A Framework for Intersectional Perspectives in Software Engineering

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Abstract—**The huge demand for software practitioners and the diversity crisis in the software development industry have emphasized the absence of women and other underrepresented minorities. Thus, the diversity crisis is not limited to women, it is about social identities that go beyond gender and race, but it is mainly, about power. Here, we propose a conceptual framework for understanding intersectionality. We posit that a framework can help to incorporate attention to social reproduction of inequities in software engineering by means of the application of the concept to the discipline.**

Keywords— Intersectionality, software engineering, social identities, diversity, equity

I. INTRODUCTION

A large part of the SE literature on diversity contributes to a gendered analysis [1], [2], but tends to regard all women in the same manner, as if race, class, citizenship, ethnicity or sexual orientation do not matter or as if they are mutually exclusive. There are a handful of software engineering (SE) studies that examine more than one of identities above mentioned. However, there are cases in which software workers belong to two or more underrepresented groups, e.g. as being blind man [3] or Andean indigenous woman [4]. In the last case, one can see that their experiences diverge as they experience specific racism targeting their particular racial backgrounds and identities. Therefore, it is also important to recognize the "double bind" or "double jeopardy", of racism and sexism that Indigenous women in the SE field face, and even multiple "binds" when additional identities (e.g., class, disability, sexual identity) are considered. It is clear that systems of privilege and oppression often converge for underrepresented groups, i.e. there are organizational power dynamics that have historically privileged some groups and marginalized others in the SE field [5]. That convergence can shape their perspectives in various ways, e.g. they view themselves and their world in ways that those in privilege cannot understand. This becomes more important when software development teams reproduce bias and replicate existing structures of inequality in society because team members (e.g. White men) share similar worldviews.

One way to address that is applying an intersectionality perspective [6], [7] which call attention on social identities that are consistently treated as marginal or invisible because they are overlooked when identities are grouped up together (e.g. woman). Intersectionality emphasizes that there are interlocking systems of oppression, such as racism, sexism and heterosexism/homophobia, that can differentially affect the life chances of individuals with different social identities [8], e.g. Black lesbian woman. However, how individuals experience their identity is context-specific, as are the related systems of oppression [9]. These identities and relations of power create both privilege and oppression [8]. In turn, they could also be synergistic and operate differently at the organizational level or even within specific subcultures. The conceptualization of social identities and social inequality as interdependent and mutually constitutive, i.e. intersectional [6], [7], rather than independent and uni-dimensional poses a big research challenge with respect to methodologies used in designing and conducting intersectionality research. Such a methodological challenge shapes fundamental aspects of the research process such as measurement, data analysis, and interpretation [9]. In particular, the challenge is in interpreting the often implicit experiences of intersectionality, even when participants do not express the connections [9]. Despite the methodologies that SE researchers could employ, we believe that intersectionality has wide ranging applications in SE, like understanding the shortages of skilled professionals and diversity crisis in software development.

II. CONCEPTUAL FRAMEWORK

Fig. 1 shows an initial version of the framework that we developed as an ideal type of framing intersectionality. It is informed by a published multilevel model of intersectionality [8], [10] and previous SE literature (see details in [11]).
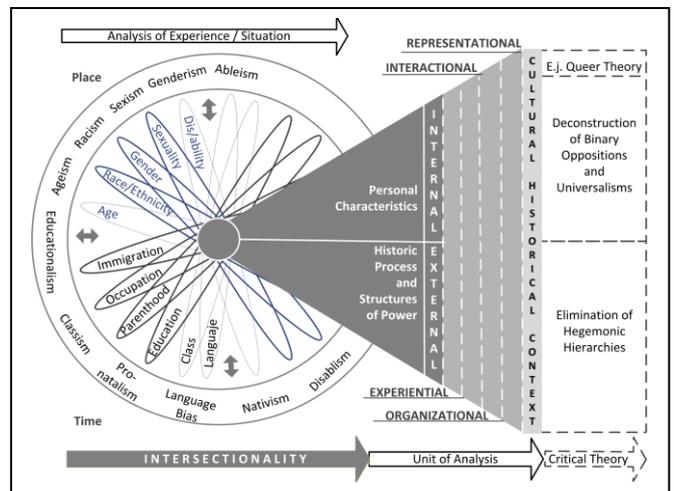
Fig. 1. Overview of the framework for intersectional perspectives in SE.

The left side of the figure depicts the first level of social identities. Surrounding the intersection point (grey circle), there are 11 identities that an individual might hold. By reviewing the SE literature, we identify *gender*, *race/ethnicity*, *sexuality, dis/ability,* and *age* (blue ellipses for personal characteristics), *immigration*, *occupation*, *parenthood*, *education*, *social class* and *language* (black ellipses for external characteristics). Around the social identities, one can see the interlocking systems of oppression, e.g. *genderism*, *sexism*, and *racism.* However, it is worth to note that other identities and interlocking systems of oppression could emerge. These identities might combine and overlap, representing certain intersections, to influence

individual's lived experiences. It means they shape a unique perspective through which an individual might see or experience the world. In addition, this level emphasizes how the role of membership in multiple social categories shapes the extent to which individuals encounter barriers to advancement in organizational settings.

The second level represents different filters that are depicted in the right side of Fig. 1. This level is focused on societal processes and organizational practices that shape the creation, perpetuation, salience, and nature of social categories. The boundaries between these domains may be permeable and overlapping, including, but are not limited to, four types. (i) *Organizational* is related to the processes in the institutions that inhibit the participation of diverse groups (e.g., positions in structures of society such as work, family, and education). (ii) *Representational*, or the extent to which diverse groups and related policies are represented in materials depicting the profession (e.g., association websites and other media about the discipline). It is also related to how stereotypes that threaten marginalized groups are created and sustained while their self-consciousness around failure is raised. (iii) *Interactional*, addressing the nature of interactions between social actors (e.g., relationships between individuals and members of groups). It is also related to how those relationships influence life chances and outcomes that have the capacity to lessen or reify stereotype threats. Finally, (iv) *Experiential*, or how individuals' sense-making of their lived experiences relate to their perceptions of their own social identities in shaping their opportunities.

The third level represents the cultural-historical context that situates the first and second levels within a particular place and time. This suggests that these multiple identities are socially constituted and influence on how social positions, divisions, and hierarchies are created and reified in society. Fig. 1 also illustrates Queer Theory as other possible theoretical frameworks of critical analyses that can be used in tandem with intersectionality.

III. CONCLUSION

As a community, we are already thinking about the impact of human factors in SE and the various roles of SE in society. In this sense, we believe that SE community is mainly called to not reproduce bias and to not replicate existing structures of inequality in Society. In other words, we ought to acknowledge power relationships, and focus on equity and justice in order to not perpetuate existing forms of structural inequality. However, this imposes a challenge to SE methods and practices.

The diversity crisis of SE industry and the issues of bias in the software it builds share the same root cause: issues of discrimination. Therefore, tackling the challenges of bias within software systems requires addressing workforce diversity, and vice versa. However, it is worth noting that current diversity initiatives could tend to introduce new biases, for example toward "White women" [12]. The diversity crisis is not just about women, it is about social identities that goes beyond gender and race, but it is mainly, about power [13]. SE, as any other STEM fields, has not been able yet to improve on existing diversity challenges regarding gender, race, and other social identities, neither for the end users of software products nor for the companies and organizations building them [14]. Homogenous teams, with similar worldviews, have overlooked or exacerbated design

flaws for a part of society that are underrepresented on their teams, e.g. communities of color [14]**.** An intersectional approach invites SE researchers to read data in different ways and ask other questions that increasingly demonstrate the flaws of a race-only or gender-only approach. We found that intersectionality is a complex and relevant approach that is little known in the scope of SE research field. Although intersectionality has its oppositions among scholars in other disciplines, we are inviting the SE community to reflect on our own practices and how intersectionality, a lens from the social sciences, can be expanded to incorporate attention to existing structures of inequality in society. Finally, we hope this paper paves the way for more work in this area.

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