Gender STI

VTT

Inclusiveness in Research

a manual for research personnel and RTOs

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Inclusiveness in Research: a manual for research personnel and RTOs

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The HORIZON 2020-funded GENDER STI project (2020-2023) aims to solve complex problems associated with the integration of the gender perspective in Science, Technology, and Innovation (STI) dialogues with third countries. By applying an intersectional approach to gender, the project focuses on three key areas: gender equality in scientific careers, gender balance in decision making and the integration of the gender dimension in Research and Innovation (R&I) content. The project created the European Observatory on Gender in STI, which is unique of its kind in Europe, serving as a hub for gender equality in STI dialogues, incorporating all knowledge and materials resulting from the project. The Gender STI consortium is made up of partners from 16 countries in four continents.

VTT Technical Research Centre of Finland Ltd is the leading research and technology company in the Nordic countries. VTT has the largest public applied research activity in Northern Europe with a staff of +2000 employees from 51 different nationalities. Over the years, VTT has participated in more than 1000 European Research and Development Framework Programme projects, within various thematic programmes, and serves both private and public sectors. VTT has been recognised with the "HR Excellence in Research" award by the European Commission as one of the first RTO's. The award reflects VTT's commitment to continuously improve its own human resource and leadership policies in line with the 40 principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. Notably, VTT has an operating DEI taskforce dedicated to ensuring the implementation of Diversity, Equity, and Inclusion principles across the organisation and as an integral part of its working culture.

ABOUT THE AUTHORS

Essi Laitinen (she, her, hers) (BSocSc) is a Finnish Research Trainee in the Responsible Innovations and Ethics team in VTT, finalising her master studies in Peace, Mediation and Conflict Research in the University of Tampere. Laitinen's main academic interests and expertise lie in topics related to Diversity, Equity, and Inclusion (DEI), collaborative and participatory methods, Indigenous research, and decolonisation of science. Although an early career researcher, Laitinen has already developed DEI-related trainings, guidelines, tools, and online-courses, as well as trained researcher personnel in the field of STI on DEI-related topics.

Giovanna Sanchez Nieminen (she, her, hers) (MSocSc) is a Research Scientist in VTT with over 10 years of experience working on issues related to gender-based violence, gender equality, social inclusion, and exclusion dynamics. Sanchez Nieminen holds a bachelor's degree in international relations and a master's degree in Peace, Mediation and Conflict research. She has throughout her career been involved with a variety of public-funded research projects related to the socio-political and ethical aspects of new technologies. As a member of the Responsible Innovations and Ethics team in VTT, Giovanna has developed guidelines, trainings and courses to inform scientists working on innovations on topics related to responsibility and inclusiveness in research.

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LIST OF ABBREVIATIONS

AC	Associated Countries
AI	Artificial Intelligence
AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander People
BITC	Business in the community
EC	European Commission
ECR	Early career researcher
ERA	European Research Area
EU	European Union
FUURT	Finnish Union of University Researchers and Teachers
GBV	Gender-based violence
GEP	Gender Equality Plan
LGBTIQ+	Lesbian, Gay, Bisexual, Trans, Intersex, Queer and all the other gender and sexual orientations that don't fit into the letters (+).
MS	Member States
NGO	Non-Governmental Organisation
R&D&I	Research, Development, and Innovation
R&I	Research and Innovation
RTO	Research and Technology Organisation
STEM	Science Technology Engineering and Mathematics
STI	Science Technology and Innovation
TB	Tuberculosis

Gender STI⇶

1 INTRODUCTION

The goal of this manual is to bring awareness and guide those working in the field of Science, Technology, and Innovation (STI) on the implementation of gender and inclusiveness dimensions into research and innovation (R&I) content. This manual offers a compilation of various topical academic knowledge, publicly available tools and materials, as well as practical examples on how the lack of inclusiveness can impact the work in different STI fields, and in what ways we can address these issues. The need to create and compile this type of manual rose from a series of Co-Design workshops, organised by the Horizon 2020-funded Gender STI project. These workshops were held with international research personnel in Spring 2022, with the purpose to collaboratively develop new ways to implement inclusiveness into R&I content.

Recognising that science and technology are not neutral is the first step for gender sensitisation and inclusive thinking in the research and innovation process and work environment. The path to building inclusive innovation is complex and requires a basic understanding of terms and methods, which once were exclusively used in the realm of social sciences and gender studies. Such terms and methods provide us the tools to critically think about the research design process and future implementation of technologies in real-life settings. In our times, innovations are expected to have societal responsiveness and help to solve systemic problems. New solutions should not only bring economic growth but tackle effectively complex societal challenges such as poverty, climate change, and universal access to education. Multi-layered by nature, societal challenges can only be tackled with diverse solutions that are designed with an in-depth understanding of society and its dynamics.

STI fields have been deficient to some extent in responding effectively to diverse and systemic challenges due to a lack of gender-informed research. STI fields are rather exclusive than inclusive, mostly dominated by white masculine culture, with persistent gender inequality and restricted inclusive perspective (Cockburn and Ormrod, 1993; Lindberg and Schiffbaenker, 2013; Lövkrona, 2016; Pecis, 2016; Wajcman, 2010). If not carefully attained, research and innovation can generate negative social impacts, while reproducing and reinforcing existing inequalities.

Furthermore, societally responsive and sustainable innovations can only flourish in respectful and inclusive work environments, where research teams are not only quantitatively diverse, but every individual member of research personnel[1] is fairly treated and equally valued within the team and institution where they work. Thus, the pathway to creating societally responsive innovations is three-folded. First, research teams should be quantitatively diverse. Secondly, an inclusive work culture must be in place. And finally, the inclusiveness dimension must be integrated into research and innovation content.

Overall, the promotion of an inclusive approach to research and innovation can:
- add value to the research in terms of excellence, by making research more relevant to the society, and enhance responsibility by generating ethically sound outcomes

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[1] In this manual, we use the term *research personnel* to refer to all individuals working in and contributing to research and innovation processes, from grant writers to researchers, technicians to communications officers, and from project managers to administrators.

- enable research personnel to think critically about social inequality, gender norms, and stereotypes – including the ability to recognise their own positionality
- elucidating the needs and behaviours of diverse individuals, and therefore boost not only the societal relevance of research and innovation but also generate new business opportunities before unforeseen
- support the development of goods and services with higher acceptance rates among diverse consumer groups.

We hope the information found in this manual will support research personnel to consider diversity, equity, and inclusion (DEI) across all steps of the research and innovation process, starting from the definition of research questions until the dissemination of results, as well as provide RTOs with the basic knowledge and tools to transform the work environment into inclusive spaces, where research personnel can feel empowered and equally valued to perform at the best of their capacities.

There is no one-size-fits all approach to diversity and inclusion, nor is there a onetime fix for inequalities in research organisations (such as a sole online course or a manual). Rather, diversity and inclusion should be considered as a process; a commitment to learn, challenge and act every day to make STI fields more inclusive and diverse, although it may be challenging and requires resources.

Finally, gender and inclusiveness are topics that can spark many types of feelings and that relate to many different aspects of research and innovation work. Furthermore, as this manual tackles the biases, inequalities, and discrimination that occurs in the field of STI, feelings of discomfort or irritation are expected while reading this. These feelings are an inevitable part of the process of learning new perspectives to our work, that we might not have been familiar with before. Therefore, we ask you to keep an open mind when reading this manual.

2 CENTRAL CONCEPTS AND THEIR RELEVANCE FOR STI

To understand inclusiveness and inclusive practices, it is important to get acquainted with definitions and terms which are commonly used in the fields of social sciences and gender studies. Some words are commonly used in our daily lives, but their scientific meaning and definition might escape us when using them on a day-to-day basis. Thus, this report starts with the definition of words used to reflect and create more inclusive research and scientific outcomes. Overall, the definitions below are in line with how the European Institute for Gender Equality (EIGE, 2016a) and the American Psychology Association (APA, 2021) define these terms.

Cisgender: an individual whose gender identity aligns with the sex assigned at birth.

Colonialism: a general term to describe the conquering, settling and exploitation of the lands and cultures of others, and shaping of local societies and their inhabitants. Colonialism also involves making differences between people (for e.g., cultural and/or physical characteristics), and building oppressive social hierarchies based on these differences.

Disability: a general term used to describe functional limitations that affect major life activities, such as walking, lifting, learning, seeing, talking, hearing, and breathing. On the other hand, people without disabilities are referred to as **able-bodied**.

Discrimination: prejudicial and unequal treatment of individuals based on factual or assumed personal characteristics (race, gender, sexual orientation, religion, sex, disabilities, etc) or participation in certain social groups. Discrimination can take the form of a single act, word, or situation, or it can be persistent as the result of discriminatory social rules, norms, values, and practices.

Diversity: refers to the existence of individuals with different characteristics (for e.g., varying genders, races, religions, skills) in a group of people.

Early career researcher (ECR): an umbrella term to describe researchers who have recently entered the research system, such as research trainees, doctoral researchers, and post-doctoral researchers.

Equality: entails ensuring that every individual has the same rights and opportunities.

Equity: in contrast to equality, equity entails recognizing that treating everyone the same does not ensure equality, as individuals do not start from the same place nor have the same opportunities.

Ethnicity: a social category which is based on having a shared culture (e.g., language, food, music, values, and beliefs) related to common ancestry and shared history.

Gender: a social category created to describe characteristics that a certain society considers to be appropriate for men and women such as their attributes, behaviour, and roles in private and public life, in addition to their relationships with each other as

individuals and as groups. The concept of gender is context-based, and it can vary in different cultures, historical times, and geographical locations.

Gender identity: an individual's gender identity is determined by the way individuals or groups perceive and present gender norms. Identities, such as gender, ethnicity, class, and cultural heritage, may be context-specific and interact with one another.

Identity: the characteristics, qualities, feelings, and beliefs that make a person or group of individuals different from others. Individuals perceive themselves with unique characteristics, and perceptions and as members of social groups (e.g., family, work community, religious group, college class).

Indigenous People: an umbrella term to describe peoples that descent from populations that inhabited a certain geographical area prior to its colonisation and the creation of the concept of nation-states. Being referred to as "Indigenous" also entails a legal status under international law, with special protective measures concerning the distinct language, culture, political systems, and ancestral lands of Indigenous Peoples.

Inclusiveness: the quality or practice of including different types of individuals, particularly for those who otherwise might be excluded or marginalised. To provide them equal opportunities, resources, and fair treatment.

Neurodiversity: Neurodiversity refers to the range of differences in the way that individuals' brains work when it comes to, for example, learning and attention (dis)abilities, mood, and executive functions. The term **neurodivergent** is commonly used to refer to those with autism, dyslexia, Tourette syndrome, and ADHD (among others), while **neurotypical** refers to those with no detected developmental, attention deficit, or learning disorders. Rather than dividing neurotypes into good and flawed, or normal and abnormal, neurotypes should be considered as simply differences in the functioning of brains.

Positionality: refers to how our characteristics and background shapes the way we see the world, what our position in the society is, and how much power we have. For e.g., being white, European, heterosexual, highly educated and from a middle-class family affects the way we see the world, while granting us a considerable advantage in comparison to other social groups.

Privilege: can be understood as the opposite of being discriminated against. While discrimination occurs based on certain (assumed) characteristics of a group of people, the same system favours the characteristics of another group of people.

Race: a social category, like gender, created in a process called *racialisation.* It categorises people into groups based on their physical qualities such as skin colour.

Sex: a set of biological and physiological attributes used to categorize humans and animals as females, males or intersex (people born with sex characteristics that do not fit typical notions of female or male bodies).

Sexual orientation: an immutable or inherent pattern of emotional, romantic, and/or sexual attraction (or lack of it) to other people. Examples of sexual orientation are lesbian, gay, heterosexual, straight, asexual, bisexual, pansexual etc.

Transgender: an umbrella term used to describe a range of gender identities that goes beyond the conventional binary female/male. The term is commonly used to describe an individual whose gender identity does not conform to cultural expectations and/or to the assigned sex at birth.

For further information, see:
- EIGE's Gender Equality Glossary & Thesaurus (EIGE, 206a)
- APA Guideline on Inclusive Language in Writing (APA, 2021)

2.1 Understanding Discrimination

In a nutshell, discrimination entails systematic and unequal treatment of individuals or groups (APA, 2022). Discrimination can be based on any real or assumed characteristic(s) of an individual or group, such as gender, age, ethnicity, citizenship, language, religion, disability, or sexual orientation (APA, 2022). The emphasis here is on the *assumed*; discrimination is often based on prejudices or stereotypes linked to a group of people rather than actual attributes. Discrimination is also often based on the external characteristics of an individual or a group, rather than their actual identities. Therefore, an individual can be discriminated against for merely looking like they belong to a certain group, regardless of what their identity is (University of Helsinki, 2021). As such, discrimination may also occur by association, i.e., when an individual is associated with someone belonging to a minority group (University of Helsinki, 2021).

Roughly, discrimination can be divided into two categories: **institutional/structural** and **individual discrimination**. Institutional and/or structural discrimination refer to practices of an organisation, society, or state that has a discriminatory effect (Pincus, 2000). These include norms, values, rules, laws, and practices, that either intentionally (institutional discrimination) or unintentionally (structural discrimination) discriminate against individuals or groups of people (Lövkrona, 2016; Pincus, 2000). Where institutional discrimination entails that a state has laws that purposefully discriminate a group of people (for e.g., the Apartheid in South Africa and South-West Africa), structural discrimination is harder to detect, as it is neutral in intent, but has discriminatory effects (Pincus, 2000).

Structural and institutional discrimination are typically based on the idea that some characteristics are more 'normal' and 'better'. Examples of such norms are the hetero norm, the binary male/female norm, the able-bodied norm, and the white skin-colour norm. These norms include presumptions that it is 'normal' to be heterosexual, either a man or a woman, white-skinned and without disabilities, and therefore, laws are created in support of these norms.

Individual discrimination, on the other hand, refers to discriminatory behaviour of an individual, such as the use of offensive language, refusing to work with someone based on the colour of their skin, or telling jokes that reinforce gender stereotypes (Lövkrona, 2016; University of Helsinki, 2021), such as "she must be on her period since she is so emotional", "women's logic" or "you (woman) can take notes since your handwriting is better". Individual discrimination is by no means an isolated phenomenon, but a symptom of living in a society with structural, discriminatory practices. In other words, individual and structural discrimination are intertwined; the former is made possible by the ideas, notions,

and values that spread throughout societal structures, institutions, and organisations (Lövkrona, 2016; Pincus, 2000). Whether intentional or unintentional, everyday discrimination is often rooted in unexamined actions.

Since discrimination is based on external characteristics, it is also possible for a person belonging to a minority or an underrepresented group to be safeguarded from discrimination or gain privileges due to their appearance. For example, a transwoman (a woman who was assigned male at birth, but who has a female gender identity) might "pass" to others as a ciswoman based on their appearance, and avoid everyday forms of discrimination, such as name-calling or violence (Dias et al., 2021). Passing as a cisgender woman, however, does not protect from structural discrimination, such as laws preventing transgender people from having biological children.

Individual discrimination is not necessarily intended, purposefully malicious, nor is it always visible (Buitendijk et al., 2019; University of Helsinki, 2021). On the contrary, since we live and have been raised in discriminatory societies, it is only logical that we embody discriminatory attitudes without realising it. These are referred to as **unconscious bias** (Williams, 2015). Research in psychology has shown that in addition to having prejudices against different people and groups of people, we have preconceived notions about how discrimination occurs (Buitendijk et al., 2019). Furthermore, we tend to think that discrimination or bias is visible from specific cues, such as a person explicitly voicing negative opinions about certain groups of people ("women are not fit for leadership" or "migrants are not qualified for these jobs") (Buitendijk et al., 2019; EC, 2020; Williams, 2015). However, much of discriminatory and biased attitudes are expressed in more subtle manner, such as asking black and brown research personnel where they are 'actually' from. These subtle and often unintentional discriminatory comments and attitudes are referred to as **micro-aggressions.**

Privilege can be understood as the opposite of being discriminated against. While discrimination occurs based on certain (assumed) characteristics of a group of people, the same system favours the characteristics of another group of people (University of Helsinki, 2021). Privilege, then, is not an accomplishment nor based on merit, but a feature of the discriminatory structures of an organisation or a society. Furthermore, a privileged person benefits from the unfair system. The more a person embodies the normative traits (I.e., heterosexuality, male, abled-body, white), the more a person has privilege. Consequently, the more a person has minority characteristics (I.e., homosexuality, woman, transgender, disabled, black), the less a person has privilege and is more likely subject to discrimination (University of Helsinki, 2021). For example, a white, able-bodied man has more privilege than a white, disabled man, or a black, able-bodied man, as societies are primarily built for white and able-bodied people. The *Wheel of Privilege* below (Figure 1.) visualises the different degrees to which a person can be discriminated against or have privilege and power over others based on their characteristics.
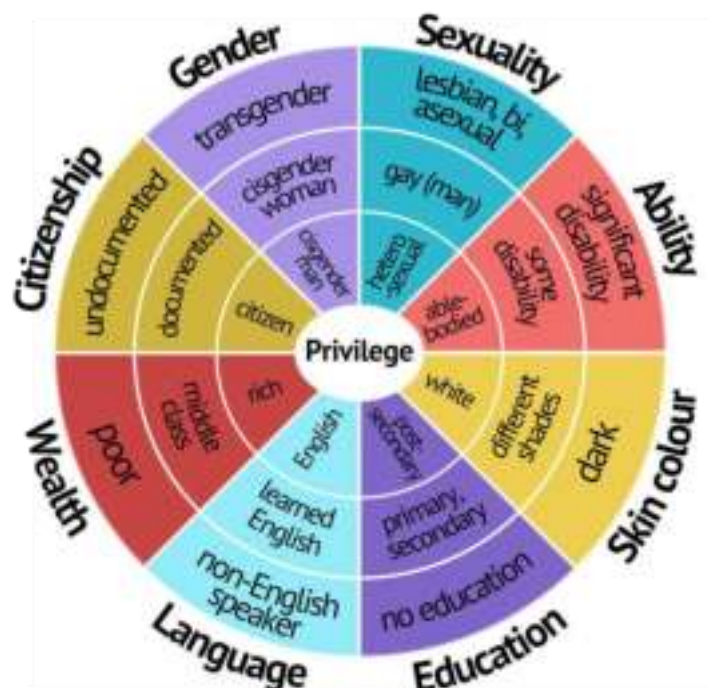
Figure 1. Wheel of Privilege.
Adapted from CCR (2021). Identifying any discriminatory structures in which you participate, begins by recognising your privilege and listening to those belonging to other groups (Buitendijk et al., 2019).

To fight discrimination, many countries and organisations have developed anti-discrimination laws and practices, and through these laws and policies, blatant expressions of discrimination have also become rarer (Buitendijk et al., 2019). In addition, because of global campaigns against sexual harassment and racism (such as #metoo and Black Lives Matter), the more direct ways of discriminating have decreased, as they are no longer considered acceptable or appropriate. Nevertheless, this does not imply that discriminatory attitudes have disappeared, nor that they no longer impact decision-making – instead, they are just not expressed so directly (Lövkrona, 2016). Consequently, unfair treatment is more difficult to detect or prove when filing complaints, and those with legitimate complaints tend to be seen as complainers (Buitendijk et al., 2019). Discrimination is also more difficult to identify if you have not personally experienced it, since we often tend to understand only the types of discrimination that we have personally faced. Similarly, privileges are often invisible to those who benefit from them, and the inability to recognise discrimination in itself can also be considered a privilege (University of Helsinki, 2021).

While organisations are increasingly speaking out for equal opportunities, these are sometimes limited to symbolic gestures (Buitendijk et al., 2019). Furthermore, discrimination today can function in seemingly positive ways, making it difficult for the perpetrator as well as the target to recognise the discriminatory behaviour. An example of this is the "family-friendly" renovations of tenure track systems in many North American universities; although measures are taken to address the discriminatory structures in the academia, they actually failed to improve gender equality (see CASE EXAMPLE: The tenure track system).

CASE EXAMPLE: The tenure track system

Academics who wish to become tenured (secure a lifelong academic position), must finish graduate school, become assistant professors, network, publish, receive external funding, and establish themselves as valuable members of the academic community. In addition, all the aforementioned must be conducted within a time-period of seven years to avoid falling off the tenure track. This system was found to discriminate against women, especially those women who are or aspire to be mothers.

The crucial phases of the tenure track (years between doctoral dissertation and securing a professorship) are commonly situated during the ages of 30 to 40 – the same years that women most commonly have small children or give birth. Consequently, compared to married men with young children, married women with young children were found to have a 35% less chance of securing tenure-track positions, as they could not meet the tenure track criteria due to maternity leaves, pregnancies, and childcare responsibilities. As a response to the discriminatory system, some universities adopted a one-year-extension policy for new parents. However, these "family-friendly" policies were found to give further privileges to male researchers: the policy granted an added year of conducting research, networking, publishing, and applying for grants for men at the expense of mothers. Therefore, these policies failed to take into consideration that men do not need an added year – it only concerns women. Since pregnancy and giving birth are not gender-neutral events, neither should anti-discrimination policies be. (Antecol et al., 2016; Wolfers, 2016; Wolfinger, 2013)

While it might be tempting to think that discrimination cannot hurt if you cannot recognise it, research has continuously proven otherwise. Rather, as the tenure track example shows, subtle discrimination is equally or more adverse than open expressions of discrimination. Denying the existence of discrimination and unfair treatment in the structures and culture of an organisation will result in strengthened discriminatory attitudes and structures (Buitendijk et al., 2019).

Each of us encounters discriminative structures, practices, and attitudes in our daily lives. It is not something that happens somewhere else in the world, but a real everyday challenge. Thus, the implementation of equality and diversity should not be treated as a given (University of Helsinki, 2021). What is crucial is unmasking discriminatory laws, practices, and attitudes on societal, organisational, and individual levels. It is our responsibility as research team members and/or leaders to question our privileges, learn to recognise discriminatory practices and norms in our work organisations, communities, and societies, and actively promote diversity. The first steps to non-discrimination are the acknowledgement of discrimination and learning to listen and believe others (Lövkrona, 2016; University of Helsinki, 2021).
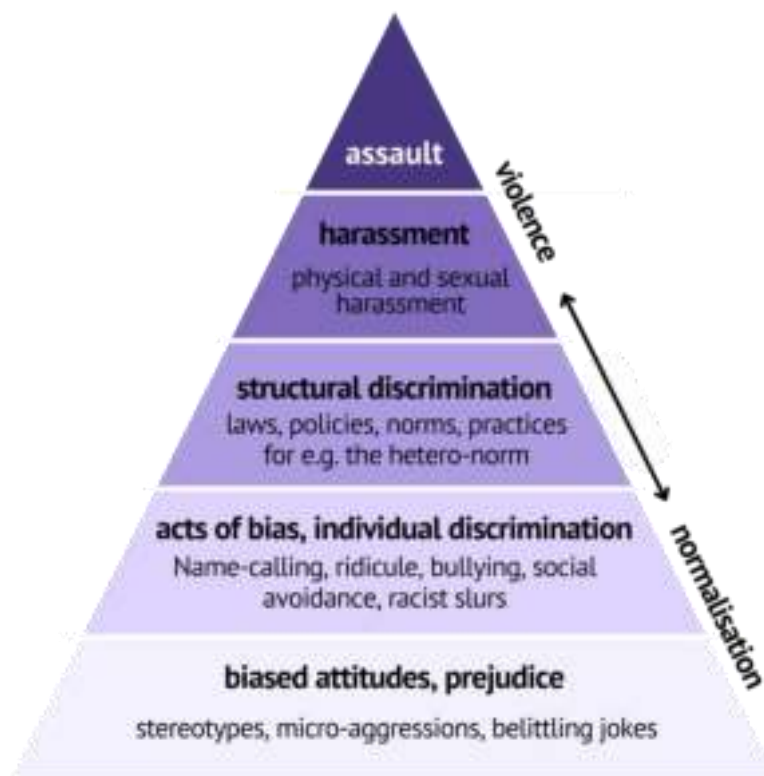
Figure 2. Pyramid of discrimination.
Adapted from the Holocaust Centre for Humanity (2021), Citizens for Justice and Peace (2021),
and the Anti-Defamation League (2022).

The Pyramid of discrimination illustrates the prevalence and the culture of bias, discrimination, and violence in our societies. From bottom to top, attitudes and discrimination become increasingly severe. The upper levels are supported by the lower levels – just like in a pyramid. However, unlike in a pyramid, the levels are not in a ranking order nor function consecutively. Rather, they co-exist in our society and enable each other. Bias and prejudice on each level reflects a system of discrimination, but when unchecked on the lower levels, can become normalised and contribute to severe forms of physical and sexual violence. By challenging our own biases, the biases of others and of those in the institutions we function in (for e.g., the workplace, STI, the society we live in) we can interrupt this process of normalisation (ADL, 2022; CJP Team, 2021; Holocaust Centre for Humanity, 2021; PCAR, 2021).

2.2 Understanding Gender

While sex is assigned to us at birth, gender is learned and performed. Even if not explicitly taught to us, we learn how a certain sex should perform: i.e., how females and males should act, speak, dress, and behave (Leder et al., 2016). How we perform our gender is related to socially and culturally bound **gender roles**.

A gender role can be defined as the behaviours that males and females are expected to display in both the private (individually, in families or relationships) and public realms (schools, workplace, restaurants). In other words, based on our assigned biological sex, our society expects us to act, speak, dress, and behave in a certain way. As such gender roles define what is considered acceptable and appropriate behaviour for a man and a

woman (Tong, 2012). For example, women and girls are typically expected to be polite, accommodating, and nurturing, while men are typically expected to be aggressive, bold, and strong. Gender roles also relate to what is considered feminine and masculine. For example, showing empathy and wearing a dress are considered feminine, and behaving aggressively and wearing a suit are considered masculine. Gender roles are present in every society, yet they are distinct in different regions of the world or even within a country; what is considered feminine in Finland, might not be considered feminine in China. In a similar manner, gender roles may change over time.

According to van Dijk & van Engen, gender roles and expectations stem from the need to make sense of ourselves and each other. Moreover, with an infinite number of characteristics that an individual can have (kind, aggressive, compassionate, self-assured, patient, rational, emotional, etc.), knowing one's gender helps us know what kind of behaviour to expect from them and how to behave ourselves (van Dijk & van Engen, 2019). However, the gendered behaviour expected from individuals can feel arbitrary and restrictive, as the traits do not necessarily portray who we are, but simply what is expected of our sex and gender in the society we live in, and what we have been taught to like, wear, and act like.

2.2.1 Gendered division of labour

Gender roles also influence the division of labour. Due to gender roles and expectations, women, men, boys, and girls are likely to be involved in different labour activities. For example, according to Statista (2019; 2022) on average 79% of nurses worldwide are women, whereas 92% of software developers worldwide are men. When it comes to STI, the field suffers from a clear inequality between women and men; there are only 41.3% female researchers and engineers in the EU (EC, 2021). When looking at high-level positions in academia, such as full professorship positions, the participation of women drops significantly to only 26.2% (EC, 2021). These results show us that work is to be done to narrow inequalities in STI fields (for further information, see Chapter 3: Gender and inclusiveness dimension in research and innovation).

In addition to the inequalities in paid labour, women also perform most of the unpaid reproductive work and much of the community work in many societies, such as household maintenance, childcare, and nursing (Leder et al., 2016). Consequently, often women's workload at home can prevent them from participating in salaried work in ways that men are able to. On the other hand, in instances where women do participate in paid labour activities as well as perform their unpaid tasks at home, they lack time to participate in public engagement activities such as meetings and workshops related to research projects.

Therefore, when planning research activities within the consortium, and when conducting research that requires public engagement, the gendered division of labour (such as that women simply might not be able to attend research activities due to their obligations at home) should be considered. These considerations are particularly important in order to tackle gendered biases in research (see Chapters 3 and 6) and must be done already at the proposal drafting stage. In other words, research personnel must consider practical ways to enable women to participate in their research projects, such as organising meetings during the day when children are at school, providing childcare support, or providing monetary compensation for participants. Ensuring the participation of all genders in research projects entails understanding of gender roles and gendered division of labour

2.3 Understanding intersectionality

As made apparent already in this manual, gender is by no means the only factor contributing to privilege and discrimination in societies. Rather, **the system of discrimination and privilege consists of various overlapping or intersecting social categories, including gender**, **sex**, **age**, **ethnicity**, **disability**, **skin colour**, **career stage**, **religion**, **and sexual orientation** (EC, 2020). These categories are interconnected and mutually reinforcing; for example, a black woman has less power in society than a white woman, and a black, disabled woman has less power in society than black, able-bodied women. The combinations of different overlapping categories create unique identities and experiences of discrimination and privilege (EC, 2020; Lövkrona, 2016). Therefore, when analysing and addressing inequalities, discrimination, and privilege, it is not enough to take merely gender into consideration. This perspective is commonly referred to as **intersectionality.**

The term *intersectionality* has roots in the anti-racist feminist movement in the United States. and was coined by legal scholar Kimberlé Crenshaw in 1989 to describe how discrimination, power and privilege intersect in the lives of black women. More specifically, Crenshaw argued that black women experience sexism differently than white women, and racism differently than black men (Crenshaw, 1989). By recognising that considering gender and sex alone is not enough, intersectionality responded to the insufficiencies of gender theory, created to explain the specifically gendered power structures – the structural superiority of men and subordination of women (EC, 2020; Hankivsky, 2014).
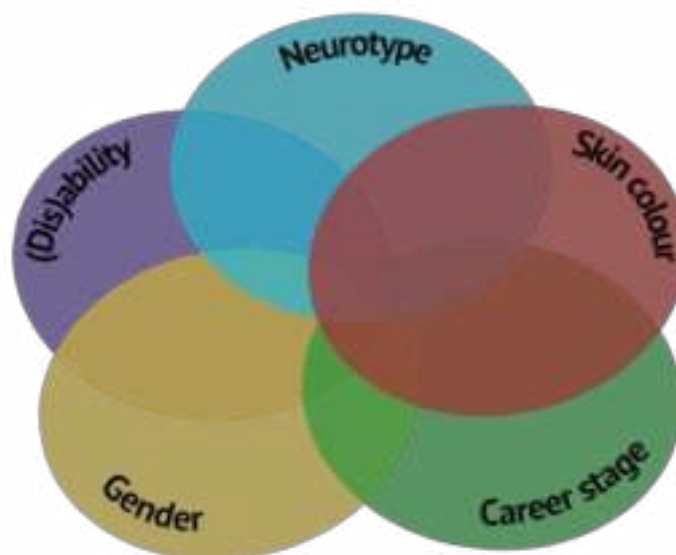

Figure 3. Intersectionality.
Adapted from Taylor (2019).

Intersectionality has since become a crucial theoretical instrument to understand all intersecting or overlapping forms of inequality that result from structural advantages and disadvantages. Moreover, by using intersectionality as a framework or a lens, we can identify how power accumulates through socially constructed categories such as gender, ethnicity, age, neurotype, socio-economic status, and abilities/disabilities. The power

relations between the different categories are what create inequality, i.e., superiority (or "normality") of one group or social category over another (Lövkrona, 2016). For example, in Western societies whiteness is considered structurally superior to blackness, ability is structurally superior to disability, and heterosexuality is structurally superior to homosexuality.

Figure 3. visualises intersectionality and the way in which the multiple forms of discrimination (sexism, transphobia, racism, ableism, ageism) combine, overlap, and intersect in the experiences of marginalised people. The circles represent social categories that alone may expose a person to discrimination, such as being black, being a woman, being with disability, and being lesbian. However, when the different categories overlap, they create unique combinations of social opportunities and discrimination. For example, being a black man does not expose a person to sexism, but it exposes the person to racism. Another example: being transgender exposes a person to transphobia but being transgender and black exposes a person to a combination of transphobia and racism.

2.4 Understanding colonialism

Although often understood as the exploitation of overseas regions from the 15th to early 20th century by the great European states such as France and Spain, colonialism is a much wider and more complex phenomenon that is still highly relevant in today's context (Cooper, 2005).

In short, colonialism can be defined as the conquering of lands and resources of other people, the utilisation of their labour, and shaping their societies and cultures to suit the interests and worldviews of the conquerors (Cooper, 2005; Väyrynen, 2019). Furthermore, colonialism entails creating oppressive hierarchies, where some people and worldviews (such as Western people and Western knowledge) are considered superior to others (Smith, 1999; Spivak, 1988). Colonial projects have been undertaken not only by states, but also by private trading companies, independent adventurers, and by Western scientists (Porsanger, 2004. On the other hand, advances in science and technology have also served the interests of colonisers; Photographs were used to study physical and racial stereotypes between non-Western and Western people, steamboats were crucial in the colonial exploration of Africa, and aircrafts enabled the British empire to surveil and bomb Iraqi rebellions in the 20th century (Roy, 2018). Where science has aided colonial activities, the natural resources and free labour of colonised nations have also enabled Western states to become scientifically, industrially, and technologically dominant on a global scale (Roy, 2018).

Colonialism still exists in the structures and worldviews of Western societies – in a similar manner to discrimination. In the context of STI, this is visible in the dominance of Western science, the exploitation of non-Western natural and human resources, and Western power over research funding, research agenda, research methods and aims, as well as in the biases of individual research team members. Modern colonialism (or postcolonialism) in research context entails preferring Western universities in rankings, limiting access to research databases and journals, and deeming some fields of research (such as medicine, engineering) more scientific and neutral than others (such as feminist or Indigenous studies) (Arnold, 2005; Simmons, 2015; Smith, 1999). Unfortunately, non-Western countries and research organisations still today remain dependent on Western

funding, partnerships, and scientific expertise, and when creating new innovations, the role of non-Western partners is often providing natural and human resources (Simmons, 2015; Tarvainen, 2022).

CASE EXAMPLE: Green energy vs green colonialism ⊹

To address the need for climate-friendly energy solutions, Finland and Norway have planned and implemented wind power projects in the Sápmi – the homeland of the indigenous Sámi people, stitching over northern areas of Norway, Sweden, Finland and Russia. Although aiming to target European climate sustainability goals, the green energy transitions in Finland and Norway have been criticized for being "green colonialism", as they infringe on the rights of the Sámi to their traditional lands, livelihoods, and language. (Fjellheim, 2020; Normann, 2020; Zilliacus, 2022) Furthermore, the Sámi argue that while on first glance the Sápmi might seem like scarcely populated wasteland, it is actively and sustainably used for reindeer herding – a protected cultural practice and a traditional livelihood of the Sámi. Reindeer find their food from nature, and thus reindeer herding acquires broad and diverse grazing areas in order for it to function in an ecologically, socially, financially, and culturally sustainable manner. Studies have shown that wind farms have negative impacts on reindeer herding, as the reindeer avoid going near the wind farms and more pressure is placed on smaller areas of land reserved for grazing. (Reindeer Herders' Association, 2014; Seipiharju, 2020; Zilliacus, 2022)

However, the devastations of wind power go beyond the reindeer herding practice. Currently most of the Sámi population live in southern cities, as opportunities to make a living in the Sápmi are scarce. Reindeer herding is one of the few traditional means to make a living for the Sámi in Sápmi, and one of the few occupations where Sámi languages are still frequently used. Therefore, establishing wind farms in Sápmi not only entails hampering reindeer herding, but Sámi culture and languages. (Normann, 2020; Hætta, 2020)

The Sámi communities have not been included in the planning and construction of any of the wind farms. In October 2021, the Supreme Court of Norway declared that Norway violated the rights of the Sámi, by permitting the construction of two wind farms. (Hætta, 2020)

An example of this is the electric vehicle industry; while electric cars are mainly designed and used in rich societies in the global north, the mining of lithium and cobalt for car batteries is centred in countries such as the Democratic Republic of Congo and Chile, where both natural and human resources (including child labour) are exploited (Berman, 2019; UN News, 2020). Thus, although an innovation is sustainable climate-wise, it can still have colonial and predatory tendencies. Some prominent green growth initiatives, such as windfarms, extensive railroad systems, or production of electric cars have also been recently criticised in Finland and Norway for their coloniality; while attempting to produce energy, transport, and mobility solutions in a more climate-friendly manner, these green initiatives involve exploitation of the Sápmi, the ancestral land of the indigenous Sámi people (see "Case example: Green energy vs Green colonialism" above) (Fjellheim and Carl, 2020; Saami Council, 2020; Seipiharju, 2020). Like discrimination, **colonising attitudes and behaviours often stem from the lack of knowledge,** and in particular from lack of diverse knowledge and expertise in research teams and consortiums.

Indigenous, postcolonial, and feminist researchers have long argued for the need to decolonise Western scientific practices (Porsanger, 2004). The process of decolonisation begins with acknowledging that Western science is not innocent nor neutral, but supports Western economic, social, climate, and environmental interests. In a similar manner, scientists (regardless of their field of research), are not neutral, but hold their own subjective worldviews that are bound to impact the research that they do (Ventour, 2021). Thus, what is needed is recognising other ways of knowing and doing research, including diverse knowledge in research projects, and ensuring ownership over research for people impacted by it. **"Steps of colonisation vs Steps of decolonisation"** (Figure 4.) visualises how Western research personnel can contribute to the process of decolonisation in research projects and become aware of the colonial structures in Western scientific practices.

Figure 4. Steps of colonisation vs Steps of decolonisation.
Consider the differences in these steps to ensure your research team and projects contribute to the decolonisation of scientific practices. Adapted from the literary works of Kovach (2020), Lassiter (2005), Martini (2017), Porsanger (2004), Simmons (2015), Spivak (1988), Tarvainen (2022), Trisos et al. (2021), Tuhiwai Smith (1999), and West (2018), and the Ethical Guidelines to research from the Aboriginal and Strait Islander Peoples and Communities (AIATSIS, 2020), the Māori people (HRC, 2010), and the Swedish Sámi Parliament (Sámiid Riikkasearvi, 2019).

Research personnel should be particularly aware of the colonial tendencies of science when it comes to Indigenous People. The Aboriginal and Torres Strait People (hereby, Australian Indigenous People) are considered the most researched people in the world, and similarly to many other Indigenous Peoples, they have historically had little power over research conserning them, let alone benefited from the research (NHMRC, 2020). The most grose examples include the measuring of the skulls and corpes of Australian Indigenous People to study the degree of their "savagery" and to justify the superiority of the European "race" (Buchan & Burnett, 2019, p. 115-117). In today's context, Indigenous People's are often still treated as exotic subjects of research, rather than research partners (Smith, 1999; Spivak, 1988). To ensure their right to self-determination in research, many Indigenous Peoples have created ethical research guidelines – among the most exhaustive of which are the ethical guidelines of the Aboriginal and Torres Strait people (see Figure 5. "The AIATSIS Code of Research Ethics"). Before initiating or engaging in any research activities concerning the Australian

Indigenous Peoples, research personnel should familiarise themselves with these ethical research guidelines.

Figure 5. The AIATSIS Code of Research Ethics.
Adapted from the AIATSIS (2020 & 2022). Before initiating or engaging in any research activities concerning Indigenous Peoples, research personnel should familiarise themselves with the ethical research guidelines of the Indigenous group. If none are available, familiarise yourself with the AIATSIS guidelines prior to contacting the Indigenous group.

Further reading:
- "Decolonizing technology: a reading list", by Beatrice Martini
- (Smith, 1999) Decolonizing methodologies, research and indigenous people

Other helpful resources:
- A Guide to applying the AIATSIS Code of Ethics for Aboriginal and Torres Strait Islander Research
- Podcast with assistant professor Maria Ehrnström-Fuentes (Hanken) and Sámi activist Petra Laiti

3 GENDER AND INCLUSIVENESS DIMENSIONS IN RESEARCH AND INNOVATION

Gender in research context refers to gender diverse work groups, inclusive research cultures as well as to the ways in which gender dimension is integrated into research and innovation (R&I) content. Enhancing gender and inclusiveness dimensions in R&I, while a matter of building research personnel's understanding and capabilities in these topics, should be considered as a broader normative shift within the R&I cultures. In other words, there is a need to create inclusive cultures in research and technology organisations (RTOs) to enhance the integration of the gender dimension into R&I content and process.

3.1 Creating diverse work groups is more than just numbers

Creating diverse research teams can benefit challenge-oriented research in ways that homogenous groups cannot by creating filters for bias through a diversity of the mindsets, perspectives, and approaches (Government of United Kingdom Department for Business, Energy & Industrial Strategy, 2021). Because of the gender assigned to them, men and women tend to be socialised differently, thus most likely they will have different perspectives and knowledge about a specific topic or challenge that needs to be tackled (EC, 2020). Same goes for other social categories: black female scholars perceive and face something that neither their white male and female colleagues cannot see nor must face, and vice versa. Therefore, diverse research teams have the potential to eradicate dangerous data biases, which unfortunately are more common than rare (Buitendijk et al., 2019; EC, 2020; Government of United Kingdom Department for Business, Energy & Industrial Strategy, 2021).

Academia is by no means a "gender-neutral space of objectivity and meritocracy" (Lövkrona, 2016, p. 115).

For instance, despite the anatomical and physiological characteristics that differentiate the female sex from males, or different skin tones from each other, when it comes to engineering and product design research, these differences have often been ignored. Consequently, devices, machines as well as workplace safety gear have often been designed according to a unisex fit, which solely fits a certain type of male body – although the target end-users will most likely be men, women and transgender people of all shapes and forms (EC, 2020). Wearable technologies, such as Smartwatches provide a good example of how the lack of diversity in research teams can impact the design and performance of a technological product (Wetsman, 2022). The light sensors of smartwatch models already in the market have been found to be less accurate when tracking the heartrate of individuals with obesity and those with dark, tattooed and/or hairy skin (Wetsman, 2022). The list goes on: A 2018 study demonstrated that facial recognition technologies in the market failed to identify female faces (especially black female faces) but were very precise on lighter-skinned male faces (Buolamwini & Gembru 2018). Even cars have been found to be more dangerous for women, and especially for pregnant women (see CASE EXAMPLE: Crash test dummies).

> ## CASE EXAMPLE: Crash test dummies ⊹
>
> Crash test dummies were developed in the 1950s, and for decades the dummies were based on the average weight and height of a male body. In 2018, Astrid Linder, the research director of the Swedish Road and Transport Research Institute, concluded that none of the EU crash tests required an anthropometrically female-like dummy. Although female-like dummies are used today, they still fail to take into consideration bodily differences between females and males, such as neck length and musculature in the neck area and upper body. (EC, 2020; Linder & Svedberg, 2019) In addition, rear-end collision tests with live people have shown that women are catapulted forward at a greater speed than men since the seats are too stiff for lighter female bodies. Therefore, women have a higher risk of injury in rear-end collisions. (Eikeseth & Lillealtern, 2013) Lack of data on women in crash tests is even more dangerous for pregnant women; using pregnant dummies is not required in crash tests in the EU or the US, and the standardised safety belts fail to protect most women that are in their third trimester. (Buitendijk & Maes, 2015; EC, 2013)

Although diverse research teams can contribute to more inclusive innovations, one of the main challenges related to the creation of diverse work groups is the underrepresentation of female research personnel and research personnel from underrepresented groups. As shown in a recent European Commission report (EC, 2021), **women represent only 32,8% of researchers in the EU**. They are underrepresented in ICT jobs, inventors' teams, management positions and academic careers, with the gender gap being even higher when considering immigrant women. The report describes that in Europe, **"**[…] women are less likely to be employed as scientists and engineers. Similarly, women are under-represented among self-employed professionals in Science and Engineering (S&E) and ICT occupations." (EC, 2021, p. 60). In addition, people of colour, and especially indigenous women and women of colour, are drastically underrepresented particularly in the higher ranks of academic hierarchy (Casad et al., 2021; Fox Tree & Vaid 2022; Lövkrona, 2016).

Moreover, women who are employed in STI often face discrimination and are more likely to leave their positions compared to men (Casad et al., 2021). The chances of women succeeding as a scientist are tempered by uncertain employment, sexist working culture, and lack of administrative support and resources, meanwhile the same system promotes male scientists (Casad et al., 2021; Lövkrona, 2016). Examples of these are direct forms of discrimination (sexual harassment, name-calling), and more subtle

forms of discrimination, such as taking credit for the work women do, scheduling meetings at times when women are not available (e.g., when children need to be picked up from school or day-care), questioning women's professionalism, excluding women from informal male networks (gatekeeping), and providing fewer resources for women (e.g., less or smaller workspaces, computers, lab equipment, lower salaries) (Casad et al., 2021; Lövkrona, 2016).

When it comes to the recruitment and assessment of qualifications of men and women, double standards are often applied (Casad et al*.,* 2021; Lövkrona, 2016). Women, and especially women of colour are often expected to conduct community roles within departments, are assigned heavier teaching loads, and often feel more obliged to mentor large number of students (Casad et al., 2021, 15; Mekalu & Beeman, 2020). Mekalu and Beeman (2020) refer to this work as *invisible*, as it not recognised in tenure and promotion decisions. At the same time, this invisible labour in the academia takes away from publishing, writing, and obtaining grants – i.e., the work that contributes to their opportunities for tenure.
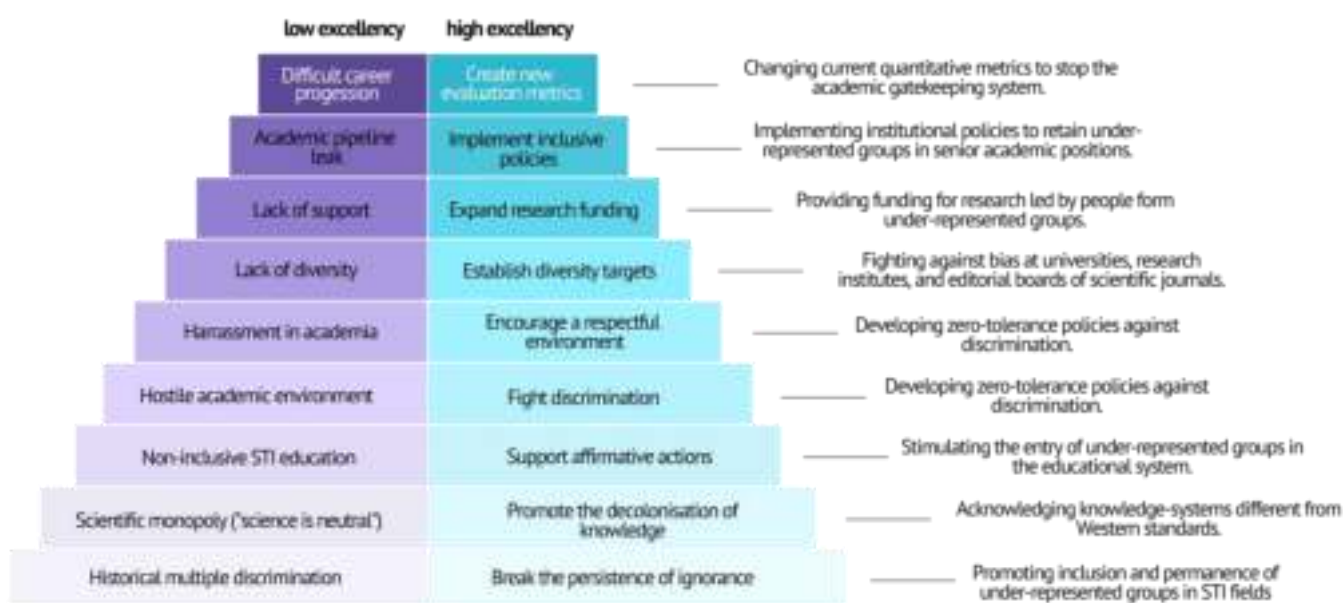

Figure 6. Pyramid of discrimination and a pyramid for inclusive solutions.
Adapted from Diele-Viegas et al. (2021).

While often thought of as isolated, individual occurrences, the phenomena described above are systematic and exist in the cultures and structures of research organisations. However, due to their subtle, invisible, and silent nature, these types of discrimination are often difficult to recognise (Lövkrona*,* 2016). **Therefore, merely recruiting female research personnel and research personnel from underrepresented groups is not enough to create diverse research teams, but the gender and inclusiveness lens should be applied to the structures and cultures in research organisations.**

This involves, for example, establishing clear policies and guidelines on how to respond to cases of discrimination and harassment, improving work-life balance to enable academic careers and opportunities for women, crediting the invisible work women and people of colour do in STI, boosting professional capabilities for all genders, and implementing policies to ensure diverse representation in higher ranks of STI positions (Government of

United Kingdom Department for Business, Energy & Industrial Strategy, 2021; Laland, 2020; Mekalu & Beeman, 2020). Transparency in wages and promotions, targeted and practical inclusion trainings, use of inclusive language internally and externally, establishing employee resources groups specifically for diversity and inclusiveness matters, promoting zero-tolerance policies for harassment, as well as using gender quota's as specific measures, have also been found to boost inclusion in the workplace (Diele-Viegas et al., 2021; Dixon-Fyle et al., 2020).
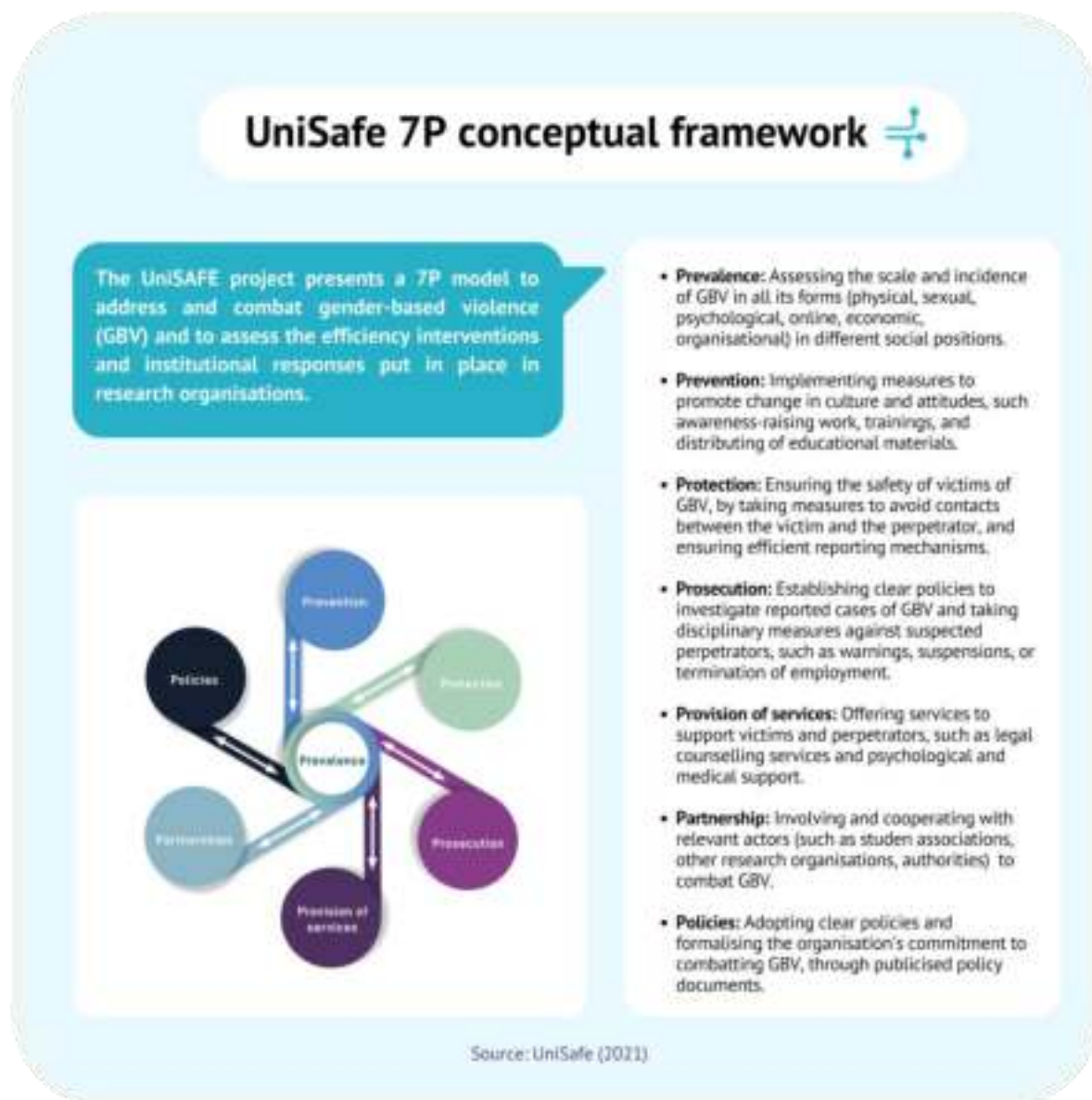

UniSafe 7P conceptual framework

The UniSAFE project presents a 7P model to address and combat gender-based violence (GBV) and to assess the efficiency interventions and institutional responses put in place in research organisations.

- **Prevalence:** Assessing the scale and incidence of GBV in all its forms (physical, sexual, psychological, online, economic, organisational) in different social positions.

- **Prevention:** Implementing measures to promote change in culture and attitudes, such awareness-raising work, trainings, and distributing of educational materials.

- **Protection:** Ensuring the safety of victims of GBV, by taking measures to avoid contacts between the victim and the perpetrator, and ensuring efficient reporting mechanisms.

- **Prosecution:** Establishing clear policies to investigate reported cases of GBV and taking disciplinary measures against suspected perpetrators, such as warnings, suspensions, or termination of employment.

- **Provision of services:** Offering services to support victims and perpetrators, such as legal counselling services and psychological and medical support.

- **Partnership:** Involving and cooperating with relevant actors (such as studen associations, other research organisations, authorities) to combat GBV.

- **Policies:** Adopting clear policies and formalising the organisation's commitment to combatting GBV, through publicised policy documents.

Source: UniSafe (2021)

Figure 7. UniSAFE 7P conceptual framework.
The UniSAFE project outlines a seven-section model to combat gender-based violence in research organisations, and to assess the efficiency of institutional measures and interventions put in place (UniSAFE, 2021).

Further reading:
- Discrimination in academia – a research overview. (Lovkrona, 2016)
- Potential solutions for discrimination in STEM (Diele-Viegas *et al.* 2021)

Other useful materials:
- "Ending gender-based violence in academia", a conference recording (24-25-11-2022)
- "Fostering and inclusive culture at work" by Deloitte
- Policies of the Finnish Union of University Researchers and Teachers (FUURT) intended to support the work and well-being of early career researchers
- Video: UniSAFE 7P conceptual framework to combat GBV

3.1.1 Early-career researchers' challenges in STI

Early-career researchers (ECRs) is an umbrella term used to describe researchers who have recently entered the research system, and who often hold grant-based or fixed-term positions in research organisations (OECD, 2021). The exact definition of ECRs varies, but often researchers with less than 10 years of experience after the completion of their PhD are considered ECRs (Teixeira da Silva, 2021). ECRs position is not determined by age, whilst many ECRs are young when entering research organisations (Teixeira da Silva, 2021).

Although ECRs constitute an important sector in the STI, several challenges in the contemporary research landscape, ranging from gender-based violence (GBV), precarious research positions, to increased competition for funding, disproportionately affect ECRs. For example, a 2022-2023 UniSAFE study suggests researchers working on temporary contracts, such as ECRs, are more likely to experience different types of GBV (UniSAFE, 2023). Typical instances of GBV in STI include sexual, physical, and verbal harassment, taking credit for the work that ECRs do, and pressuring ECRs to take on extra work in hopes for a permanent position (Teixeira da Silva, 2021; UniSAFE, 2023). The UniSAFE study also found that the majority of perpetrators are in positions of power (men, supervisors, managers, professors, lecturers), and that being a woman, young, disabled, and belonging to an ethnic, sexual, or gender minority, increases the vulnerability of ECRs to violence and discrimination (UniSAFE, 2023). In a similar manner, Nature's 2021 survey on research job satisfaction in the field of science found that discrimination occurred mostly in the form of power imbalances (Woolston, 2020).

Although research organisations are increasingly applying diversity, equity, and inclusion (DEI) policies, limited funding, increasing number of people entering higher education systems, and transition of RTOs to more entrepreneurial institutional systems, have left ECRs competing for the few opportunities, grants, and research positions available (OECD, 2021). In turn, the intense competition in academia leads to long hours, a severe dependence on senior researchers and their interests, a lack of visibility and recognition, job insecurity, job dissatisfaction, stress, limitations on academic freedom, and physical and mental health deterioration (Kelly, 2022; OECD, 2021). Although many aspire to work as researchers, discrimination and bias, low job security, and the lack of support or mentorship have left many to consider leaving STI (Jones, 2023).

To tackle the challenges ECRs are made vulnerable to, the Finnish Union of University Researchers and Teachers (FUURT, 2023) has drafted policies to support the work and well-being of ECRs. The FUURT policies suggest preferring employments over awarding grants, granting proper titles, providing proper tools, instructions, and supervision for ECR work, ensuring ownership and copyrights to the work of ECR, supporting the integration

and language studies of international ECRs, and ensuring the equitable treatment of grant-based, fixed-term and permanent contract researchers (FUURT, 2023).

Other useful materials:
- [Challenges and opportunities: Early career researchers (*MDPI Blog*) (Kelly, 2022)](#)
- [Policies of the Finnish Union of University Researchers and Teachers (FUURT) intended to support the work and well-being of early career researchers.](#)
- [Discrimination still plagues science, a survey by Nature (Woolston, 2021)](#)

3.1.2 The research team as a safe space

One concrete tool to implement inclusiveness in RTOs is co-creating and adopting principles of *safe space* – i.e., principles to secure the workplace is "free from all kinds of discrimination, harassment, bullying and ridicule, as well as threatening behaviour" (University of Helsinki, 2022).

Figure 8. Guidelines for safe space.
Adapted from the Aalto University Student Union (2021) and the University of Helsinki (2021) Safe Space Principles.

Creating a safe space for all entails co-developing and adopting policies and principles on both organisational and individual levels, that prevent and intervene in inappropriate behaviour and discrimination. For organisations, this typically entails providing accessible and non-discriminatory facilities onsite and online, use of inclusive language (see sub-chapter 5.1.) in meetings and materials, training the staff on topics of inclusiveness and safe spaces, and establishing clear policies on how to respond to cases of discrimination. For employees, guidelines for safe space typically include respecting the physical and psychological space of others, using inclusive language, and intervening in and/or reporting inappropriate behaviour. To ensure the safe space principles are effective and meet the specific needs of the organisation, the principles should always be collaboratively created and accepted by those working within the organisation.

Other useful materials:
- A student's guide to equality and diversity, by Helsinki University
- Safe Space Policy, by Edinburg University Students' Association

3.1.3 Inclusive leadership and recruitment

As discussed earlier in this manual, discrimination impacts the self-esteem, well-being, ability to work, career advancement and planning, as well as working conditions for women and minorities, causing many to either voluntarily leave or be dismissed from their research positions (Casad et al., 2021; Lövkrona, 2016). A crucial element in tackling discrimination and promoting inclusion in RTOs and research teams is **inclusive leadership.**

Leaders and their interactions with wider staff play a crucial role in workplace inclusion – i.e., the "fine balance between employees feeling that they belong and that their differences are acknowledged and accepted" (GIWL, 2020, p. 8). Inclusive leadership entails treating people fairly, understanding, and valuing uniqueness and diversity, and utilising the ideas and insights of diverse groups for better ideation and decision making (Dillon & Bourke, 2016). According to the Harvard Business Review, individuals report feeling included based on how leaders behave, speak to, and treat employees up to 70% of the time (Bourke & Titus, 2020). Therefore, the interpersonal skills and personal qualities of leaders are particularly important in the creation of a diverse and inclusive working environment (Dillon & Bourke, 2016; GIWL, 2020).

Qualities that have been rated more supportive of diversity and inclusion by employees include openness, self-awareness, and integrity. According to Dillon and Bourke (2016), other crucial aspects in leading diverse teams are **cultural intelligence** and **collaboration**. The former entails understanding the ways in which one's own culture affects their worldview and the way in which they see members of other cultures, and the latter emphasises the importance cooperating with team members and empowering them to make decisions regarding their work and working conditions. Collaboration as a decision-making process function as an antidote to process biases and sameness of thinking (like-minded members drawn together and testing ideas) – that is, if diverse talents are recruited in the first place (Dillon and Bourke, 2016).

Although the diversity of talent brings arguable profits for teams (e.g., higher excellency in research), many organisations seem to struggle to recruit diverse employees. Pressure on diverse recruitment is likely to increase, as organisations will compete over international, highly educated talents to tackle the rapid aging of workforce, and new

generations (millennials comprise 50% of global workforce) also typically hold higher expectations and different attitudes towards work (Dillon & Bourke, 2016). Thus, **leaders of research teams should also learn how to recruit new and diverse talent.**

Figure 9. The Deloitte Model to inclusive leadership.
(Dillon & Bourke, 2016)

The first step to attracting diverse talent is to develop an inclusive working culture (see sub-chapter 3.1.). This includes critically examining the biases and prejudice each of us has, to avoid recruiting only research personnel with similar characteristics. The second step is to use measures and language that attracts diverse talent. For example, research in the field of STI suggests that the use of inclusive language (see sub-chapter 4.1.) in recruitment ads, as well as anonymous recruitment more likely attract diverse talent. In addition, when it comes to recruitment ads, emphasising transparency in wages, flexible working hours, exhaustive maternity leaves, and only emphasising qualities that are essential to have to thrive in the offered position, have been found to be efficient in attracting women in STI fields (Forbes Coaches Council, 2017; Harper Fox Search Partners, 2021).

Other useful materials:
- [Diversity in Recruitment (STEM WOMEN, 2019)](#)
- [Gender Equality Route Map – 8 steps to gender equality for employers (BITC, 2021)](#)
- [The Key to Inclusive Leadership (Harvard Business Review, 2020)](#)
- [The Six signature traits of inclusive leadership (Dillon & Bourke, 2016)](#)
- [15 Recruiting Tactics to Attract A Wider range Of Candidates (Forbes, 2017)](#)

3.2 Funders expectations for gender equality and dimension

Different research funding organisations have different requirements for integrating gender dimension into the research design. This can either refer to quantitative aspects, such as the demographics of the research team in terms of gender or career stage, or qualitative aspects, such as how gender dimension is considered in research design.

First step is to check the funders expectations, and whether they refer to quantitative or qualitative aspects. If quantitative, check the specific requirements for the demographics for research team, boards, expert groups, and evaluation committees. For illustration purpose, we will use the European research and innovation programme **Horizon Europe** as an example. In this programme, **gender equality plan (GEP) is considered an eligibility criterion.**

Horizon Europe gender requirements ⇥

1. Having a Gender Equality Plan (GEP) in place is now an eligibility criterion for certain categories of legal entities from EU countries and non-EU countries associated to Horizon Europe.

2. The integration of a gender dimension into research and innovation content is a requirement by default, and evaluated under the excellence criterion, unless the topic description explicitly specifies otherwise

3. Increasing gender balance throughout the programme is another objective, with a target of 50% women in Horizon Europe related boards, expert groups and evaluation committees, and gender balance among research teams set as a ranking criterion for proposals with the same score.

Source: EC 2023

Figure 10. Horizon Europe gender requirements.
(EC, 2023)

The qualitative dimension refers to integrating sex and gender dimension into the research content. This goes beyond a gender-balanced research team and asks the proposal to elaborate how the research design considers gender, will the research have gendered impacts and if so, how can this be elaborated. In the Horizon Europe, integration of the gender dimension is considered an award criterion. To tackle the qualitative dimensions of funders expectations, consider who will be acknowledged in, integrated to, and affected by the research (for further details, see Chapter 6: Inclusiveness in practice: tools and examples) and how the research results will be disseminated to different segments of the society (for further details, see Chapter 4: Inclusive research communication).

Some funders also have a list of requirements to be considered. For example, the Horizon Europe funding instrument requires applicants to fulfil these criteria to be eligible for funding (see Figure 10.).

Other useful materials:
- EU Science & Innovation webinar (23.6.2022) on the Gender Equality Plan eligibility criterion (*YouTube*)
- Horizon Europe Guidance on Gender Equality Plans

4   INCLUSIVE RESEARCH COMMUNICATION

Inclusiveness entails communicating and sharing knowledge in a respectful way that reaches, empowers, and is understood by everyone – whether it be internal communication in a research organisation, research team, or a consortium, or external communication such as recruitment adds and research publications. This chapter will introduce you to inclusive language, the importance of representation in research communication and planning targeted and situated dissemination activities.

4.1   Inclusive language

Speech is an act. Language not only describes but also constructs reality: by talking about things in a certain way, we create mental images or reinforce pre-existing ones (EIGE, 2019). Language reflects our attitudes, whether conscious or hidden, and shapes people's attitudes of what is considered normal and acceptable (EIGE, 2019). When talking about people or groups of people, this is especially important, as language can discriminate and reinforce pre-existing discriminatory stereotypes (United Nations, 2023).
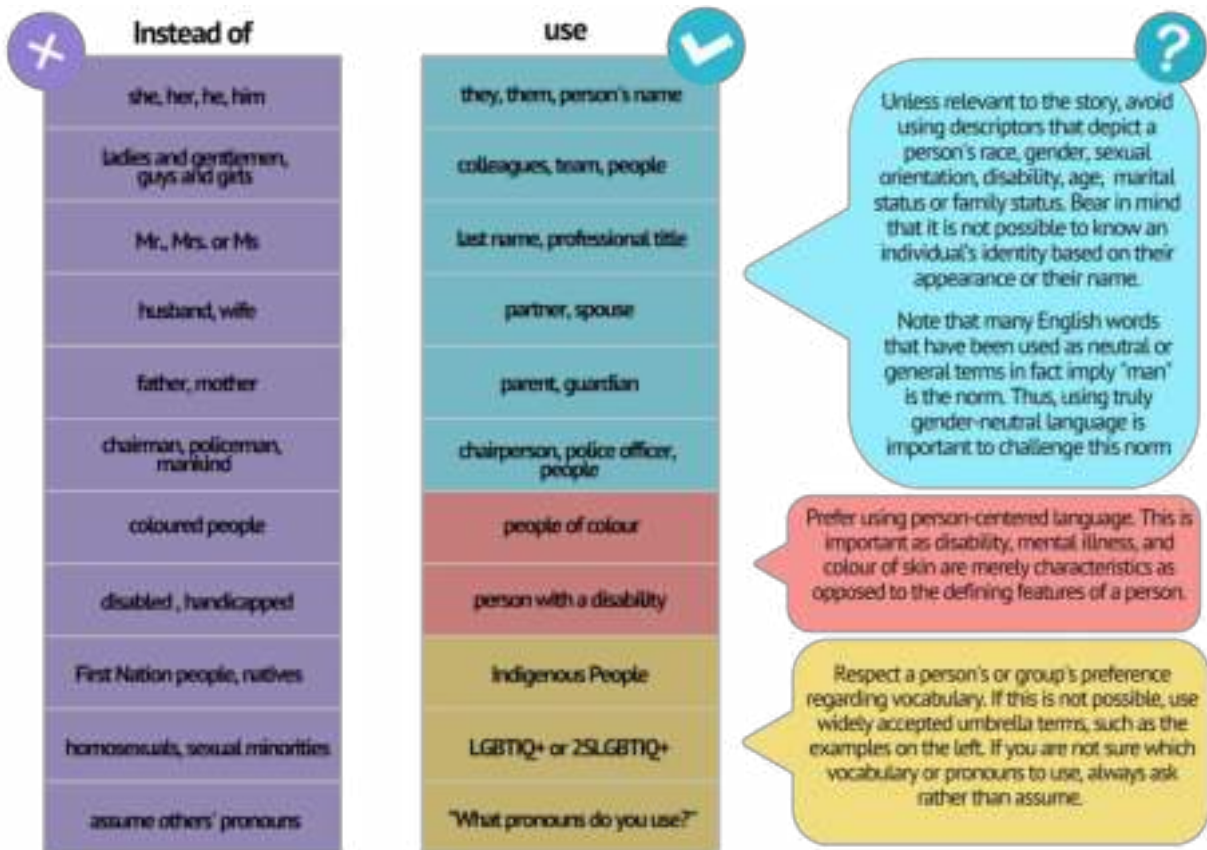
Figure 11. Inclusive language.
Adapted from APA (2021), EIGE (2016a and 2019), and Queen's University (2023).

Inclusive language is sensitive, non-discriminative, and treats everyone equally by choices of word, tone of speech and manner of conversation. Using inclusive language plays a crucial role in creating environments that are respectful, psychologically safe, and welcoming (APA, 2021). Use of inclusive language internally and externally signals the staff as well as potential job applicants that they are welcome and accepted as they are. In practice, using inclusive language entails using people-centred language, that references

a person's characteristics (gender, ethnicity) only when relevant to the context, and does not make assumptions: for example, if not relevant to the story, research personnel should be referred to by their last name and professional title rather than their marital status (Mr., Mrs, or Ms), and their gender pronouns should not be assumed.

One way to make our accurate pronouns visible to other researchers, and to normalise the differences in gender identities, is to place them in brackets after our name in ORCID, and in the articles and other research outputs we participate in. For example, see how the authors of this manual have communicated their pronouns on page 3.

Other useful material:
- APA (2021) Guideline on Inclusive Language in Writing
- EIGE (2019) toolkit to Gender-sensitive communication.
- Queens University (2023) Style Guide on Inclusive language

4.2 Representation in research communication

Representation entails the description or portraying of a person or a group and is a crucial component when planning and conducting inclusive communication activities, whether internal or external (Rozaki et al., 2020).

Congrats, you have an all male panel!

All-male panels have been a frequent sight at conferences and seminars from chemical engineering to women's reproductive rights – until Dr. Saara Särmä from the University of Tampere initiated a trend that would later challenge the status-quo. After following male-panels for years in the rather masculine field of security studies and foreign policy, Dr. Särmä began collecting images of all-male panels in Tumblr, and creating "Congrats, you have an all male panel" memes of them by incorporating a thumbs-up picture of David Hasselhof into the images. Särmä's memes soon went viral on Twitter. (Locker, 2015)

While the all-male-panel-memes are humorous, they address a serious shortcoming of representation in academic conferences and seminars: although there are female researchers, they are simply not represented in panel discussions. Moreover, when only men occupy a panel, it suggests that women's perspectives are not relevant, and reinforces the prejudice that women are not skilled enough to sit on a panel. Thus, by excluding female research and researchers of colour as well, all-male panels lack diversity of viewpoints in the discussions, and prevent young female or BIPOC researchers from having role models to look up to. (Locker, 2015; Murray, 2016)

To put it shortly, the aim of representation is to mirror reality and avoid prejudice and harmful stereotypes. Unfortunately, media outlets mostly portray white, heterosexual, and able-bodied men and women, and if/when underrepresented groups are portrayed, it is often done stereotypically (Rozaki et al., 2020). Ignoring underrepresented groups and their stereotypical depiction can be extremely harmful, as it enforces prejudice and

discriminatory attitudes and can contribute to severe forms of violence (see Figure 2. Pyramid of Discrimination).

Poor representation and notions of what an 'ideal' scientist looks and behaves like are contributing factors to the lack of diversity in STI (Lövkrona*, 2016). For example, the idea of researchers involves several stereotypical masculine characteristics: always available, dedicated, aggressive, competitive, ambitious, and objective, with no social commitments (Lövkrona*, 2016). Therefore, women struggle to fit into the role of a researcher, do not see themselves as researchers to begin with, and suffer from a lack of confidence in their abilities). On the other hand, by improving representation in communications (such as recruitment adds, in companies' social media channels), it is possible to empower different people to pursue careers in the field of STI. Therefore, **who** we decide to portray in photos, videos, and other visuals, and **how** we decide to portray them are key considerations in inclusive research communication (Rozaki et al., 2020).

Further reading and other useful resources:
- [Erasmus Student Network (2020) guidelines to inclusive communication](#)
- [United Nations Indonesia Guidance to avoiding All-Male Panels](#)

4.3 Inclusive dissemination and open science

The goal of the dissemination is to maximise the use and benefits of the research findings. However, dissemination activities are often limited to traditional academic publishing (journals, books) and meetings (workshops and seminars), and public engagement through social media activities. While all the aforementioned are important aspects of research dissemination, they might not be sufficient to reach all relevant audiences (Ross-Hellauer et al., 2020). Furthermore, most scientific outputs remain accessible only to those with academic affiliation, more than 60 percent of the world's population remains offline, and English language (or rather not speaking it) remains a barrier to use the content on the internet (Martini, 2017). Thus, not all those who should be able to benefit from research have access to information produced by research. Therefore, considering the relevant target audiences, and how to reach early in the R&I process is a crucial aspect of inclusive dissemination.

Some basic elements of inclusive dissemination are disseminating in multiple languages, providing an option to listen the content, preferring Open Access publication, and engaging the public to lower the gaps between academic community and citizens (EC, 2019). Representation is also an important consideration in planning dissemination activities: when organising seminars, workshops, and panel discussions for the academic community or the public, it is important to consider that room and platform are given to experts from diverse universities, genders, and career stages.

While some elements of inclusive dissemination are universal, some aspects of dissemination are always situated. In other words, dissemination should always be designed in a way that is accessible to the specific target audience. This could, for example, involve creating video or other visual material in several languages, taking part in science festivals or TedTalks, organising radio campaigns (in contexts where radio is used more than social media or TV), and collaborating with local organisations to disseminate on a grassroot level (Ross-Hellauer et al., 2020). To take into consideration members of the audience who have sensorial disabilities (trouble hearing or seeing), Pérez-Montero (2019)

also encorages presenters and authors to use white backgrounds for text, provide subtitles or transcripts of speeches and an audio version of written text, and always speak towards the audience to facilitate lip-reading.

Figure 12. RESET checklist for gender–inclusive dissemination and assessment of societal impact.
Adapted from Heikkinen et al. (2021).

Further reading:

- (EC, 2019) Open Science, European Commission.
- (Heikkinen, et al., 2021) GIA checklist and protocol in all project languages (D7.2.). The Reset Consortium, University of Oulu.
- (Pérez-Montero, 2019) Towards more inclusive outreach. Nature Astronomy, (3), 114–115
- (Ross-Hellauer et al., 2020) Ten simple rules for innovative dissemination of research

Gender STI⇵

5 THE RELEVANCE OF INCLUSIVENESS IN DIFFERENT STI FIELDS

This chapter presents an overview of the relevance of implementing an inclusive approach to research using examples of three different STI fields: artificial intelligence, smart mobility and cities, and health technology. A deeper look into examples from different STI fields allows us to understand how the lack of inclusiveness reflects on the excellency of science and innovations, as well as the usability and acceptability of the innovation amongst potential end-users.

5.1 Artificial Intelligence: Machine Learning and data bias

Once terms only used in engineering and computer sciences, *Artificial Intelligence* (AI) and *Machine Learning* have become hot topics in the scientific community and have received tremendous attention in recent years. AI tools have a variety of applications, from face recognition at border control to quick diagnosis of infectious diseases. The processes behind the research and development of AI technologies as well as their real-life implementation provide us with concrete case examples of how the lack of both diversity in research teams and overall qualitative inclusiveness in STI can further exacerbate social inequalities and halt the potential of new technologies.

CASE EXAMPLE: Facial analysis technology ⇵

Recent studies conducted on the accuracy disparities of commercially available facial analysis technology have revealed the pervasive bias in automated facial analysis datasets used for facial recognition (Buolamwini & Gebru, 2018). To evaluate the performance of various facial analysis technologies currently on the market, Buolamwini and Gebru applied an intersectional approach to investigate how accurate individuals with different gender, skin type, and the intersection of skin types and gender would be classified. The results demonstrated that across three different commercial systems for gender classification, darker-skinned females faced error rates up to 34.7%, while for lighter-skinned males error rates were up to 0.8%. Overall lighter-skinned individuals had higher accuracy rates than darker-skinned ones, however, when intersecting the data combining gender and race, darker-skinned female faces had the worst accuracy rates in all tested systems. (Buolamwini & Gebru, 2018) Moreover, considering the use of such facial analysis systems for, for example, law enforcement purposes, such as border control or criminal investigation, high error rates fuelled by algorithm bias as described above are very dangerous and can compromise the well-being and ultimately the freedom of individuals.

Globally, only 26% of Data and AI positions in the workforce are filled by women (World Economic Forum, 2020). Women's lack of representation in the field of AI reveals another problem, the gender bias in AI algorithms and their social impact, generating exclusionary experiences and discriminatory practices. When thinking about AI algorithms, two facts are important to remember: 1) Algorithms are as good as the data that they use; and 2) Algorithms are not discriminatory per se, but they can produce the effects of discrimination. For example, the use of biased facial analysis technologies in border control and criminal investigation, can have detrimental impacts (see CASE EXAMPLE: Facial analysis technologies). Furthermore, assuming an inherent neutrality of technology and AI only reinforces existing patterns of discrimination and inequality, pushing individuals from vulnerable societal groups to further marginalisation.

5.2 Smart mobility and smart cities

Gender and other social categories such as ethnicity, socioeconomic class, (dis)abilities and sexual orientation, affect the way people mobilise and the needs and concerns they have regarding public spaces and transportation. For example, international research has continuously shown that women walk and use public transport more than men, while men drive cars, cycle, share rides (e.g. Uber), and e-scooters more than women (Ramboll, 2021). Mobility has also been found to relate to income status: public transport is more commonly used by low to mid-income people, while driving cars are more common for middle and upper-income people (Roberts et al., 2019).

CASE EXAMPLE: Rethinking public transport ⚬

In 2012, there were nearly 25,000 reported cases of rape in India (McVeigh, 2013). Finally, after the brutal gang rape and killing of a 23-year-old woman on a private bus in Delhi in 2012, and subsequent protests and campaigns for better urban planning, the Government of India appointed a committee to review how public transportation and spaces should be improved to combat violence against women. The committee discovered that the Delhi infrastructure, from public transport to toilets and streets, in fact exposed women to violence due to having been designed for only men. It concluded that better street lighting, wider pavements, presence and training of transport staff, as well as access to telephone booths, safe public toilets, police and hospital, would improved women's feeling of safety in low-income neighbourhoods in Delhi. (McVeigh, 2013; UN WOMEN, 2013)

In response to a similar problem (according to surveys conducted by the French National Federation of Transport Users, 90% of women had experienced sexual harassment in public transport), France created a national plan in 2015 to combat violence against women in public transport, with measures to prevent and better understand security threats in the transport system. The measures included, for example, participative walks, where women pinpointed unsafe areas in train stations and subways, based on which the French government was able to improve lighting, human presence and video protection in public spaces and transport. (UN Women, 2020)

There are also significant differences in how public transport is used by, for example, different genders. Since women oversee most of the unpaid care work in the world, women are more likely to chain their trips, i.e., make several short trips by walking or by taking the bus to do grocery shopping, pick up children from school, or help older family members (Ramboll, 2021; Roberts et al., 2019). Men, however, are more likely to take individual trips to and from work (Ramboll, 2021; Roberts et al., 2019). The transgender community has reported that using public transport is often done in groups for increased safety, and taxi services are often preferred over public transport (MoJ, 2022; Weintrob et al., 2021).

CASE EXAMPLE: The Finnish transgender community

While Finland has ranked slightly better than the EU average when it comes to discrimination against the LGBTIQ+ community, the 2020 FRA survey study "A long way to go for LGBTI[Q+] equality" raised concerns over high figures regarding harassment and violence in Finland, particularly targeted towards transgender people (MoJ 2021). 42% of the transgender respondents of FRA survey had experienced harassment within the span of one year in Finland, and 20% of trans- and intergender people had experienced physical and sexual violence within the past five years. Hate speech, harassment and violence against transgender people in Finland mostly take place in public spaces, due to which many have altered the way they mobilise. (MoJ 2016, 2020, 2021 and 2022) Avoiding public transport, taking taxi rides, and circumventing known-to-be dangerous districts (such as the Kaisaniemi park in Helsinki) are among common coping strategies for the transgender community.

Crimes against transgender people are underreported, as many do not believe the police will take the matter seriously (MoJ 2016, 2020, 2021 and 2022). The lack of trust towards the police was reinforced by a recent murder of a transwoman, reported by the Finnish police as an "argument between two men" (YLE News 2021; Trasek 2020). Binary and gender-revealing public transport tickets, as well as the current Finnish transgender legislation (that infringes the right to self-determination of gender identity), also expose transgender people to forced outing in public spaces (SETA 2013).

Yet, similarly to other STI fields, the transport sector suffers from a male bias, as less than a third of transport sector employees are women in Europe, and transport systems are mainly designed based on the needs of men (Ramboll, 2021). Consequently, public transport can be often dangerous for women, people of colour and the LGBTIQ+ community. Consequently, fear or harassment and assault affect the choice of mode and the time-of-day underrepresented groups mobilise in public spaces designed for men (Weintrob et al., 2021). Common coping strategies include circumventing certain areas, not staying out too late, taking expensive taxi rides, travelling in groups or where transport staff is present, or carrying keys in a pocket where they can be used quickly as a weapon (Weintrob et al., 2021; Ramboll, 2021).

5.3 Health technology

"Every cell is sexed, and every person is gendered" (CIHR, 2013). The diseases we develop, how we respond to medical treatments, and how frequently we seek health care is influenced by our sex and gender (CIHR, 2013). Yet, the female sex, as well as the concept of gender, have often been ignored in health research, leaving the field with a massive lack of data concerning women (Jackson, 2019). In addition, while *sex* and *gender* as well as their differences have become prominent concepts in the field of health research in social sciences, in the context of clinical and biomedical health research the two are still often inaccurately understood as synonyms (Johnson et al., 2009).

CASE EXAMPLE: Clinical bias ⇌

"We know less about every aspect of female biology compared to male biology"

- Dr. Janine Austin Clayton
Associate director for women's health research
the United States National Institutes of Health

A female is three times more likely than a male to die of a heart attack, and two-thirds of those with Alzheimer's disease are females. The list goes on: chronic pain conditions such as fibromyalgia, chronic fatigue syndrome, and chronic Lyme disease are twice as common among females than males, and there is a three-to-one ratio between migraines among females and males. (Burrowes, 2021; Franconi et al., 2014) Yet, the medicine developed for these diseases has often been designed according to male biology and consequently, causes unanticipated side effects for females. Between the years 1997 and 2000, eight out of ten drugs were removed from the US market for causing side effects for females, and from 2004 to 2013, females suffered more than 2 million adverse events due to drugs in the US. In comparison, during the same period, males suffered 1.3 million adverse events in the US. (Burrowes, 2021)

Human health is profoundly affected by sex. Research has demonstrated that male and female bodies differ physiologically and hormonally, resulting in different responses to, for example, alcohol, drugs, and treatments. From cellular metabolism to blood chemistry, the female body inherently differs from the male body (see for e.g., Madla et al., 2021). Same goes for other physiological differences: for example, darker skin tones absorb melanin more than lighter skin tones, and thus wearable health technology, such as heart rate censors (typically designed for white skin) that use green infra light have been found to function poorly on dark, tattooed, or hairy skin (Boxall, 2021). Therefore, the results of one group cannot be applied to the other. Yet, most doctors, scientists, and health research personnel, as well as most cells, animals, and humans studied have also been white males

(Burrowes, 2021). In other words, **most of the advances in medicine have come from white male biology,** and consequently, we know little about female and black biology (Cleghorn, 2021).

While sex and gender should be treated as separate concepts in health research, the two are also intrinsically linked and mutually influenced. What is socially considered normal and appropriate for people is based on their secondary sex characteristics: penis, or vagina or female breasts (Johnson et al*.*, 2009). Therefore, the sex of a person influences how different genders behave and are treated in societies.

An example of the interconnectedness of sex and gender can be found in the immune system and differences in disease severity between males and females. The female immune system has been found to demonstrate a stronger response to viral infection compared to males, much due to gendered behaviour. More specifically, women tend to wash hands, comply with public health measures, and wear masks more diligently than men (Kalenga et al., 2020). In a similar manner, high-risk sports are considered masculine or ultra-masculine, and therefore men who practice these sports often experience an increase in testosterone levels (Johnson et al., 2009). Therefore, it is essential to include both the concepts of gender and sex into health research to apply efficient prevention and treatment strategies, as well as understand the implications of disease for different genders (Kalenga et al., 2020).

In sum, health research that ignores the effect of physiological and social differences on validity and generalisability compromise the excellency of research as well as individuals' health (Johnson et al., 2009). Hence, in each R&I process where when new health innovations and technology are developed, it is crucial to take sex and other physiological characteristics, as well as the usage purposes and impacts of the device to different groups, into consideration.

6   INCLUSIVENESS IN PRACTICE: TOOLS AND EXAMPLES

This chapter will provide an introduction and tools for implementing inclusiveness into research and innovation (R&I) processes and content, from drafting research questions to writing proposals, and from executing projects to disseminating research findings. In addition, two cases will be presented, to show in a concrete manner examples of what implementing inclusiveness can look like in practice. The first case (6.1.) focuses on the research proposal stage, and the second case (6.2) tackles implementing inclusiveness in a research project, from the project initiation to final dissemination. The authors of this manual (Laitinen & Sanchez Nieminen) were involved in both the research proposal and the project in question.

6.1   Research Impact Assessment and Researchers' self-assessment: tools and methods

From beginning to end of every R&I process, research personnel should consider, who benefits from the research or innovation, and what contexts (social, geographical, economic) and groups (gender, ethnicity, age) are considered when creating new innovations.

One of the initial steps that research personnel can take towards inclusive research and innovation, is self-reflection, or reflecting on one's own positionality. **Positionality** refers to understanding that one's knowledge is always situated, and thus does not represent universal knowledge. Elaborating on one's position is highly encouraged in social sciences especially when conducting qualitative research, as research personnel's values, attitudes, and beliefs have been recognised to influence research. Moreover, belonging to certain social groups (for e.g., Finnish, ciswoman, white, young, heterosexual, atheist, bipolar) influences our worldviews, which in turn influence our decisions regarding what topics we choose to study, what research questions we pose, and how we choose to execute research projects.

While STI fields and quantitative research are often perceived as neutral, both are also influenced by the research personnel's positions when it comes to the strengths and limitations of the personnel's knowledge, deciding on the topic and the direction of the research, research methodology, acquiring partners and collaborators, and disseminating the research findings. Thus, it is paramount to reflect on whose point of views and experiences are considered relevant in the R&I process from the initial stage when formulating research questions all the way to the technology implementation and exploitation.

A following crucial step is **to consider how sex, gender, age, skin colour, and/or social status can impact the study**. For example, when developing new wearable devices, at least sex, skin colour and thickness (biological and physiological factors), as well as gender (usage purposes, needs, acceptability) should be considered and analysed to ensure the device's efficiency and accuracy for diverse groups of people. If the project lacks capabilities to conduct this type of an **intersectional analysis**, this expertise should be acquired through the inclusion of gender experts and/or social scientists.

As a rule, when conducting research and creating innovations, research personnel should ask themselves,

Why sex, gender, and ethnicity among other aspects of inclusiveness are *not* relevant to research?

Moreover, research personnel should try to critically justify **why**, instead of **if**, aspects of inclusiveness are relevant to research.

Figure 13. RESET checklist for Gender Impact Assessment (GIA).
Adapted from Heikkinen et al. (2021).

The Horizon 2020 RESET project has developed a series of tools for research personnel and research organisations to support effective gender balance in all academic and scientific careers. One of the tools is the **RESET checklist for Gender Impact Assessment,** developed to support research personnel's self-assessment at different stages of the R&I process. The checklist functions as a reminder of different aspects of gender dimension in research that research personnel should take into consideration.

Further reading:
- Heisook & Pollitzer (2020) Applying gender lenses to the interlinkages and synergies between SDGs. Making sure that Agenda 2030 will not leave women behind.
- Buitendijk & Maes (2015). Gendered research and Innovation: Integrating sex and gender analysis into the research process. Advice Paper, 18.
- EIGE (2016b). Gender equality in academia and research. GEAR tool. (see Chapter 3.2.8. Integrating gender in research and education content, p. 48-52)

Other useful materials:
- Integration of the sex/gender dimension into research and teaching content | European Institute for Gender Equality (europa.eu)
- Methods for sex and gender analysis (Stanford Universty 2011)
- Gender Dimension in R&I, PowerPoint Presentation by European Commission Katja Reppel (2021)
- Understanding Gender in Research (YouTube) by Stanford University Dr. Schiebinger (2015)

6.2 Inclusiveness in the research proposal phase: a citizen security proposal

In response to a Horizon Europe call focused on public security, a research project proposal was submitted focusing on security threats and experiences of insecurity within the EU. It included studying the subjective experiences of insecurity of vulnerable or marginalised groups (such as the LGBTIQ+ community and elderly people) across regions in EU, and co-creating mechanisms and tools together with members of these groups to tackle prominent security challenges.

Due to the specific focus on vulnerable groups, the consortium had to consider specific measures the ensure that no harm is done to the already marginalised group, and that the innovation would bring actual benefits to the group. This entails including the effective participation of vulnerable groups in each stage of the R&I process, sharing power over the research agenda, and ensuring the community involved has the resources to be part of the R&I process.

In practice, the research personnel first identified a gap in both knowledge and solutions for the security challenges which lead them to start the idealisation of the proposal and map potential local partners that could be a bridge between research and the everyday life. After this, an NGO specialising in matters concerning the LGBTIQ+ was contacted and invited to discuss the research proposal concept and methodologies, giving them the space to provide feedback, suggestions and engage in future research activities of their interest. The NGO's representatives agreed to support the consortium by giving direction on the needs of the Finnish LGBTIQ+ community. Furthermore, the NGO emphasised the need to

tackle the everyday security challenges the LGBTIQ+ community is faced with in Finland when mobilising in cities (see sub-chapter 5.3. for further details), and the need to study this in collaborative and storytelling-based workshops, facilitated by the NGO and the community themselves.

To ensure the involvement of the NGO throughout the R&I process, funds were allocated from the project to cover their consultative and facilitative work.

Figure 14. Inclusiveness in practice: Citizen security proposal.

6.3 Inclusiveness in research projects: The A-PATCH

The Horizon 2020 funded A-PATCH project (CORDIS, 2022) developed a non-invasive autonomous wearable diagnostic patch for the real-time detection of infection status of tuberculosis. In the A-PATCH concept, the individual will wear a patch in his/her arm, to perform a tuberculosis test. After this, the healthcare professional uses a reader to visualise the result from the patch.

Tuberculosis (TB) is an infectious bacterial disease which incidence is unevenly distributed across countries and population groups, as it can be close to eradication in some, while high and rising in others. Individuals infected by TB can suffer with its physical symptoms

and social stigma when the disease is active, which can lead to social-economic consequences (i.e., particularly to women) negatively impact one's mental health and cause delay on diagnosis and treatment of TB (Courtwright & Turner, 2010).

Thus, when developing new technologies for the detection, treatment, and eradication of infectious and stigmatised diseases such as TB, a wide range of knowledges and expertise must be included in the research and innovation process to ensure that the technology, once implemented will not cause unforeseen harm on vulnerable individuals or widen the gap of health inequality.

Examples of actions taken at different stages of the A-PATCH research and innovation process can be found in the table below. **The list is non-exhaustive and intendents to inform research personnel on potential actions that can be taken during a research project, from its idealisation to the technological implementation of gender, inclusiveness, and diversity dimensions in research and innovation.**
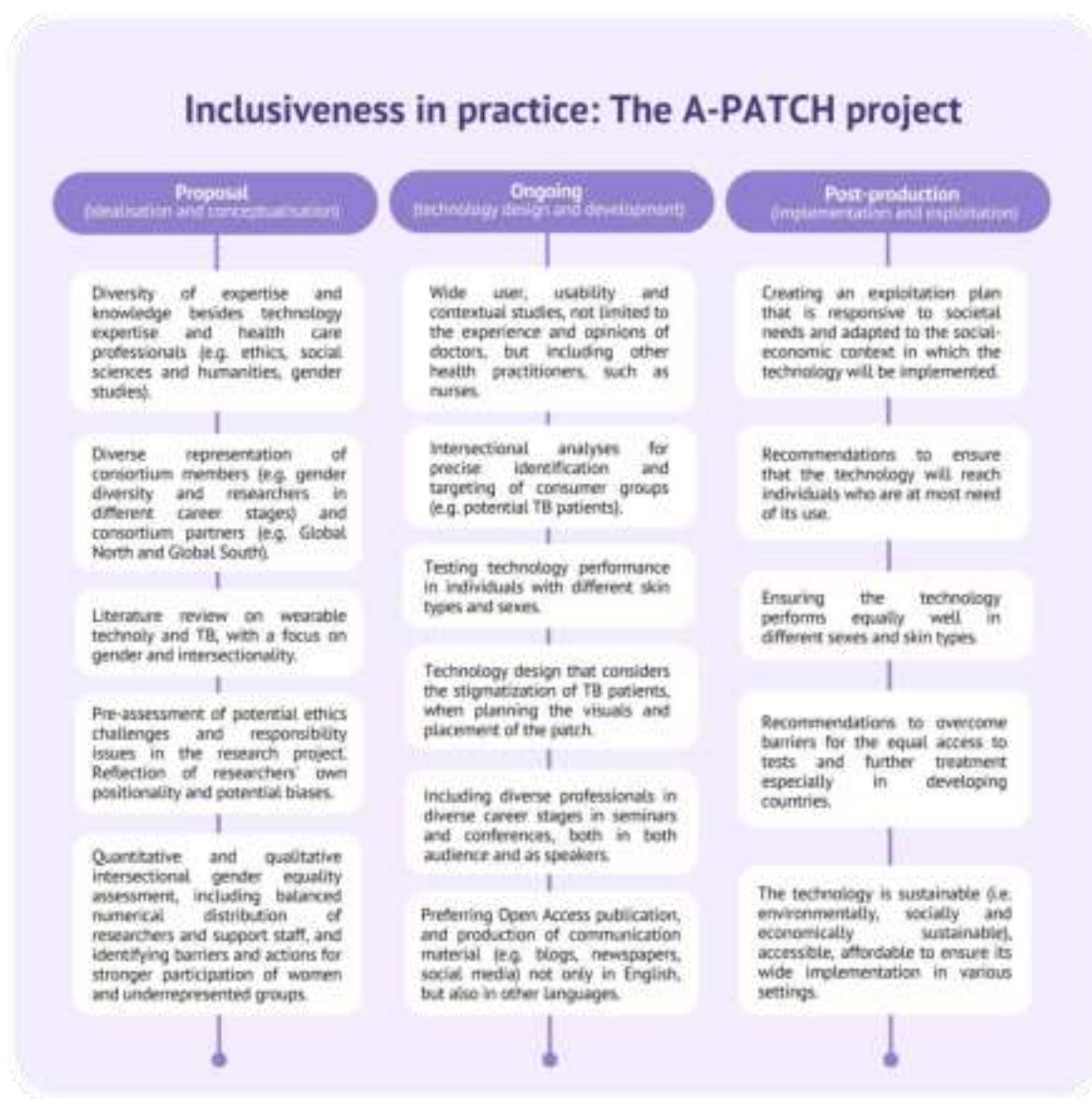

Figure 15. Inclusiveness in practice: The A-PATCH project.

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