiA favour the liberal approach of choosing the under-represented gender in the selection and decision process without any sanctions or formal requirements for gender representation. This liberal approach is mentioned explicitly in this CERN interview:

CERN 1: *"We don't want to go down the quota route. There is no support for that, so we've chosen a gender target which allows people to focus a little bit on their good intentions onto something a bit more scientific, i.e., statistic numbers."* (CERN Interview 26/01/2022, female interviewee)

To map the status quo of female representation at CERN and UiA with a focus on STEM, I evaluated the statistical data supplied by CERN and UiA. I specifically focused on female staff and fellows at CERN and PhD students and professors at the Faculty of Engineering and Science at UiA. I added a factor of time to see the actual development in time.

6.1.1 Case 1: University of Agder (UiA)

Plan of Action for Equality, Inclusion and Diversity 2021-2024 covers more areas than the gender-balanced recruitment of employees. The overall objectives of this action plan are:

1) Gender balance among employees
2) Equal pay for equal work
3) Gender balance in management
4) Gender balance among students
5) Diversity among employees
6) Diversity among students
7) Inclusive LGBTIQ community
8) Zero tolerance for bullying and harassment

9) Sexual etiquette
10) Incident reporting procedures (University of Agder, UiA og likestilling, 2021)

According to www.utdanning.no, the professor is a protected title awarded to the highest scientific position at Norwegian teaching and research institutions. There is no formal requirement for a professor to have a doctorate (PhD), but the practice is that no one without it would become an appointed professor. Furthermore, each institution decides the requirements for achieving this title and can vary from institution to institution and faculty to faculty (utdanning.no, 2022). In addition to national standards, UiA specifies its own employment criteria for educational competence for a professor position (University of Agder, 2022).

In 2021, 31.9% female and 68.1% male professors and associate professors were employed at UiA. Compared with 2018, there was a 2.9% increase in the employment of female professors, which is approx. 1% per year for three consecutive years. Unfortunately, this is not the case in the STEM field. In 2021, 13.2% of female professors and 86.8% of male professors were employed by the Faculty of Engineering and Science. On the contrary, in 2018, the gender distribution was 14.9% female professors and 85.1% male professors. Over three years, there was a 1.7% decline in the employment of female professors (UiA Personal og organisasjonsavdelingen, 2022).

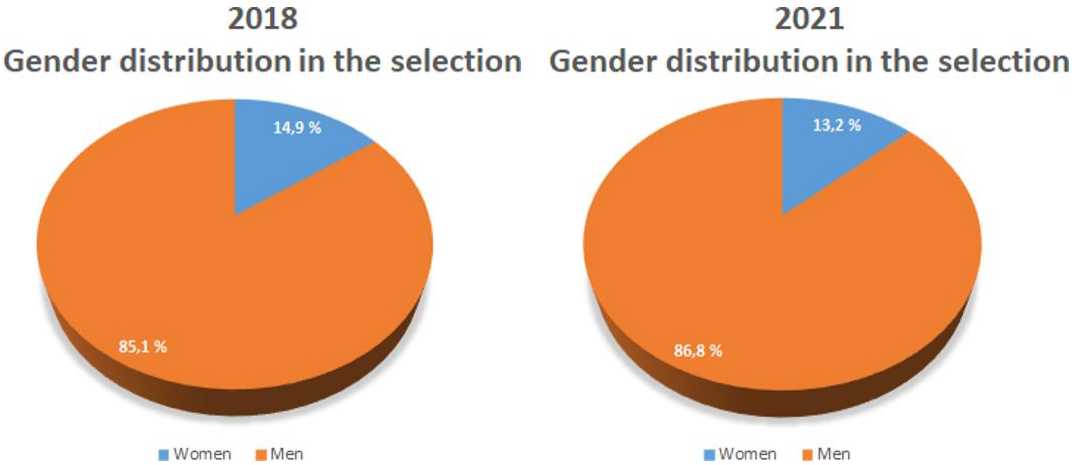


Figure 7 Gender distribution: UiA professors, including professors II[1] in STEM (Faculty of Engineering and Science) (University of Agder, Internal Statistics of Personnel for Faculty of Engineering and Science, 2022)

[1] Professor II is a professor employed by another university or employer and is hired only in a smaller percentage in an affiliated position at UiA.

A similar status quo applies to PhD students; there is a slight decrease of female PhD students, 25% in 2021 compared to 25.7% in 2018.

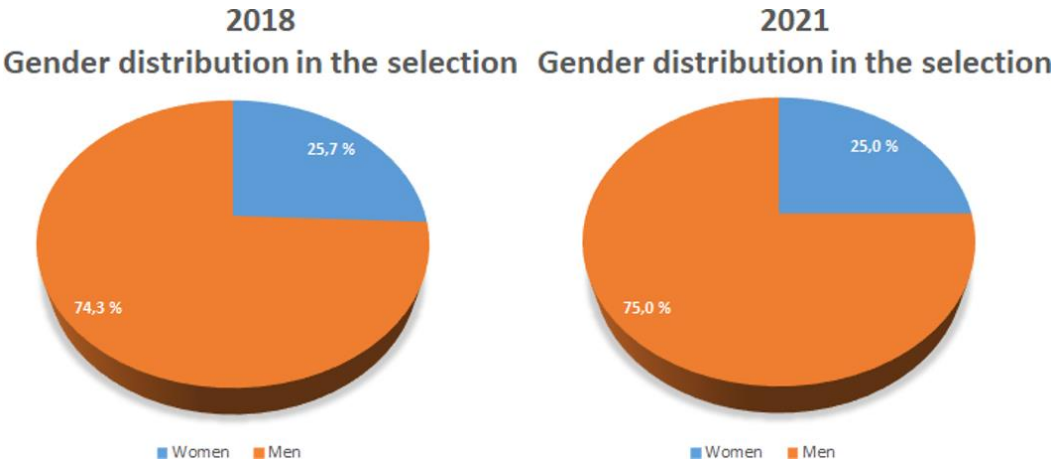


Figure 8 Gender distribution: STEM PhD students (Faculty of Engineering and Science) (University of Agder, Internal Statistics of Personnel for Faculty of Engineering and Science, 2022)

The goal of UiA is to achieve a gender balance of 40% and 60% of both genders per each unit, where units with less than 20% of either gender should set their own target for this period. At least 40% of all professors and lecturers at UiA should consist of either gender.

Although statistics for overall top academic staff and PhD students' positions are showing progress in terms of gender balance, the figures in the case of STEM fields show the opposite or stagnant trend, and women are hugely under-represented.

6.1.2 Case 2: European Council for Nuclear Research (CERN)

The total gender distribution among staff and fellows has been around 21% women for the past decade. Some units have much higher female representation than others. The STEM positions within units- engineering, physics, information and communication technologies (ICT) and technical work are significantly under-represented; for more details, see Figure 9 (CERN, 2021).

CERN's *25 by '25* strategic plan covers two areas for achieving a better balance distribution:

1) Gender balance across the organisation – where STEM disciplines are of significant concern, these are physics, engineering, and technical unit

2) More balanced employment based on nationality, motivated by the member states' budget contributions – where 12 countries are under-represented, including Norway (CERN, The 25 by '25 journey, 2022).

Table 17. Staff Members by Gender and Type of Contract - 31.12.2020

Gender	Type of contract: Limited Duration Contract	%	Indefinite Contract	%	Total	%
F	182	33.27	365	66.73	**547**	20.76
M	684	32.76	1,404	67.24	**2,088**	79.24
Total	866	32.87	1,769	67.13	**2,635**	100

Figure 9 Total number of staff members by gender and type of contract by 31-12-2020

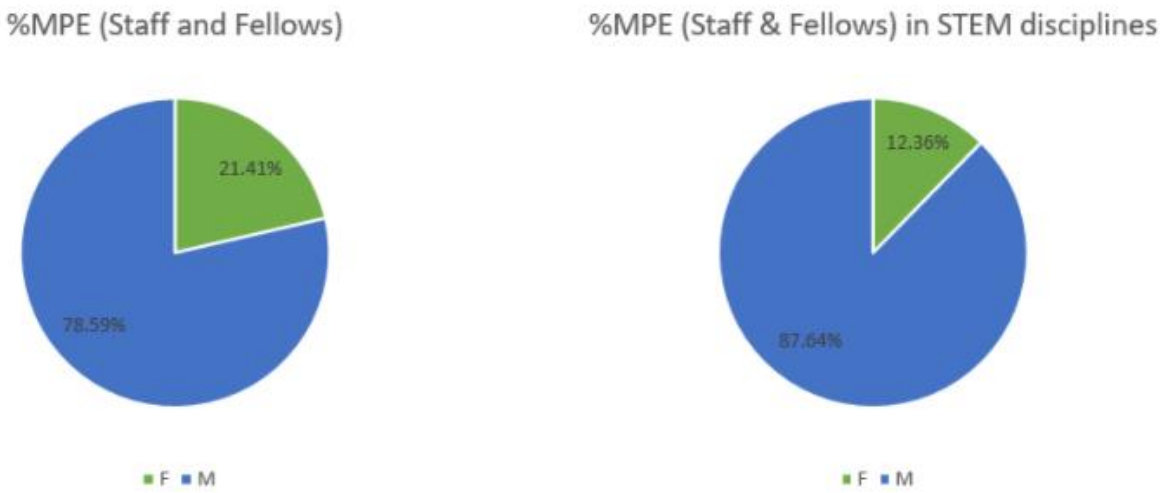


Figure 10 Gender distribution of staff and fellows in general and specifically for STEM disciplines

CERN's *25 by '25* strategy aims to achieve 25% of women across all departments, where some units will need to have a specific target as 25% will be unrealistic to achieve based on a very low proportion of women. CERN focuses on a 25% average with a long-term goal for parity between the two genders. CERN has extreme differences across the STEM disciplines, and a dedicated approach and target per unit are needed (CERN, 2022). This can be seen in the figure below.

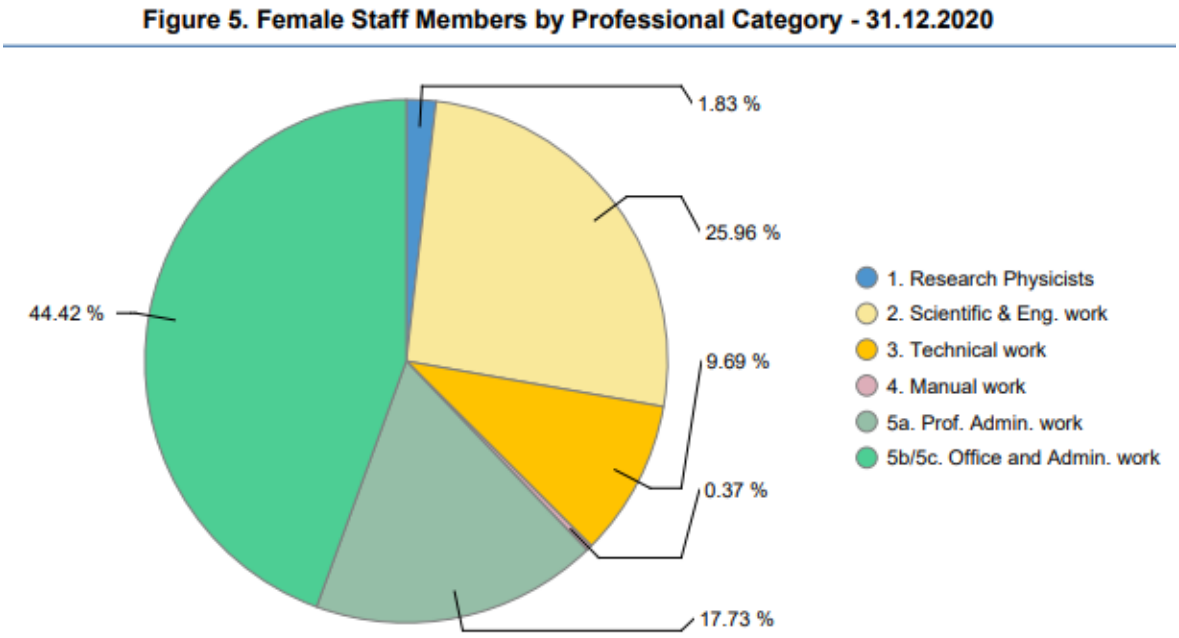


Figure 11 Female staff members by professional category as of 31-12-2020 (CERN, 2022, p. 11)

6.2 The Role of Interviewees

Understanding the role of interviewees in these recruitment strategies was crucial to understanding the context of the recruitment processes in each organisation. It gave me a sense of understanding of CERN's and UiA's strategies and the importance of setting the targets and resources for implementing interventions and action plans. These strategies and actual implementation programmes cover a broader perspective of inclusion and equality than gender (the ratio of men and women within the organisation). But for this thesis, I focused only on the gender balance within these strategies and their implementation.

The commonalities and responsibilities of the interviewees varied according to the group to which they belonged. There was a clear sense of individual responsibility among the interviewees. It gave a strong impression that these action plans heavily depend on the people involved. The informants expressed a profound personal commitment and individual responsibility. It was apparent that many processes were driven based on a "goodwill" and outside of the working hours based on the tremendous interest of everybody involved rather than their employment.

In group 1, the interviewees were employed explicitly to drive the action plans within their organisation and help faculties and departments in their implementation. Due to the complexity of these programmes, both CERN and UiA, based on their strategic plans, employed a dedicated person to initiate activities improving the gender balance, coordinate these activities in specific departments/faculties, groups and sections and follow up on them.

Further on, at UiA, this action plan's representative cooperates with the Equality and Inclusion Committee[2] appointed by the University Board. All faculties are represented in this committee. The members are staff representatives, including the faculty's administrative staff, academic staff, student representatives and the faculty director (University of Agder, The Equality and Inclusion Committee, 2022). CERN employs one staff person in a 50% role and one fellow in a 100% role in support, so 1 1/2 people dedicated to the programme, half a staff and one full-time fellow. Further on, department leaders assigned the focal points in each department. These employees represent different groups within departments and are crucial for collecting specific input per each department. They map the position and situation of each department and set the scope, targets, and measures to improve the gender balance per particular department.

In group 2, the interviewees were part of the organisational and personnel department, and one participant was a focal point at CERN. These employees had central insight into human resources organisations. Some had an overall supervisory position, and some had the operational responsibility to carry out the programmes directly in the faculties or departments.

In group 3, the interviewees were a PhD student and a fellow staff. They did not have an active role in coordinating or implementing these action plans, but they were from the marginalised group of women in STEM. It was essential for me to understand how the action plans were seen from their perspective.

[2] Likestillings- og inkluderingsutvalget (LIU) (University of Agder, The Equality and Inclusion Committee, 2022)

6.3 Perception of the Gender Balance at CERN and UiA

Perception of the gender balance in each organisation was another theme I was interested in exploring and understanding better. The statistics tell us the quantitative metrics of gender ratio in each organisation. The theories and previous research give us possible explanations for such status quo. But it is the knowledge of people with hands-on experience from a specific organisational context that might help find solutions for a particular organisation. Hence, I was interested in mapping how the interviewees perceived the gender balance in their organisation.

Interviewees from UiA had an evident egalitarian focus. Their perspective was very complex throughout the interviews; their attention was on all aspects of equality, diversity, and inclusion, and it was taken as a natural part of society. It was challenging to discuss only the under-representation of women in STEM. I found it very positive that they placed importance not only on the gender, meaning the male VS female ratio. Saying this, though, I also asked myself if this might undermine the recognition and addressing of UiA's interventions and efforts on female under-representation in the STEM faculty. And despite Norway being a highly egalitarian society, which UiA mirrors, it is still challenging to recruit women to STEM. This can be seen in the following interview excerpt:

UiA 1: *"Yes, yes, it's a bit like that. It is a bigger challenge than you think, and I think with good reason. We live in a society where this is important and natural for us. But, at the same time, we end up doing such unconscious acts as recruiting the same people like us. What, why do I make these choices? Then it's like that. And, and get that change in, that they must not think, that I must recruit a woman, but to think that it goes in as a natural part of them. And that there was no mistake made."* (UiA Interview 28/01/2022, male interviewee)

CERN's 25 by '25 strategy primarily focuses on women's representation and better gender balance. And although a better distribution of nationality is part of the strategy, there was a clear perception that gender balance is essential in this strategy. I experienced CERN being transparent in its presentation that the focus is on gender balance, for the most part. Gender balance is the most challenging part of CERN's recruitment, as CERN today is not representative of society in terms of

diversity. Based on my interviews, the activities to reverse the negative gender balance need to parallelly focus on the overall gender equality and inclusion and recruitment strategies.

CERN 1: *"We've put in place a new course that we're now making sure people are aware about bystander intervention, meaning if you see inappropriate behaviour, often sexism related between members of personnel. Deescalate what looks to be a way in which people relate to each other inappropriately - so, equipping personnel with how to intervene. It's not just the diversity- that's halfway; you need the inclusion. Uh, awareness to be able to retain. The people who come in as a minority, as you say, now - gender and nationality. You need to show by your own behaviour and engagement and contribution that the more diverse is your population of whatever it is."* (CERN Interview 26/01/2022, female interviewee)

My question, "Is there enough women? Do we have enough women in the STEM fields?" aimed to understand how they perceive in their own eyes the gender balance at CERN and UiA. Here are some of the answers from my interviews:

UiA 1: *"We have- no, it's like the society around us, you could say. Then we struggle with it both in the staff and in the student body."* (UiA Interview 28/01/2022, male interviewee)

CERN 1: *"At CERN, there are not. CERN has a personnel population of, at any given time, up to 17 or 18,000 people. But only 3500 or so of them are people hired by CERN, meaning there, we have some influence over who we hire, whether it be gender or another basis. So technical knowledge, gender, nationality, and age. 12% of the population are in STEM roles, so the difference between 12 and 21, of course, is the number of women in non-STEM bowls at CERN. The 25 by '25 strategy is meant to address an increase in the population of women across the organisation."* (CERN Interview 26/01/2022, female interviewee)

It was very interesting that I received different answers from different interviewees. From a clear "no" to "it depends on what you mean with enough and how you look at it" to "yes, indeed, we have women". I found that their answers seemed to strongly depend on how close they were to the actual implementation of strategies. Interviewees with a general overall organisational overview and

follow-up of the action plans were more aware of the female under-representation within the organisation. On the contrary, interviewees directly involved in STEM departments or faculties were more likely to say that there were women, even many women. Statistical data confirm the overall female under-representation without any doubt. Still, I did not perceive the positive answers as blind or ignorant of the actual status, even though that possibility exists. Instead, I understood them as strongly influenced by the change over time. Some interviewees were directly involved in this change and saw many activities and improvements over many years.

However, the female representation in each organisation may also vary across the smaller groups and units within departments and faculties. This perception of different female representation across the organisation supports one CERN interview. One of the interviewees reacted to female representation in the workshop, and it was said very clearly that there were no women in the workshop. T believed that managers assumed that women were not physically strong to work in such an environment. She disagreed with the leaders' assumptions that female technicians and engineers could not work in physically demanding environments. Nevertheless, according to her, the situation in the workshops was strongly influenced by the idea that this type of work required physically strong personnel and, therefore, not suitable for women.

CERN 4: *"There is no woman. No women in the workshop. No, not even students. No, no, all the technicians were men."* (CERN Interview 23/01/2022, female interviewee)

6.4 Perception of the Reasons for Female Under-representation

I was further interested in what the interviewees thought about the reasons that influenced the low representation of women in STEM and whether they could point to some factors that played a role in this female under-representation in their organisation. Multiple reasons were repeated across the interviews, and the examples can be seen in these two interview excerpts:

CERN 1: *"There are some countries that are attracting more women in STEM studies than in others, other countries, and the gap between the number of people graduating and people who have been at CERN. The leaky pipe syndrome, which we have seen, also outside CERN. There seems to be still a*

stronger expectation from society, family pressure on young women to take the burden of the line share of a child." (CERN Interview 26/01/2022, female interviewee)

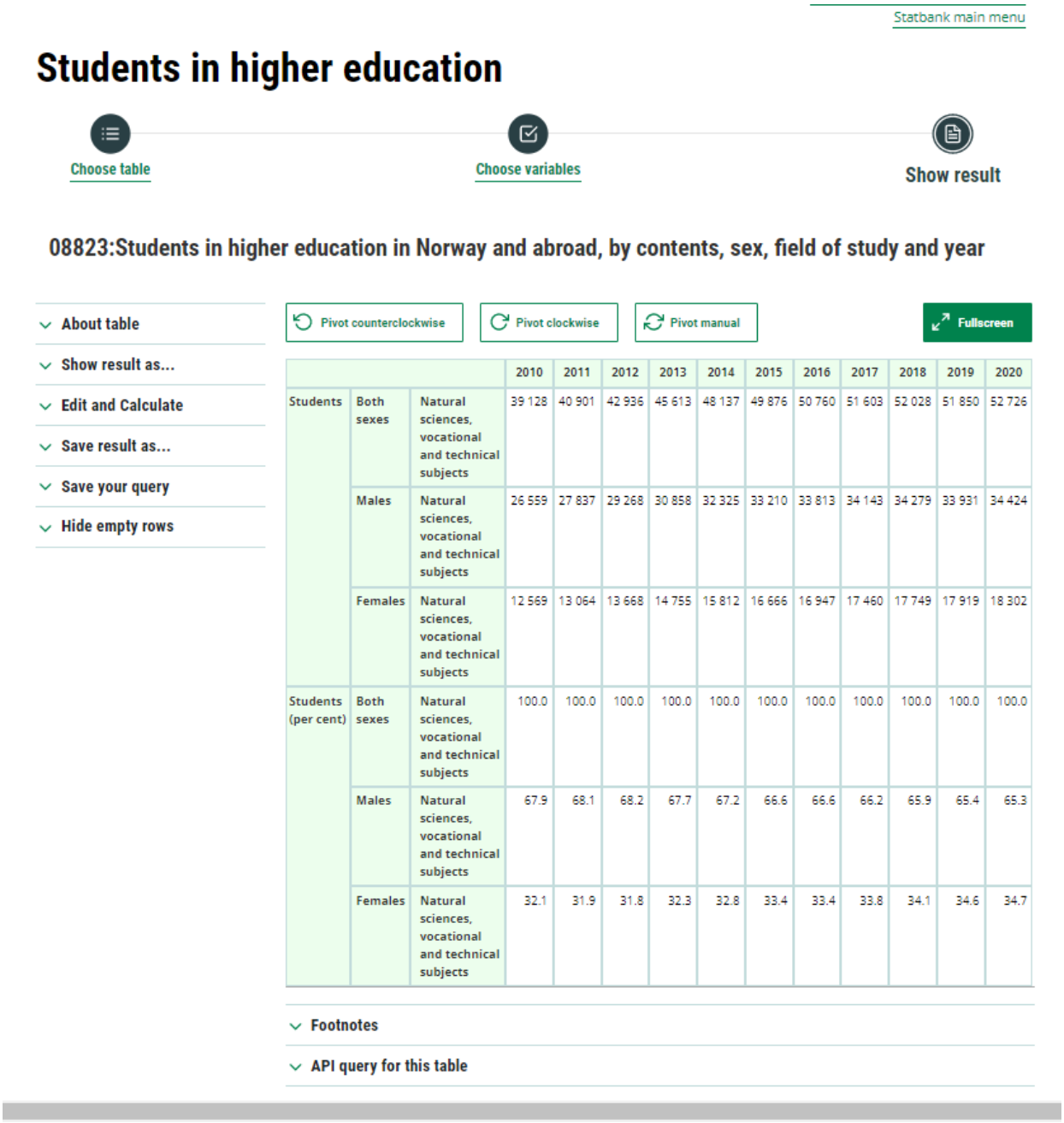
UiA 5: *"So, women are an under-represented gender within some STEM disciplines. Maybe you think it has something to do with the fact that this imbalance starts already in high school. That's just my assumption. I assume that although Norway is one of the most equal countries in the world, I believe that young people still make gender-stereotyped choices when it comes to education. And it continues when they apply for higher education. So, I think the differences already occur in high school and that the skewed gender distribution only continues in higher education - both in the educational process and working life."* (UiA Interview 04/02/2022, female interviewee)

These interviewees pointed to the rationale, which corresponds with the theoretical framework of this thesis. The gender-equality paradox was expressed by differences between the countries in the CERN interview. CERN could see the differences between the number of students in STEM from different countries and the number of applicants at CERN. Furthermore, gender roles in many societies were still strongly influenced by gender stereotypes. And finally, the leaky pipeline was seen as one of the main reasons for female under-representation in STEM, from the early stages of female education to staff recruitment at CERN and UiA.

Based on the above, I returned in the following section to the theoretical background for this thesis and reviewed the theories in the context of CERN and UiA. According to Stoet & Geary's (2018) research, the gender-equality paradox in STEM could be observed in egalitarian countries like Norway. According to personnel statistics for 2020 from CERN, personnel from highly developed and egalitarian countries of Denmark, Norway, and Sweden were under-represented at CERN (CERN, The 25 by '25 journey, 2022). And the under-representation included both genders. It is not clear why the qualified personnel from Norway are not represented in higher numbers at CERN.

Since the main focus of this master's thesis was on female representation in STEM, I looked first and foremost at women's statistics in this section. According to Statistics Norway, female representation in higher education in the STEM fields (natural sciences, vocational and technical subjects) was

almost 35% in 2020, suggesting there could be more room for Norwegian female STEM graduates at CERN.



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Students in higher education

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08823:Students in higher education in Norway and abroad, by contents, sex, field of study and year

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			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Students	Both sexes	Natural sciences, vocational and technical subjects	39 128	40 901	42 936	45 613	48 137	49 876	50 760	51 603	52 028	51 850	52 726
	Males	Natural sciences, vocational and technical subjects	26 559	27 837	29 268	30 858	32 325	33 210	33 813	34 143	34 279	33 931	34 424
	Females	Natural sciences, vocational and technical subjects	12 569	13 064	13 668	14 755	15 812	16 666	16 947	17 460	17 749	17 919	18 302
Students (per cent)	Both sexes	Natural sciences, vocational and technical subjects	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Males	Natural sciences, vocational and technical subjects	67.9	68.1	68.2	67.7	67.2	66.6	66.6	66.2	65.9	65.4	65.3
	Females	Natural sciences, vocational and technical subjects	32.1	31.9	31.8	32.3	32.8	33.4	33.4	33.8	34.1	34.6	34.7

Footnotes
API query for this table

Figure 12 Students in higher education 2010-2020 in Norway (Statistics Norway (Statistisk sentralbyrå), 2022)

Other factors were more likely to cause this under-representation at CERN than the gender-equality paradox. It would be interesting to find out if the STEM female professionals from Norway did not

apply to the positions at CERN and why. Or they applied but were not selected, or if selected, it was challenging for CERN to retain them.

Further research would be needed to determine why there was such low Norwegian representation at CERN for both genders and female staff in particular. This also opens up a great potential for CERN and UiA to direct their recruitment strategies towards female students and recent STEM graduates from UiA. Conversely, UiA could refer its employment opportunities within academia in Norway to CERN alumni. Collaboration between these two institutions could be valuable in improving and expanding the application base with a particular focus on female professionals.

6.5 Perception of the Organisational Culture

Continuing to evaluate the theories in the context of CERN and UiA, the notion of the "chilly" culture within the STEM fields and academia became more prevalent, affecting the recruitment and retention of women in STEM. Therefore, I was interested in learning more about the structure and culture and how it expressed itself at CERN and UiA. Throughout the interviews, it became apparent that extending the quantitative female representation was possibly not enough. As retention of women in these organisations also required some qualitative changes. One of the interviewees from CERN perceived the culture and changes within the organisation in the following way:

CERN 1: *"So that, there is even in the workplace a tendency toward holding meetings later on weekends. Where men are more likely to attend than women and women feel less included, and women are self-excluding from this environment that this could also be the case that. It's very difficult to point to one area in particular. It should be said that for the last ten years, my predecessors and elsewhere at CERN, people have tried different techniques to shift the culture to raise awareness around unconscious bias to put in place facilities. To facilitate women, for instance, women to have an infant feeding room or locations in which they can attend conferences on-site and be able to have this place where they can feed an infant. And we've got a day-care on-site."* (CERN Interview 26/01/2022, female interviewee)

Based on this interview, organisational changes supporting a family life might substantially influence the perception of the organisational culture. Improvement of working hours supporting family life, introducing a daycare facility, and supporting young mothers were interventions in the hope of having a positive effect and an essential role in the inclusion and retention of women at CERN. The issue of family-work balance in Whitelegg, Hodgson, Scanlon, & Donovan's (2002) article supports my findings. The interview participants in that research were concerned about not just being on maternity leave but also combining childcare and work. Several interview participants confirmed that they would delay having children in the hope of having more permanent positions. In addition, the flexibility of the work was minimal. The working hours in the lab experiments were long, often during weekends and in the evenings, which created a real challenge in combination with raising a child. Often, they felt that changing a career to a medical lab was the only option as that gave them more flexibility. In the case of CERN, where families often come from all over Europe, the culture supporting work-family balance, mothers, and parents in general, was even more critical. And it seems like there was the CERN's focus in previous years.

Further on, the importance of overall organisational education through awareness was pointed out as an essential part of this organisational change. Another CERN interviewee stressed the importance of fighting the biases within the organisation through education, bias training, and overall awareness activities.

CERN 2: *"I mean, CERN is a very special place to work, but it also requires getting used to and given that teams in STEM are traditionally male, it is harder for the female to make her way, and that's another problem that we have to address through unconscious bias training. Through integration, awareness, etc."* (CERN Interview 27/01/2022, female interviewee)

Another interviewee emphasized the staff's own role in this change. This interviewee said it was not just about the courses, top management, and action plans. According to him, nothing would change if people in the corridors and smaller units, where they spent most of their time, did not realise this change must come.

CERN 5: *"You know, CERN is like its buildings. They were built in the '50s, and so was CERN's culture. It takes time to change it. But we are building a new educational centre and repairing and renewing the old buildings. That is what we have to do with attitudes and culture. We need to all be more inclusive and not accept this old thinking. It takes time, and I mean, it cannot come only from the leadership."* (CERN Interview 29/01/2022, male interviewee)

My perception based on these interviews was that the culture of CERN might still be historically influenced by gender roles and negative stereotypes, which could affect how male colleagues perceive their female colleagues. It could express itself in communication difficulties and mutual misunderstanding. There could be different needs for guidance and inclusion of female colleagues within the smaller units. On the other hand, female staff could feel a need to fit in and change according to the majority; if not, they could think that could hinder their progression. The fit in culture might still be firm and contra-productive, as it is only about the quantity, and the qualitative change might be absent. An interviewee from UiA pointed out this issue in this way:

UiA 3: *"It is essential that women come in because they can have other experiences, and academia can become more diverse. But if it then only becomes the case that the women should actually adapt to the prevailing system that is already there and that no questions should be asked without any fundamental understanding of academia - then you can see more diversity on the surface, and more women come in. Still, it is not certain that academia is really changing. It may be that these women must then fit the organisation."* (UiA Interview 02/02/2022, female interviewee)

This interview points to my understanding of the previously discussed literature. As presented in the findings of Casad et al. (2020), female under-representation in academia is caused by gender stereotypes, where typical masculine stereotypes are more valued than feminine ones. Windsor, Crawford, & Breuning (2021) support it by proposing that other qualities than publishing, often attributed to male scholars, must be more valued. The activities such as teaching and supervising, which are often attributed to female scholars, should be valued equally.

6.5.1 Chilly Climate VS Fit-in Attitude

Because I wanted to research this perception of organisational culture from the point of view of the female staff, I decided to interview a female fellow at CERN and a PhD student at UiA. From their

perspective, I could detect some specific notions of a chilly climate at CERN. But such a chilly climate and fit-in attitude are also often tricky to recognise as they become very subtle. Its existence can even be difficult to admit, and female staff might get used to it. The CERN interviewee said it like this:

CERN 4: *"I felt that, uh, when I had to talk with some people, I had to take care a lot about what to say and how to say it, not to offend him. And this was very, very common."* (CERN Interview 23/01/2022, female interviewee)

The sign of this fit-in attitude became even more prevalent through multiple interviews and from different angles based on the positions the interviewees held within each organisation. As mentioned earlier, a fellow and PhD student at CERN and UiA were, to some extent, hesitant to discuss gender in STEM. It was not easy to discuss this topic because the interviewees did not want to be associated with the possibility that their gender played any role in their recruitment. Their reactions and answers suggested that discussing gender means special treatment or special hiring conditions based on qualities other than competence. They had no desire to be treated differently from their male colleagues.

It also raised questions if these interviewees consciously or unconsciously felt they needed to be *one of them*; they needed to fit in. They did not want attention to gender; they just wanted *to do the science*. One of the interviewees from UiA said it in the following words:

UiA 4: *"I don't want to be privileged because I am a woman. I want to be measured on the same merits, you know, and for me, it will be best, you know, if they don't know who is applying. You know you remove the name; you remove gender; you remove age. If you can see two anonymous applications. Yes, if these applications are without my name, without who I am, right, OK, you see only the background, you know what? What is the background or grades and everything? This is what I would like."* (UiA Interview 31/01/2022, female interviewee)

Unfortunately, the attitude that science has no gender can be working against its intention. It might be perceived as requiring to be the same rather than be equal, have equal opportunities, and bringing

possibly a different perspective. But not recognising the historical development concerning female participation in STEM would simplify the situation. And even though the question of the gender balance and female representation was challenging to grasp, later on within the interviews, it was impossible not to touch on the gendered perspective.

6.5.2 Professional Life VS Family Life

The requirement to attend meetings or events in the evenings or on weekends is one of the aspects that can affect family life and thus more affect female employees, as the role of women is traditionally strongly influenced by having children. Elaborating further on professional VS family life, some of the interview participants felt like they had to choose between the children and the job, such as in the case of this interviewee:

UiA 4: *"I think for me this would be the game-changer because you know the day I came there, it's the first I was talking with the director of the department, you know he said: "Yeah, your family needs to support you because this will be a tough journey." This is what I heard. My family is supporting me. Otherwise, it's gone, so he was right. He was right about that. Because this is my biggest problem, you know, I cannot concentrate, OK, I'm out, you don't see me for two days, and then I really need these things done. I don't feel comfortable saying that I didn't do it because I had family problems; I don't say that. Maybe it will be OK. I just couldn't because, yeah, my daughter was sick. It would help a lot at least to know that you have the possibility if there is a crisis like it's OK to deliver one week later or something like that."* (UiA Interview 31/01/2022, female interviewee)

Further on, not only the female academics were influenced by this choice between professional and family life. The hiring managers could also be influenced consciously or unconsciously to select a male over a female colleague based on the assumption that female employees are more likely to choose family over career. Long working hours, work on weekends, meetings in late evenings or having a child and being away on more extended maternity leave could contribute to this possible incompatibility between professional and family life. This interviewee from CERN portrayed it like this:

CERN 1: *"There is either conscious or unconscious decision for women to step back from some of the more demanding hours in the STEM fields at CERN and particularly experiments. I mean, family or prospective family life and professional life become very difficult. There, of course, we can point to the policy framework, which gives a much longer period of absence under maternity leave than for the co-parents, as we currently call it paternity leave. So, there is still that, if you will, mandatory absence for young women or women who have to go through childbirth to be absent from the site and not a mandatory absence for the co-parent. They may be absent on maternity leave, should they choose to have a family or a child or more, for a period of a minimum of 20 weeks just on maternity leave, whereas for the paternity leave, the absence is ten days or two weeks. This might unconsciously push hiring managers toward choosing younger males in that fellowship staff age than younger women who they feel may be absent from the workplace, so this is what one aspect of what one could say."* (CERN Interview 26/01/2022, female interviewee)

6.6 Recruitment Interventions

6.6.1 Understanding of the Recruitment Profile over Time

CERN and UiA struggled to recruit more women in STEM over the years, something we could also see in their statistics. The average female representation is 21% at CERN. At UiA, the female professors represent approximately 31%. The female representation falls to around 10-13% in STEM departments. The situation is even worse in some sections, and there are simply no women. These new recruitment strategies proposed in 2020/2021 were not unique. Both CERN and UiA had a previous approach to tackling this imbalance. But as I illustrated previously, these strategies brought only very little change in improving the gender balance within these organisations. Therefore, I was curious to understand what was different about these new recruitment strategies, what approach and what kind of interventions CERN and UiA planned in their action plans. I was also interested in finding out how their focus and actual practices changed (if they changed) compared to previous years. Here is the summary of my findings:

CERN focuses on the importance of top leadership involvement and top-down communication in terms of strategy compared to previous years, where all the work was led only by the Human Relations (HR) department. Further on, they raise general awareness through the whole organisation,

rather than focus only on specific recruitment interventions. Because of that, they introduced leadership development through dedicated programmes and broad inclusion and diversity awareness programmes for all personnel. The focus is on gender balance within the entire organisation, but with particular attention to the female staff in STEM. CERN decided to map the situation in lower units and up to the top. The smaller units appointed focal points (personnel representing smaller sections and groups within the organisation), and from their specific input, CERN creates the recruitment action and intervention plans. One of the interviewees presented it like this:

CERN 1: *"I must say that in this instance, we've had incredible support from the Director-General from the day of my presentation to the end. And since that time, a number of department heads who are being very proactive in making shifts to the way in which their personnel go through the recruitment process, but it's not about recruitment, that's one. And it's they who will lead the department personnel below them to get engaged in this strategy. And that is a much different approach than having something from HR. I'm. I'm not attached to the number of moving from 21 to 25, but I am attached to raising awareness on a much broader scale that is not HR lead.*" (CERN Interview 26/01/2022, female interviewee)

UiA directs its focus to the master's level by inviting its students to think about a career in academia. Further on, they search for possible candidates within STEM with the requirements that might be more attractive to women and cover better the competencies of the under-represented gender. Their earlier interventions focused on recruiting women in a male-dominated environment and easing their journey. UiA introduced the *Balance Programme*[3] in the past, a funding scheme to recruit women, map the situation of already employed female academics, and help to accelerate their career progression by freeing up their time to do the activities necessary to comply with professorship requirements. Based on my interviews, it was unclear whether the university would continue with further support based on the findings and proposals submitted through the *Balance Programme*. Here are two excerpts from one interview at UiA describing a change of the previous approach in terms of interventions to recruit more female academics:

[3] Gender balance in top positions and research management at UiA (BALANCE PROGRAMME) (Universitetet i Agder, 2022).

UiA 1: *"Shifting the focus to master's level to think about a career in research and teaching. In general, not just gender balance, there is also a change of perspective then. So, when we search for new ones* (academic staff- clarification by the author), we search for people with competence that attracts the underrepresented. Yes, even in close examination, there may be artificial intelligence and the gender dimension. There may be that more women are working on it. If you do not think about it, if you are not aware of this here, so recruiting becomes like recruiting of yourself."* (UiA Interview 28/01/2022, male interviewee)

UiA 1: *"There has been a focus on this throughout the previous period. Four-year period. But there was a special focus on recruiting women into men's dominated environment. Dedicated programmes like a Balance Programme, which is a funding scheme to recruit women in and enable them to free up their time, help them to be able to complete a doctorate, to get further in and up to the professor."* (UiA Interview 28/01/2022, male interviewee)

6.6.2 Specific Interventions at CERN and UiA

Early Recruitment and the pipeline

I interpreted from the interviews that the overall goal was to enlarge the pool of female applicants. In other words, if more women apply, there will be a higher chance that more women will be hired. The general female representation will increase, and the gender gap will be closed. But, according to the literature and specifically, research by Whitelegg, Hodgson, Scanlon, & Donovan (2002), Resmini (2016), Casad et al. (2020) and Windsor, Crawford, & Breuning (2021) presented earlier, the "pipeline approach" alone is not enough. Other interventions are necessary as women in STEM face many different obstacles which influence whether they apply, stay, or leave the STEM or academia.

CERN and UiA are involved in a comprehensive range of specific interventions covering areas of early recruitment. Without detailed descriptions, as this topic covers a large area and may be of further research, CERN and UiA are intensively involved in school and student programmes to promote STEM. At CERN, a commitment to reaching out to schools to promote physics and technology and show that physics can be "cool" is high. The same applies to UiA, where academics and faculty members reach out to high school students through various activities to motivate them to apply for STEM programmes. According to my informants, female scholars were very dedicated to

reaching out, especially to the young girls. This commitment also included encouraging university students in undergraduate programmes to advance to higher degree programmes at UiA.

UiA 1: *"So, you have to start early on being aware of what is possible and what is exciting and create a desire to go that way. Especially the follow-up of students by professors, the teachers should be guiding students. We have them follow students up, especially to ensure they are motivated and interested in continuing. Each faculty has an administrative and faculty board as the main responsible for this. It is important to ask this question: What has been done? What, how did it go? Where do you plan to go in the future?"* (UiA Interview 28/01/2022, male interviewee)

And although there are many activities aimed at younger children and students, the figures from the statistics tell us that something is happening on the line, where students from master's programmes do not enter the PhD programmes. This can be an area for UiA to focus on and gain more knowledge about the reasons for the students' choices. Here is also an excellent opportunity for more specific interventions aimed at existing students. A PhD degree is a prerequisite for becoming an academic and eventually becoming a professor. There may be an opportunity to capture more master's students in general and female students in particular to follow an academic path.

Further on, the retention of PhD students and their further employment after finishing their studies is unclear. Based on my interviews, it does not look like the university has clear rules to inform about different possibilities at UiA and possibly loses qualified candidates who could be interested in joining academia. Retention of PhD students could be one way of attracting the female population into STEM faculties. This is how one of my interviewees portrayed the situation:

UiA 4: *"That's like that; it's a no-no. Actually, they want you out. You know, you finish the PhD, so it's like career fairs, what you will do after your PhD. So, the people who actually get to do PhD with a normal PhD and, uh, are employed by the university, so when their contract is done, it's not given that you will, that you are continuing at the university. So, there is actually the opposite. You know they want you out. Oh, into the industry. But that is for everyone."* (UiA Interview 31/01/2022, female interviewee)

At CERN, the opposite situation might create biased hiring, and there is a need for more supervision as it might re-create the gender imbalance. For CERN, it is vital to present different career opportunities within the organisation, but these are limited. CERN's main philosophy is to circulate people so that as many as possible can gain their experience at CERN and then transfer and further develop that knowledge in industry or academia. According to my interviews, CERN managers were more likely to hire people from fellowship or student programmes; these employees and students were already working there. This retention of people might generate the cycle of re-hiring male employees in higher grades if more gender balance is not introduced at the student and fellow level. This interviewee presented it like this:

CERN 1: *"Indicator in our statistics that there are, is a greater percentage of selection over applications in favour of men than women. So you are, one could argue, more likely to be selected as a male candidate than a female candidate. And why might that be as well too that this is what we have to tackle in a number of areas is, I think, what we want to look at CERN, in particular, is a higher percentage of women in STEM who apply. And are selected for the younger early entry positions, like as students or even fellows now. Once somebody is already at CERN, their chances of being hired for the next, more stable status statistically increase. Managers and hiring managers are more inclined to select somebody as a PhD student. Equally going from fellow to staff, we see that same key, familiarity bias, is creeping in. That's even stronger than the male-female, biased where we want to look more closely at CERN."* (CERN Interview 26/01/2022, female interviewee)

Importance of the dedicated budget.

I was interested in whether dedicated funding was necessary and how important it was for these measures and interventions to succeed. I wondered if there was a need to have dedicated resources to drive the change to recruit more women. The answers varied based on what type of actions. There was a different perception of the importance of budget in the implementation work.

For UiA, the budget was necessary, especially in the case of already employed female academics. The founding was used to free up their time to proceed with the requirements for a professorship to focus on research rather than teaching and supervision of the students.

UiA 1: *"Yes, it is correct. The primary reason for one is that it signals significance. And it then goes on free purchase of scholarships, to have time to work on being able to become an associate professor or that they can become a professor, that they have time for that. What is it used for? Competence, development, and quality."* (UiA Interview 28/01/2022, male interviewee)

In the case of CERN, the budget was not consistently recognised as necessary in the actual promotion and implementation of recruitment strategies or general awareness throughout the organisation. But it was also possible that my question was not fully understood as I had intended.

According to one of the interviews, CERN has an internal budget for inclusion and diversity work. Although many activities did not require exceptionally dedicated funding and could be handled within the HR department as part of their routine work focusing on inclusion and diversity, I would argue that some needed more consideration and financial support.

Examples can be drawn from the case of female participation in various committees and their commitment to promoting gender balance, which is very time-consuming and resource-intensive. One specific example of this was the case where the focal points performed extensive exercises to map each section's situation. There was no free time for them to do so. According to the interviewees, it came on top of all their work tasks, which were challenging in time and resources. They tried to do a good job because they found the topic close to their hearts. But they also experienced that they only wanted to deliver something quickly in order to continue with their work tasks. The budget only dedicated to external activities such as announcements on prestigious job portals is probably not the only necessary means; organisations may also need internal funding to fund the activities within.

CERN 1: *"Monitoring our vacancy notices more carefully, asking colleagues at work, you know to have a set of objectives, to produce the statistics that serve that there's more conscious recruitment, you know, to evaluate where we are now versus why we are hiring you. Know, again, another male or again, another French or Italian, and have the hiring managers justify those decisions. And being more inclusive in our communications within the department using both national languages that are both official languages, English and French, for the language diversity, being careful about the word*

choice that we use, this can all be done from the D&I programme, what we already have resources, the one and half of us filtering out some of these educational uplifting upscaling tools through the 33 focal points and then disseminating this information to the personnel. These can all be done without a budget. About huge costs, we could consider using recruitment sites, paying recruitment sites that have access to diverse candidates. There's a lot that we can do that doesn't actually cost us anything." (CERN Interview 26/01/2022, female interviewee)

Here is another specific example where the need for the budget was recognised, and CERN created a new awareness programme within the leadership development.

CERN 1: *"The DG did put aside the central budget to create a new course on increasing awareness around sexual harassment. That's mandatory for senior leaders that did have a cost, but the DG put the money aside to do that. So, the cost did not fall on the departments, for instance. So, I think where there is a will; there is a way."* (CERN Interview 26/01/2022, female interviewee)

According to my interviewees, the role of Horizon Europe, an EU Commission funding program for research and innovation, did not affect UiA or CERN. The activities and recruitment strategies were introduced even before this requirement. But it gave the coordinators and implementers of these strategies more profound recognition and reaffirmed their work.

CERN 1: *"So, thankfully, having already launched the 25 by '25 before I became aware of this requirement, we are able to point to the 25 or '25 strategy as an institutional management-agreed strategy to increase the gender diversity concerns, so we meet that requirement from Brussels, which also shows that the European Commission has increased if you will, its commitment to seeing gender diversity in scientific research. So this is good timing that you asked about earlier."* (CERN Interview 26/01/2022, female interviewee)

6.6.3 Specific Interventions at CERN

Application process: According to the interviewees, job advertisements are created mainly by the hiring managers and the HR department. This is seemingly the first phase where CERN sees an opportunity to influence the candidate pool. Tailoring the announcement should be less specific,

focusing on a broader population and avoiding precise tailoring to a particular type of person or gender. The focus is more on inclusion and wording to attract a large enough applicant base rather than specific characteristics of who this person should be. This is how one of the interviewees explain that:

CERN 1: "*Is the vacancy notice too specifically tailored to either gender or a type of student? It's less attached to who the student or fellow will be; to see whether the vacancy notice is as inclusive in its wording as to attract a big enough pool.*" (CERN Interview 26/01/2022, female interviewee)

Further on, collaboration, partnership, and synergy between the CERN talent acquisition team and specific hiring managers are essential. Previously, the focus was often on the excellence of applicants instead of on what they could bring to the team. Based on my interviews and what I understood, the emphasis is now placed on the team's excellence, diversification, and progress. In the past, applicants' self-esteem played a significant role. It was important how they could "sell" their excellence. It was observed that women were more often more modest in their presentation of themselves and what they could bring to the team. Therefore, CERN now draws attention to the evaluation of the importance of excellence in order not to exclude potential applicants who could perform well. Still, with the proper support at CERN, they could perform excellently. There is a more conscious focus first on the qualification and then on the applicants' potential rather than their already acquired competence to avoid excluding many applicants.

The conscious recruitment process focuses on more precise decision-making by mapping the exact gender distribution within smaller organisational units and specific positions. Many units within CERN are composed of employees with different skills and competencies in physics, engineering, information technologies, technology and administration. Based on this specific understanding of each smaller unit, an intervention of a conscious approach to recruitment with a shortlist of best male, best female, and best under-represented gender is applied. The nationality aspect is then included on top of that shortlist. When such a selection process is not possible, the hiring manager must motivate why it was not possible. Here is how one interviewee presented this approach:

CERN 1: *"Why I don't have, or I choose not to shortlist the best female candidate or the best, let's say underrepresented nationality, and if you in the final selection do not choose an underrepresented gender or nationality minority, you must, as the hiring manager motivate that now. And CERN has never done that before. Surprisingly, CERN has never, until now, as we have produced a dashboard per department that shows the nationality and gender. The breakdown among not only the department but also the groups within that department, which is already giving the hiring managers more of an insight as to where their diversity about gender and nationality needs to change."* (CERN Interview 26/01/2022, female interviewee)

Focal Points: The establishment of hub representatives (focal points) at smaller organisational units is a crucial part of the organisational structure to implement these recruitment strategies. Their primary roles are to evaluate their departments and create a task plan for what could be improved in terms of gender balance. Their assessment covers each unit's actual position, specific unit challenges, and achievable targets and measures how these targets could be met.

The overall plan for the *25 by '25* programme is scheduled in 4 steps. The work of focal points and their assessment of each department was ongoing while I was interviewing the interviewees, progressing towards phase 3 and the implementation of the *Fitness Plan*.
Step 1: March 2021 – endorsement of the programme by the Extended Directorate of CERN and Director-General
Step 2: Department Heads appoint focal points within their department (heterogenic groups composed of people within each department based on different organisational positions, seniority levels, gender, age, position, etc.)
Step 3: Employment of a specific "Fitness Plan" based on particular requirements and needs of each department based on the input from focal points.
Step 4: The road ahead: Focus on the communication strategy, reporting, adjusting, and engaging within the organisation by the departments for international relationships and human resources (CERN, The 25 by '25 journey, 2022).

This is how this process described one of my interviewees:

CERN 2: *"You know, really it is about departments engaging and developing their own fitness plans, as we call them, identifying the particular aspects of their department that need addressing. Is it more nationalities? More gender is it both? You know all departments are different, so it's about engaging with the departments through diversity and inclusion, focal points for the project, and who really are going to drive it. Currently, now we're working on the action plan. Concretely, what the departments can commit to doing with the HR support to be able to achieve these targets so, so that, that's where we are now."* (CERN Interview 27/01/2022, female interviewee)

The initial work performed by focal points was based on ranking their department at one of five levels (from 1-inactive to 5-exemplary) on how they operated within seven specific categories focusing on diversity and inclusion. These seven categories included:

1. Recruitment
2. Career Evolution and Retention
3. Benefits, Work-life Integration, Wellbeing and Flexibility
4. Leadership and Accountability
5. Surveys, Statistics, and Measurement
6. Communications
7. Learning and Development (CERN Interview 26/01/2022, female interviewee)

CERN 1: *"Level 5, I don't expect to see in my lifetime, level 4, we might have one or two categories where department might be stronger, but overall... Well, the input from those individuals in the focus groups per department has shown that for these seven categories, recruitment being one, we see it at one or two. So, that stage one of the implementation is to look closely based on the statistics and the experience of the personnel."* (CERN Interview 26/01/2022, female interviewee)

The role of the HR department: HR hosts and is responsible for diversity and inclusion. All HR services support implementing interventions around the *25 by '25* programme. Examples are development courses with gender balance in focus, supporting well-being and promoting flexible work measures. Furthermore, the HR department is intensely involved in coordination with other services such as central communication to drive the agenda forward with concrete actions and procedures that can support the focal points and the departments. HR is also responsible for creating

analytics and statistical data and mapping and evaluating the results of interventions and measures taken by departments. This is how one interviewee described the role and work of HR:

CERN 2: *"So, HR is a driver of this whole project and also the accountable department in terms of hosting the data and reporting and analytics."* (CERN Interview 27/01/2022, female interviewee)

6.6.4 Specific Interventions at UiA

Mapping the current situation: Smaller units within the Faculty of Engineering and Science have a specific context and thus specific needs to recruit the under-represented gender. They must prepare a detailed plan to increase the gender balance. Each unit must set an achievable goal and a plan to achieve that goal. Although this plan was mentioned multiple times throughout the interviews, I was not able to collect the specific intervention plan for this faculty.

Vacancy notices – enlarging the scope: In several interviews, it was clear that UiA has a real focus on inclusive job descriptions. There is a significant focus on inclusive wording and broad descriptions. Although UiA focuses on comprehensive job descriptions to include a varied workforce, there is room for a more detailed assessment of job advertisements and the requirements of each faculty and their smaller units. It can be a dense bottleneck in different layers, which leads to an exclusion. Some departments may have narrower and tighter requirements for varying levels of competence among the applicants. I had an impression that there is a lot of knowledge from previous university research that could be applied and used in specific interventions. Through the interviews, I was able to collect different perspectives to present this issue better. Their answers varied based on their position at UiA:

UiA 4: *"Actually, I sent my application like OK, this is what I would like to do. And then then I, I was rejected on for, uh, because I sent it to the IT guys. What is it? You will find this uhm department, Department for Information, Information and Computer Studies, ICT. And then I got mad. I don't know. No, you don't have a background in that direction. And I didn't say, OK, maybe you can do something else so that I didn't get rejected. So, what I did was I sent the same email to the guys in NTNU. Yeah, the same department, and they said yes, you can come here. OK, so I got accepted actually at NTNU."* (UiA Interview 31/01/2022, female interviewee)

UiA 3: *"Neutral talent, neutral job advertising. But no human can do that. No one can just see talent completely objectively and neutrally. We then have some things we interpret as a sign of talent. It is not enough to be for equality. You also have to dig into some kind of microsocial processes."* (UiA Interview 02/02/2022, female interviewee)

Gender-balanced selection committee: Another critical factor in UiA's recruitment is a gender-balanced selection committee. If this is not possible, it is crucial to justify why not. But unfortunately, there were still some cases where this was not the case. On the other hand, employees reacted to such a situation, and improvements were made. It showed me how important it is to focus on and oversee recruitment and selection processes. It also confirmed the broad awareness of gender equality throughout the organisation at UiA.

Another issue related to selection committees is that participation in them requires a lot of resources from women who are already under-represented and struggling with time management. Participating in many committees gives them less time for research and publication. This interview excerpt shows not only how the selection committee at UiA works but also how broad the overall equality awareness at UiA is present:

UiA 1: *"I also want to believe that it is ok for men to recruit men, perhaps to a greater potential degree. So, it is in a way necessary that we have a focus on that in all the processes. Then we have seen that we have a general requirement that there should be a gender balance concerning selection. When establishing that gender balance is not possible, they must physically address that topic in the case documents. They must develop an objective basis for it not being possible not to have a gender balance in the process. Most recently, we had a case up, now related to the employment of some PhD students, where you saw that the whole process was carried out by men in that faculty. Others from the same environment reacted, so the topic was, thanks to them, actualised."* (UiA Interview 28/01/2022, male interviewee)

The Balance Project: This project lasted from 2015 until 2018 with the intent to increase female professors at UiA through three central interventions. These interventions or measures were:

1) Integration of gender equality perspectives in leadership development programmes- the aim was to increase knowledge and understanding of gender inequality within academia and focus on gender balance throughout the organisation.
2) Creation of Search- and Find Committees in recruitment processes- unique search- and find committees throughout their private networks aimed to find female candidates who could be possibly interested in applying for positions at the university.
3) Preliminary evaluations (mock-evaluation) of female associate professors to progress to a full professorship (University in Agder, 2022)

Female academics at UiA were offered a preliminary assessment of their scientific competence with the intention of assessing their advancement to a professorship. Annually, individual free purchase scholarships were announced for female associate professors to facilitate their promotion to professor.

6.6.5 Difficulty to Evaluate and Measure the Interventions

I could not gather clear answers as to why so few women are in the STEM fields at CERN and UiA. This is partly due to the complexity of this topic and partly because it was not fully mapped or evaluated in detail during my interviews. It can also be due to the complexity of theory, intentions, and practical implications. Another reason, which may explain this situation, is my inability to interview several direct employees in STEM departments at CERN and the Faculty of Engineering and Science at UiA. It would nevertheless be an advantage to map these interventions entirely within the context of each organisation and then address the level of success of the proposed measures.

Based on my interviews, an example of the intervention that was difficult to measure could be taken from a comprehensive focus on the presentation of inclusive culture, which was an essential part of organisational communication for years. The success and impact of this communication was difficult to measure. According to the interviewees, there were still areas where their organisations could be more proactive and see and measure results better. Examples taken from the interviews were for CERN, the need to evaluate the effect of job advertisements with a focus on inclusion and a more comprehensive range of applicants. For UiA, the need is to research why male students in far higher numbers than female students choose a career in academia.

CERN 1: *"A section at CERN that deals with education and outreach tries to give students different role model images of STEM professionals. But tracking the results of those kinds of efforts is almost impossible to know to what extent do we impact eventual applicants? And then there's filtration going forward, where I think we can already be a bit more proactive. Is that the drafting of our vacancy notices themselves to ensure that we are being clear and inclusive for potential diversity?"* (CERN Interview 26/01/2022, female interviewee)

UiA2: *"Maybe it may well be that one has to look at, ok, to what extent it is attractive, wholly independent of gender, to choose a career within academia? Here if you go in and just look one way, the gender distribution among students. Then maybe that picture is not so wrong to put it that way. In any case, it is significantly better than if you go and compare with actual employees, then you get to say something. But it then seems evident that if you are only going to take out in the first place the gender balance, then it looks ok regarding those who study these particular courses. Then, a more significant proportion of male students choose a career in academia than women. And then the question becomes, why is that? I do not have a good answer to that."* (UiA Interview 21/01/2022, male interviewee)

I found the *Balance Project* being an impressive project and well thought through. In my opinion the search and find committee at UiA was a remarkable intervention. Unfortunately, no interview participant could tell me if the initiative was successful, and UiA was able to recruit more female professors through this channel. The interviews also showed that the best-documented intervention was the preliminary assessments of the associate professors. But my perception was that the programme findings somehow lacked closure and I was unsure if they were fully applied at UiA. I also got the impression that UiA's commitment to advancement to the professorship is based solely on research and publication. According to an interviewee, this approach can be challenging and possibly only yield quantitative results rather than qualitative ones. The previously mentioned literature evaluating the impacts of pandemics on academic work and the research of Windsor, Crawford and Breuning (2021) also conclude that focusing only on publishing is unsustainable and gender-biased.

UiA 3: *"So, I think, yes, but is it a good development that more women also come in and just learn to play the game better? Or should we say: Is it a little undemocratic, and that may be for theoretical and abstract, and that gets a little too unrealistic, right? Do we contribute as much to society as we really should, or do we become more and more hung up on just competing with a few people out there in the world to publish in just that and that magazine?"* (UiA Interview 02/02/2022, female interviewee)

What I was able to gather from the interviews is the need to focus on details, map the situation clearly and in detail, discuss issues the smaller units in the organisation face, and evaluate the proposed measures. Overall, recruitment plans are critical, but concrete implementation requires a detailed understanding of the status quo. During the interviews, several opportunities arose to acquire such knowledge:

1) One of the possibilities is to conduct surveys and exit surveys to gain a deeper understanding of women's experiences within the framework of CERN and UiA.
2) The importance of distributing information about future development opportunities in the organisation.
3) Evaluation of implemented measures and their success.
4) Evaluation of statistics in more detail to avoid the hidden patterns in larger datasets.

6.6.6 Pandemics

Through the interviews, it was impossible to avoid the impact of pandemics on the overall activities aimed at improving the gender balance, especially in academia. The University of Agder was no exception to being spared the influence of pandemics. An interviewee assessed the situation as follows:

UiA 1: *"We had the last two years, first and foremost, a priority to get the students to progress and then the others. Life and health came at the top, and then student progression, which has had a consequence for the focus on moving up in academia. No one had that capacity to work with the release of time for academic staff. But I hope in '22 that we get to fix it."* (UiA Interview 28/01/2022, male interviewee)

Freeing up time to become a professor was not in focus, and that type of interventions was more or less completely stopped. There was a clear focus on teaching and supervising students. The student-centred approach was dominant and remained so for two years. During the interviews in January 2022, it was only then that the university slowly began to return to pre-pandemic activities. This finding supported the research that confirmed that the pandemics hit female researchers harder. All activities at UiA to support their female academics and their research, to free-up their time, actively search for new female professors nationally and internationally and generally attract more female academics and female professors in STEM in particular, were downgraded.

Nevertheless, this period created an additional stop for the recruitment and progression of female academics. This challenging situation and the experiences of many scholars give us the information we would not have had to such an extent if it were not for pandemics. In my opinion, we can use it to our advantage and based on that knowledge make a proactive effort to implement interventions that incorporate this knowledge.

As a possible concrete example, which caught my attention, we could look at these bar graphs from UiA's personnel statistics below. A change can be seen in professorships between 2018 and 2021; two of these four years were significantly affected by pandemics. The group, 40-49, shows a high jump for male professors and a constant number of female professors. I could think of some reasons for this significant difference, such as the new recruitment of male professors or the change in the status of male academics from the position of associate professor to professor. No difference in the number of female professors could be explained by the movement from one age group (40-49) to another (50-61) or stagnation. A detailed assessment and understanding of this leap will help to find out what the reasons were and the next concrete intervention to recruit more female professors in STEM at UiA.

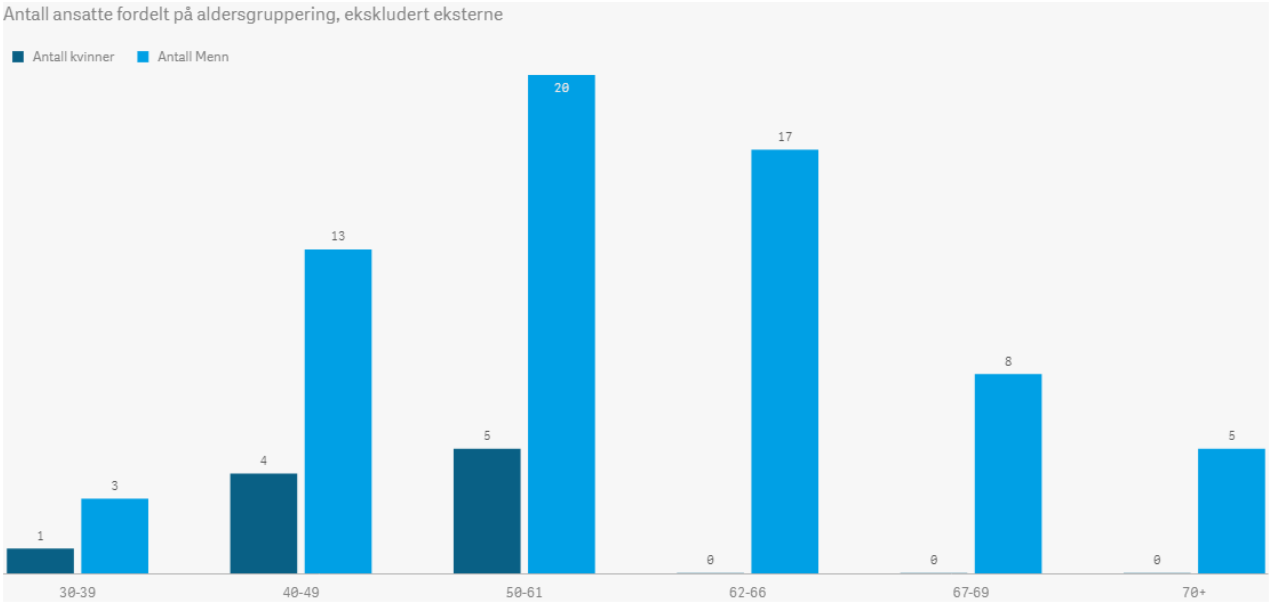

Figure 13 Selection by professor status, including professors II at Faculty of Engineering and Science 2018 (University of Agder, 2022)

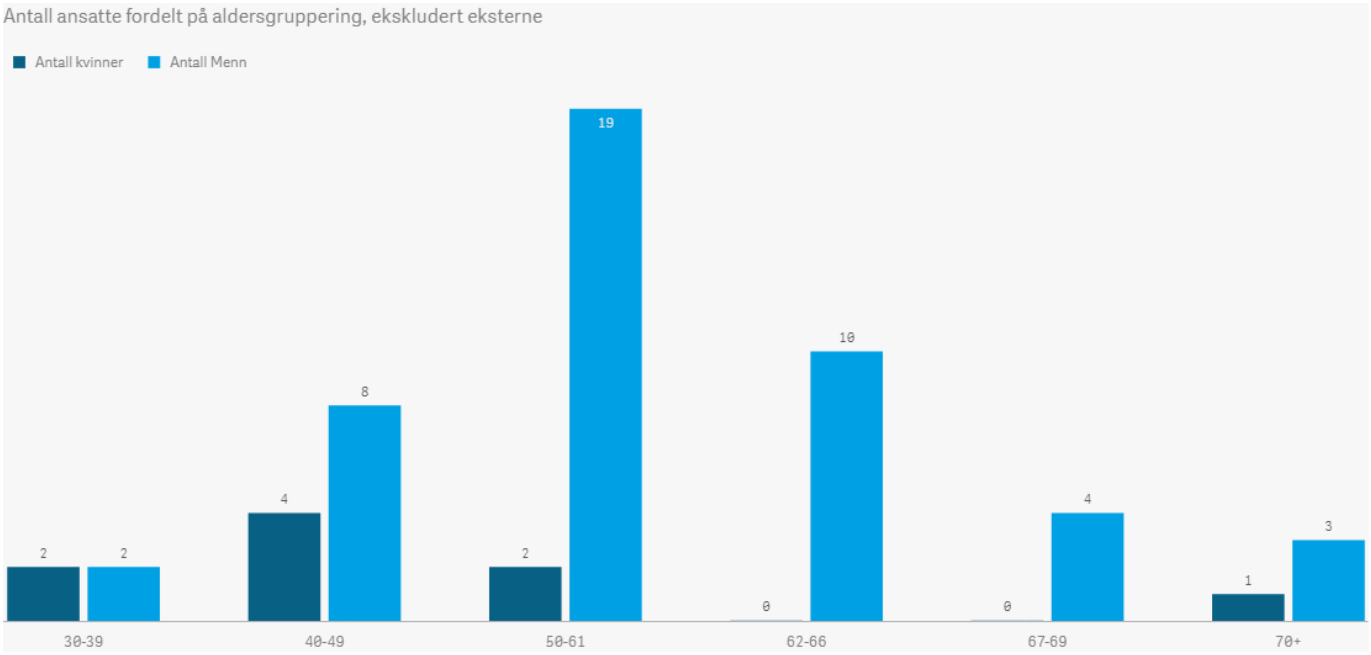

Figure 14 Selection by professor status, including professors II at Faculty of Engineering and Science in 2021 (University of Agder, 2022)

The situation at CERN was somewhat different compared to UiA. From what I collected from the interviews; CERN had no data or knowledge to support that the pandemic had any greater impact on female employees than on male employees. There was no extra focus on that type of data in the recruitment activities.

7 Summarising Remarks and Conclusion

Achieving gender equality and empowering all women and girls is one of the 17 goals defined by the United Nations in the 2030 Agenda for Sustainable Development (United Nations, Transforming our world: the 2030 Agenda for Sustainable Development, 2021). According to the Global Gender Gap Report 2020, it will take almost a century, based on the latest pace of change, to achieve gender equality. Even in the countries that score high according to the gender equality index and where educational gender equality is achieved, "women's skills are not always in line with those required to succeed in professions of the future. In addition, they encounter barriers to employment in the most dynamic and in-demand occupations" (World Economic Forum, 2021). Such occupations include science, technology, engineering, and mathematics (STEM) professions.

Based on the above, the gender gap in STEM has gained more attention, and various strategies and interventions to improve this gender imbalance have been presented. Many organisations have started implementing new recruitment strategies to reduce the gender imbalance as a part of their overall equality plans.

My thesis's focus and primary intention were directed at two organisations, CERN and UiA and how they improve the gender imbalance in STEM within their own organisations. Both organisations are, to some extent, similar; both derive from academia. But they are also very different. One is a large international organisation, and another is a local university in southern Norway. They both have their own path to improving the gender balance within their organisation.

In 2021, CERN launched a strategy called *25 by '25*. Their main goal is to achieve 25% female representation throughout the entire organisation by 2025. UiA launched a second *Plan of Action for Equality, Diversity and Inclusion* for 2020-2024, intending to achieve 40 % and 60% gender balance in all units.

In this master's thesis, I have focused on these two strategies; I tried to understand their primary goals, specific measures and interventions and how each organisation dedicated its efforts to the gender balance in STEM. Through ten interviews with five interviewees from CERN and five from UiA, I gained more understanding of their recruitment processes focusing on female representation in

STEM. I gathered and summarised my findings and what we could learn from these organisations and their interventions. The interviewees concentrated on a couple of essential factors which they found crucial in their work. I believe that their practical experience within a specific context of CERN and UiA is enormously valuable.

Here is the summary of these measures and interventions to improve the gender balance:

1) Leadership-led change. The change must be more anchored in the leadership rather than Human Relationships department. This way, one can more easily engage the senior leadership and the supporting personnel. It gives a sense of accountability for one's commitment to the strategy.
2) Leadership development to increase competence on the subject increases the activity and dedication to other activities and interventions to improve the gender balance. One focuses more on progression and understanding why it is crucial to commit to these strategies. It is essential to see the world, the struggles and challenges from the perspective of the marginalised group, and then the understanding and will to change comes naturally.
3) The overall awareness interventions are attention, visibility, and more focus on the topic throughout the organisation.
4) There is a need for a dedicated program coordinator and advisor on the topic who coordinates and oversees the activities. The need to follow up on the activities and ensure that managers and personnel are involved in this work because there will be no changes without their support. The importance of the budget allocated to finance dedicated activities helps anchor the interventions; it gives more space to move around and does not constrain the activities due to missing finances.
5) Although leadership-led strategies, the action must be built from the bottom-up - commitment from the entire organisation through various activities focusing on women in STEM.
6) Gain more profound knowledge, and a deeper understanding of the challenges employees face within the context of each organisation. Implement the survey research (as an example) to understand better the views of female personnel, specifically those who choose to leave.

Covering this topic and my research question turned out to be even more complex and challenging than I had previously imagined. The research question covered a wider area than this thesis's scope and time frame. The findings were based on ten interviews. This scope did not allow me to generalise, but the findings still contribute to the general knowledge about the gender balance within

STEM. My findings and concluding remarks are strongly influenced by the perceptions of the interviewer and the interviewees. Initially, eight interviews were planned, but due to the scope and complexity of the topic, I chose to conduct one more interview per organisation. At each interview, new opportunities and new issues were revealed that would be very interesting to investigate further. I chose not to change the research question, focusing on only one organisation or part of recruitment strategies. One of the main findings was comparing the two organisations and their differences in their recruitment strategies. However, this limited the depth of understanding of the context of each organisation and each recruitment strategy. I could not cover perspectives and gather more detailed information from leaders, professors, academic staff, and several fellows and PhD students who experienced or implemented these strategies in the specific context of these organisations.

It is also important to mention that this thesis was written in the middle of the pandemics, and researched organisations had to deal with many unexpected situations and demands on a unique scale. The work on gender balance was strongly influenced and probably even thrown back, especially at the University of Agder. Many ongoing activities before the pandemics had to stop, and the focus was solemnly on the students and their progression. Therefore, the picture of the strategies described in this thesis would also be completely different if they were not affected by the pandemic.

Although the last two years have been difficult for these organisations, I have a positive case at the student level where these strategies possibly began to yield results. It is my own personal experience. While in my second year of this master's degree programme, I was able to apply for a student programme at CERN. And I was finally accepted. I am a woman, and I am a member of the under-represented nationality at CERN. But I have not experienced that my gender or nationality was the only reason for my employment. After talking to my supervisor, my experience with technical documentation from Norway's oil and gas industry was the main reason for my acceptance at CERN. Within a significant number of applications from highly qualified students from all over Europe, one can still become invisible, and available places are limited. With dedicated attention to a more inclusive and balanced environment, one's application may manifest itself in a different view. As possibly mine did.

Ultimately, it is not just our skills and education that are crucial. It is also who we are as human beings and what we can bring to the group. My own story shows that it is possible to balance recruitment in STEM, but it does not happen without commitment, strategy and plan. And a supervisor with a focus on gender balance, which I experience every day in collaboration with her. In my group, the combination of the quantitative women's representation and the qualitative dynamics of the group makes me feel very welcome. I do not think I have to be someone else and fit into this environment. But it might as well be that I am aware of this fit-in attitude and choose to balance it within some reasonable limits. On the one hand, being part of the team and cooperating with your colleagues is an essential skill; on the other hand, being oneself and contributing to the team with one's perspective and one's own set of expertise is another.

I will end my thesis with a comment from one of the interviewees. It summarises the past and the future. It also reflects our duty to improve the situation. But above all, it gives us confirmation that change is not only possible but also inevitable. And I am glad that organisations like CERN and UiA are already actively participating in this critical change.

CERN 1: *"...to reflect the diverse population in gender and other dimensions that we see throughout our Member States not only from who our salaries are provided. But it's the science that we're developing. We are serving a diverse gender population in Europe, so we must be able to reflect better that population."* (CERN Interview 26/01/2022, female interviewee)

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9 Attachment 1: Interview Guide

Guide for Recruitment Policy Programme's Leaders and Managers

Topic: Introduction and gender balance

1) Can you please present yourself and your position at CERN / UiA?
2) What do you think? Are there enough women in STEM positions at CERN / UiA? If not, why do you think that is the case?
3) Why did your organisation start focusing on gender balance? And why now?

Topic: The actual recruitment strategies

4) Can you tell me more about the gender balance recruitment strategy 25 by '25 / 2020-2024 Plan of Action for Equality, Inclusion and Diversity?
5) Why is it essential for CERN / UiA to have 25 by '25 / 2020-2024 Plan of Action for Equality, Inclusion and Diversity?
6) How will CERN / UiA implement the programme? What is your role in the implementation process?
7) What are the fundamental changes compared to previous years regarding the hiring process? Job descriptions, handling of applications (is AI involved and is it customised), selection of candidates for interview, the final choice?

Topic: Implementation

8) What do you think: How vital is dedicated financial support for implementing this programme? Do you have a specific budget?
   Sub-question: Is this budget specifically allocated, and if so, to which activities?
9) Do you have an implementation plan for 4-5 years? If so, what are the planned steps in this 4–5-year period.
10) Do you have any additional activities to improve and promote the organisational culture regarding gender balance? Do you think it is essential to focus on the corporate culture for this recruitment programme to succeed? Bottom-up process?
11) What role do top management and middle management play in implementing? Top-down implementation.

Topic: Knowledge transfer

12) What do you want to bring out as the essential knowledge from your work so far?

Guide for Female Fellows / PhD-students

Topic: Introduction and gender balance

1) Can you please present yourself and your position at CERN / UiA?
2) What do you think? Are there enough women in STEM positions at CERN / UiA? If not, why do you think that is the case?

Topic: The actual recruitment strategies

3) Do you know that your organisation has a dedicated recruitment programme focusing on gender balance?
4) Have you heard of the 25 by ’25 / 2020-2024 Plan of Action for Equality, Inclusion and Diversity? If so, what do you know about it?
5) Do you think it is essential for CERN / UiA to have dedicated recruitment strategies such as the 25 by ’25 / 2020-2024 Plan of Action for Equality, Inclusion and Diversity? Why?

Topic: Implementation

6) Have you experienced an active implementation of recruitment strategies focusing on gender balance in your department?
7) When CERN/UiA recruited you, did you find that your organisation focused on gender balance?
8) Do you have additional activities in your department to improve and promote the organisational culture focusing on gender balance? If so, what are they?

Topic: Knowledge transfer

9) From your perspective, do you have any suggestions, ideas, or thoughts for your organisation to improve its gender balance?

10 Attachment 2: NESH's Approval Letter

Notification form / There is not enough women / Assessment

Assessment

Print

Reference number
931298

Project title
There is not enough women

Data controller (institution responsible for the project)
Universitetet i Agder / Fakultet for humaniora og pedagogikk / Institutt for religion, filosofi og historie

Project leader (academic employee/supervisor or PhD candidate)
Hanne Haaland, hanne.haaland@uia.no, tlf: +4797718817

Type of project
Student project, Master's thesis

Contact information, student
Hanne Haaland, hanne.haaland@uia.no, tlf: +4797718817

Project period
01.01.2022 - 09.05.2022

Assessment (1)

21.01.2022 - Assessed
Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet med vedlegg den 21.01.2022, samt i meldingsdialogen mellom innmelder og Personverntjenester. Behandlingen kan starte.

TYPE OPPLYSNINGER OG VARIGHET
Prosjektet vil behandle alminnelige kategorier av personopplysninger frem til 09.05.2022.

LOVLIG GRUNNLAG
Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse som kan dokumenteres, og som den registrerte kan trekke tilbake.

Lovlig grunnlag for behandlingen vil dermed være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 bokstav a.

PERSONVERNPRINSIPPER
Personverntjenester vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om:

· lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen
· formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke behandles til nye, uforenlige formål
· dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet
· lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet

DE REGISTRERTES RETTIGHETER
Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), og dataportabilitet (art. 20).

Personverntjenester vurderer at informasjonen om behandlingen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13.
Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER
Personverntjenester legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32).
Zoom er databehandler i prosjektet. Personverntjenester legger til grunn at behandlingen oppfyller kravene til bruk av databehandler, jf. art 28 og 29.
For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og/eller rådføre dere med behandlingsansvarlig institusjon.

MELD VESENTLIGE ENDRINGER
Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde dette til oss ved å oppdatere meldeskjemaet.
Før du melder inn en endring, oppfordrer vi deg til å lese om hvilke type endringer det er nødvendig å melde: https://www.nsd.no/personverntjenester/fylle-ut-meldeskjema-for-personopplysninger/melde-endringer-i-meldeskjema
Du må vente på svar fra oss før endringen gjennomføres.

OPPFØLGING AV PROSJEKTET
Personverntjenester vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.
Lykke til med prosjektet!