Diversity Matters: Perceived Inclusion and Discrimination by Brazilian Tech Professionals

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Abstract

Diversity and inclusion are widely recognized as essential drivers of innovation in software engineering. However, systemic inequalities and implicit biases remain persistent challenges. This study aims to explore how tech professionals in Brazil perceive inclusion, discrimination, and unconscious bias in the workplace. We surveyed 220 tech professionals, focusing on experiences of bias, perceptions of fairness, and the influence of organizational setting. The findings reveal that 95.2% of women experienced sexism, compared to 70.3% of men; 77.1% of non-white professionals identify racism as a key issue, while 61.5% of disabled professionals report experiencing ableism. Hybrid work models were associated with the highest reports of sexism (80%), while employees at smaller companies reported more frequent instances of ableism than those at larger ones. Despite widespread acknowledgment of discrimination, only 23% of respondents explicitly recognized the presence of unconscious bias in themselves. While most see their teams as diverse, leadership inclusion lags, especially for disabled (25.9%) and neurodivergent (36.4%) professionals. These results reveal persistent equity gaps and call for DEI (Diversity, Equity, and Inclusion) strategies in Brazil's tech sector.

Keywords

Diversity, Equity, Inclusion, DEI Strategies, Software Engineering, Tech Industry, Brazil.

1 Introduction

Diversity and inclusion are not only ethical imperatives but also strategic pillars for innovation and performance in software engineering (SE) [1]. Organizations that embrace diverse perspectives – across dimensions such as gender, race, ethnicity, sexual orientation, age, disability, and socioeconomic background – tend to foster more creative, collaborative, and effective environments. For instance, studies like Hunt et al. [10] reveal that diverse teams outperform their less diverse counterparts in profitability and value creation. Similarly, de Souza Santos et al. [6] highlights how broader representation in technology can address systemic challenges and stimulate innovation.

Despite these advantages, implementing diversity strategies in Brazilian software development faces unique hurdles, as Brazil remains one of the world's most unequal countries [30]. Collaborative work environments, central to software development, can either foster inclusivity or amplify challenges depending on how diverse perspectives are integrated. Social biases, communication barriers, and ingrained cultural norms in Brazil significantly influence how diverse team members interact and are perceived [13]. Consequently, organizations often struggle to create environments where all voices are genuinely valued, resulting in inconsistent progress toward achieving inclusion [19, 20].

While prior studies have shed light on single-axis experiences, most studies have either focused on a single underrepresented dimension (e.g., gender) [3, 5, 8] or examined global samples [6]. Brazilian-specific investigations have further noted limited Diversity, Equity, and Inclusion (DEI) practices that emphasize diversity over equity and inclusion [7, 13], yet few [18] have holistically compared how various work models, company sizes, sectors, and different tech professionals' profiles (e.g., gender and race) shape perceptions of inclusion in the workplace.

To address these gaps, this study investigates how Brazilian tech professionals perceive inclusion and discrimination in their work environments. Through a nationwide survey with 220 participants, we explored the lived experiences of professionals across multiple identity axes and organizational contexts. The study aims not only to document perceived discrimination, but also to assess how developers interpret unconscious bias and whether they recognize it in their attitudes.

We summarize our key contributions to the literature on DEI in software engineering as follows:

- We present a nationwide, large-scale survey of 220 tech professionals that captures perceptions of discrimination across multiple identity axes (i.e., gender, race, sexuality, disability, age, and neurodivergence), providing a multi-dimensional view of DEI in Brazil's software industry.
- We discuss participants' awareness of unconscious bias. Our analysis reveals that only 23% of respondents explicitly recognised unconscious bias in their own interpretations, underscoring a pervasive lack of self-awareness about systemic biases among majority-group professionals.
- We compare perceptions of discrimination across diverse professionals' profiles, company sizes, and work models, revealing that majority-group professionals (e.g., white, cisgender, heterosexual men) report lower levels of perceived discrimination - often failing to recognize systemic issues highlighted

by underrepresented groups - while discrimination perceptions vary significantly across contexts, underscoring the importance of intersectional approaches.
- We show the gap between team-level and leadership-level inclusion, indicating that career progression remains inequitable for many underrepresented groups.
- We make all anonymized responses to the 37 survey questions publicly available in our supplementary material. This dataset offers a valuable resource for researchers and practitioners interested in further exploring DEI in software engineering through new perspectives, applying different analytical approaches, or building upon our findings.

Our findings offer concrete, data-driven evidence for organizations seeking to establish DEI strategies. It provides a foundation for cultivating collaborative and innovative teams, which are essential for driving sustainable organizational success.

2 Related Work

This section reviews key literature addressing perceived diversity and various factors promoting equality in the Information and Communications Technology (ICT) industry. Many existing studies focus on the experiences of underrepresented groups, offering critical insights into their unique challenges and contributions. For instance, Silveira et al. [26] analyzed Stack Overflow developer survey data, revealing that diversity is not a primary factor when developers assess job opportunities. Their study emphasizes the presence of unconscious bias and impostor syndrome, highlighting the need for policies to attract and retain diverse talent in software engineering (SE). Similarly, Albusays et al. [1] discuss the diversity crisis in SE, examining issues like gender biases, limited opportunities for Palestinian tech entrepreneurs, and barriers faced by visually impaired developers. Their findings underscore the need for equitable practices, considering factors such as geography, gender, socioeconomic background, and disability.

Additional studies by De Souza Santos et al. [5, 24] delve into the effects of work models on inclusion. They found that remote work, while providing security and visibility for LGBTQIA+ individuals, often leads to feelings of isolation. Their more recent case study also found that hybrid work structures are preferred post-pandemic by underrepresented groups, including neurodivergent individuals and those with disabilities, due to benefits like enhanced focus and customized work setups. These findings emphasize the need for supportive structures to address the isolation and infrastructure challenges within these work models. Weisshaar et al. [32] contribute further by examining hiring discrimination in SE, revealing that diversity commodification can influence hiring decisions and bias in favor of certain groups over others in senior roles. Trinkenreich et al. [29] highlight that psychological safety and work appreciation are key to fostering a sense of belonging in software delivery teams, though disparities persist, especially for women outside of leadership roles.

Several Brazilian studies contribute region-specific insights on diversity in SE. For instance, Kohl and Prikladnicki [11] surveyed Brazilian agile teams to explore diversity perceptions. They found that while diversity is valued for innovation and team cohesion, significant gender disparities in roles and experiences persist. Menezes

and Prikladnicki [15] and Rodríguez-Pérez et al. [22] reviewed SE diversity practices, noting that gender diversity has been extensively studied while other aspects, like race and age, remain underexplored. They emphasize the need for broader research on diversity. Marques et al. [13] focus on DEI in Brazilian software teams, highlighting that, despite growing interest, DEI practices are limited and tend to focus more on diversity than on equity and inclusion. Their findings suggest that collaboration and diverse perspectives significantly improve problem-solving, underscoring the potential impact of DEI practices on productivity and creativity in Brazilian SE teams.

Building on these findings, our study examines how Brazilian tech professionals' perceptions of inclusion and discrimination vary not only across work models (on-site, hybrid, remote) but also by demographic axes (gender, race, disability, sexual orientation), organizational context (company size, sector) and the ability to recognize unconscious bias - thereby offering a comprehensive, intersectional mapping of DEI dynamics in Brazil's software industry. While prior studies have documented diversity challenges in SE, such as gender inequalities in agile teams [11] and remote-work experiences of minority professionals [5, 24], critical dimensions such as race and disability remain underexamined in the Brazilian SE context [21].

Our work explicitly addresses these gaps by surveying 220 Brazilian tech professionals across intersecting identities—gender, race, age, disability, and sexual orientation—and by comparing their perceptions of inclusion and discrimination not only across on-site, hybrid, and remote work models but also across organizational size and sector. This intersectional, multi-contextual approach delivers the first Brazil-tailored, holistic mapping of how diverse profiles and work arrangements co-shape inclusion dynamics in software development. By focusing on both underrepresented and more represented groups, we aim to gain a holistic understanding of diversity dynamics in Brazil, where social biases, cultural norms, and regional factors play a significant role in shaping team interactions and workplace inclusivity.

3 Research Methodology

We introduce our goal and research questions (RQ$_s$), study phases, and experiment setup as follows.

3.1 Goals and Research Questions

This study aims to explore and analyze the dynamics of inclusion and discrimination within the software development industry in Brazil. By examining the interplay between developers' personal characteristics, work environments, and professional roles, the research seeks to uncover patterns and insights that can contribute to fostering a more inclusive and equitable work environment. We posed four RQ$_s$ to understand the dynamics of inclusion and diversity within technology organizations.

RQ$_1$. Are tech professionals able to identify when they are the target of unconscious bias? This question aims to investigate the extent to which tech professionals demonstrate awareness of unconscious bias. Thus, RQ$_1$ explores whether individuals are able to critically reflect on how implicit assumptions may influence their interpretations and actions. By analyzing open-ended survey responses, we seek to understand the depth of self-awareness among

participants regarding their own potential for bias, and to what degree this awareness varies across different individuals.

RQ$_2$. How do tech professionals with diverse demographic backgrounds perceive fairness and inclusion in their workplace? This question aims to investigate how tech professionals from diverse demographic backgrounds, such as gender, race, ethnicity, age, sexual orientation, and disability status, perceive fairness and inclusion in their workplace environments. Thus, RQ$_2$ explores the subjective experiences and perspectives of tech professionals in different identity groups, shedding light on how their policies are interpreted through the lens of diversity. By examining these perceptions, the research seeks to determine if certain minority groups report higher instances of discrimination than others.

RQ$_3$. How do different organizational settings influence tech professionals' perceptions of fairness and inclusion in the workplace? This question aims to explore whether the type of work environment influences developers' experiences and perceptions of fairness and inclusion in the workplace. Thus, RQ$_3$ examines how factors such as company size, work model, and sector shape the way tech professionals perceive discrimination and inclusion. By analyzing how organizational settings interact with individual experiences, we seek to identify whether certain work environments foster more inclusive atmospheres or contribute to the perpetuation of biases and inequalities.

RQ$_4$. How do tech professionals perceive the inclusion of various demographic groups within their development teams and in leadership positions? This question aims to examine how the representation of under-represented groups manifests at two levels of organizational hierarchy: day-to-day collaboration in development teams versus decision-making in leadership roles. Thus, RQ$_4$ investigates professionals' perceptions of demographic diversity – across axes such as race, gender, sexual orientation, disability, neurodiversity, and age – in both team composition and leadership appointment encouragement. By analyzing these two dimensions side by side, we seek to uncover gaps between localized inclusion and systemic representation in leadership.

3.2 Study Phases

To address our RQ$_s$, we follow the guidelines provided by Linaker et al. [12] for designing and conducting the survey.

Phase 1: Defining objectives for information collection. The initial phase involved several brainstorming sessions to establish the survey's objectives and scope. Our primary goal was to understand the experiences and challenges faced by Brazilian software developers from diverse ethnic-racial backgrounds and gender identities. This goal guided the design and focus of our survey questions, ensuring the collection of relevant and comprehensive data.

Phase 2: Survey instrument. All authors collectively designed an exploratory survey comprising seven sections with 22 closed questions and 14 open questions. The survey was authored and administered in Brazilian Portuguese. For reporting purposes, all open-ended responses quoted in this paper were manually translated into English by our research team; both the original Portuguese items and their English translations are available in our replication package [27]. It gathers demographic information and

insights into company policies, team dynamics, personal experiences, values, and perceived barriers to inclusion. This structured approach ensures a broad and nuanced understanding of the various factors influencing inclusion and diversity in software development environments. Table 1 outlines the survey structure used in this paper to answer our RQ$_s$. Due to space constraints, we did not address all the questions in this study. However, we are currently working on extending the analysis to cover all questions.

Phase 3: Identifying the target population and sampling. Our target population consisted of Brazilian tech professionals. To capture this, in Q11 (see Table 1) we asked each respondent to select the roles they perform in software development projects (e.g., UX/UI designer, Fullstack developer), ensuring we captured a broad spectrum of technical functions. To further ensure the suitability of our sample, we included a control question to confirm that they accurately represented our intended audience.

Phase 4: Validating the survey. We conducted a pilot test [4] to review and refine the questions and response options. This test involved three researchers who were not part of our main study. We received numerous suggestions for improvements, such as clarifying questions and providing additional response options. We made the necessary adjustments after each pilot. After these iterations, we validated the survey questions. The pilot participants took an average of 15 minutes to complete the survey, and we communicated this estimated completion time to the respondents when the survey was released to the public.

Phase 5: Sharing the survey. The survey was distributed through multiple channels to reach a wide and diverse audience. We used the authors' personal LinkedIn, WhatsApp SE groups, and Brazilian subreddits[1] to share the survey through posts and private messages, targeting professional contacts. Furthermore, the ICT department of our university assisted by sending emails directly to ICT students and sharing the survey through its Discord. These combined efforts ensured broad participation and improved the reliability of the collected data.

Phase 6: Performing the data analysis. Initially, the data underwent a thorough cleaning process, where we removed one invalid response out of 220 (due to the respondent not being in the targeted audience). Next, we standardized the data format, ensuring consistency across the dataset (*e.g.*, ensuring all race responses used the same terms, like *"Black"* and *"White"* instead of mixed variations such as *"black"*, *"African American"*, *"Caucasian"*, etc). This preparation ensures that the data is ready for accurate analysis.

We adopted a mixed-methods approach to analyze the survey data, predominantly qualitative research complemented by quantitative data. For the quantitative analysis, we used data visualizations and correlation analysis for questions presented in Table 1. For RQ$_1$, we used Q37. For RQ$_2$, we used Q04, Q05, Q06, Q07, Q12, and Q30 of the survey. For RQ$_3$, we used Q10, Q14, Q15, Q18, Q19, and Q30. For RQ$_4$, we used Q24, Q25 and Q30. For qualitative analysis, we applied the Grounded Theory procedures by performing open and axial codings for open-ended questions to improve the reliability of the findings [4] by systematically categorizing responses to identify key themes and patterns.

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[1]https://www.reddit.com/r/brdev/
https://www.reddit.com/r/devBR/
https://www.reddit.com/r/linuxbrasil/

Table 1: Survey Structure

1	**Informed Consent Form (ICF)**
2	**Participant Characterization**
Q02	How old are you?
Q03	Where do you currently live in?
Q04	How do you identify yourself in terms of gender identity?
Q05	How do you identify yourself in terms of sexuality?
Q06	How do you identify yourself in terms of ethnicity?
Q07	Do you have any disabilities?
Q08	If you do, which is it?
Q09	What is your highest level of formal education completed?
Q10	What is your work model?
Q11	How would you describe your position in software development projects?
Q12	Please indicate the seniority of the position you hold.
Q13	How many years of experience do you have in software development?
Q14	What is the sector of the organization you currently work for?
Q15	What is the size of the company that you currently work for?
3	**Company Policies and Practices**
Q16	Does the company you work(ed) for have a department dedicated to inclusion and diversity?
Q17	Does the company you work(ed) for have any reporting channels and/or an ethics committee established to combat discrimination?
Q18	Does the company you work(ed) for have any initiatives or use any automated solutions to identify discrimination within its processes?
Q19	If it does, what are those?
Q20	Could you mention any initiatives or automated solutions that were not implemented by the company you work(ed) for, but could help in identifying and mitigating discrimination within its internal processes?
Q21	Does the company you work(ed) for offer training in any tools for inclusive software development?
Q22	If it does, what are those?
4	**Team Collaboration and Composition**
Q23	Do you agree that in the company you work(ed) for, diversity and inclusion aspects are considered when forming the development team?
Q24	Do you agree that in the company you work(ed) for, the development teams include members from the following groups? [People of different races/ethnicities, Different genders and sexual orientations (LGBTQIAPN+), Neurodivergent individuals (ADHD, Autism, Dyslexia), People with disabilities (visual, hearing, motor), The elderly (60+)] [Strongly disagree - Strongly agree]
Q25	Do you agree that in the company you work(ed) for, the appointment to leadership positions for people from the following groups is encouraged? [People of different races/ethnicities, Different genders and sexual orientations (LGBTQIAPN+), Neurodivergent individuals (ADHD, Autism, Dyslexia), People with disabilities (visual, hearing, motor), The elderly (60+)] [Strongly disagree - Strongly agree]
Q26	What positive impact do you believe diversity and inclusion within a development team have on the creative process and the quality of the work performed?
Q27	Can you share an experience where team diversity helped overcome a specific technical challenge or enhanced the functionality of a project?
5	**Personal Experience**
Q28	Have you ever experienced, witnessed, or heard about a situation where someone received differential treatment based on personal characteristics?
Q29	If you answered yes to the previous question, what happened?
Q30	Which type(s) of discrimination do you think are most recurrent within the software development field? [Ageism, Sexism, Homophobia, Religious Intolerance, Racism, Elitism, Ableism, Others]
Q31	What strategies can be implemented to ensure that everyone on the team feels heard and valued, regardless of their identity or background?
6	**Personal Values and Considerations**
Q32	What do diversity and inclusion mean to you?
Q33	What do prejudice and discrimination mean to you?
Q34	How important do you consider inclusion and diversity policies in the workplace?
Q35	Can you identify any emerging trend that indicates progress in inclusion and diversity within the technology sector?
Q36	What are the primary barriers to achieving more inclusion and diversity in technology, and how do you believe they can be overcome?
Q37	Do you recognize any bias in your interpretation of words, questions, or mentioned experiences? If so, which one(s)?
7	**Thank You**

4 Study Results

Overview of the participants' characterization: Our survey gathered responses from Brazilian tech professionals, providing a comprehensive overview of their demographic and professional backgrounds. About 59.5% of the respondents are from the Southeast region of Brazil, with a significant portion of 78% identifying themselves as men, 76.4% as heterosexual, 63.6% as white, and 90.9% without any disabilities. Although this demographic may seem more representative of majority groups, it allows us to address a gap in existing research (see Section 2) by exploring how their perspectives influence the understanding of inclusion and discrimination. In terms of education, the respondents are primarily graduated professionals (59.1%), with 53.2% working in remote jobs, predominantly in back-end development roles (41.4%). Experience levels are broadly distributed: junior professionals (up to 5 years) make up 34.5%, while mid-levels (6-9 years) and seniors (10+ years) are

similarly represented (22.7% and 27.3% respectively), and interns make up 15.5%. The respondents mainly (83.2%) work in the private sector, and most are employed by large companies with more than 1,000 employees (63.6%). This profile highlights a predominantly experienced and diverse group working in significant roles within large organizations, providing valuable insights into the state of inclusion and diversity in the tech industry. Further participant characterization is available in the complementary material [27].

4.1 RQ$_1$: Awareness of Unconscious Bias in Tech

To address **RQ$_1$**, we conducted a qualitative analysis of responses to question `Q37` of the survey (see Table 1). This question was specifically designed to assess participants' awareness of unconscious bias, that is, their ability to critically reflect on how their interpretations may be influenced by implicit assumptions. Notice that our sample is demographically representative of groups traditionally in majority positions within the tech industry – predominantly cisgender men, heterosexual individuals, and those without disabilities; therefore, this analysis holds critical value. Understanding how members of these dominant groups perceive, recognize, or deny bias is essential for advancing DEI efforts. Historically, research has often centered on the experiences of marginalized groups, which remains vital. However, addressing the bias systemically also requires a deep understanding of the perspectives held by majority groups, as these individuals often occupy leadership roles and decision-making positions that shape organizational culture.

The responses were manually analyzed through a coding process. Initially, two of the authors read each response and categorized it based on its core meaning. These were grouped into broader thematic categories and further refined into subcategories that captured more specific nuances of meaning. Figure 1 visually summarizes the results of the qualitative coding process. Each bar represents the number of responses associated with a specific subcategory related to bias awareness. The thematic subcategories are color-coded based on their broader classification: Uncertainty about Bias, Denial of Bias, Bias Recognition, Bias Related to Personal Experience, and Out of Scope. These responses are critically important for understanding the different levels of awareness and reflection among tech professionals. Recognition of bias suggests a heightened sensitivity and a potential openness to addressing systemic inequalities in the workplace. On the other hand, denial or uncertainty signals a gap in awareness that can hinder efforts to build inclusive environments. Even responses categorized as "Out of Scope" highlight the challenges in communicating and eliciting reflections on such a nuanced and often invisible phenomenon.

The Uncertainty about Bias category (in blue) comprised 11 responses marked by hesitation or confusion about the existence or nature of bias in their experiences, grouped under subcategories such as Unconscious Bias and Unsure of Bias. Participant #P03, who wrote, *"I don't know how to answer"*, exemplifies the difficulty some participants had in engaging with the concept of bias.

By contrast, the Denial of Bias category (in orange) captured 23 responses that explicitly rejected the idea of holding any bias. This category included two subcategories: No Recognized Bias, which represented respondents who flatly denied the presence of any bias, and Efforts to Avoid Bias, which reflected a proactive stance in trying to remain neutral or respectful. Notably, the subcategory No
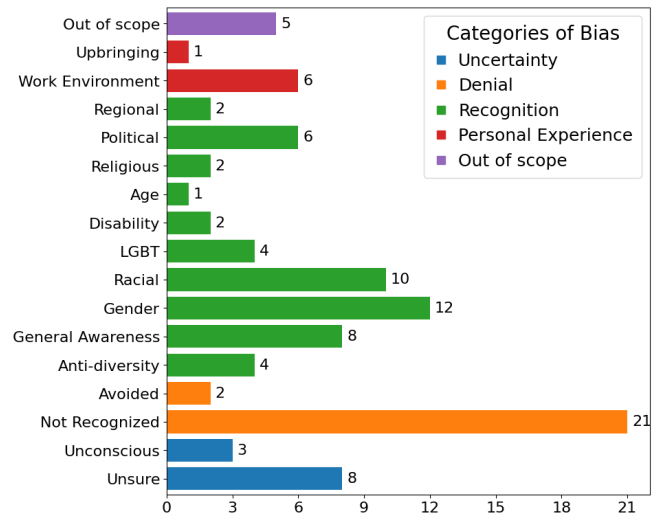

Figure 1: Perceived Bias

Recognized Bias was the most common among all subcategories across the dataset, encompassing 21 quotes. This trend may indicate a widespread lack of self-perceived bias among tech professionals, which could stem from limited exposure to diversity training, social desirability bias, or a deeper lack of reflection about unconscious processes. For instance, participant #P07's concise reply *"No"* reflects a categorical denial of any bias. Participant #P72, on the other hand, presents a more nuanced reply: *"Initially no, I always try to respect everyone and not let any language habits incite any kind of differentiation"*. This kind of response suggests a conscious effort to avoid bias but may also mask a lack of awareness about how implicit biases can operate even in well-meaning individuals.

The Bias Recognition category (in green) included 51 responses from participants who explicitly acknowledged the presence of biases in their interpretative processes. This category reflects an awareness where respondents were able to identify how their background, beliefs, or experiences might shape their perceptions. Subcategories spanned a range of social identities and contexts: Regional Bias, Political Bias, Religious Bias, Age Bias, Disability Bias, LGBTQ+ Bias, Racial Bias, Gender Bias, General Bias Awareness, and Anti-diversity bias. Gender and Racial bias were the most recurrent among respondents. #P17 said what many others also did: *"As a cis, straight, white man, I not only recognize the presence of unconscious bias, but I understand that unfortunately, this is one of the foundations of how our unfair and unequal society functions"*.

On the other hand, some participants admitted to an Anti-diversity bias, #P189 stated: *"Yes, I don't believe diversity and inclusion should be a priority. I think competence should come first, and sometimes these topics seem to deviate from that"*. This quote demonstrates how certain individuals may recognize bias not only in others, but within their own worldview, highlighting the internal tensions that can arise when interpreting questions related to inclusion.

The category of Bias Related to Personal Experience (in red) includes responses in which participants shared specific, personal anecdotes related to bias: 7 responses connected awareness of bias

to individual identity or context. Subcategories included Work Environment Influence and Upbringing bias, suggesting that participants' interpretations may be shaped by their professional dynamics. One such example came from participant #P44, who reflected, *"I believe that maybe because I'm a woman and my manager is a man, I tend to interpret some things as sexist"*, linking Gender Bias to lived experience. Another interesting point of view on work experience bias came from #P47, who said *"As previously mentioned, I feel like my responses are subject to the unique functioning of game development and may not be generalizable to software development as a whole. If that's the case, I sincerely apologize for wasting your time"*. Finally, the Out of Scope category (in purple) was used for the 5 responses that did not engage with the question's intent, including expressions of misunderstanding like the reply from participant #P78: *"I didn't understand the question :("*.

These five categories, along with their nuanced subcategories, demonstrate varying degrees of self-awareness and readiness to engage with unconscious bias. A considerable portion (52.6%) of respondents could identify how their profile shaped their perceptions, often connecting personal experiences to broader systemic patterns. Conversely, some professionals (23.7%) firmly denied any bias or described efforts simply to *"treat everyone respectfully"* without acknowledging that even well-intentioned behaviors can carry implicit assumptions. A smaller group (11.3%) admitted uncertainty or misunderstood the question entirely. This mix of recognition, denial, and confusion highlights uneven engagement with the concept of unconscious bias and underscores the necessity for targeted interventions in the tech industry.

> **Finding 1:** A significant portion of the majority-group professionals either underestimate or are unaware of the biases that permeate their environments. This gap in awareness is a pivotal barrier to creating genuinely inclusive workplaces. Moving forward, the tech industry must invest not only in empowering marginalized groups, but also in educating and engaging majority groups in critical self-reflection about unconscious bias.

4.2 RQ$_2$: Understanding Perceptions of Equity Across Diverse Tech Professionals

To address **RQ$_2$**, we examined how tech professionals from different demographic profiles – across gender, race, disability status, sexual orientation, and more – perceive fairness and inclusion within their daily work experiences. Figure 2 presents a heatmap summarizing the percentage of respondents within each demographic group who reported recognizing inequities related to six categories: ableism, ageism, elitism, homophobia, racism, and sexism. Darker shades indicate higher percentages of acknowledgment, highlighting areas where perceived inequities are particularly salient among different groups. Each row corresponds to a demographic category (e.g., Women, Men, LGBTQ+, Non-white professionals, Senior-level employees), while each column reflects a particular category.

Our analysis reveals notable differences in how gender affects the perception of workplace fairness. Women in tech report a strikingly high level of perceived sexism (95.2%). Figure 2 also reinforces the ongoing issue of gender bias within the tech industry, where women
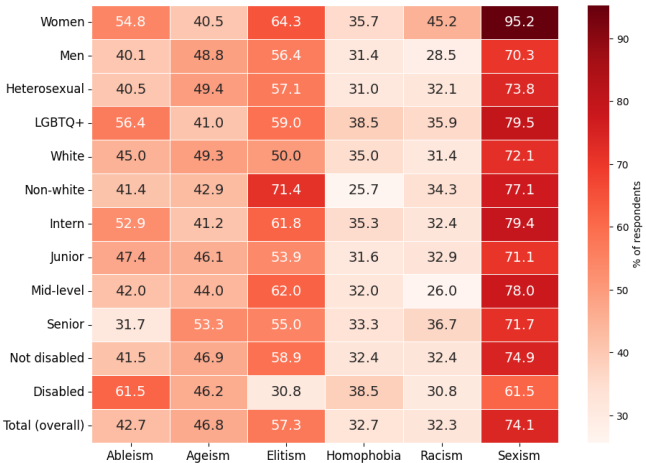

Figure 2: Percentage of Perceived Discrimination by Professionals' Profiles

often face significant challenges in male-dominated spaces [8, 20, 28]. Their experiences suggest that gender-based discrimination continues to shape not only their professional opportunities but also their daily work interactions, as stated by #P44, *"I believe that maybe because I'm a woman and mostly work with straight cis men, there wouldn't be different views if I were already in a diverse environment."*, showing how everyday dynamics sharpen women's sensitivity to sexist incidents.

In contrast, men reported significantly lower levels of sexism (70.3%), which aligns with broader trends in industries where men are more represented in leadership and technical roles. This disparity indicates that gender, particularly being a woman in a male-dominated field, continues to be a key determinant of how tech professionals perceive inclusivity and fairness. Although we had this discrepancy on perceptions, some men interestingly acknowledged their bias towards the theme, like #P17 *"As a cis, straight, white man, I not only recognize the presence of unconscious bias[...]"* and #P34 *"As a cisgender heterosexual white man, with the cultural privileges that this has conferred on me throughout my life, it's inevitable that I'm biased"*.

LGBTQ+ professionals report heightened levels of discrimination across multiple categories. They experience a particularly high level of Sexism (79.5%) and a moderate level of Homophobia (38.5%), underscoring the compounded biases faced by LGBT individuals, who navigate both gender and sexual orientation-based discrimination. Additionally, LGBT professionals report Ableism (56.4%) and Elitism (59.0%), indicating that their experiences of discrimination are not solely linked to their sexual identity but also to broader social biases in the workplace. In Q37, they often recognized bias on their perceptions, as commented by #P79 *"As part of the LGBT community, I tend to be more sensitive to these issues"*, #P69 *"It's possible that I'm biased, specially about gender/sexuality matters due to my personal experience as a gay woman"* and #P58 *"The bias of a gay man surrounded by homophobic straight man"*.

For non-white individuals, our results show that racism (77.1%) is their most prominent concern, in contrast with white professionals (31.4%). It highlights how racial biases persist in the workplace,

making it clear that non-white professionals often feel excluded or unfairly treated because of their race, a theme echoed across some studies in the tech industry [2]. This group also experiences higher levels of Elitism (71.4%) compared to their White counterparts (50.0%), suggesting that race may influence not only interpersonal treatment but also access to professional opportunities. The numbers reflect this group's lived experience of racial inequities, which remain significant barriers to full inclusion, as recognized by #P33 *"I may be biased because I'm a black person responding based on my experiences as part of a group that is often marginalized"*.

Interestingly, disabled professionals report the highest levels of Ableism (61.5%), which is 20% higher than their non-disabled counterparts. That potential sensitivity was acknowledged by some participants, like #P71 *"Because I'm autistic, I may perceive more disability-related concerns"* and #P204 *"We have to keep in mind that I'm neurodivergent"*. This indicates that individuals with disabilities continue to face systemic barriers in the workplace, not only in terms of physical accommodations but also in social and professional interactions, highlighted by #P171 *"I recognize the need to include people with disabilities in our field, and therefore I think the main focus of inclusion in our area should be on that"*.

Perceptions of fairness also vary by professional level. Interns reported a high level of perceived sexism (79.4%), highlighting the significant gender-related biases experienced by those in the early stages of their careers. These findings reflect the challenges that young professionals often face in navigating tech environments. Conversely, senior professionals report the highest levels of ageism (53.3%), a form of discrimination that is often attributed to age-related assumptions about competence and adaptability, which #P22, as a senior developer and hybrid worker, said *"I'm biased because I feel affected by ageism"*. This perception is consistent with studies in the field [23, 25], which suggest that the fast-paced nature of the tech industry, driven by rapid technological advancements, can cause professionals with more experience to feel *"outdated"* or less capable of keeping up with emerging tools and trends.

The analysis presents a mixed picture of discrimination, with some trends aligning closely with demographic expectations while others reveal more complex patterns. For instance, women report the highest levels of sexism (95.2%), which aligns with what might be expected given the gendered dynamics of the tech industry. Similarly, disabled individuals report the highest levels of ableism (61.5%), a direct reflection of the barriers faced by those with disabilities in the workplace. However, there are cases where discrimination does not follow expected patterns, such as LGBT professionals, who, despite experiencing notable sexism (79.5%) and ableism (56.4%), do not report homophobia (38.5%) as the highest form of discrimination they face. This suggests that while identity-based discrimination is a critical factor in shaping workplace experiences, it does not operate in isolation. Instead, perceptions of inequity are layered and intersectional, shaped by the interplay of multiple identity factors such as gender, race, sexual orientation, disability status, and career stage. Thus, our analysis reveals important takeaways:

- Individuals do not experience bias through a single lens; for example, an LGBTQ+ woman of color may simultaneously face sexism, racism, homophobia, and elitism. Addressing a single form of discrimination, without recognizing how it intersects with other forms, risks oversimplifying the full complexity of individuals' lived experiences.
- The consistent reports of sexism, racism, and ableism across different demographic groups reveal that these are not isolated incidents but systemic issues embedded in organizational cultures and practices.
- Even among dominant groups, like men or non-disabled professionals, there is some recognition of their own biases and privileges. However, the magnitude of perceived discrimination is markedly lower among these groups, suggesting that dominant-group members may be less attuned to inequities.
- Younger professionals, particularly interns and juniors, report significant experiences of sexism, indicating that early-career stages are crucial periods where exclusionary practices can significantly impact retention and professional growth. Meanwhile, senior professionals' heightened awareness of ageism suggests that inclusivity initiatives must also address biases that arise later in the career lifecycle.

Our findings reinforce the importance of creating psychologically safe environments where individuals feel empowered to recognize, report, and discuss biases. This self-awareness is a powerful lever for cultural change, suggesting that DEI programs that encourage reflection and open dialogue can help foster more inclusive workplace cultures.

> **Finding 2:** Perceptions of fairness and inclusion vary sharply by identity: women overwhelmingly report sexism, while men report it less often; non-white professionals identify racism as their chief concern; LGBTQ+ professionals face high levels of sexism yet unexpectedly moderate levels of homophobia; and professionals with disabilities perceive ableism most acutely. Early-career interns face substantial sexism, whereas senior developers feel age-based bias most strongly. These patterns make clear that individuals from marginalized groups consistently feel less treated fairly and less included in Brazilian tech workplaces.

4.3 RQ$_3$: Organizational Environments and Perceived Equity in Tech

To address **RQ$_3$**, we analyzed survey data across various company types and work arrangements, including company size [14, 17]: big companies (100+ employees) and small companies (up to 99 employees); work models: on-site, remote, and hybrid; and company sector: public sector, private sector, and non-profit/NGOs. This analysis highlights how these factors can impact professionals' experiences with discrimination. Figure 3 shows a heatmap of the percentage of respondents within each organizational environment group who reported recognizing inequities related to the six categories: ableism, ageism, elitism, homophobia, racism, and sexism.

Our analysis reveals some distinct patterns when comparing big companies and small companies. Professionals in small companies report higher levels of perceived discrimination in several categories compared to those in big companies. For instance, small companies report significantly higher levels of ableism (50.8%) compared to big companies (37.9%), suggesting that smaller organizations may
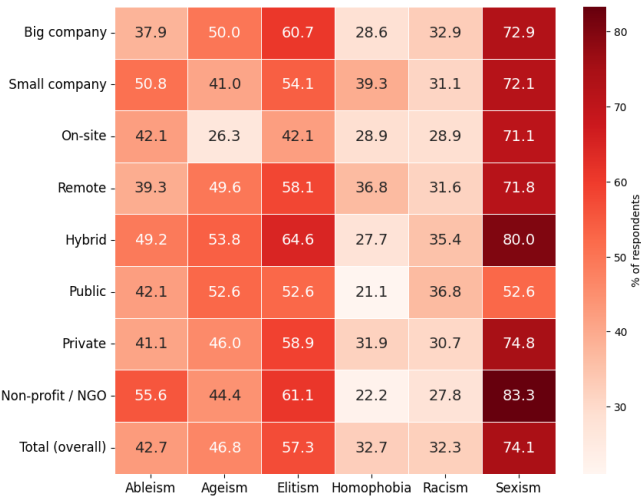
Figure 3: Percentage of Perceived Discrimination by Organizational Environments

struggle more with inclusivity for individuals with disabilities. This pattern is further illustrated by #P106, who stated *"In smaller companies, I believe I would only have negative things to say"*. Turning to the work model, there are notable differences between hybrid, remote, and on-site settings. Hybrid models report above-average levels of sexism (80.0%), standing out as the work setting where professionals perceive the most gender-based discrimination. However, remote workers report levels of sexism (71.8%) that are comparable to those of their on-site counterparts (71.1%), suggesting that remote work, despite its flexibility, does not appear to offer a major advantage when it comes to reducing gender-related discrimination.

Additionally, hybrid and remote workers report higher levels of Ageism (53.8% and 49.6%, respectively) compared to on-site workers (26.3%), which #P22, as a senior developer and hybrid worker, said *"I'm biased because I feel affected by ageism"*. Thus, hybrid and remote models, while offering flexibility and broader access, may inadvertently exacerbate biases against senior professionals, possibly due to assumptions about technological adaptability or visibility in distributed teams. This underscores the need for organizations to proactively address new forms of bias that emerge with changing work arrangements.

In terms of sector, non-profit/NGO workplaces stand out for reporting the highest levels of ableism (55.6%), sexism (83.3%), and elitism (61.1%), exceeding both public and private organizations. Rather than indicating uniquely hostile environments, we interpret these elevated figures as a product of two characteristics that distinguish this sector from public and private organizations: (1) a comparatively more diverse workforce, and (2) a mission-driven culture that heightens awareness of social inequities. Section 4.2 reveals that members of historically marginalized groups consistently reported higher levels of discrimination that affected them directly (e.g., women in the case of sexism, professionals with disabilities in the case of ableism). As non-profit workplaces tend to attract these groups, the probability of discrimination being perceived and reported increases. Moreover, staff who choose to work in organizations whose core purpose is social impact may possess

greater sensitivity to injustice and stronger expectations of equity inside the workplace itself. This combination of diverse representation and sharper critical consciousness can amplify the detection and reporting of discriminatory behavior, producing the seemingly "contradictory" result that organizations devoted to social causes also surface higher levels of perceived discrimination.

> **Finding 3:** Non-profit/NGO workplaces register the highest perceived ableism (55.6%), sexism (83.3%), and elitism (61.1%) in our sample, outpacing both public and private organizations. We highlighted 2 factors that likely drive these figures: (1) a comparatively more diverse workforce and (2) stronger social-justice awareness.

While differences across organizational settings provide valuable insights into how perceptions of fairness and inclusion vary, sexism continues to be the dominant challenge that needs to be addressed comprehensively across all organizational contexts. Moreover, the higher reported levels of ableism in smaller companies point to the additional vulnerabilities faced by marginalized groups in less structured organizational environments, where resources for DEI efforts may be more limited.

> **Finding 4:** Employees in small companies report higher ableism than those in large companies. Hybrid workers perceive the most sexism and elevated ageism alongside remote workers, compared to on-site workers. Yet sexism remains pervasive across hybrid, remote, and on-site work models, revealing that simply changing the work model is insufficient to eliminate gender-based inequities, making targeted policies, training programs, and cultural shifts essential to fostering truly inclusive environments in Brazilian tech workplaces.

4.4 RQ$_4$: Perceptions of Inclusion Across Development Teams and Leadership Roles

To address **RQ$_4$**, Figure 4 presents respondents' perceptions regarding team-level inclusion across five dimensions: race/ethnicity, gender/sexuality, neurodivergency, disability, and elderly status. The figure uses a diverging stacked bar chart to clearly illustrate the distribution of opinions, with agreement levels shown to the right of the central axis and disagreement levels to the left. Darker shades represent stronger sentiments. This visualization allows for immediate comparison across groups and highlights areas where inclusion is more or less prominent within development teams.

Our analysis shows that team-level inclusion is rated markedly higher than perceptions of discrimination evaluated in Figures 2 and 3 across nearly every dimension. For instance, 84.5% of respondents agree that their development teams include professionals of different races and ethnicities, despite 32.3% identifying racism as a recurrent discrimination in the Brazilian tech sector. Similarly, 79.1% report inclusion of gender and sexual minorities within their teams, contrasted with 74.1% who perceive sexism industry-wide and 32.7% who report homophobia. Inclusion of neurodivergent professionals is moderate (53.2%), while teams show the lowest inclusion for people with disabilities (31.4%) and the elderly (32.7%),
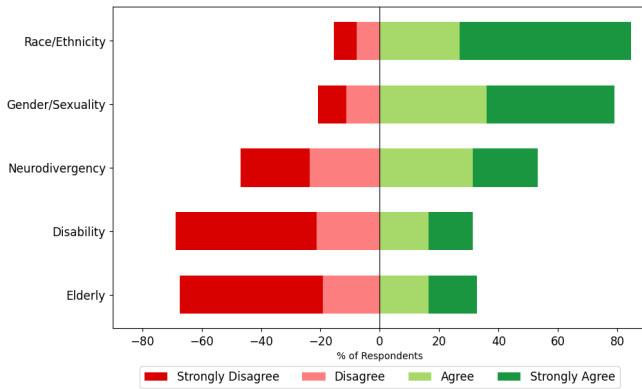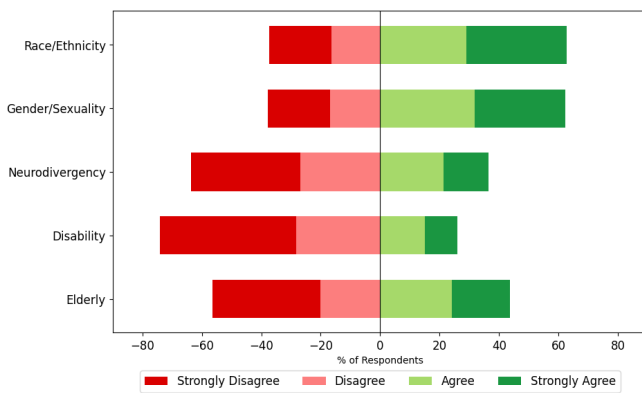
Figure 4: Team Members Inclusion

Figure 5: Leadership Roles Inclusion

though ableism (42.7%) and ageism (46.8%) remain substantial concerns across the field.

When turning to leadership-level inclusion, Figure 5 illustrates respondents' perceptions of diversity in leadership positions across the same five dimensions. The figure uses a diverging stacked bar chart format, similar to Figure 4. Our analysis shows agreement rates decline for nearly every group, except the elderly. 62.7% of the respondents feel their organizations encourage racial diversity in leadership, and 62.3% see equivalent support for gender and sexual minorities - both markedly lower than the corresponding team-level inclusion shown in Figure 4. Leadership inclusion for neurodivergent professionals drops to 36.4%, and for disabled professionals to 25.9%. Research highlights how these professionals may be welcomed onto teams but still face real obstacles, like the pressure to overperform or a lack of accessible environments, when it comes to stepping into leadership roles [18, 21]. It may reflect structural gatekeeping, such as biases in promotion criteria, informal networks, or stereotypes about leadership "fit".

Notably, elderly inclusion is the sole exception: agreement rises from 32.7% at the team level to 43.6% in leadership, suggesting that older professionals may be more readily advanced into senior roles. This trend aligns with findings in the literature that highlight the value of experience and institutional knowledge that older workers bring to leadership positions [16, 31]. However, it also raises the

question of whether older professionals from marginalized backgrounds (e.g., women, non-white, disabled) are equally likely to ascend—or whether the pattern favors only a subset of the elderly population, like older white men.

Overall, these analyses demonstrate that although many respondents view their own teams as relatively inclusive, significant gaps remain in career progression for underrepresented groups [9]. The disparity between higher team-inclusion scores and lower leadership-inclusion scores mirrors the perceptions of the prevalence of discrimination reported in Q30. Moreover, the contrast between race/gender inclusion and the much lower rates for disability/neurodivergence suggests that some forms of diversity are more socially accepted or more actively supported than others.

> **Finding 5:** Although a large majority of respondents report that their development teams include professionals of different races and gender/sexual minorities, perceptions of leadership-level inclusion fall sharply for nearly every group. This reveals a pronounced "advancement gap", where localized team inclusivity does not translate into equity in leadership roles.

5 Threats to Validity

Following well-established recommendations for empirical studies in software engineering, we organize the potential threats to our study into four types [33]: conclusion, internal, construct, and external validity.

Internal validity Since our study is exploratory and descriptive in nature, we do not infer causal relationships. However, participants' responses may have been influenced by recent experiences, organizational changes, or broader social events. To mitigate this, we included open-ended questions to capture individual context and used triangulation between qualitative and quantitative data, which helps reduce bias and increase robustness in interpretation.

Construct Validity Diversity, inclusion, and unconscious bias are inherently complex and subjective constructs, which may be interpreted differently by each participant. To mitigate this, we conducted expert reviews to ensure conceptual clarity and relevance of the survey items and performed a pilot study with participants outside the main research team, which led to revisions in language, examples, and response options. Also, for qualitative responses, we applied systematic thematic coding, independently reviewed by multiple researchers to strengthen the reliability and consistency of our interpretations.

External Validity While our 220 respondents include diverse roles and backgrounds, the sample is still predominantly composed of professionals from the Southeast region of Brazil, most of whom identify as white, heterosexual, cisgender men without disabilities. These characteristics may limit the applicability of findings to other regions or more marginalized populations. To mitigate this, we disseminated the survey across varied online platforms, including LinkedIn, WhatsApp groups, Discord channels, and Brazilian subreddits, to reach a broader and more diverse audience; and reported and analyzed findings with intersectional breakdowns, allowing readers to assess how results may or may not apply to specific groups or contexts.

Conclusion Validity Since our findings are based on self-reported data and subjective perceptions, they are inherently vulnerable to potential biases. To mitigate these risks, we took several precautionary steps. First, we guaranteed anonymity and confidentiality to all participants, which likely encouraged more honest and candid responses, particularly on sensitive topics such as discrimination and bias. Second, we employed a mixed-methods approach to strengthen the robustness of our interpretations. Quantitative data were analyzed using descriptive statistics and correlation analysis to identify trends and relationships across demographic and organizational dimensions. Open-ended responses underwent a qualitative coding process involving multiple independent researchers. Finally, recognizing that the original survey was administered in Portuguese, translations to English were reviewed collaboratively. Both original and translated versions of the responses are included in the replication package, ensuring full transparency and traceability.

6 Conclusion and Future Work

Diversity is critical in the software development field, driving innovation and organizational success. The findings emphasize that personal characteristics such as race, gender, and sexual orientation significantly influence perceptions of inclusion and discrimination in the workplace. Sexism stands out as the most commonly reported form of discrimination across the entire survey population, with a prevalence of 74.1%. This suggests that despite the diversity of experiences across demographic groups, gender-based discrimination remains a dominant issue in the tech industry. To foster inclusive and diverse software development environments, it is essential to develop targeted interventions addressing the specific needs of various minority groups, as shown in Section 4.2. Effective DEI strategies must consider the complex interplay of personal characteristics and organizational practices. These strategies should be supported by robust public policies and ongoing research to ensure continuous improvement and adaptation.

We also observed that organizational context plays a critical role in shaping these experiences. Employees at smaller companies report higher levels of ableism than those in larger companies, suggesting that resource constraints and less formalized policies may exacerbate exclusion. Hybrid work models, while offering flexibility, coincide with the highest perceptions of sexism and elevated ageism, indicating that shifting between remote and on-site settings may introduce new forms of bias or highlight existing ones. Remote and on-site workers show similar levels of gender discrimination, which points to the need for comprehensive, organization-wide interventions regardless of work model.

When it comes to unconscious bias, respondents occupy a spectrum of self-awareness. Roughly a quarter of participants explicitly acknowledge how their background — be it gender, race, age, or disability — shapes their perspectives, demonstrating an important step toward reflexivity. Yet, 10% firmly deny any personal bias or offer generic commitments to *"treat everyone respectfully,"* revealing a gap between good intentions and genuine introspection. A smaller subset (5%) expresses uncertainty or misunderstandings about what unconscious bias entails. This uneven engagement highlights the urgent need for structured bias-awareness initiatives. Practical measures — such as facilitated workshops using real-world scenarios,

regular peer reflection sessions, and integrated bias checks in hiring and performance reviews — can help bridge the gap between abstract definitions and personal insight, equipping all employees to spot and counteract their own blind spots.

Overall, our study further reveals a pronounced "advancement gap" for most underrepresented groups: although race and gender/sexuality show relatively high levels of inclusion at the team level (84.5% and 79.1%, respectively), this representation drops significantly when it comes to leadership roles (62%); neurodivergent and disabled professionals fall even further (53.2% to 36.4% and 31.4% to 25.9%). The sole exception is the elderly, whose inclusion rises from 32.7% on teams to 43.6% in leadership. This pattern reinforces that localized pockets of inclusivity within teams do not automatically lead to systemic equity across an organization. It echoes broader industry-wide reports of ableism (42.7%), ageism (46.8%), racism (32.3%), homophobia (32.7%), elitism (57.3%), and sexism (74.1%). To address this leadership pipeline gap, organizations must implement transparent promotion criteria, establish formal mentorship and sponsorship programs for underrepresented professionals, and regularly audit advancement decisions for bias. These measures are essential to ensure that everyday inclusivity is backed by equitable opportunities at all levels of decision-making.

Looking forward, advancing DEI practices in Brazilian tech organizations will require sustained collaboration between practitioners, researchers, and policymakers. By showing how members of traditionally dominant groups perceived or failed to perceive their own biases, we highlight that future initiatives must not only be designed for marginalized groups, but also engage those in majority positions who hold significant influence over workplace culture and decision-making processes.

While our current analysis treats gender, race, and disability independently, future work will employ intersectional statistical methods and extend our qualitative coding to investigate compounded experiences - such as those of Black women with disabilities - to uncover how overlapping identities shape perceptions of inclusion and discrimination. Additionally, we aim to analyze responses to the remaining open- and closed-ended questions in the survey, which cover critical themes in Table 1.

Artifact Availability

All research artifacts from this study, including anonymized datasets, analysis scripts, and supporting documentation, are publicly available at https://github.com/aisepucrio/Diversity4BRSE. This open repository enables transparency, reproducibility, and further exploration by researchers and practitioners interested in DEI within the Brazilian software engineering context.

Acknowledgments

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