How human factors can enhance the delivery of equality, diversity, and inclusion (EDI)

Contents

1. Foreword

This guidance will help to demonstrate how human factors (HF) as a discipline can help address issues relating to equality, diversity, and inclusion (EDI).

It explores the different situations that cause EDI issues, including the impact of:

- Confusing user interface language and terminology.
- Ill-fitting personal protective equipment (PPE).
- Biases in equipment design.

It also describes how HF can make a difference in addressing these issues, including:

- Adopting a systems approach.
- Using a participatory design process.
- Applying specific HF methods to enhance EDI delivery.

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The Chartered Institute of Ergonomics & Human Factors (CIEHF) received its Royal Charter in 2014 to recognise the uniqueness and value of the scientific discipline and the pre-eminent role of the Institute in representing both the discipline and the profession in the UK. This includes the protected status of “Chartered Ergonomist and Human Factors Specialist” with the post-nominal C.ErgHF awarded to practising Registered Members/Fellows who are among a group of elite professionals working at a world-class level.

2. Equality, Diversity, and Inclusion (EDI)

How do we define Equality, Diversity, and Inclusion (EDI)?

- **Equality** is about treating everyone fairly, regardless of the protected characteristics they hold. It's about ensuring everyone is given equal access to opportunities [Ref. 1], for example by giving all employees access to a tablet device [Ref. 2].

  It's closely related to equity, which is about addressing barriers that can prevent people from thriving and recognising that "some people need more because they started with less" [Ref. 2]. If we continue the example of providing everyone with a tablet, equity would mean identifying any employees who don't have access to Wi-Fi, then providing them with access to both Wi-Fi and a tablet. Employees who do have access to Wi-Fi would only need the tablet [Ref. 2].

- **Diversity** is about recognising people's differences. This includes both protected and non-protected characteristics [Ref. 1]. Considering diversity can mean explicitly monitoring the people's characteristics and identifying groups that are under-represented. Understanding the systemic reasons behind under-representation allows positive action to address it.

- **Inclusion** is about making sure everyone feels involved [Ref. 1] and that the environment they're in makes everyone as accepted and comfortable as each other. For example, the means of access to and within a space influences the extent to which the people using it can participate in activities. Ensuring inclusion might involve designing physical access to and within a space to allow everyone to easily access all areas.

In other words:

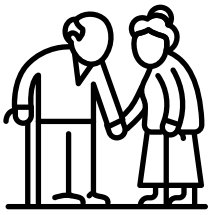
Equality
is concerned with **fairness** [Ref. 3].

Diversity
is concerned with **representation** [Ref. 4].

Inclusion
is concerned with **involvement** [Ref. 4].

EDI is important. It brings clear economic as well as human benefits. For example, research shows that diverse companies are 35% more likely to outperform the market financially [Ref. 5]. It also brings talent benefits. Inclusive employers say that focusing on building a more inclusive culture means being more likely to attract and retain a wider diversity of talent [Ref. 6]. Finally, EDI can enhance safety, usability, and user satisfaction. We'll look into that in more detail later in this guidance.

In the United Kingdom, EDI is governed by the Equality Act 2010 [Ref. 7], which gives people legal protection from discrimination in the workplace and in society with respect to nine protected characteristics:

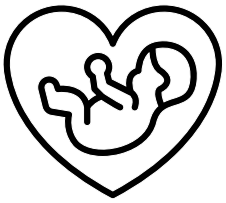


AGE

DISABILITY

GENDER REASSIGNMENT

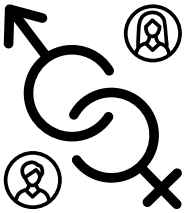
MARRIAGE AND CIVIL PARTNERSHIPS



PREGNANCY AND MATERNITY

RACE

RELIGION AND BELIEF



SEX

SEXUAL ORIENTATION

Other countries across the world, including Brazil [Ref. 8], South Africa [Ref. 9], and the United States of America [Ref. 10], have similar legal protection from discrimination. Socio-economic status is not formally recognised as a protected characteristic, however it is referenced in section 1 of the Equality Act. Many organisations also recognise it as part of their EDI strategies.

3. Four principles to enhance EDI delivery

Four principles highlight potential ways to enhance EDI delivery [Ref. 11]:

3.1 Adopt a participatory approach

As Nancy J. Cooke says, “no single discipline (including human systems engineering) can solve these systemic problems alone” [Ref. 12]. The path to becoming EDI leaders involves working effectively with stakeholders to solve EDI challenges. This can help everyone gain a better understanding of the causes that contribute to issues [Ref. 11]. Participatory ergonomics can be used as an approach [Ref. 13]. It not only leads to better solutions, it also engages participants at an early stage, building trust and ensuring there are local advocates for change throughout a team or organisation.

3.2 Utilise both quantitative and qualitative data

As Hugh Beyer and Karen Holtzblatt say, “data pushes us forward to successful design” [Ref. 14]. Quantitative HF data (e.g., anthropometric data etc.) can address specific EDI challenges in the here and now. HF also has a role to play in influencing longer-term EDI goals that need to be tracked over years because of the time they will take to come to fruition. However, sometimes data can mask the detailed, personal experiences that result from inequality. For example, an organisation may be able to demonstrate that it has a good spread of ethnic diversity amongst its graduate recruits; however it might be the case that black or minority ethnic background recruits were more likely to need a postgraduate qualification to be successful in their application.

It’s important to look at other methods that help us understand the shorter-term and more detailed impact of HF interventions, which is where qualitative data can come into play [Ref. 11]. There are few things more powerful than gaining direct insight into someone’s lived experience. Presenting specific and emotive examples of qualitative stories can help positively influence stakeholders to act [Ref. 11].

3.3 Recognise the impact of design on behaviour

As Microsoft say, “Every decision we make can raise or lower barriers to participation in society” [Ref. 15]. To make systems and environments inclusive and accessible to everybody, it’s important to recognise the role design plays in shaping behaviour [Ref. 11]. For example, task design can impact the wellbeing of pregnant women in the workplace [Ref. 16], and the way food is provided can be designed to suit different cultural and religious traditions [Ref. 11].

3.4 Adopt a systems perspective

As Nancy J. Cooke says, “When you avoid a myopic perspective on a problem, you might begin to see other factors at play.” [Ref. 12]. Adopting a systems perspective means taking a holistic approach to a problem. It means looking at how the system’s different parts relate to each other, and how they all work together in the context of the larger system. It helps people avoid rushed thinking, where key aspects of a system can get overlooked [Ref. 12]. Rushed decision-making can be a precursor to unconscious bias [Ref. 11]. Equity Design illustrates this point by saying, “It stands to reason that any problem definition or solution created by biased individuals — which we all are — will perpetuate inequity if the process does not actively acknowledge and combat bias” [Ref. 17]. Adopting a systems perspective provides a powerful tool to combat biases, while also improving the likelihood of developing long-lasting solutions that can address discriminatory changes at a system level.

4. Examples of EDI challenges

In this section we'll examine some of the specific EDI challenges arising from the protected characteristics defined in the UK's Equality Act and consider how the four principles we've just described might be used to address them.

4.1 Protected characteristic: Age

4.1.1 Example of an EDI challenge

Jane Wakefield, a technology journalist for the BBC, wrote an article called "The generation that tech forgot" [Ref. 18], in which she paints a vivid picture of her elderly mother's lived experience with technology. Jane says, "she wants to buy a tablet but is worried that she will not know how to use it." Statistically, her mother is not alone; a research study shows that 77% of older people would need someone to walk them through the process of setting up a new device [Ref. 18].

Ian Hosking, an expert in design for the elderly, makes the implications of this problem clear, saying, "there are some very tech-savvy older people around, but there is clearly a large cohort of people who feel excluded by technology." [Ref. 18].

4.1.2 Potential ways to enhance EDI delivery

Adopt a participatory approach: Engaging Jane's mother in a participatory design process will give her the opportunity to share her own ideas on how to improve the situation. For example, Scandurra et. al (2013) engaged elderly users in a participatory design process to develop an interactive eHealth service, where the users helped generate ideas that informed the design [Ref. 19].

Utilise both Quantitative and Qualitative Data: Capturing Jane's mother's fears in the form of a qualitative story will provide a better insight into any design factors that might be troublesome for her. For example, observing Jane's mother interacting with technology will help to determine what her specific problems are. These could then be mapped onto a "Pain Matrix" to understand how frequently any troublesome experiences occur, and how intense/ painful they are — i.e. how much fear, stress, anxiety etc. they cause [Ref. 20]. These insights can then be used to develop better solutions.

Recognise the Impact of Design on Behaviour: Interviewing Jane's mother will lead to a better understanding of the impact that technology design has on her behaviour. For example, Harris et. al (2020) interviewed elderly participants and asked them to detail what they considered to be the most challenging tasks to complete for six different aspects of their lives. Once they described the tasks that were most challenging, researchers asked them to describe how they handled them. This allowed researchers to understand the impact of designs on behaviour and provided clues on how to address unfulfilled needs [Ref. 21].

Adopt a Systems Perspective: Involving Jane's mother in a participatory design process will help to adopt a systems perspective, because her input will guard against myopic thinking [Ref. 12]. Scandurra et. al (2013) found that the participatory design process helped to reduce uncertainty about what future might need to be supported, which can be lacking without participatory design [Ref. 19]. What's more, adopting a systems perspective can help identify the factors that affect Jane's mother's ability to use the device. This would involve firstly considering whether the device is needed at all, and then looking beyond it — understanding the environment where it's used, for example, and the tasks she carries out on it, as well as considering whether maintenance-related issues like battery life can be simplified.

4.2 Protected characteristic: Disability

4.2.1 Example of an EDI challenge

Aphasia is a condition that can impair a person's ability to read [Ref. 22]. It can also affect how a person speaks, writes, and uses numbers [Ref. 23]. John Liechty lives with aphasia after suffering a brain aneurysm that caused him to lose his ability to speak. His road to recovery has been long and painful, beginning with relearning his ABCs [Ref. 24]. John knows he will have to live with the struggles of aphasia for the rest of his life.

He says receptive aphasia "can make persons with aphasia feel as though everyone else is speaking a foreign language, and everything they read is gibberish." [Ref. 25]. The condition demonstrates the intersection between EDI and HF — for example, a website that uses confusing and ambiguous language is likely to be a challenge for someone with aphasia. That increases the risk of what some researchers call "digital exclusion" [Ref. 22].

4.2.2 Potential ways to enhance EDI delivery

Adopt a participatory approach: Engaging people with aphasia in a participatory design process can help deliver unique insights into their lived experience. For example, Ghidella, Murray, Smart, McKenna, and Worrall (2005) assessed the accessibility of websites for people with aphasia by speaking to speech and language therapists as well as people with the condition. The perceptions of quality and accessibility differed between the two groups [Ref. 26], which shows the importance of including people with aphasia in the design process [Ref. 22]. Actively involving the relevant users helps address the EDI challenges they face.

Utilise both Quantitative and Qualitative Data: Making use of data that considers the needs of people with aphasia can improve their user experience. For example, the Centre for HCI Design, City University London, developed the "Language-Light UX Guidelines" [Ref. 27]. Their recommendations include minimising the use of language (text or speech) and using everyday language where it is used. It also recommended replacing text or speech with familiar icons and/or images, applying accessible information guidelines and avoiding textual passwords [Ref. 27].

Recognise the Impact of Design on Behaviour: While Newell et. al (2011), who created the User Sensitive Inclusive Design Framework, recognise that design for all "is a very difficult, if not often impossible task" [Ref. 28], their framework has proven particularly valuable when it comes to recognising the impact of design on behaviour [Ref. 28]. It advocates a narrative rather than a guideline-based approach [Ref. 28], emphasising the importance of storytelling. As part of a toolkit involving various approaches, this kind of framework can help designers understand the lived experience of people who have conditions like receptive aphasia.

Adopt a Systems Perspective: Specific systems techniques can help combat the risk of myopic thinking and deliver a richer understanding of people's needs. For example, researchers measured aphasic end-user reactions to pictures, both positive (e.g. helpful, appealing, considerate) and negative (e.g. childish, embarrassing, offensive). They found that participants with the most profound levels of reading difficulty found more offence in the pictures [Ref. 29]. Without that perspective, designers might have assumed that everyone would react in the same way. This approach helped to combat such myopic thinking.

4.3 Protected characteristic: Gender Reassignment

4.3.1 Example of an EDI challenge

Transgender Human-Computer Interaction specialist Audrey Reinert shared their lived experience of working in an academic setting [Ref. 30] with limited gender-neutral toilet facilities. Audrey said, “The location of a restroom may not sound like a huge issue until you think of how many times you use the restroom every day.” [Ref. 30].

Audrey makes the implications of this problem clear, saying, “I spent months planning my daily schedule around where I would be relative to a small number of restrooms... If I had class on the other side of campus from a restroom, I had to either avoid drinking or eating anything so I could make it through class without an incident, or risk using one of the more common gendered restrooms.” [Ref. 30].

4.3.2 Potential ways to enhance EDI delivery

Adopt a participatory approach: As a Human-Computer Interaction specialist, Audrey describes how a participatory approach can help to address the EDI challenges they experienced: “As designers we need to actively engage with members of marginalized communities during the design process. Direct engagement will help designers identify specific elements of the design that must be altered or added to make the system more inclusive. We can also learn about the experiences of marginalized groups by researching their experiences and studying how other designs can be exclusionary.” [Ref. 30].

Utilise both Quantitative and Qualitative Data: Audrey’s story is a powerful example of the importance of qualitative data in defending against exclusionary design. With respect to quantitative data, robust HF data on the optimum distance to a toilet for different user groups would add a lot of value to the design process, because it would help designers understand the impact their designs will have on the behaviour of different user groups. A good starting point might be to consider the data contained in the UK Department for Transport’s “Inclusive Mobility” guidance document, which includes data on “recommended distance limit without a rest” [Ref. 31].

Recognise the Impact of Design on Behaviour: Inclusive frameworks encourage designers to work at the margins. Audrey specifically cited Equity Design as a useful framework that can help avoid exclusionary design [Ref. 30]. One of the tools from that framework is an equity pause, during which designers take time to reflect on their language, ideas, and hunches [Ref. 17]. If the designers of Audrey’s work environment had taken an equity pause, they might have reflected more on the impact their design would have on the behaviour of users in the margins.

Adopt a Systems Perspective: With respect to the places where Audrey suffered exclusionary design experiences, they suggest that designers may have had a form of inattentional blindness in understanding experiences dissimilar to their own, thus explaining why they failed to understand what was exclusionary [Ref. 30]. Adopting a systems perspective would have been beneficial in combating myopic thinking [Ref. 12].

4.4 Protected characteristic: Marriage and Civil Partnerships

4.4.1 Example of an EDI challenge

It has been found that people who are single may be treated less favourably than people who are married or in civil partnerships [Ref. 32]. For example, one study found that in the context of healthcare, married patients were consistently treated more favourably when it came to being recommended for a transplant [Ref. 33].

What's more, when determining someone's ability to handle challenging treatments, physicians might factor in a person's social support system [Ref. 34]. It's been found that married people may be perceived as having a stronger support system, despite the fact that such bias is "founded on cultural narratives, not evidence" [Ref. 34].

4.4.2 Potential ways to enhance EDI delivery

Adopt a participatory approach: Adopting a participatory approach could help challenge biases. Abib et. al (2014) used a participatory design process to understand how healthcare professionals "communicate and share information during their working day", with the aim of verifying "how their communication process happens: following standards procedures or just by their own knowledge/feelings/instructions or a combination of those things." [Ref. 35].

Utilise both Quantitative and Qualitative Data: Using qualitative stories can help to highlight inequalities. For example, Marotta et. al (2019) created three variations of a story about a patient who needed a kidney transplant, with the only difference in each story being whether the person was married, divorced, or single. This approach helped them identify favourable treatment towards married people [Ref. 33].

Recognise the Impact of Design on Behaviour: It's been found that, when making the kind of medical determinations described above, "there is no standardized measure of social support used in the evaluation process. Instead, what counts is the judgment of the person doing the evaluation" [Ref. 33]. The task design as it stands introduces the risk of biases being introduced, namely that married people are perceived as having a better social support system [Ref. 33]. On the other hand, it has been found that explicitly asking patients about their social support system, for example by asking them if they have people who will provide them with support, can help minimise marital bias [Ref. 34].

Adopt a Systems Perspective: Adopting a systems perspective can help to identify issues with decision-making and lay the foundation for improvements. Carmichael (2020) adopted a systems approach to look at "various sources that contribute to different decisions between people" and found that "taking a devil's advocacy style approach" can help reduce the influence of the source of any bias [Ref. 36]. This is especially important given that studies show that "people do not always appear to be fully cognisant as to how they make decisions, and what factors have influenced their decisions." [Ref. 36]. A systems perspective approach could help combat marital bias in decision-making in healthcare.

4.5 Protected characteristic: Pregnancy and Maternity

4.5.1 Example of an EDI challenge

Changes that occur during pregnancy may present certain HF challenges. For example, manual handling becomes more of a risk, with pushing, pulling, and carrying of loads being key things to manage. Backache may become an issue. Finding a comfortable posture, working under high stress conditions, even working shifts may become more challenging.

It's important to make sure risk assessments adequately consider pregnancy-related risk factors. Some mothers, however, have expressed concerns that their employers take a "tick-box" approach to risk management during pregnancy, the implications being that risks have not been dealt with properly [Ref. 37].

Failure to protect pregnant women from risks could have serious implications. In the case of Hardman v Mallon t/a Orchard Lodge Nursing Home, it was found that the employer did not carry out a risk assessment for a pregnant care assistant, which was found to be discriminatory [Ref. 38]. In other cases, pregnant women can be excluded from opportunities (e.g. being asked to take on new responsibilities, given the opportunity to participate in training courses) on the basis of their pregnancy status, adversely affecting career progression.

4.5.2 Potential ways to enhance EDI delivery

Adopt a participatory approach: A participatory approach would deepen the sense of empathy with pregnant women and challenge traditional thinking about risk. Sandman et. al (2020) used a participatory design process to help stakeholders experience and appraise the world from a pregnant woman's point of view [Ref. 39]. Such an approach would especially help to address concerns about pregnancy risk assessments being non-empathetic "tick-box" exercises [Ref. 37]. Ideally, risk assessments and adjustments should enable a pregnant woman to retain the fullest experience possible in the workplace whilst reducing the impact of work on their health.

Utilise both Quantitative and Qualitative Data: Paul et. al (1995) looked at optimal work surface heights for pregnant women and recommended that abdominal height should also be considered as an additional relevant design factor [Ref. 40]. This aspect might not have been previously considered under an employee's existing risk assessment process.

Recognise the Impact of Design on Behaviour: The design of a task can create problems for pregnant women. Cheng et. al (2006) found that pregnant women needed to apply a greater level of effort for tasks that involve "reaching above the head, bending forward, bending and twisting, pushing, repeating actions and working at a fast pace"'. [Ref. 41]. Employers can use such findings to help them design, assign and analyse tasks for pregnant women in the workforce [Ref. 41].

Adopt a Systems Perspective: Adopting a systems perspective helps designers account for the needs of pregnant women. Ko-Chiu Wu et. al (2017) carried out a systematic review of the needs of different user groups when accessing public park facilities [Ref. 42], which had formerly focused predominantly on the needs of disabled populations. The review looked at the situation through a wider societal lens and expanded the set of end-users who were included. As a result, their approach took into account the needs of pregnant women [Ref. 42]. This approach is more likely to yield insights that improve pregnant women's wellbeing.

4.6 Protected characteristic: Race

4.6.1 Example of an EDI challenge

A pulse oximeter checks the level of oxygen in a person's blood and is a tool that has become particularly important during the COVID-19 pandemic [Ref. 43]. However, experts have warned that it is less effective when used on patients with darker skin [Ref. 44]. Ranjit Senghera Marwaha bought a pulse oximeter after contracting COVID-19. When her oxygen levels dropped so low that she had to be hospitalised, she discovered that the oximeter wasn't working as expected. Ranjit said, "When I went into hospital the first thing they said was 'you've really left it too late'… Never ever did I factor that the colour of my skin or the pigmentation in my skin would have an impact on the way in which these gadgets work." [Ref. 44].

4.6.2 Potential ways to enhance EDI delivery

Adopt a participatory approach: Adopting a participatory approach can help to broaden the diversity of stakeholders involved in the design of pulse oximeters. Dr Habib Naqvi, Director of the NHS Race and Health Observatory, has stressed the importance of carrying out culturally-inclusive research to address the issue of oximeter reading inaccuracies related to people with darker skin [Ref. 44].

Utilise both Quantitative and Qualitative Data: The pulse oximeter example shows how important it is for a system to provide the right level of functionality for the user [Ref. 45]. This can be achieved by fully modelling users' work, which helps to understand the context and identify user needs [Ref. 45].

Recognise the Impact of Design on Behaviour: Recognising the impact of design on behaviour could help to mitigate inaccuracies in relation to oximeter readings in patients with darker skin, by ensuring that people using them are aware of their potential limitations, and that designers are aware of those limitations and address them in future iterations. Dr Habib Naqvi said, "Clinicians are increasingly becoming aware of the potential errors or inconsistencies associated with pulse oximeters, so we need to have this in mind when using the devices…We need to ensure there is common knowledge on potential limitations in healthcare equipment and devices" [Ref. 44].

It has been suggested that an interim design solution would be to add a feature that allows "adjustment for individual patients' skin colour… given how pulse oximetry works (transmittance or reflectance of light)" [Ref. 46]. It has been suggested that this "may be the least bad approach to reducing the impact of this vitally important issue in the immediate short term until a concrete solution is found." [Ref. 46]. Another potential solution could be to allow the device to be calibrated to the person's skin colour [Ref. 46].

It has been suggested that this is "another real world-example" of how HF is critical to the design of systems like medical diagnostics, because "Whether it is skin pigmentation, color blindness, or even cognitive abilities, it is important that medical device manufacturers fully integrate usability engineering into their products." [Ref. 47].

Adopt a Systems Perspective: Adopting a systems perspective could help to look at all the factors at play. Schraagen et. al (2012) created an Impact Flow Diagram in order to show "the relationship of computer technology, cognition, practitioner behaviour and system failure in the area of medical infusion devices." [Ref. 48]. They found that an inaccurate mental model could lead users to miss significant events. This approach could help to address the risk (from both clinicians and patients) of having an inaccurate mental model with respect to pulse oximeters — in other words, failing to realise that they work less effectively for people with darker skin.

4.7 Protected characteristic: Religion and Belief

4.7.1 Example of an EDI challenge

Nya Robinson, a reception pupil at the Huntingdon Academy in St Ann's, Nottingham, is Rastafarian and doesn't eat pork. [Ref. 49]. One Christmas, Nya's mother gave the academy a signed letter requesting that they serve Nya the vegetarian option at the forthcoming Christmas dinner being held for the children. The academy, however, accidentally served Nya pork, which she ate. Her mother was understandably upset, saying, "I want people to be aware that this has happened. If she had been allergic, she would be in a morgue right now. Saying sorry does not cut it… To be quite honest I felt that angry and disgusted with the school." [Ref. 49]. The academy put what happened down to "human error" [Ref. 49].

4.7.2 Potential ways to enhance EDI delivery

Adopt a participatory approach: CIEHF have published guidance that advocates a participatory design approach in school settings [Ref. 50], and a children's charity has advocated for a strong participatory process that involves parents to tackle food-related challenges [Ref. 51]. It makes sense to involve parents in a participatory design process to share ideas about how to reduce the risk of situations like Nya's from taking place.

Utilise both Quantitative and Qualitative Data: Capturing the stories of those involved can help to find out more about the context and how the error happened. Looking at how other dietary restrictions, like allergies, are handled at the academy will help identify whether there are differences between these very similar tasks that might have contributed to what happened [Ref. 52].

Recognise the Impact of Design on Behaviour: Looking at how designers have solved the same (or a similar) challenge can help to illustrate the impact of design on behaviour. For example, colour-coded plates could be used to make identifying specific dietary needs easier, and to reduce the risk of error [Ref. 53].

Adopt a Systems Perspective: Adopting a systems perspective can help to ensure all aspects of the problem space are looked at. Wallace (2015) mapped out the end-to-end process of how dietary restrictions are handled and identified potential errors that can occur at each step [Ref. 54]. This approach helps identify influences and consequences that may be less obvious [Ref. 55].

4.8 Protected characteristic: Sex

4.8.1 Example of an EDI challenge

The task of healthcare professionals during the COVID-19 pandemic was made even more challenging by problems with personal protective equipment (PPE) [Ref. 56]. During the first wave in 2020, several frontline healthcare professionals shared pictures showing physical damage caused by ill-fitting PPE. The images backed up concerns about how the problem was disproportionately affecting women, including Alessia Bonari, a nurse from Tuscany, Italy. Alessia wrote, “I’m afraid to go to work... I’m afraid because the mask may not adhere well to the face... I am physically tired because the protective devices are bad” [Ref. 57].

Dr Helen Fidler, deputy chair of the British Medical Association’s UK consultants committee, made the implications of the problem clear, saying, “Women’s lives are absolutely being put at risk because of ill-fitting PPE. We know that properly fitted PPE works, but masks are designed for a male template, with the irony being that 75% of workers in the NHS are female.” [Ref. 58].

4.8.2 Potential ways to enhance EDI delivery

Adopt a participatory approach: Involving users in a participatory design process would allow users to share insights about their needs. Townsend et. al (2020) describe how a participatory approach to making clothing can help designers stay “attuned to participants’ experiential knowledge and feedback” [Ref. 59]. A similar approach could be used for PPE design.

Utilise both Quantitative and Qualitative Data: If PPE suppliers need to meet the needs of a diverse group of users, a “one size fits all” strategy is not appropriate. This is where anthropometric datasets, including the “Design for Everybody” work done by the CIEHF [Ref. 60], can help. Research has shown that using anthropometric data in a meaningful way is critical to ensuring a proper fit of PPE equipment [Ref. 56].

Recognise the Impact of Design on Behaviour: It’s important that PPE manufacturers recognise the impact of their designs on users. Hignett et. al (2020) carried out HF research looking at the impact of PPE design on frontline healthcare workers during the first wave of the pandemic [Ref. 61]. They looked at HF issues like “fit and comfort, reading and operating equipment, hearing and communicating, reaching and moving, and dexterity to use touch screens, press buttons, open vials/taps and use syringes” [Ref. 61]. The findings showed that PPE posed several problems, including problems with fit. There was a statistically significant association between PPE fit and sex, with women reporting a poorer fit and more discomfort. These quantitative findings shine further light on the qualitative stories shared by frontline healthcare professionals.

Adopt a Systems Perspective: Looking at how PPE fits into the different work situations healthcare professionals find themselves in will create a better understanding of the implications of ill-fitting PPE.

4.9 Protected characteristic: Sexual Orientation

4.9.1 Example of an EDI challenge

Ellen J. Bass is a HF specialist who took up a job opportunity with the University of Virginia. She moved to Virginia with her female partner, a gym enthusiast. Ellen wanted to sign her partner up for gym benefits at the University. She did not expect to see any problems. [Ref. 62].

She was unable to sign her partner up for gym benefits, however, because the University's policies did not recognise that partner as someone entitled to that benefit. In speaking to lawyers about the issue, she was told that public universities, as public agencies, were actively prevented from extending same-sex partner benefits to employees. [Ref. 62].

4.9.2 Potential ways to enhance EDI delivery

Adopt a participatory approach: Ellen showed how HF can enhance EDI delivery, saying, "To address these multi-faceted and multi-level problems, I reached into the Human Factors and systems engineering toolbox… I started with stakeholder analysis, a process of gathering and analyzing qualitative information to determine whose interests need to be addressed when developing and/or implementing a policy or program… Who were the stakeholders and what were their needs? Who were the decision-makers and what were their interests? What actions could be taken given the current climate?" Ellen "reached for collaborative methods" to work with stakeholders later in the process [Ref. 62].

Utilise both Quantitative and Qualitative Data: Ellen's stakeholder analysis allowed her to identify "a data-driven research strategy to convince administration to add protected classes" and gave her useful qualitative insights into the views of different stakeholders [Ref. 62]. For example, she found that most students were supportive of her cause, but said that their activism could have been better organised [Ref. 62]. This helped her shape a strategy on how to deal with each stakeholder.

Recognise the Impact of Design on Behaviour: This challenge had a profound impact on Ellen, who said, "This denial of gym benefits changed my life… I learned that workplace non-discrimination protection on the basis of sexual orientation was not available for state workers" [Ref. 62]. Ellen's "data-driven research strategy" produced the data that showed the impact of the impact of the policy design [Ref. 62]. This approach helped to eventually bring about incremental benefits.

Adopt a Systems Perspective: The key tool that Ellen applied (i.e. stakeholder analysis) helps to adopt a systems perspective [Ref. 63] by looking at the "policy issues of concern" in a very structured way [Ref. 64].

5. Other factors to consider

It's important to consider some additional factors with respect to EDI. These factors can help embed HF into EDI at a deeper level, which can in turn help to enhance it further.

Support more protected characteristics:
Whilst this guidance looks at the protected characteristics and how HF can help address EDI challenges related to each, it's important to note that as a discipline, HF has historically been more involved with some protected characteristics (e.g., disability) more than others (e.g., religion and belief).

Look beyond protected characteristics:
For example, we should also consider:

- Different socio-economic backgrounds [Ref. 65]
- Caring responsibilities [Ref. 65]

Recognise hidden disabilities:
Not all disabilities are visible [Ref. 66, Ref. 67], for example:

- Neurodiversity [Ref. 68].
- Learning disabilities [Ref. 69]
- Colour blindness [Ref. 70]

Recognise capability loss:
With a globally ageing population an increasing number of adults will experience multiple capability losses, like vision, dexterity, hearing, mobility, and reach. In combination these can be significantly disabling [Ref. 71].

Recognise disability as a continuum:
Microsoft created the "Persona Spectrum" which recognises permanent, temporary, or situational disabilities [Ref. 15]. For example, a permanent disability related to touch would include someone who has one arm. A temporary impairment would include someone with an arm injury like a fracture. A situational impairment would include a parent holding a child in one arm. This approach helps to "solve for one, extend to many" [Ref. 15].

The impact of 'Long Covid' [Ref. 72] (also known as 'Post Covid' [Ref. 73]) is also being seen to cause many people, including younger cohorts, long-term neurological and capability losses that they had not previously encountered [Ref. 72].

Design with all the senses in mind:
For example, by offering multi-modal and multi-sensory information via images and icons in addition to text and auditory modalities [Ref. 74]. This creates more communication channels through which people can understand, interact and express themselves [Ref. 75].

Look at the intersectionality of different characteristics:
The way that different characteristics intersect can greatly impact someone's situation and solutions to any challenges they face [Ref. 76].

Support a person's sense of belonging:
A person can be included in an organization but still feel like they don't truly belong. Homes England states, "People feel that they belong when they are seen and valued for who they are, their true and unique self, which helps them, and people around them, to thrive" [Ref. 1].

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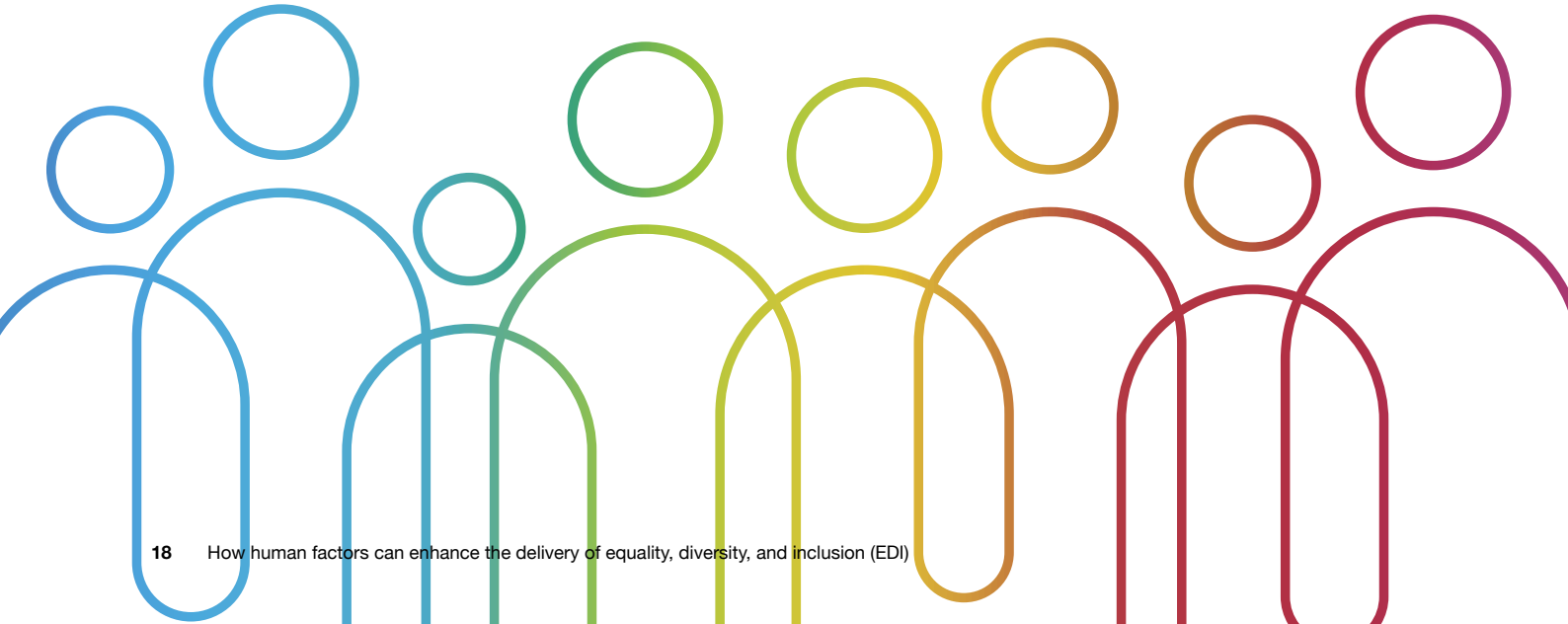

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