

Gender Inclusive Design in Technology: Case Studies and Guidelines

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Abstract. The importance of inclusivity as a value in our social contexts is increasing; thus, it is not unusual that the software industry has started to embrace it. The need for such a consideration stems from the fact that the composition of the IT sector, especially of positions responsible for decision-making and the design of tools, reflects a workforce that is not diverse enough. This can result in blind spots in the design process, leading to exclusionary user experiences. Therefore, the idea of inclusive design is gaining more prevalence; in fact, it is becoming a general expectation to create software that is useful for and used by more people. With a focus on intersectionality — the understanding that social and digital difficulties result from a complex web of overlapping factors — inclusive user experience seeks to actively and consciously integrate minority, vulnerable, and understudied user groups in the design. UX that is based on inclusive design aims to overcome social disadvantages in all of their intersectional complexities arising from gender, sexual orientation, age, education, dis/ability, socioeconomic status, and race/ethnicity, among others. At the same time, it must be acknowledged that gender-inclusive design has challenges and limitations: the idea of gender inclusion in design is not yet a reality. Our research investigates academic literature, as well as tech industry practices, like the websites of Microsoft, Apple, Google, and Meta. We aim to understand how inclusive design is theorized and implemented nowadays. Our analysis shows that intersectionality suffers even when inclusivity is intended to be taken into consideration. We also offer guidelines for factors that might be explored for a more inclusive design. Our paper’s analysis leaves an opportunity for additional study; the complexity of identities and how disregarding them in software design can exacerbate inequality call for even more investigation and awareness.

Keywords: gender inclusive design, inclusive design, intersectionality, user experience, technology, human-computer interaction

1 Introduction

The demographics of the IT sector, especially of positions responsible for decision-making and the design of tools, reflect a workforce that is not diverse enough.

This homogeneity, characterized by a preponderance of Global Northern, educated, middle-class, white, heterosexual, young to middle-aged men and the tendency in Software Design to design for “self-as-user” [29] leads to inherent biases in the industry. This results in a potential for blind spots and exclusionary user experiences when it is assumed that all users are like the designers themselves.

Inclusivity as a principle is increasingly important in our social environments, so it is not surprising that even the Software Industry has started to embrace it recently. Researchers and practitioners have produced multitudes of papers, case studies, opinion articles, design examples, and even tool-kits about inclusive design [14,24,8,21].

The concept of inclusive design is spreading more extensively; in fact, it is becoming a general expectation to create useful and usable software for more people [29]. Yet, inclusive design is more than just a guiding principle for creating products for a broader user base; it is also a deliberate method for addressing the needs of consumers who could encounter exclusionary situations on a regular basis [24]. Moreover, inclusive User Experience (UX) wants to actively and purposefully include and involve minorities, vulnerable, and understudied user groups in the design, with specific attention to intersectionality.

Gender equality is one of the UN Sustainability Goals [4]. As Goal 5 out of the 17, it calls to “achieve gender equality and empower all women and girls.” For the sustainable development of the world, we need to overcome gender disparity, which involves not just social but also digital inclusion. Digital design, therefore, needs to consider gender inclusiveness as a priority.

However, gender-inclusive design has challenges and limitations. Overviewing hiring processes to consciously create more diverse teams, especially if team members do not perceive gender diversity to be essential [9], can put a strain on companies. Alternatively, applying tools, such as the Gender Inclusiveness Magnifier (GenderMag), to detect how the software measures up can risk cost-efficiency [14,32]. As a consequence, the idea of gender inclusion in design is not yet a reality.

This paper has the following structure: Section 2 introduces the methodology we used in this research. Section 3 analyses the literature and introduces concepts related to inclusive design (Non-Binary Gender, Intersectionality, and Inclusive Imagery). Further, Section 4 presents case studies of big tech companies (Microsoft, Apple, Google, and Meta) and discuss their impact on the real world. Section 5 provides a discussion of gender-inclusive design in technology. Also, we introduce guidelines based on our analysis of literature and industry case studies in Section 6. Finally, we conclude this paper in Section 7, with reference to future works to be done.

2 Methodology

We conducted exploratory research in which we surveyed the literature and expanded the analysis on the strategy and role of companies in order to see how

the principles of inclusive design are theorized in the literature and applied in the tech industry. We searched for procedures, repositories, papers, toolkits, and website directories in order to better understand key concepts and position the industry’s most prominent players. In addition, we offered a critical analysis by compiling a list of statements and strategies, contrasting those with the data that was available.

In the course of the design process, we investigate how they think about and implement inclusivity as a guiding principle. With the help of this analysis, our goal is to map how the concept of inclusive design is theorized and implemented in the modern world. This will allow us to identify inconsistencies and brainstorm new areas of inquiry. Based on the analysis, we also offer guidelines for gender-inclusive design.

3 Background and Literature Review

In this section, we look at the main concepts in connection with inclusive design, such as Non-Binary Gender, Intersectionality, and Inclusive Imagery.

Non-Binary Gender The analysis of the gendered aspects of web interfaces typically starts from the notion of binary gender, namely, that people are conceptualized as a binary opposition: women and men. This idea is built on the concept of biological sex, which tends to be female or male for most people, lending the belief that gender derives from this binary [16]. However, gender is not something we are born with, and not something we have, but something we do [33]. It is a series of social practices, which are not clear cut.

Yet, many of the gender research done in HCI and UX still approach the issue from a binary perspective [20,7,18]. How “gender-inclusive” a site is becomes the question of how much it considers “female” aspects, which maintains the binary notion. On the other end, it must be noted that gender inclusivity is not gender neutrality either [26]. Instead of rigid binaries or complete ignorance of the concept, gender is fluid and flexible.

The literature on non-binary gender explores the challenges and opportunities of representing non-binary gender identities and provides recommendations for designing technology that is inclusive of individuals who do not identify as belonging to either of the two gender binaries [25,28]. Recognizing the manner in which technology either sustains or undermines binary gender norms is essential [13]. The intersectional experiences of non-binary individuals in the technology industry highlight how important it is to take into consideration gender diversity while designing technology [27]. Therefore, gender-inclusive design needs to acknowledge the diversity of gender, overwriting the traditional gender binary [31,23].

Intersectionality Another concept that is often missing from analyses of inclusive design is intersectionality, that is, the recognition that barriers are not one-dimensional.

Intersectionality is a term coined to account for the fact that challenges (or social oppression) come from a complex web of intersecting factors, rather than from one source [11]. The notion is that “race, class, gender, sexuality, ethnicity, nation, ability and age operate not as unitary, mutually exclusive entities, but as reciprocally constructing phenomena that in turn shape complex social inequalities” [10].

Even if we are far from having a fully accessible digital community, accessibility, that is, the acknowledgment of disability as a barrier to digital use has a relatively long tradition in UX and HCI [22]. Nevertheless, UX that is based on inclusive design is not only about addressing mental and physical disadvantages, that is, solely accessibility. It should also be about attempting to overcome social disadvantages. The data-driven technology that permeates our daily lives also channels social issues into the digital sphere; therefore, people can experience exclusion in their daily lives and in virtual space because of multiple other factors, such as gender, sexuality, age, education, socioeconomic status, race, and ethnicity. As a consequence, there is a need to critically examine if the software surrounding us is fair and inclusive, yet the analysis is often approached from a single identity dimension, such as disability, gender, or race [11,34,17], even if barriers are more complex.

In fact, a design that is truly inclusive must respect the complexities of identity and overcome the one-dimensional focus. More research that includes the gender and the sexuality aspect in their complex form is needed. The exclusion of Trans and Non-Binary people in Software Design is just starting to get attention [19], for reasons described above. Just like gender, sexuality also needs to be viewed as a complex and integral part of social and digital identity that inclusive design considers.

Inclusive Imagery It is important to note that the representation of identities in computing is heavily influenced by imagery [12]. People who identify as gender non-conforming or have disabilities are frequently left out of discussions centered on Diversity, Equity, and Inclusion (DEI). These categories are frequently underrepresented in computing-related jobs, products, and even the methods used to design products.

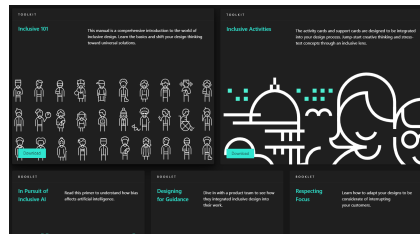
Individuals are predisposed to believe that everyone is in some way similar to them [15], which also reflects the challenges of reflecting diversity in design when choosing images to represent consumers and people in the IT business. Images, texts, forms, and personas must be aligned for a non-binary and non-stereotypical gender portrayal [21,29]. It is crucial to avoid normalizing stereotypical gender roles and make room for gender as a spectrum, rather than as a binary choice, in portrayal as much as in analysis.

Moreover, the computing industry is responsible for promoting inclusion and appropriately representing all identities. This may be accomplished in design through the use of diverse and representative images, texts, forms, and personas. Furthermore, businesses and organizations should take proactive initiatives to enhance workforce diversity and give DEI training to their staff. This not only

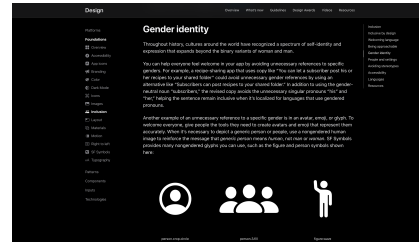
contributes to a more inclusive workplace but also leads to the development of more diverse and representative products. The significance of appropriately reflecting all identities in computing cannot be overstated, since it has a tremendous influence on the daily experiences and views of those who use technology. The computer industry may contribute to breaking down societal barriers and fostering a more fair and just society by supporting diversity and inclusivity.

4 Tech Industry Case Studies

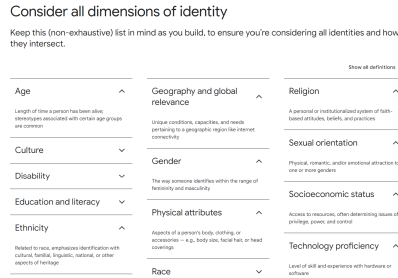
In this section, we examine how some of the leading tech companies approach inclusivity in design. We decided to look at the top 10 tech companies by market capitalization in 2022 and chose to focus on the top three of the list [2] – Microsoft, Apple, and Google – and add the biggest social network company available – Meta. Some examples of screenshots from the companies’ websites are available in Figure 1.



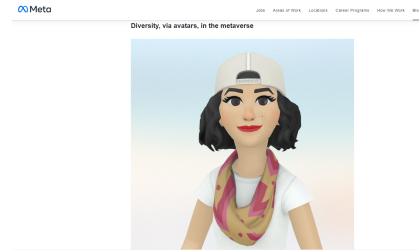
(a) Microsoft



(b) Apple



(c) Google



(d) Meta

Fig. 1: Different interfaces of Tech Industry websites.

Microsoft It is an important fact that Microsoft, one of the top tech companies of the world, acknowledges the significance of inclusivity in design. In fact, Microsoft has a dedicated site to inclusive design. Their site [3] not merely mentions inclusive design but it also goes into both theoretical and practical details about it.

First, it explains the main principles or rather the steps to take in order to realize inclusivity: 1) “recognize exclusion”, 2) “solve for one, extend to many” and 3) “learn from diversity”. Each of these principles is further exemplified and elaborated on the site. Second, Microsoft even provides resources for design practitioners in the form of a manual, a video, activities, and booklets, all free of charge, in order to give practical tools for implementing the above principles in design (see Figure 1a).

The manual does a great job explaining why there is a need for inclusivity when designing products. The info video presents a case study, which is audio-narrated, thus making it accessible to people with visual impairments as well. Not only is the material a study-like presentation of the principles but it is also an example of how to put sensitivity to difference into practice. Finally, the activity cards give specific tool-kits to practitioners so they can check whether their design is in fact inclusive, for example by applying the notion of “persona spectrums”.

While the site is an excellent example to follow regarding social responsibility, we have to underline that it has shortcomings. Microsoft addresses inclusivity on the axis of (mental and physical) dis/ability only. On the one hand, the explicit examples are limited to accessibility; on the other hand, even if “social challenges” are also mentioned in the text, the imagery maintains and reproduces the gender binary, one of the main sources of social challenge [30].

Apple Apple also has a dedicated site for design foundations, listing areas of consideration such as Accessibility, Color, Images, and Typography, among others [6]. There is also a tab for Inclusion, labelling it as an essential part of the design process. The page starts by stating that an app’s communication, content, and functionality need to prioritize inclusion.

The site presents a rather detailed description of what the company thinks about inclusive design. The framework that they use for the definition of inclusivity is much broader and more comprehensive than what we saw on Microsoft’s site. In fact, Apple approaches inclusion by listing a great number of factors to consider, going far beyond accessibility. Some of the elements underlined are language use, gender identity, contexts, stereotypes, and regions.

Regarding the copy of the app, it is emphasized that the tone needs to be welcoming and tailored to different perspectives. For example, it should not be taken for granted that only educated people will (manage to) read your texts. Plain language is more inclusive and considerate than technical language or colloquialism.

As far as gender identity is concerned, it is better to avoid referring to specific genders, especially through the gender binary. This means both text and images, including emojis and avatars as well (see Figure 1b).

In close relation to this, the contexts in which we illustrate people, whether in writing or in visuals, matter a lot too. For example, a fitness app should portray its products or services with people, with different looks and backgrounds, not just, say, young white women.

It is also important to avoid gender stereotypes and biases. If an app wants to refer to a family, it should have a broader definition of the unit than the traditional woman + man + child(ren). It is also necessary to overcome the stereotypical association of women as being in charge of family duties, thus, targeting only female audiences for apps connected to family life.

In addition to the above, Apple underlines that a consideration for regional and cultural backgrounds is vital too. If the design of an app avoids stereotypes, illustrates a diversity of people, and uses plain language, it is easier to create versions localized into more languages and cultural contexts.

As opposed to Microsoft, Apple does not provide its users or designers with a lot of practical tools on how to do inclusive design. At the bottom of the page, there is a Resources section, but it only contains two – lengthy, thus not too user-friendly – videos which focus on the “practice” of inclusive design. The videos have subtitles and the people sharing their thoughts represent different genders, ethnicities, and roles, demonstrating the consideration for intersectionality.

Google Google [1] acknowledges the continuous effort of constructing equality and inclusion on their products by prioritizing the voices of the most underrepresented groups throughout the product creation process. The company presents a list of diversity considerations for designers on its website, listing various identity segments to consider (see Figure 1c). Google’s mission was complemented with three respects: respect for the user, the opportunity, and each other.

To make information universally accessible and useful, Google focuses on providing the same experiences for everyone, as more voices at the table lead to better outcomes. The company claims to provide access and opportunities for historically underrepresented groups, even if its 2021 Diversity Annual Report still highlights the majority of its employees being Asian or White, with about two-thirds of men, and with a decreased amount of self-identified LGBTQ+, and people with disabilities.

For the technology design, the company provides examples highlighting how inclusive testing allowed for improving camera technology for all and how virtual voice assistants are designed to ensure everyone’s voice. They also provide questions in different design phases to include different perspectives and center on underrepresented voices:

- First phase - Ideation, specifications, and design: focus on teams with historically marginalized representation; who benefits from your product; needs of novice users; mitigate bias on machine learning; discuss ideas with an accessibility expert and with inclusivity-focused co-creators; and centering community-based market research.
- Second phase - Prototype and evaluation: share insights from the first phase; build a testing plan; center historically marginalized groups through language, images, graphics, and avatars; make the content clearly understandable for everyone; consider cultural factors; and ensure delight for users with disabilities.

- Third phase - Build and user test: including a range of perspectives in the user testing; test the accessibility considerations; use a screen reader or other accessibility tools in your product; and test with slow internet speeds.
- Fourth phase - Market, measure and monitor: check if the audience characteristics include and reflect what you expected; check if the audience is diverse; check if language and localization features are being used as you expected; are the geographic location of the audience matching your intentions?; make sure all users have a similar and positive experience; marketing should target a diverse audience; the team should keep gathering consumer product feedback.

Meta Meta, a leader in the field of social networks, has demonstrated a commitment to inclusivity in design. The company is evolving to recognize the importance of developing products that are accessible and inclusive to all users, regardless of race, ethnicity, gender identity, or ability.

The company has implemented several key strategies in its design process to accomplish this. One approach is to use diverse and representative imagery, such as avatars and virtual environments (see Figure 1d). This is also true about their product design, even if some extra customizability is still required. In addition, the company favors accessibility in its design, taking into account the needs of users with disabilities for a better overall UX.

Meta also conducts user research and testing on a regular basis with a diverse group of participants to gather feedback and identify areas for improvement. Their most recent press [5] aims to overcome cultural bias, provide diversity through avatars, and increase access through immersive learning. After years of being chastised for its lack of privacy, Facebook has publicly acknowledged the importance of this aspect to all of its customers.

5 Discussion

We observed that the traditional approach to analyzing the gender aspect of web interfaces is based on the binary opposition of women and men, which is built on the concept of biological sex. This approach, however, is limited as gender is a social construct that is fluid and flexible. It is critical to highlight the challenges and opportunities of representing non-binary gender identities and make recommendations for designing technology that is inclusive of individuals who do not identify as belonging to either of the two gender binaries.

We also introduced the concept of intersectionality, which acknowledges that barriers to digital use are caused by a complex web of intersecting factors, rather than by a single source. This paper argues that the UX based on inclusive design should aim to overcome social disadvantages, such as those caused by gender, sexuality, age, education, socioeconomic status, race, and ethnicity, rather than addressing only mental and physical disadvantages.

Our literature review concludes by emphasizing the significance of inclusive imagery in computing, noting that individuals who identify as gender non-

conforming or have disabilities are frequently underrepresented in the products and design methods used in the technology industry.

Furthermore, our previous section, Tech Industry Case Studies, describes the approach to inclusivity in the design of leading tech companies, Microsoft, Apple, Google, and Meta. Companies have inclusive design websites that explain the principles of inclusivity and provide resources for practitioners in the form of a manual, video, activities, and/or booklets.

Throughout this paper, we argue that truly inclusive design must consider the complexities of identity and overcome a one-dimensional focus, and that more research on the exclusion of trans and non-binary people in software design is needed.

6 Guidelines

Considering the exploratory research we conducted in this paper, we are providing guidelines for designing gender-inclusive tools in technology. Our guidelines can be applied to both academia or industry.

- **Consider intersectionality:** avoid simplifying people to one-dimensional characters. Note that people have complex identities, which go beyond belonging to one specific gender, race, or sexuality group.
- **Avoid propagating stereotypes:** note that by attaching typical looks, occupations, and traits to a person based on their gender, race, or sexuality, you are contributing to social stereotypes that aggravate misogyny, racism, and homophobia.
- **Overcome the gender-binary:** avoid producing text and images that reinforce the gender binary and social stereotypes, regarding appearance, jobs, preferences, or skills.
- **Make your text, tone, and imagery consistent and inclusive:** note that it is necessary that you maintain your efforts to inclusivity throughout your copy, visuals, communication, and products.
- **Show the diversity of each community:** make a conscious effort to illustrate how multi-colored communities are, instead of simplifying them to stereotypes.
- **Involve people with that particular identity:** diversity and inclusion should be taken seriously, and there's no better person than the one with that particular identity to tell you about their concerns and challenges.
- **Avoid concentrating on a single mode of communication:** adapt your copy, images, and communication to different languages, cultures, and levels of complexity.
- **Provide training in Diversity, Equity, and Inclusion:** help your business or organization by providing constant training and mentorship.

7 Conclusions

The findings of our research highlight a significant issue within the field of software design. Regardless of efforts to promote inclusivity mainly in terms of

gender, the intersectionality of identities is frequently overlooked and ignored in design. This is concerning because it has the potential to exacerbate inequality and the marginalization of certain communities. Our analysis sheds some light on the issue, but it is clear that much more work is needed to fully comprehend the complexities of identity and its impact on software development. Researchers and practitioners must continue to investigate this topic and raise awareness about the importance of considering intersectionality, when trying to achieve gender inclusivity, in software design. By doing so, we can contribute to the development of more inclusive and equitable technology that benefits everyone, regardless of identity.

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