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Advancing More Inclusive Tech Careers - Analyzing How People Develop Their Unique Potential and Thrive Through the Outreachy Program

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Abstract

The tech industry suffers from a diversity problem. Increasing diversity quotas is not the solution, because while that solves part of the problem, other strategies need to be put in place to lead to positive outcomes. Open-source internship initiatives are created to address this issue by offering upskilling and mentorship to underrepresented groups in technology to allow them to thrive in the field. One such initiative is the Outreachy program which provides paid internships to people from underrepresented and marginalized groups to contribute to open-source and open-science projects. This research investigates how underrepresented people in technology, especially Outreachy alumni, develop and harness their potential. This study also explores what additional program and technology assets can be designed to cultivate inclusion. A mixed method approach was applied; a survey that gathered 101 responses followed by 11 semi-structured interviews. As a result of this study, six capabilities that cultivated success were identified; learning, communication, empathy, work experience, perseverance, and curiosity. This study also identified five key capabilities that when implemented can enable underrepresented people in technology to succeed. These are networking, technical upskilling (knowledge/expertise), communication, management skills (time/team management), and confidence. That being said, participation in programs such as Outreachy or other mentorship programs, while providing people with more opportunities did not stop the study participants from experiencing the systemic and social challenges that are linked to their belonging to underrepresented groups. Organizations need to amplify efforts towards creating a nurturing environment where people of various backgrounds can thrive through the provision of support, equity in treatment, and resources to cultivate inclusive leaders to get the best performance out of diversified teams.

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IV. Abbreviations

CV: Curriculum Vitae

GDPR: General Data Protection Regulation

NCWIT: National Center for Women & Information Technology

IT: Information Technology

RG: Research Goal

RQ: Research Question

STEM: [The fields of] Science, Technology, Engineering and Mathematics

UX: User Experience

V. Definitions

Open source: Find in page 1

Outreachy: Find in page 3

Summer of code: Find in page 5

Success: Find in page 7

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1. Introduction

Information technology is confronted with the challenge of being more inclusive: the workforce does not reflect societal demographics (Scott et al., 2018). The underrepresentation of non-males in both computer science and open-source software is a persistent phenomenon, with women holding only 26% of computing jobs in the United States, despite representing roughly half of the total workforce (DuBow & Gonzalez, 2020; Martínez de la Cruz & Chesñevar, 2013; Wang & Weinberger, 2020). *Open source* software is an expression used to signify that people can have access to the original source code of the software, which is typically not possible when using proprietary software, and they can modify and redistribute it (Bretthauer, 2001; Peterson, 2018). Similar to other research findings, a report by the Kapor Center for Social Impact found that only 3% of employees in the tech industry are Black and only 6% are Latinx, despite these groups making up a significant portion of the population (Scott et al., 2018).

Historical facts have also allowed people to inspect the changes in the number of women working in the tech industry. The Second World War was one catalyst in getting various women into technology, since men were fighting, women were hired to take up the role of what could have been considered a human computer to calculate firing angles for the military (Light, 1999). Over time, the number of women in technology dwindled, starting from the enrollment and graduation numbers through the hiring gender composition of employees. Some reasons given for that phenomenon are the lower wages, long work hours, gender bias, and eventually the lack of representation of women (Todd et al., 2005). In addition, the work came to be considered masculine and valued higher (Todd et al., 2005; Verdín et al., 2018). Women have also been proven to provide substantial contributions to the field of technology but have often been found to not be given proper attribution or acknowledgment (Castilla & Benard, 2010; Todd et al., 2005). More studies have investigated why women have a harder time remaining in technology compared to men (e.g., Ashcraft et al., 2016; Rapporteur, 2014; Todd et al., 2005).

There are several reasons why underrepresentation based on race, age, geography, and income is prevalent in the field of technology — the digital divide is one of them. According to Van Dijk (2006), the digital divide explains the phenomenon of how people experience or get benefits from technology differently. The digital divide has four layers of access. The first layer is mental access, where people have limited knowledge of technology because of

anxiety about handling digital tools or having a low interest in technology. The second layer is material access, where people do not own digital tools or have the infrastructure, e.g. an internet connection, to make use of it. The third layer is skill access, and in this layer, people have the tools and connections but do not have adequate social support, or the education to use it. A similar issue is observed when one has a tool that is not user-friendly, making it intricate to use. Last, in the fourth layer, called usage access, a user has access and knows how to use the tools, but struggles to get any benefit from its usage (Van Dijk, 2006).

Another reason we see this underrepresentation is the number of biases that exist that would discourage people from entering the field, some of which stem from assumptions of how a computer engineer/scientist is supposed to look or act (Cheryan et al., 2013; Verdín et al., 2018). Some of the existing stereotypes promote the idea that computer scientists have a singular interest in things like computing and programming, are involved in hobbies like gaming, lack interpersonal skills because they are expected to have limited interactions while coding, are intelligent, and that being part of a team that codes is a masculine role (Cheryan et al., 2013). On the same note, women are often perceived as less competent in technical fields compared to men, which is something they can end up internalizing (Kenny & Donnelly, 2020; Smith, 2013). Women were found to be seen as less competent if pregnant or a mother and if they returned to work after parental leave they were viewed as less committed to their job (Ogden, 2019). These behaviors towards women in tech are not something that causes surprise because based on the role congruity theory, when an observer comes into contact with a person who belongs to a social group associated with certain stereotypes that classify the group as incompetent to succeed in a role; the person is met with prejudice which causes the observer to believe that the person is less qualified to hold a specific job position (Eagly & Karau, 2002). Furthermore, the media circulates these biases and stereotypes contributing to the perception that the field is not for females and hampers the development of interest of girls in computer science (Cheryan et al., 2013; Steinke et al., 2007). Media is a powerful tool; exposure to media content can influence people's opinions and beliefs (Arias, 2019; Cheryan et al., 2013). Societal attitudes such as how women are portrayed in the media, in roles in which they are underrepresented, affect how welcomed they feel in that environment (Kalyanpur & Kirmani, 2005). Seeing women as role models in the workplace has the power to encourage young girls to pursue a career in technology (Milgram, 2011). Women’s interest in computer science grew significantly when the media was manipulated to contradict biases (Cheryan et al., 2013), and female undergraduate students expressed more

interest in computer science when their tech-related classrooms were decorated with unstereotypical computer science objects (Cheryan et al., 2009).

Nonetheless, it is important to note that diverse people creating technologies does not necessarily equate to an equal and fairer future. We need to remember the social and economic circumstances that can cause certain people to gain fewer or more opportunities, while also the role of existing technology in affecting social arrangements and power distribution (Dunbar-Hester, 2019). Women who succeed in remaining in the tech industry sometimes find it necessary to adapt to existing power structures, for instance, by changing their appearance to present as less feminine or softening their language to avoid giving offense (van Breukelen et al., 2023).

Research supports that diverse teams lead to better outcomes, success, and innovation breakthroughs (Jones et al., 2020; Snowball et al., 2021). However, it also suggests that within the open source community, diversity can lead to tensions as teams lean towards being more homogenous in the level of coding or project experience; teams with a diversity of coding or project experience may suffer from challenges in coordinating their efforts (Vasilescu et al., 2015).

The research goal (RG) of this study is to analyze how underrepresented people in technology launch their careers in tech, focusing on Outreachy. Outreachy[1] is a paid internship program where people who experience systemic bias or are underrepresented in technology work on contributing to open source and open science projects. The following two research questions are being answered here:

1. How do individuals who participate in Outreachy harness and develop their potential? (RQ1)
2. What additional program assets and technology can be designed to cultivate inclusion in diverse organizations and further contribute to societal change? (RQ2)

To address the first question, I conducted a survey and an interview to explore the capabilities that are necessary to succeed in tech and address, or better, defy established biases. For the second question I also relied on interviews where I investigated what attributes characterize an inclusive organization or leader for the participant. In addition, I explored the feedback participants provided about Outreachy but also what the challenges experienced by the Outreachy alumni to identify if any could be addressed through a

[1] *Outreachy | Internships Supporting Diversity in Tech*. (n.d.). Retrieved July 5, 2023, from https://outreachy.org/

technology asset. In this paper, the technology asset that would be introduced would be a mobile application that might help resolve challenges identified during the data analysis; more on that can be seen in Section 4.6 and Chapter 5.

Since most of the interviewees of this research unintentionally identified as a woman, (with nine out of eleven explicitly stating they are a woman during the interviews) the study and referenced literature focuses heavily on the experiences of women in tech. However, it is important to acknowledge that the experiences of people belonging to multiple underrepresented groups deserve special attention as there are unique differences between people of diverse backgrounds. For example, the experiences of Blacks versus Asians in Silicon Valley, even though on a large scale both are considered underrepresented, are different, as Asians often have a higher social capital due to the larger representation of Asians in the tech community, providing them more access to opportunities (Fairlie & Robb, 2008; K. McGee, 2018; Twine, 2022). For that reason, one thing that was taken into consideration for this research is the intersectional nature of underrepresentation when selecting the interview participants for the study.

As an outcome of this research I:

a) Provide best practices or suggestions that can be used by people underrepresented in the tech industry, whether they are Outreachy alumni or not, to improve their career outcomes.
b) Identify possible improvements to the offerings of the Outreachy program.
c) Suggest how organizations can foster inclusive leaders and environments.

The remainder of the paper is organized into seven chapters. Chapter 2 provides some literature background about previous research and related topics such as diversity within organizations. Chapter 3 outlines the theoretical framework that is the basis of this study, namely inclusive leadership, capability approach, and systems theory, alongside an explanation of my analytical framework. The methodology for the research and the processes it entails such as data collection and analysis are described in Chapter 4. Chapter 5 illustrates the results of a potential technical solution, i.e. mobile application, for a pain point that was identified during the data analysis process. The empirical data and the findings for both the survey and the interviews are provided in Chapter 6. The discussion of the major findings, limitations of the study, and suggestions for future work are found in Chapter 7. Finally, Chapter 8 is devoted to the conclusion of this paper.

2. Literature Background

In this chapter we investigate literature that is relevant to provide some background understanding about my research, especially on topics relating to the state of technology, underrepresentation, and the open source community. The chapter ends with related work and an explanation of the gap that this research fills.

2.1. Summer of Codes and Opportunities in the Open Source Communities

Summer of code programs "connect students to open source software projects, typically during the summer break from school." (J. O. Silva et al., 2020, p. 1). Students are provided with a mentor and a stipend and are usually able to participate remotely. The best-known example is Google Summer of Code[2], which since 2005 has provided contributors to a variety of open-source communities. Open-source projects which apply to participate in the program are paired with successful applicants. Google Summer of Code is currently open to people over 18, as long as they meet the other eligibility requirements. Rail Girls Summer of Code[3] is another global summer program linked to multiple open source projects in a variety of programming languages that started in 2013; it provides paid opportunities for women and non-binary people who want to enter the world of programming full-time to gain experience through working on an existing open source project. Unlike Google Summer of Code, Rail Girls Summer of Code focuses on the inclusion of underrepresented genders. Outreachy (started as Women's Summer Outreach Program in 2006 and has been renamed a few times up till it received its current name in 2015) is a program under Software Freedom Conservancy. Outreachy was created for people who experience systemic bias and are underrepresented in open-source software.

One of the very famous open-source projects is the Linux Kernel which started in 1991 as a personal project of Linus Torvalds, a then undergraduate student (Bretthauer, 2001; Dahlander et al., 2008). The open-source community though has existed since the 1970s; a

[2] *Google Summer of Code*. (n.d.). Retrieved July 3, 2023, from https://summerofcode.withgoogle.com/

[3] *About Rails Girls Summer of Code*. (n.d.). Rails Girls Summer of Code. Retrieved July 3, 2023, from https://railsgirlssummerofcode.org/about/

key element of such communities is the existence of individuals with similar interests, distributed all around the globe, working together to maintain or improve open-source software (Bretthauer, 2001; Dahlander et al., 2008). While the Linux community is one of the well-known ones, there have been previous incidences of sexist experiences that discouraged women from joining this and other communities (Schroder, 2009). In recent years, the Linux Foundation has worked on ways to increase the diversity of the community through funding scholarships for conferences or offering upskilling with programs such as the Shubhra Kar Linux Foundation Training. That said, the predominant demographic of open source software contributors has been male (Wang & Weinberger, 2020).

A survey conducted on the famous open-source collaboration platform called GitHub, in 2017, revealed that only 3% out of 5500 randomly selected users identified as women (*Open Source Survey*, 2017). Some scholars caution that increasing representation in open-source communities does not necessarily lead to a shift in the social power dynamics. It is believed that it might be beneficial for diversity advocates in open-technology communities to concentrate on objectives other than representation in technological involvement if they are sincere about altering the configuration of social power (Dunbar-Hester, 2019).

The evaluation of why the underrepresentation of women has also been observed in the open-source community, in specific, is important as the Outreachy participants interact with such communities as part of their internships. Sometimes people expressed a reason for the lack of diversity being the hostile environment faced by underrepresented and marginalized people in technology while contributing to the open-source projects of their interest (Cohen, 2018; Wang & Weinberger, 2020). Within the open-source community, it is said that women mostly experience social challenges, such as communication issues or lack of peer parity (Frluckaj et al., 2022). Women have been found to have identical acceptance rates, of their code contributions, to men within open-source communities if they are insiders i.e., owners or collaborators to a project, or when the gender of the contributor remains unknown (Terrell et al., 2017). The tools themselves that are used within an open-source community have been found to exacerbate the challenges that contribute to gender exclusion, which calls for the creation of tools and infrastructure that can help attract and maintain diverse talents while also considering the variety in needs and challenges of the talent (Mendez et al., 2018). Furthermore, It is noted that disparities and differences in treatment exist when the contributors have been considered outsiders and their gender is identifiable.

Under that circumstance, there seems to be gender bias which results in a reduced acceptance rate of contributions by women compared to that of men (Terrell et al., 2017).

2.2. Characteristics of Success in Career & The Role of Organizations in Driving Social Change

Success is “the experience of achieving goals that are personally meaningful to the individual, rather than those set by parents, peers, an organization, or society”(Mirvis & Hall, 1994, p. 366). We see that the meaning of success has transformed based on changes in historical contexts, therefore one definition might not accurately depict the essence of it (Dries, 2011). Technology has been said to be the tool that can bridge people into networks that could lead them to career success by breaking existing glass ceilings (Fadil et al., 2009). That being said, even though I focus on success through a career with an organization, entrepreneurship can provide an alternative path to career success for minority groups (Fairlie & Robb, 2008).

In the information technology (IT) field people often begin working directly within that industry or start working in IT after a brief stint at a non-IT job. Once they get into IT they either remain in a technical role or eventually begin transitioning into management (Joseph et al., 2012). Organizations have tried to be more inclusive by adopting meritocracy where employees are expected to advance and gain recognition for their work irrespective of their race or gender, but this approach is not always effective, because when meritocracy is implemented bias works in the favor of men to the disadvantage of equally performing women (Castilla & Benard, 2010). The concept of meritocracy in an already biased system has been shown by several studies to exacerbate the pervasive issue of inequalities within an organization where the minority does not get the recognition or compensation they deserve as their well-represented counterparts (Castilla & Benard, 2010; van Dijk et al., 2020).

According to Chamaro-Premuzic (2019) there are three characteristic observations that have been linked to preferential treatment towards men, by some organizations, leading to the hiring of incompetent leaders. The first one is choosing confidence over competence. While women can be as confident as men, in a professional setting, men's confidence is often reinforced resulting in overconfidence, while the confidence of women is weakened. Chamaro-Premuzic also explains another characteristic observation is that attributes of

narcissism and psychopathy are often observed in leaders that are particularly men which can lead to toxicity. A third characteristic observation is that men project more charisma, which is also a preferred trait. All these three attributes combined, according to Chamaro-Premuzic, may lead to a male leader being more likely to be chosen over a female one, and because of the toxic traits that are linked to their choices organizations end up with a destructive environment.

Organizations and businesses play a key role in driving societal change and influencing the changes that may lead to an egalitarian society. Societal change is the transformation of society's belief system, the norms, through patterns and relationships over some time (Stephan et al., 2013). Conflict, demographic changes, and cultural changes often act as a trigger to promote social change which may result in racial equality, gender equality, improvements in businesses, the environment, and workers' rights (Soken-Huberty, 2020). An organization can achieve surface-level (short-lasting) or deep-level change (long-lasting). Long-lasting changes happen when an organization works with the demographic they are trying to change, by enabling them to direct the change efforts (Stephan et al., 2013). Numerous strategies can create temporary or long-term change in organizations. One of those strategies is the Positive Deviance Approach, which promotes identifying who are the individuals (called deviants), within a community/organization with pervasive issues, that have found unique ways to problem solve. Deviants problem-solve by creatively taking advantage of the same or fewer resources within their community. Organizations can tap into the potential of deviants by enabling them to use that knowledge to educate others within their community (Pascale et al., 2010).

In recent years, there has been growing recognition of the importance of diversity and inclusivity in the industry, with many organizations and initiatives working to promote these. Inclusive workplace practices such as the introduction of family-friendly policies, for example, paid and secure parental leave, on-site childcare, and flexible working hours, have been found to be beneficial in relieving work-family conflict (Grandey, 2001). An organization's leadership plays a significant role in creating inclusion, as they have the power to raise awareness about unfairness within the institutions and communities they partake in (Ryan, 2007).

Diversity challenges persist from C-Suite to the average employee. Men have been found to have an easier time getting into upper management because of certain characteristics that are usually observed between men that are preferred by organizations; organizations also

select leaders based on potential rather than their leadership performance (Chamarro-Premuzic, 2019; Player et al., 2019). Women are preferred when their leadership performance is valued rather than potential (Player et al., 2019). In addition to that, gendered wording, which are terms related to male stereotypes, in job postings makes male-dominated jobs “less appealing” to women, indicating that inequality can be maintained even through hiring practices (Gaucher et al., 2011, p. 109).

Attributes that women usually rate higher than their male counterparts, such as emotional intelligence, self-awareness, and effectiveness can be considered when selecting competent leaders to encourage more women to pursue leadership roles (Chamarro-Premuzic, 2019). In addition to that, employee affinity groups can be safe spaces within an organization where people from underrepresented groups can gain support; however, it is important that organizations do not put the burden on employees from minority groups to lead diversity efforts uncompensated, as that can leave them feeling unappreciated (Tiku, 2020). Driving change within an organization might benefit from collaborations with external organizations with expertise in the domain they want to implement the change e.g. diversity and inclusion. However, for that to happen there needs to be a willingness for organizations to collaborate with the experts and trust among the stakeholders (Stephan et al., 2016). That being said, mandatory diversity training, selectively testing interviewees (often giving a pass to people from non-minority groups), and being asked to report discrimination when there is a high risk of retribution, are some of the reasons diversity efforts of organizations fail. Therefore, aside from getting expert help, it is important for organizations to seek to adopt methods with higher success rates such as providing optional diversity training, cross-training to allow managers to be exposed to people working in different groups, and mentorship (Dobbin & Kalev, 2016).

At work, people can expand their professional and social networks. Online platforms have been examined to identify how demographic factors such as age, gender, ethnicity, family structure, and others, influence people’s acceptance into an existing network (Fadil et al., 2009). Despite the effort to bring more women into the industry, their experience of being disparaged as less competent, negative occurrences during their formative years or microaggressions have led them to struggle with impostor (aka imposter) syndrome and negative self-talk (Martin, 2018; Young, 2011). However, research has been conducted to explore how this syndrome is also prevalent in men, while also identifying how social factors such as friend/teacher/classmate/parent support affects impostor syndrome (Caselman et al.,

2006). Institutional, cultural, and individual racist experiences have also been proven to have negative psychological and physical effects on racial minorities (Carter, 2007; Martin, 2018). People of such minority groups try to adapt by using a number of coping mechanisms which if unsuccessful can result in stress and trauma (Carter, 2007). Some argue that while research has put the onus on the individual who suffers from impostor syndrome, historical and cultural occurrences play a role in why this is prevalent in women (Martin, 2018; Young, 2011). Supporting the existence of people with different leadership styles and racial, ethnic, and gender backgrounds might allow others to see underrepresented people as more competent and thus enable people who belong to minority groups to not feel the individual need to be the trailblazer (Tulshyan & Burey, 2021). Impostor syndrome left unaddressed may lead to someone destroying their career, by exhibiting behaviors such as not asking for opportunities or seeking promotions because of feeling inadequate (Mullangi & Jagsi, 2019).

2.3. Related Work

Previous studies have shown that by getting students involved in the open-source world, they improve their self-confidence and technical skills (Pinto et al., 2019). Contributors to open-source projects spoke about how it enhanced their ability to find employment (Hawthorn, 2008), enriched their resumes by providing relevant experience, improved their usage of new technologies, and their social skills through their interaction with the open-source communities. It also provided them with technical credibility since a third party person needs to approve one's contribution before it gets accepted or incorporated into a project (Pinto et al., 2019; Riehle, 2015). Involvement in open-source projects also helped in other ways, such as accelerating the onboarding processes of new hires who have been previously involved in contributing to open-source projects because of their previous relevant hands-on experience with open-source projects through the usage of specific tools or applying common software development methods (Muller et al., 2019). The existence of an onboarding program or mentorship has been proven to be extremely beneficial in easing newcomers into these technical communities which can often feel intimidating to get involved with (Pinto et al., 2019; Steinmacher et al., 2014)

Studies have also attempted to evaluate the motivations that lead people to join Summer of Codes (J. O. Silva et al., 2020), the reason there is a lack of diversity in contributors within open source communities (Wang & Weinberger, 2020), the engagement

levels of contributors (Barcomb et al., 2020; J. D. O. Silva et al., 2017), the participation of women in open source software, the motivations that encourage them to stay and the causes for departure (Trinkenreich, 2021). Researchers have identified that people from underrepresented groups are more likely to contribute to open-source initiatives that are linked to having a positive social impact (Ellis et al., 2021). Academics also have investigated the motivations between men and women to contribute to open source, finding unique observations, such as that women respond better to personal invitations to engage in open source projects (Frluckaj et al., 2022). In addition, some of the closest research to this study focuses on experiences of women in open source software, sharing some capabilities to success (Singh & Bongiovanni, 2021) and a study encouraging women to take part in open source by sharing the experiences of women who participated in the predecessor of the Outreachy program, GNOME Outreach Program for Women (Martínez de la Cruz & Chesñevar, 2013).

This study will focus on the outcomes of participation in mentorship, open-source related internship programs, and the capabilities that enabled underrepresented people who thrive to do so. All these are important elements that provide more insights into how people perceive or interact with each other in open-source communities. No study has focused on the aspects that enabled the alumni of the Outreachy Program to launch their careers or what technological or other aspects could improve such a program. The motivation for this study is to explore underrepresented people's experiences in the tech industry from the Outreachy program but also investigate a subset of people who have not taken part in this program that also work in the tech industry

3. Selected Theoretical Frameworks

Numerous theories and frameworks have been used in comparable studies to this, such as lifestyle theory, social network theory, epistemic injustice, and intersectionality theory. Lifestyle theory has been used in research on sustainability economics and others. In lifestyle theory, the individual is the central figure of analysis, but it also shows how certain choices can lead to criminal victimization. (Berman Caggiano et al., 2021; Sovacool & Hess, 2017). Because I am interested in the effects of Outreachy as an internship program, I focus on the outcomes of the programs instead of participant ideologies about life. Social Network Theory speaks about the relationship between actors/participants (Borgatti & Ofem, 2010). It has been utilized in several areas, such as research that explores social network relationships between East Asia and the West, the level of difficulty in entering the network, what characterizes the East Asian social networks eg. consumerism (Horak et al., 2019) and tourism (for example looking into how individuals morph themselves in order to gain acceptance into a network) (Chang, 2021). While that is a useful theory, it does not give room to explore other aspects that can affect one's capabilities to succeed, such as one's socioeconomic status, or gender (Ching et al., 2005).

By investigating epistemic injustice, we can think about whether silencing (Cohen, 2018), sexism (Schroder, 2009) or other forms of bias and discrimination that underrepresented people might face in an open-source community could be a reason why they leave the field of technology (Scott et al., 2018). However, the reason for departure is not the major point of this study. Lastly, Intersectionality can give us different insights based on the intersection of different attributes such as gender, and class. Studies have used intersectionality to explore aspects of equality within an organization and combine it with theories such as the capabilities approach to create other frameworks (Nussbaum, 2011; Woods et al., 2022) and to explore the intersection between inequalities in the digital world such as digital divide with gender, race and work (Zheng & Walsham, 2021). Intersectionality in itself is inherent in many of the theories I use to allow me to answer the research questions. However it is not sufficient to provide an explanation of the capabilities that allow people to succeed. It may affect one's living experience but does not provide something that could not be covered with the chosen theories, which I will discuss next. All these theories targeted

issues that will be addressed in this research but are not in themselves addressing the bigger picture of the research in order to allow me to achieve my research goal.

In order to answer the research questions outlined in Chapter 1, I am going to draw on the following three theoretical frameworks: the capabilities approach, inclusive leadership, and systems theory. In this chapter, I introduce the three theories, discuss how they have been used in similar work and why they are appropriate for this research, evaluate criticisms of the theories, and explain how they have informed this research.

3.1. The Capabilities Approach

The Capability Approach emphasizes the importance of individual capabilities or the freedoms that people have to lead lives they value. This approach considers the social and economic factors that limit individuals' capabilities and focuses on ways to enhance and expand these capabilities (Sen, 1985). The capabilities approach looks into people's innate capabilities that support their well-being and their development (Haenssgen & Ariana, 2018); it looks into what a person can be or achieve based on the current state of justice or injustice within society, and some authors argue that having certain rights can be enablers in supporting people to achieve their goal towards well-being (Nussbaum, 2016). Sen's (1985) Capability Approach was initially used to explain poverty, economic inequality, and well-being; however, a major component of this theory was also one's functioning and capability. Sen explains that by functioning he means what someone can achieve through who they are or what they do, while capability explains what is the potential of someone to attain a functioning.

While the context of underrepresentation in tech in relation to the capabilities approach has been researched sparingly, studies have explored the intersectionality aspect where different forms of oppression and dimensions of diversity can influence someone's lived experiences (Woods et al., 2022). Researchers also have tried to apply this approach to technological and IT-related development settings (Haenssgen & Ariana, 2018; Kleine, 2010). Studies have tried to apply approaches of the theory to provide solutions that allow organizations to boost the numbers of representation of women or other minorities by promoting workplace equality (Gagnon & Cornelius, 2000). The Capability Approach highlights both human diversity and heterogeneity while providing insights into how

elements such as gender, caste, and age contribute to group imbalances through their interaction (Clark, 2005). My research addresses systemic barriers that prevent underrepresented groups from accessing and thriving in the industry but also explores the capabilities of the study participants and what they are supposed or able to achieve by utilizing those capabilities. For example, there are several challenges such as limited access to education and training (Nussbaum, 2016), biased hiring practices (Isaac et al., 2009), and unwelcoming workplace culture that limits the capabilities of underrepresented groups in the tech industry, preventing them from achieving a successful career (Tapia & Kvasny, 2004). Addressing issues related to justice and equity allows society to promote inclusion and ensure that social injustices do not exclude certain groups from realizing their potential (Nussbaum, 2016).

Over time, several people have criticized Sen's theory for its broad original nature or expanded this framework while acknowledging the interdisciplinary applicability of this theory (Alkire, 2005; Clark, 2005). Nussbaum, one of the most influential critics of Sen's work, went to the extent of expanding the theory to include a specific list of capabilities as Sen did not define any; Sen left the theory broad enough so that it can apply to various fields because he believed it was not the role of the experts to define capabilities but the people who participate in the social community that is explored (Clark, 2005; Robeyns, 2017). Nussbaum (2011) proposed 10 central normative capabilities, with hopes to operationalize this theory, which are briefly described next:

1. Emotion - Being capable of experiencing an array of feelings while not being subjected to fear.
2. Practical reason - Being capable of thinking critically and distinguishing between the good and the bad.
3. Affiliation - Being capable of interacting with others, protecting their rights, and seeking justice.
4. Bodily health - Being capable of having good health through having access to medical treatment and benefits such as healthful food.
5. Bodily integrity - Being capable of navigating through one's environment without fear of being attacked or abused.
6. Life - Being able to live a full life, without being forced to a premature death or subjected to a life that is not worth living.

7. Play - Being capable of having fun, enjoying oneself, laughing, and being happy without being criticized for that.
8. Control over one's environment - Being capable of being employed, taking part in politics, and promoting one's political views without being worried about retaliation.
9. Other species - Being capable of cohabitating with non-human species such as animals or plants.
10. Senses, Imagination, and Thought - Being capable of using one's senses, and having access to education that allows that person to think and reason or participate in cultural, political, or religious activities in a civil and unrestricted way.

The capabilities above propose a fundamental set of what is necessary for humans to live the life they are capable of while having equal access to opportunities; however, the original nature of this theory has allowed researchers from a number of fields to apply it in different ways (Alkire, 2005; Clark, 2005; Robeyns, 2005). Nonetheless, some ethicists have implied that the basic capability is to alleviate poverty (Robeyns, 2017), which also explains the reason why Sen (1985) initially focused on economics and poverty.

Nussbaum (1999) had earlier proposed other categorizations for the theory. She grouped the capabilities into three categories: basic (talents someone might have irrespective of whether they can express or use them), internal (capabilities attained by someone that allows them to participate in a more substantive way in the society), and combined (capabilities that work in combination with the availability of the right environment that can allow a person to function to their full potential). These three principles are more in line with the goals of this study.

In this study the capabilities approach is used to allow me to find answers on which skills the participants could further hone through the Outreachy program or on their own, to develop their potential. Even though this theory originally is said to not provide a fixed set of capabilities, the flexibility and ease it provides in the requirements for its application make it difficult to regard it as a complete theory of justice or development (Nussbaum, 2016; Sen, 1985) and other metrics such as liberty, economic growth, and efficiency need to be taken into consideration. For that reason, it is advised to combine this theory with others (Clark, 2005).

Through the usage of the capabilities approach I expect to identify how society affects one's capability for success, for example, if someone lives in a country where women are not expected to pursue formal education I expect that to have affected the capacity by which they experience success or result in more challenges. This study is combined with inclusive leadership and systems theory, to allow me to provide an answer to both of my research questions.

3.2. Inclusive Leadership

Alongside the capabilities approach, I investigate how organizations can empower employees in leadership roles to foster inclusivity. Inclusion is considered as “the degree to which an employee perceives that he or she is an esteemed member of the work group through experiencing treatment that satisfies his or her needs for belongingness and uniqueness” (Shore et al., 2011, p. 1265), while inclusive leadership is “a set of leader behaviors that are focused on facilitating group members feeling part of the group (belongingness) and keeping their sense of individuality (uniqueness) while contributing to group processes and outcomes”(Randel et al., 2018, p. 191). The set of leader behaviors that are proposed by Randel ties nicely with the capabilities approach.

Inclusive leadership is focused on how organizations can cultivate an inclusive community within themselves. Inclusive leadership has been said to have multiple dimensions where different stakeholders, especially those in leadership, have a role to play to assist their organization in attaining them (Veli Korkmaz et al., 2022). Inclusiveness emerged because of other leadership theories which were exclusive, as they led to stereotypes of what an effective leader should look like by focusing on what is perceived as masculine traits (Ferdman et al., 2020). Inclusive leadership has been advantageous for diverse teams because of its focus on accepting underrepresented people and minorities for their unique perspectives, additions, and qualities which result in improved performance (Randel et al., 2018).

Conceptual frameworks have been used in studies to explain the key values of the dimensions leading to inclusive leadership such as fostering one's uniqueness or appreciating employees (Veli Korkmaz et al., 2022). Psychological empowerment is one tool inclusive leaders use to encourage people to share their thoughts and opinions, which may cause innovative work behavior (Booker & Williams, 2022; Javed et al., 2019). Cultural

intelligence, leveraging diverse perspectives, and having a leader as a change agent (being ready to lead the change towards inclusive leadership) in combination with psychological safety are competencies that are important for an inclusive leader to possess (Booker & Williams, 2022). Cultural intelligence is the ability of an individual to adapt to new cultural settings, and in an organizational setting express interest in learning about the different cultures that one's teammates associate with (Booker & Williams, 2022; Earley, 2003). Other frameworks such as the Inclusive Leadership Compass have showcased principles that an inclusive leader needs to possess such as to "empower diverse talent" through respect, equality, personalization, and participation, "enable diverse thinking teams" by supporting team unity, facilitation, psychological safety, coaching, "embed diversity and inclusion across the organization" through work flexibility, systems/processes, accountability, vision/strategy, and lastly "embrace the difference" in oneself through humility, self-awareness, openness, conviction (Sable & Dillon, 2021, p. 2). Nonetheless, there are many other combinations of mechanisms that have been said to boost inclusion, psychological safety, psychological empowerment (also referred to as intrinsic motivation), and social group identification (Shore & Chung, 2022).

Inclusive leaders have people and their well-being as the center of their attention and not what they can gain from these people. They encourage a participatory process where competition and cooperation can be used as a benchmark for further improvements within an organization (Hollander, 2012). By being able to get managers to understand the importance of being inclusive and open, we not only provide them with tools that allow them to assist their employees but we also promote an innovative environment within an organization (Qi et al., 2019). However, studies also suggest that there might be a benefit to encouraging debates and disputes in teams, because it might be helpful in dissolving group boundaries resulting in engagement with team members who are often excluded from the decision-making processes (Roberson & Perry, 2022).

Managers might be skeptical of the benefits of inclusion if they have followed the steps necessary to foster inclusive and diverse teams but do not reap the promised benefits of improved performance. The reason they might not acquire any benefits is that they recruit people from underrepresented groups but do not fully take advantage of their unique perspective to drive change within an organization (Randel et al., 2018).

This theory serves my purpose of understanding which Outreachy program assets can cultivate inclusion. As some participants may take up leadership roles during their careers to

support or introduce an inclusive environment within the organizations they work at, inclusive leadership is necessary. Evaluating the observations of the interview participants on their experiences of inclusion will allow me to partially answer RQ2. The hypothesis from using this theory is that people who mention feeling included by the actions of someone else do so because of the person exhibiting attributes linked to inclusive leadership.

3.3. System Theory

System theories have been applied in multiple fields such as psychology, biology, and physics, looking into the forces that help maintain the equilibrium of the system but also the various components that make a system whole (Von Bertalanffy, 1972). A single organization can be seen as a system within a larger ecosystem where the different teams interact with each other and experience different levels of dependencies (Hurth, 2017; Teece, 2018). System theories have been inspired a lot by biology, and the ecosystem through which the different organisms interact, along with the relationships between each component in influencing the dynamics within the environment has been explored (Von Bertalanffy, 1968).

There are open and closed systems. Closed systems are unaffected by what happens in their environment. In an open system, an organization interacts with its external environment through inputs, throughput, output, and feedback (Katz, 1978). Through the open systems theory, one focuses on how an input gets processed to create an output. An input gets processed into throughput, which is the amount of information that has been processed in order to create an output. Feedback can be generated with the output, and that feedback can become a new input that can create a new reality while maintaining the equilibrium of the system eg. organization (Small et al., 2022). This feedback loop is considered as an external input concerning changes coming into a system to help it adjust to the environment and maintain the equilibrium (Teece, 2018).

Systems theory is complemented by other theories such as systems thinking and dynamical systems. Systems thinking is an approach by which organizations can create social change by focusing on four main challenges: finding the motivation behind the reason for the change, understanding the importance of collaboration in achieving change, identifying what are the areas to focus on that lead to a bigger impact, and continuous learning which allows us to approach evolving challenges in different ways (Stroh, 2015). Dynamic Systems on the other hand “suggests that structure spontaneously and without prescription emerges through

self-organization"(Witherington, 2011, p. 66); a fundamental concept of this theory is self-organization. The self-organization component of dynamic systems can be seen in two different ways, one refers to the system forming a connection with its existing components in response to external triggers, in such a way that can result in collective behaviors and trends, and the other is a bad organization turning into a good one. Positive and negative feedback is utilized to enable this self-regulation of self-organized systems (Ashby, 1991; Banzhaf, 2009).

Systems theory is utilized for both questions because it looks at an ecosystem and supports the idea that external feedback has the ability, if processed, to drive change into a system and generate new outputs. The tech industry is looked at as an ecosystem, the various actors within it such as the Outreachy program, the media, and the organizations that the interviewees work with affect the retention of the underrepresented or marginalized talent within this ecosystem. High attrition rates are seen within companies that do not create the appropriate environment for underrepresented people to thrive, but the same happens when other actors such as the media promote stereotypes that may discourage people (Cheryan et al., 2013; Tapia & Kvasny, 2004). During the interviews with the Outreachy interviewees, I requested feedback on the platform and the current resources it offers. Overall, for both Outreachy and non-Outreachy interviewees, I asked about how they feel in their work environment or educational institution (if they are currently studying). Systems theory informed my questions by allowing me to investigate how one's environment affected their capabilities, and what can become a new input into an organization or one's personal environment to create positive changes for individuals in comparable circumstances.

3.4. How These Theories Intersect

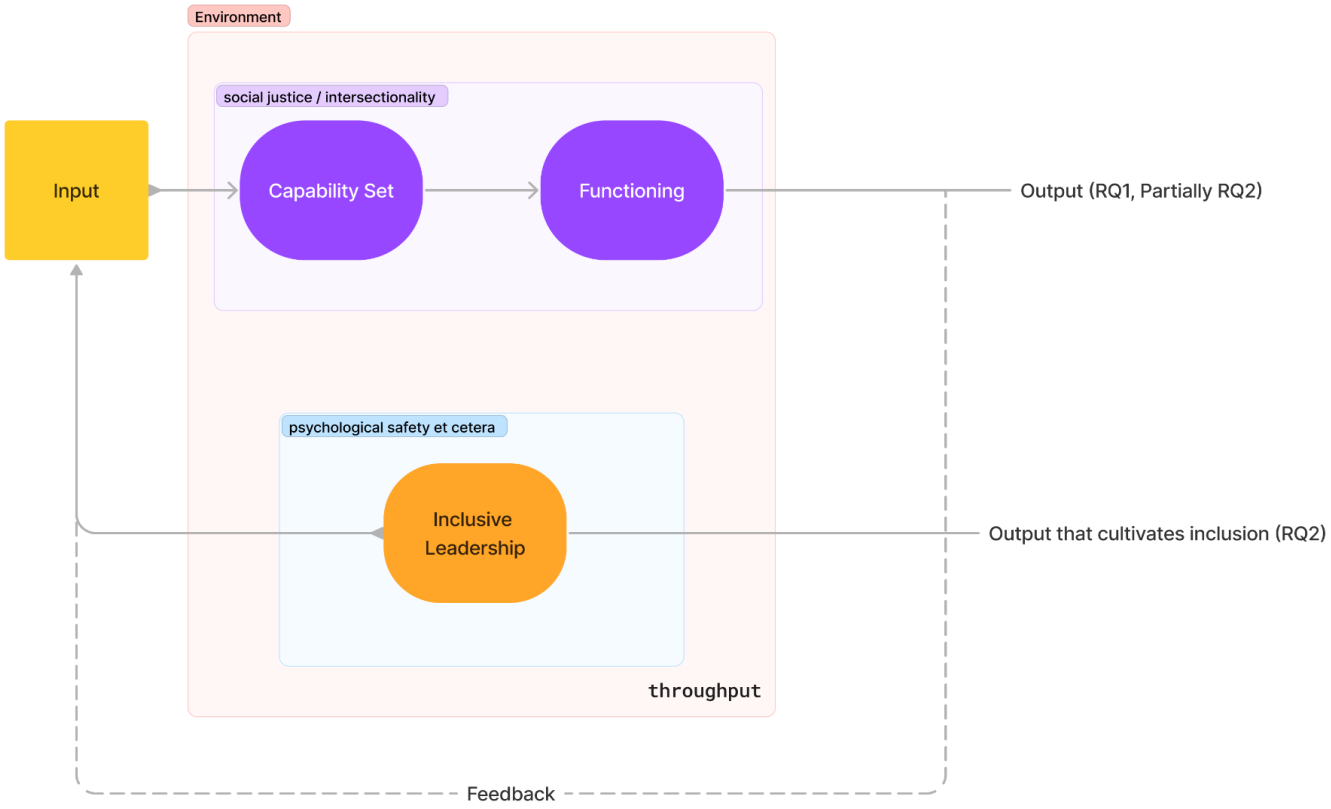
Systems theory acts as a bridge connecting the other two theories. I provide a diagram of the analytical framework in Figure 1. First, I utilize systems theory to look into an individual as the system, input (yellow box on the left) from external forces power the capability set of an individual (seen as left rounded purple rectangle in the diagram) which enables someone to achieve certain functionings (right rounded purple rectangle in the diagram). Through these functionings, an individual is capable of providing some substantial contributions to an organization, succeeding (as the output), or returning feedback that can be new input to improve their capability set/functionings to create a better outcome. Social

justice and intersectionality affect the environment and thus their presence is explicitly referenced in the diagram. The potential changes needed to improve one's life to enable them to thrive in the technical field would be considered the feedback which returns into the system to create a new output. As having feedback is optional, it is symbolized by dashed lines. Systems theory will also be utilized in seeing the organization as a system, both the organization and the individuals' ecosystem are characterized as the environment in Figure 1. Combined with principles of inclusive leadership such as psychological safety, cultural intelligence, and other attributes that foster an inclusive environment, I will explore the elements necessary to drive organizational change and enable inclusion, but also the potential technological solutions/changes that could empower the demographic I am exploring to thrive in technology.

The research on which I based part of the survey questions from mentions networking, willingness to learn, occupational expertise, the level of support the respondents receive from their social environment, career confidence, and clarity amongst other attributes as indicators of success (Hirschi et al., 2018). These metrics are part of the inputs that are necessary to create individual change regarding getting a successful career. The feedback, from an individual’s point of view, could also be the changes that can be utilized through the capabilities approach to achieve the life they want and the changes to be done in organizations through inclusive leadership to create an environment where people of diverse backgrounds can thrive. As stated by Veli Korkmaz et al., “inclusive leadership behaviors may address not only the employee and team levels but also the organizational level”(Veli Korkmaz et al., 2022, p. 4). In addition, Figure 1 references which questions each output of the diagram is expected to answer.

Figure 1

Overview of Conceptual Framework



4. Methodology

This chapter explains the methodological approach followed to conduct this study to find an answer to the research questions, starting from a short description of the keywords used for the main literature search to data analysis.

4.1. Literature Search

To select the papers for this research, a traditional literature search was conducted. As a systematic literature review was not the goal, the guide to deciding which literature will be included or excluded was by setting a primary focus on papers that were related to the tech industry, followed by ones speaking about technical education and ones about gender in a professional setting. When insufficient information was found for the tech industry, research about other industries with relevant findings were considered. The keywords used for the main search were: Diversity in computing, Diversity in Tech, underrepresentation in tech, inclusive leadership, capabilities approach, history of women in tech, women AND open source, diversity AND open source, bias, impostor syndrome, negatives of inclusion, success in technology, minority groups AND tech, and factors for career success.

4.2. Methodological approach

Before the study conception phase a preliminary communication with the Outreachy organizers was initiated, that was to ensure I am not infringing Outreachy's community rules by distributing the survey but also by conducting this research. The Outreachy organizers wholeheartedly supported this endeavor which was beneficial during the data collection process.

For this study I followed a deductive approach going from the general theoretical foundation to the more specific (Saunders et al., 2019). I applied a mixed-method research design, meaning I used both quantitative (survey) and qualitative methods (interviews) because it was the best way to provide answers to the research questions. Qualitative research has the weakness that it is often not generalizable due to its small sample size in comparison to quantitative research, by using a mixed-method approach that weakness is mitigated by the strength of quantitative research which is its ability to be conducted with large amounts of

data (Carr, 1994). The survey enabled me to get statistical insights from my target audience to partially answer RQ1, while the interviews allowed me to reach more depth by analyzing what people think so that I could provide answers to RQ1 and RQ2. Overall both methods allowed me to achieve my research goal. Starting with a survey and then interviewing allowed me to employ purposive sampling which ensured that the people being interviewed fitted the criteria that were the focal points of this research (Bryman, 2016). Purposeful sampling, also called purposive sampling, is a method where one identifies unique and information-rich cases for the phenomenon they are researching (Palinkas et al., 2015).

The survey consisted of validated instruments selected from previous studies and ensured that I could measure the phenomenon I wished to explore. Specifically, I used four key predictors for career success from the validated instrument — namely career confidence, career clarity, networking, and learning. These were adopted from Hirschi et al. research as these are some capabilities that are enablers of success (Hirschi et al., 2018). To further confirm the survey functioned as expected and was comprehensible, a pilot study was conducted with three participants. After collecting their feedback and making the appropriate changes to the survey, which comprises 25 questions (some of which were conditional), it was then made ready for the public. You can find the survey questions in Appendix A. The survey remained available for 42 days. It was shared on 15th of March 2023, and up till 26th of April 2023. This duration indicates that the research is cross-sectional, as the samples for the survey and interview were taken during a fixed timeframe between March and June 2023.

Following the survey and an analysis of the responses, questions were formulated for the interviews. To ensure that the interview questions were the right ones, a quick preliminary look at the survey data for points to focus on, and a constant reflection of if each question might provide an answer that could lead to answering the RQs was necessary. Therefore, while formulating the questions I kept notes on what I hope to get or be able to analyze through the answer of each question. The questions were sent for feedback to the supervisors and subsequently, a pilot interview with one participant with a technical background was conducted to gather more feedback regarding the quality of the questions.

At the initial stage before the interview process began, where an initial analysis of the survey data was performed, I observed that Outreachy participants scored slightly lower on attributes such as networking, compared to non-Outreachy participants.

For that reason, questions were adapted to request, for example, what are people's opinions about networking, but also were written in a way that would allow me to derive answers to the research questions by applying my analytical framework.

4.3. Sampling Strategy: Survey and Interviews

As mentioned previously, the research was broken down into two phases, the first one was the survey and the second was the semi-structured interviews.

To conduct the survey, the population of this study was people who are in the tech industry. I was particularly interested in underrepresented people, which I classified into Outreachy participants and non-Outreachy participants. However, non-underrepresented people could also complete the survey as they could provide important insights for the study when contrasting the results of the survey between underrepresented and non-underrepresented, and capabilities for success.

As Outreachy has specific requirements on who can participate in their internship program, my focus was people fitting that requirement. This means that the participants of the survey from Outreachy were people who are women (both cis and trans), trans men, non-binary people, genderqueers, residents and nationals of the United States of America of any gender who are Black/African American, Hispanic/Latinx, Native American/American Indian, Alaska Native, Native Hawaiian, or Pacific Islander, and members of historically disadvantaged case/scheduled caste/tribe or other groups in the technology industry of their country, such as Dalits in India.

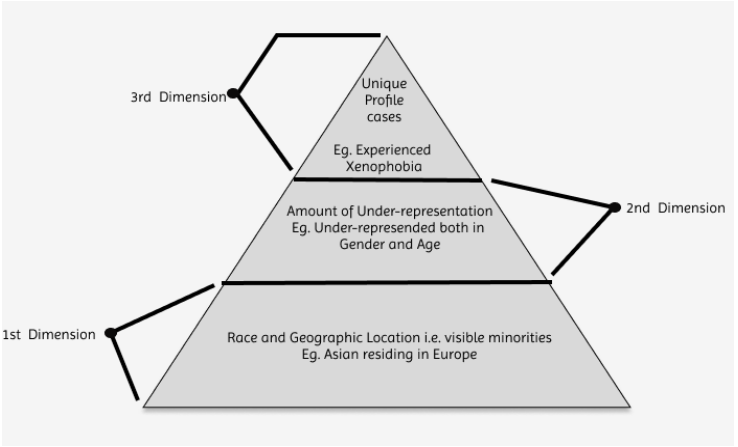
For the selection of who was interviewed, I looked into which subset of the survey participants expressed an interest to be interviewed. As some of them were not in the Outreachy program the overall selection of people to be interviewed happened by staying focused on people who had similar profiles to that of Outreachy participants by considering themselves underrepresented in technology in a way or form. By looking into the data I identified the people that matched specific combinations of diversity which might result in a diversity of experiences as those would be the most useful in providing answers to the research question. As mentioned previously, purposeful sampling was be used to help me establish the sample populations for the interviews, initially I used it to identify certain attributes of underrepresentation that were similar e.g. selecting visible minorities, and later

on emphasis on variation e.g. selecting people with varying types of underrepresentation such as gender plus disability. I broke down the divisions made through purposeful sampling into three dimensions. In Figure 2 I provide a breakdown of these dimensions.

The first dimension is race and geographic location, with that dimension I looked to identify people whose race is atypical of the geographic location they reside in, for example, an Asian living in Africa. In the second dimension, I looked into the amount of types of underrepresentation that the respondent identified themselves with during the survey. The options available were gender, sexuality, race, scheduled caste/tribe, disability, age, prefer not to say, and other. Those who affiliated with more than one of these options (aside of prefer not to say) were considered to have multiple types of underrepresentation factors. The third dimension is composed of unique profile cases; there were people who mentioned additional reasons why they feel underrepresented in tech by filling in the "other" text box, and those who provided an interesting cause of underrepresentation were placed in the 3rd dimension. Figure 2 displays that my foundation was the first dimension when it came to selecting interview participants; it occupies the biggest portion of the designed triangle. Once I could not identify enough participants who fit that dimension, I layered it with the two other dimensions to create a diverse set of participants that could allow me to provide answers to the research questions. Thus the initial set of selected interview participants came from the first dimension. Had that set of potential interview participants all scheduled an interview I may not have utilized the other two dimensions. In this case, though, it was necessary to explore all of these layers to account for the loss of information due to attrition.

Figure 2

Dimensions of Interests Through Which Interview Participants Were Selected



4.4. Data Collection: Survey and Interviews

To conduct the survey, which was the first data collection method, I created a questionnaire that consisted of 25 questions. The questions were grouped in certain categories focused on the demographics, gathering information on the respondent's background, involvement with tech, and identifying the capabilities that enable them to be successful or the ones they perceive would allow them to succeed in their careers. In Appendix A one can find the breakdown of the categories of the questions in the survey, the full list of questions, and available answer options alongside the hypothesis or reasoning behind each question.

After creating the questionnaire for the survey, and a series of feedback from supervisors and tutors, I set up the survey on LimeSurvey[4]. Before being allowed to complete the survey, the participants needed to accept and consent to a General Data Protection Regulation (GDPR) and data processing notice by ticking a checkbox that existed. This means that by default anyone that proceeded with participating in the survey provided consent for their data to be processed.

Once the survey was established in the platform, three people (a past Outreachy intern, a non-Outreachy participant who works in the tech industry, and a person who does not work in tech) were asked to complete it, provide the approximate time it took to finalize it, give feedback on questions that were hard to comprehend or took longer to answer, note errors in addition to providing comments on how easy or accessible the survey was. Upon the completion of the pilot survey, I requested permission from the IT department of Salzburg University which hosts the survey tooling, to be allowed to edit the template I was using due to some accessibility issues it had for people with visual impairment. In addition, I refined the questions, created a fresh copy of the survey, ran through it once, and asked one of the previous testers to take it one more time to confirm the survey ran as intended, then I distributed it. Initially, it was shared on my LinkedIn and encouraged to be further distributed through word of mouth. Therefore, those who participated in the survey were via self-selection. To boost responses, a second reminder post was made on LinkedIn a few days before the survey was to close. In Appendix C one can find a sample of the type of post I shared on LinkedIn.

[4] *LimeSurvey — free online survey tool*. (n.d.). Retrieved July 29, 2023, from https://www.limesurvey.org/

Later on, a technical mailing list focused on diversity in tech, called Diversify Tech, featured the survey in one of their online newsletter editions (sent out on March 22nd, 2023). In Appendix C one can find a screenshot of the message shared, and following that, the Outreachy organizers helped to distribute it to the Outreachy Opportunities mailing list to reach out to the main target demographic. These two shares helped boost the reach of my survey.

At the end of the survey form, there was an option to express interest if one wanted to participate in the interviews. If they were willing to, they could provide a name and an email to be contacted. Those who took part in the semi-structured interviews were selected through a combination of self-selection, polar sampling, and purposeful sampling. Self-selection because they expressed interest to be interviewed, polar sampling because I then streamlined who will be interviewed based on dimensions of interest that I believed would allow me to achieve the research goal, and purposeful sampling because there was a strategy behind what unique profiles of people I would select on each dimension, which I explained in Figure 2. All the interviews were conducted online and spanned between May and June 2023.

After creating the interview questions they were also sent to my supervisors and academic tutor for further feedback. A pilot interview was then conducted with a non-Outreachy participant who has experience working in tech. The interviewee of the pilot study was asked to observe if questions were hard to comprehend and provide any feedback at the end of the interview. Based on the feedback, but also the quality of answers I got I could do a final tuning of the question and begin reaching out to the selected participants for the interview. In Table 1, I showcase the breakdown of the outcome of the responses I got after reaching out to people for the interviews. In the first email batch which consisted of 13 people that were selected based on the first dimension of interest (see Figure 2 for an explanation of dimensions of interest) four Outreachy alumni were scheduled to be interviewed, four did not reply and one did not appear in the scheduled appointment. Of these 13 people, four were non-Outreachy participants, and all four of them scheduled and completed the interviews.

In the second batch seen in Table 1, participants were selected based on the second and third dimensions of interests i.e. amount of under-representation and unique profile indicators. As more input was needed from the Outreachy community, in the second batch I reached out only to seven Outreachy Alumni, three of whom scheduled an interview and

four of whom did not respond. In total, I interviewed 11 people, seven Outreachy participants, and four non-Outreachy participants.

Table 1

Emails Being Sent to People Selected for Interviews and Outcomes

Email Batch Number	Number of People Contacted	Outreachy Alumni	Non-Outreachy Participant	Total
1 (1st Dimension)	13	9 (5 Unresponsive)	4 (All scheduled for interview)	8 People
2 (2nd + 3rd Dimension)	7	7(4 Unresponsive)	-	3 People
			Sum of people:	11

Interviewees who responded selected their preferred date and time to be interviewed through an appointment scheduling tool. Prior to the interview, a consent form was sent for each interviewee to sign. During the interview, their consent was affirmed and recorded. Each participant was given the right to ask clarifying questions regarding the consent form before proceeding with the interview questions. In the consent form, the interview participant had an option where they could express their interest to view the transcript and provide edits before its processing. In case an interviewee expressed a desire to see the contents of the interview, they were sent the transcript shortly after the interview and allowed to provide any edits in the following week. This practice of sending interview participants transcripts for clarification or edits is also considered part of member checks which is an essential procedure in research as it ensures the accuracy of the data (Birt et al., 2016). In the consent form it was also mentioned that one can withdraw consent up to two weeks after the interview. That is because once the data has been processed it will be harder to remove it from the analysis. From the 11 people that were interviewed, 8 people requested to review their transcripts.

The interviews were recorded and transcribed with the consent of the interviewee. Interviews spanned between 28 minutes to 1 hour and 13 minutes; on average the interviews were approximately 45 minutes. The interview consent document can be found in Appendix D.

4.5. Data Analysis

The survey gathered 101 complete responses and 33 partial responses. For this study, only the complete responses were considered. From the complete responses, 36 people expressed willingness to be interviewed, out of them 11 were non-Outreachy participants and 25 were Outreachy participants.

To perform an initial analysis of the survey data I assigned a numeric value to the Likert scale answer options from the validated instrument (the questions of the validated instrument are in four categories, networking, career clarity, career confidence, and learning which you can see in the survey question set in Appendix A). For those questions I used a Likert scale in three variants with scales composed of five values. In Table 2, we can see the values I assigned for each level of the scale.

Table 2

Values Replaced for Computation of Likert Scale

Likert Scale	Numeric Value Assigned
Strongly Disagree OR Not True at All OR Never	1
Disagree OR Mostly Not True OR Rarely	2
Neither agree or disagree OR Somewhat True OR Occasionally	3
Agree OR Mostly True OR Often	4
Strongly Agree OR Completely True OR Always	5

From the existing responses I created a sample frame, meaning I selected a group of people from the respondents that could represent the target population (Martínez-Mesa et al., 2016; Rooney & Evans, 2019), which are people who have experienced a career in the tech industry and the subset of Outreachy participants. I selected the interview participants based on the dimensions of interests; firstly their current geographical location of residence, followed by their race and type of underrepresentation or the lack thereof which is also

mentioned in Section 4.3. The interview questions also draw inspiration from the result of analysis like the one seen in Table 12 and Table 13 (see Chapter 6 for these tables). In addition, to further analyze the data I performed co-occurrence analysis with the usage of Python on the qualitative sections of the survey (two questions that were to be answered through a text box), to identify key capabilities for improvement amongst the survey respondents which I address in the *Empirical Data* section, the python script is attached as supplementary material to this research.

The interviews were transcribed, using a third-party software, and edited, and thematic analysis was performed to identify key themes within the interviews with the use of NVivo[5].

4.6. Mobile Application Design

In the initial analysis performed on the survey data via conversion of the Likert scale (see Section 4.5), networking was one area that Outreachy participants did not do as well as the non-Outreachy ones (this finding is mentioned in Chapter 6). In 2023 Outreachy reached its 1000th intern, the community is growing, and other ways to stay connected and network may be beneficial. Having that in mind, one addition that could help the community in the future is a mobile application for the alumni network. While there are existing networking applications, having one that meets the specific needs of the Outreachy alumni and provides information that keeps them engaged, and inspired might benefit them. In addition, as there are people within the open-source community that dislike or distrust using proprietary products, having an Outreachy owned alumni network application can provide an extra layer of trust and psychological safety. With such an app Outreachy's stakeholders and the alumni can keep up with previous participants in a safe space.

Design thinking with a human-centric focus played an important role in the design process of this application (see Chapter 5 for the app design). Design thinking is an ideology that states that a hands-on, user-centric approach can cause innovation and provide a competitive advantage. However, design thinking is also a process, which can be divided into six phases i.e. empathize, design, ideate, prototype, test, and implement divided into three

[5] NVivo - Lumivero. Retrieved July 24, 2023, from https://lumivero.com/products/nvivo

categories, understand, explore, and materialize. In the empathizing phase, the researchers try to understand what the user needs, then they try to define the pain points (define phase). These two phases belong in what is called the *understand* stage. In the ideate phase, the researchers rapidly brainstorm possible solutions to the problems. The prototyping phase is when you build a tangible prototype by designing a wireframe or other tactile materials. The phases of ideation and prototyping belong to the *explore* stage. Next is the testing phase where one shows their solution to the target user group and gets their feedback to ensure that the prototype achieves its intended goal. Once that is done, the team can proceed to implementing the solution which is an important element of the process. The testing and implementing process belongs to the *materialize* stage (Gibbons, 2016).

As part of the design procedures, you will notice that elements of the material design kit were utilized in combination with Figma[6]. Material design is " an adaptable system of guidelines, components, and tools that support the best practices of user interface design. Backed by open-source code, Material Design streamlines collaboration between designers and developers, and helps teams quickly build beautiful products."[7]

[6] *FigMa: The Collaborative Interface Design Tool*. (n.d.). Figma. Retrieved July 24, 2023, from https://www.figma.com/developers

[7] Material Design. Retrieved July 24, 2023, from https://m3.material.io/ [*citation found in footer of website*]

5. Results of App Conceptualization

In line with RQ2 a technology asset that could cultivate inclusion would be an alumni network mobile application. By applying principles of design thinking I provide a conceptual design of the alumni application spoken about in the methodology (see Section 4.6). I began the empathize phase by looking at the answers and feedback I got from the Outreachy alumni during the interviews/surveying and identified networking as a pain point (see Table 12 in Chapter 6) but also noticed the positive impact that being in a supportive community has in many of the interviewees' lives.

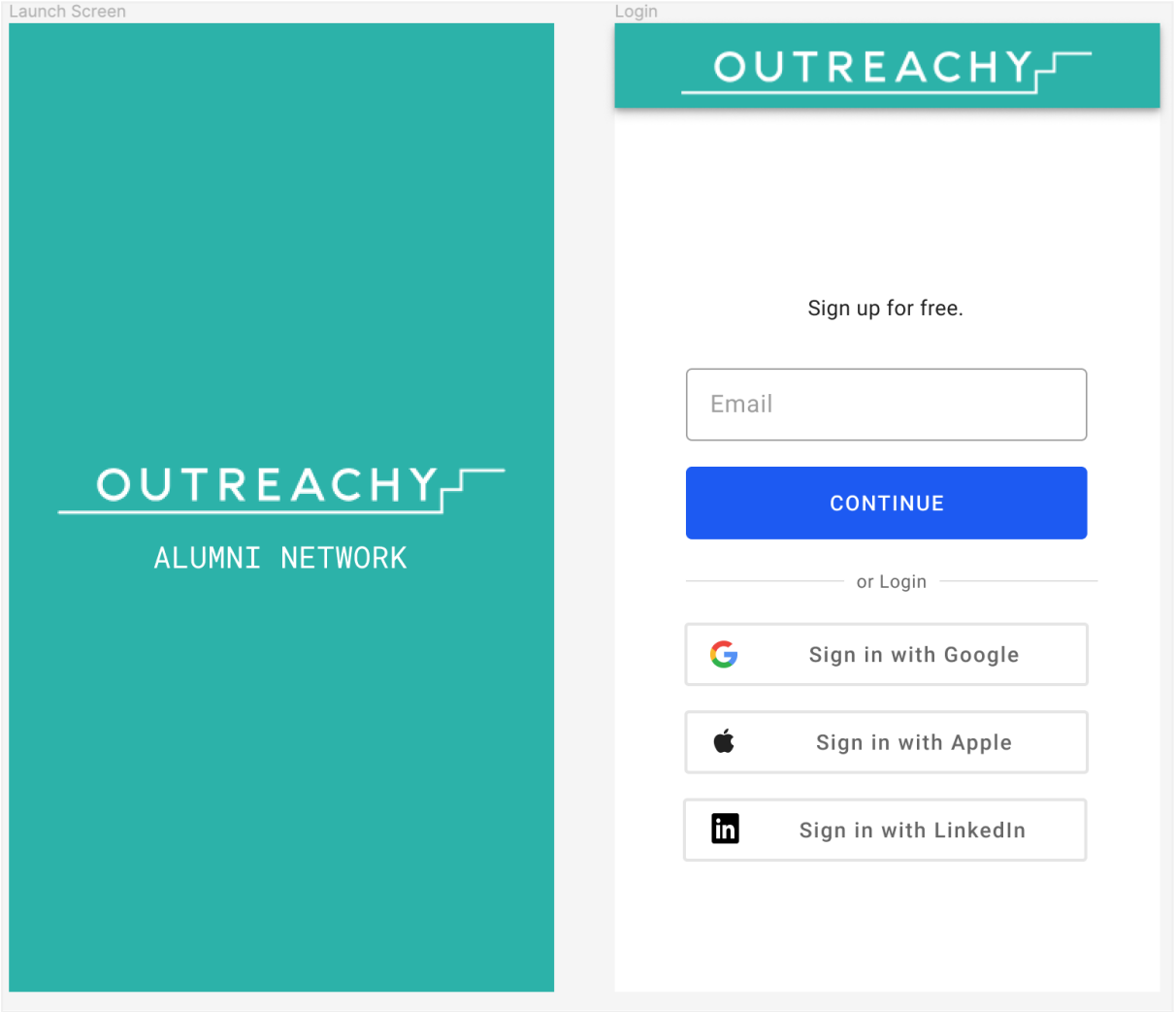
> *"The power of community is very understated, it's very important when you're building a career in tech and especially in open source communities, because it's through communities that I found out about Outreachy. It's through the positive communities that I was able to do well in my internship and it was able to help me foster more communities at the internship."* - Interviewee 10

After some initial brainstorming (ideate phase), I began converting the ideas into a tangible prototype through the use of Figma. While my process ended at the ideation stage, this would provide a foundation for potential testing where feedback can be gathered to refine the prototype and eventual adoption. For this research, I am staying in the conceptualization phase.

As we can see in Figure 3 in the next page (left side) I have the launch screen which is what appears as the app launches, while it loads. The logo can blink to indicate loading or a loader can be added. After the page loads it goes to the login page (right side), where there are several options available to enable logging in but also the ability to sign up to the app.

Figure 3

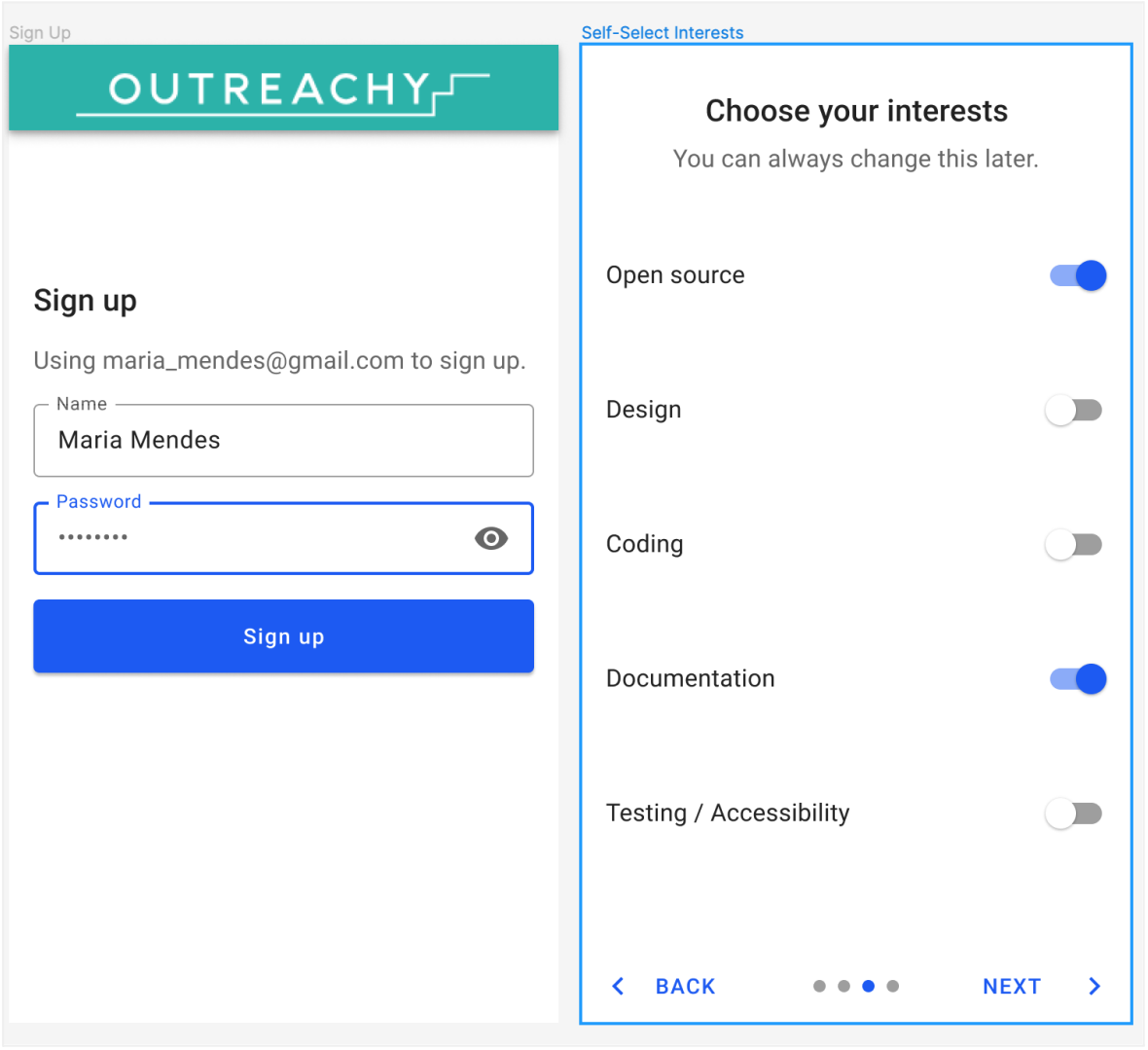
Application Launch Screen (Left) and Login Screen (Right)



If the user does not have an account, they have to create one. Figure 4 (left side) illustrates the page that appears after someone types their email and clicks next. I created a persona of an Outreachy alumnus called Maria Mendes which you will learn more about in Figure 5. While only one main persona is used in my examples, it is possible and perhaps recommended that other personas are created such as the ones offered in the GenderMag Method (Burnett et al., 2016).

Figure 4

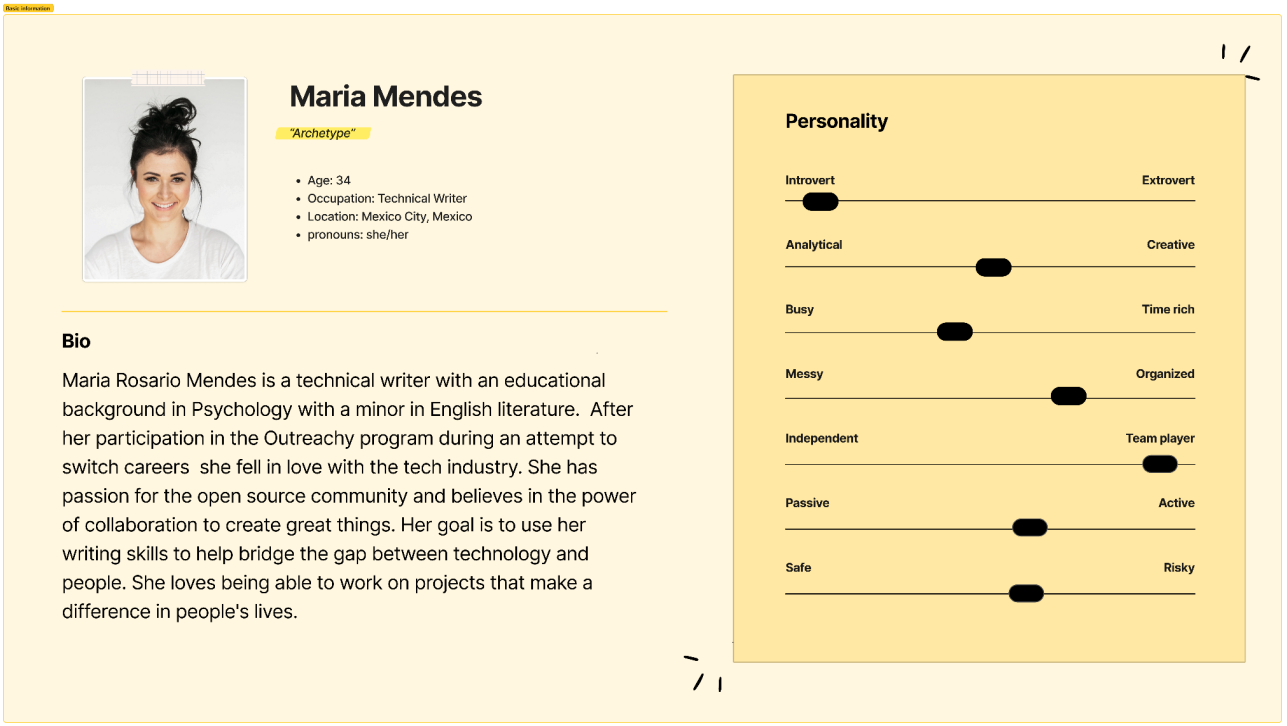
Application Sign Up (Left) and Interest Selection Page (Right)



Maria Mendes is 34 years old, is a technical writer living in Mexico. Figure 5 provides us with more information about Maria.

Figure 5

Application Persona Information



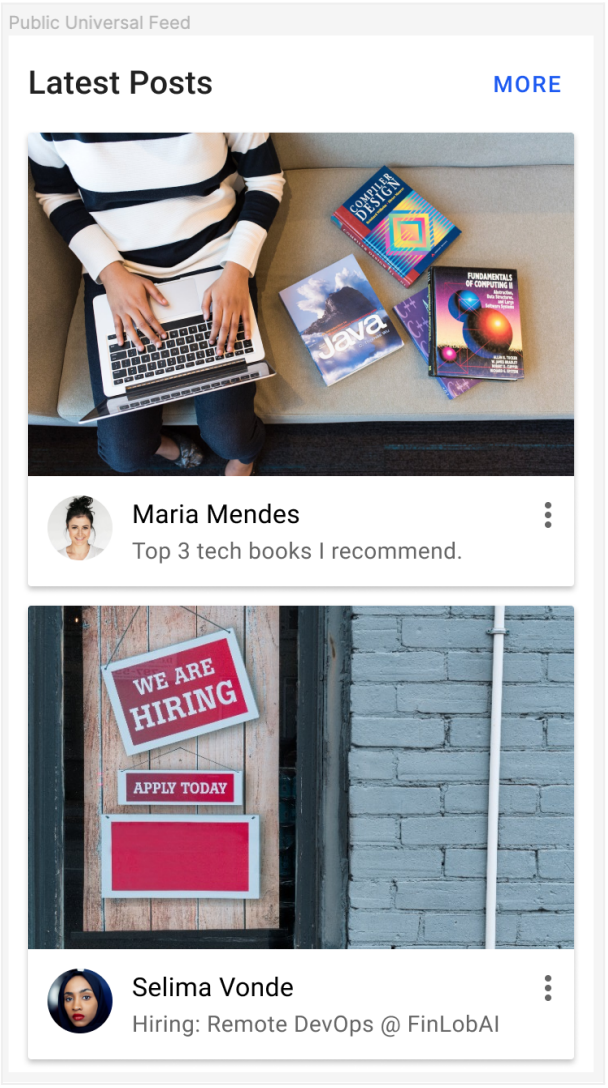
Based on Maria's pain points and goals, which you can find in Appendix F, the alumni network mobile app design should focus on creating an environment that facilitates meaningful connections, offers personalized recommendations for self-development, and highlight common interests between users to assist her in finding relatable people in the tech and writing communities.

Once Maria has registered her account, and validated it (additional approval might be necessary to ensure the community is composed strictly of Outreachy alumni), she can now choose a set of personal attributes that she has within the field of technology (see figure on the right). Once she is done with her selection and clicks to proceed to the next page, she is redirected to the home screen (see Figure 6).

Figure 6 shows an example of the application home page, where the latest or most engaging posts are featured. That could be videos, posts, articles, podcasts et cetera. For simplicity, in Figure 6 I have a few posts Maria made and then a job opportunity shared by another fictitious alumnus called Selima.

Figure 6

Application Home Page



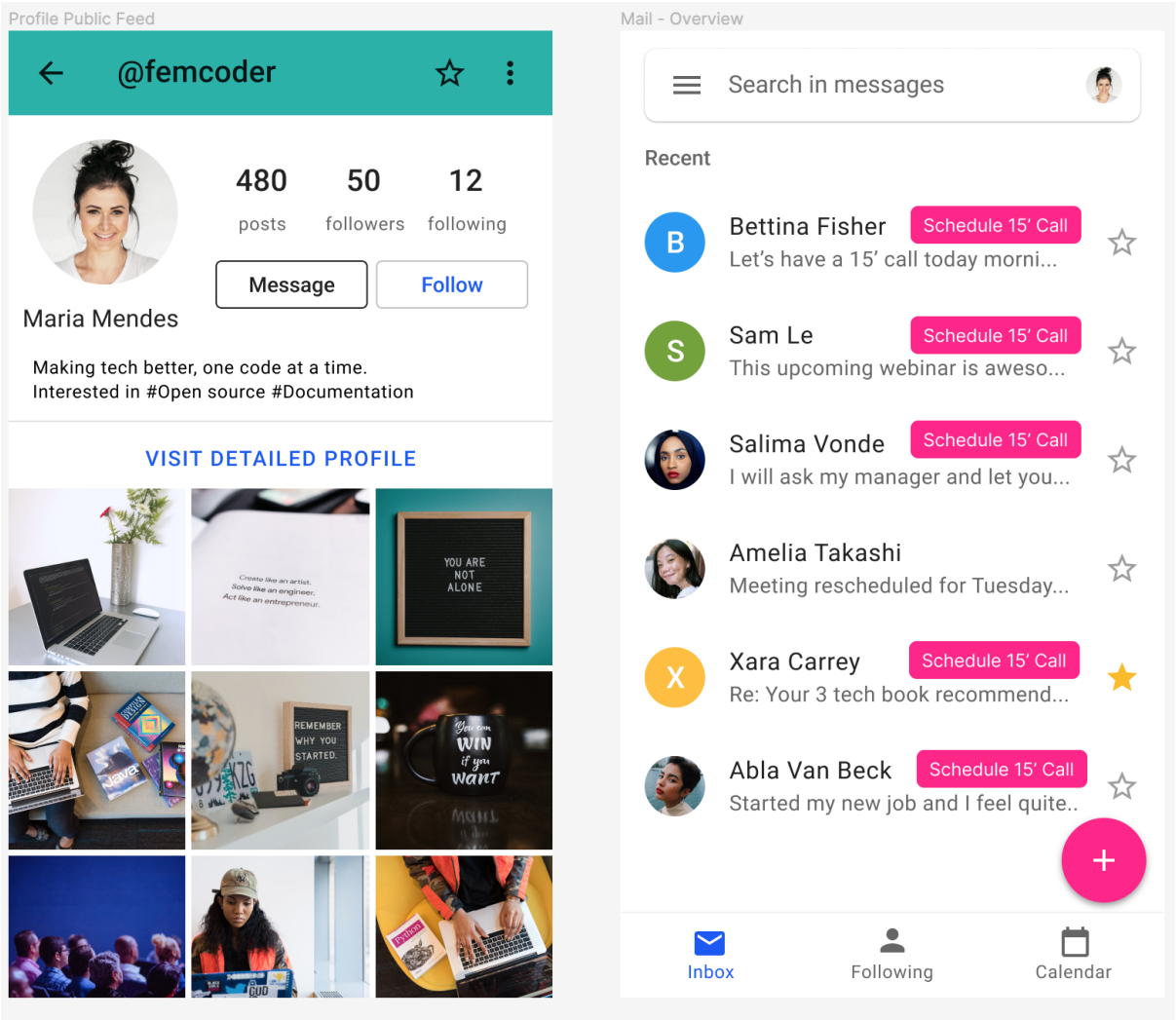
By clicking the "MORE" button seen in Figure 6 people can see other options, such as viewing their own profile, searching for other posts, notifications, privacy policy, and settings.

Figure 7 (left side) illustrates how one's public profile appears. "Interested in" has the keywords Maria selected when she initially chose her current interests (seen in Figure 4 on the right side). A user can also click "Visit Detailed Profile" to view the profile of the person where one can find information such as educational background, motto for life, the year the person participated in Outreachy, and current career status. A user can star user profiles, and messages, view public posts, and follow (or unfollow). The follow button turns into unfollow

once someone has been followed. When someone decides to message a user they end up seeing the image on the right (see Figure 7, right). The hot pink button provides options to compose messages. A user can schedule a 15-minute call based on the availability of their person of interest if that person has activated that feature, certain users, e.g. Amelia Takashi, have not activated that feature and thus that call scheduling button does not appear next to their name.

Figure 7

Public Profile Page (Left) and Messages (Right)



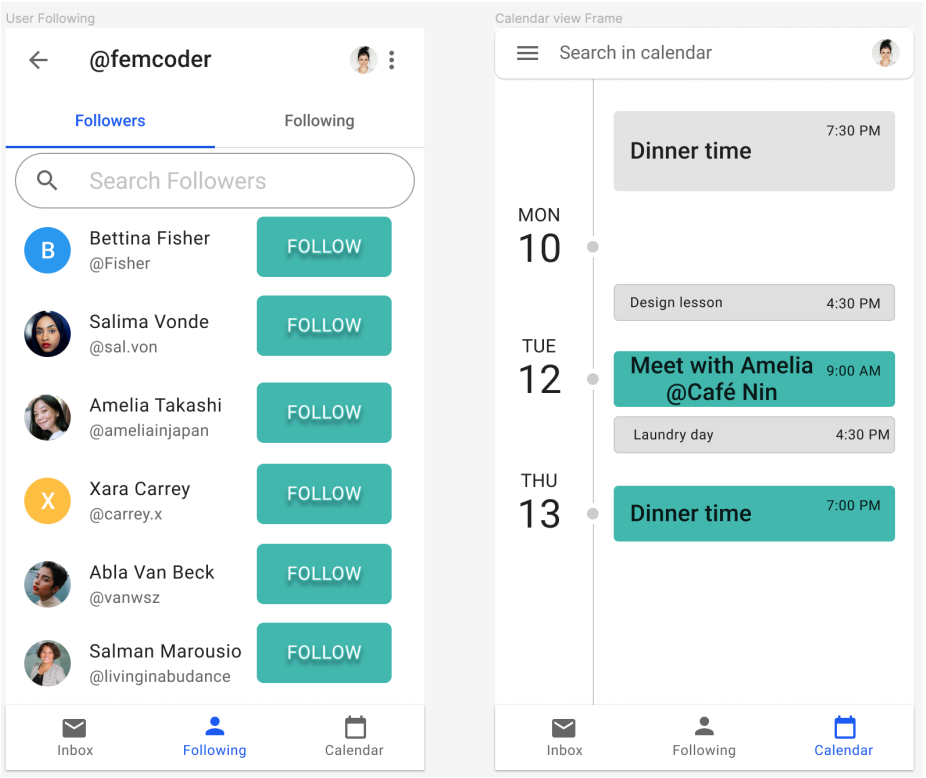
The user interface of the public profile and much of the actual app mimic that of well-known social media apps as familiarity can increase the ease of adapting to a new technology (Idemudia & Raisinghani, 2014).

In Figure 8 on the left side we see what is available when one clicks the "Following" option. They can see who is following them (and follow them back) and they can also see who they follow (and unfollow them). The image shows the page of followers, but a similar page appears in the "Following" tab, other options such as the ability to block someone could be enabled too.

On the right side of Figure 8, we can see a calendar with scheduled appointments with other alumni e.g. Meeting with Amelia, or synced information from Maria's personal calendar e.g. Dinner Time.

Figure 8

Following Page (Left) and Calendar (Right)(figure appears on next page)



To conclude this provides the basic backbone of what an alumni application could comprise, but there is definitely room for more complex functions beyond staying connected via following or communicating with other alumni.

6. Empirical Data: Survey and Interview

In this chapter I provide a breakdown of the findings of the research, which serves as a foundation for the discussion that follows. The focus of this research is to provide an answer to: How individuals who participate in Outreachy harness and develop their potential (RQ1) as well as what additional program assets and technology can be designed to cultivate inclusion (RQ2). The analysis in the findings consists of quotations of underrepresented people I have interviewed, referenced as *interviewees,* and quotations from people who participated in the survey, referenced as *respondents.* The findings comprise of quotations from underrepresented people both Outreachy alumni and non. I included the non Outreachy demographic because I also wanted to see what are the experiences of other underrepresented people and overall what are the qualities that should be honed for success. In this chapter, I showcase which of the interviewees were participants of the Outreachy program. When it comes to evaluating the capabilities necessary for success, I evaluated all participants of both the survey and the interviews, however, as Outreachy participants are the majority the data analysis resulted in the same outcome when non Outreachy participants were included in the analysis.

In order to fully understand the background of the people I am evaluating this chapter provides a breakdown of the important elements of the empirical data. As mentioned in the theory chapter (see Chapter 3), understanding the environmental context and social situation that the interviewees and survey participants relate to is important.

In Table 3, you see the number of total responses. 33 people did not fully complete the survey. The data of the pilot tester is not included in the statistics.

Table 3

Survey: Response Summary

Response Type	Count
Full responses	101
Incomplete responses	33
Total responses	135

In Table 4, we see a notable preponderance of Outreachy Alumni. As I have a special focus in the Outreachy community, it is great to see they compose 66.34% (67/101 respondents) of the gross percentage of respondents.

Table 4

Survey: Completed Outreachy Program (N=101)

Response	Percentage
Yes	66.34%
No	33.66%

As seen in Table 5 a significant portion of the survey respondents that are Outreachy alumni participated in the years 2021 (20.90%) and 2019 (17.91%).

Table 5

Survey: Year of Participation in Outreachy Breakdown (N = 67)

Response	Percentage
2012	1.49%
2013	4.48%
2014	1.49%
2015	2.99%
2016	5.97%
2017	5.97%
2918	11.94%
2019	17.91%
2020	11.94%
2021	20.90%
2022	14.93%

In Table 6 we see the programs that people have participated in, aside from Outreachy. I provided some selection options, but as it is demonstrated, some have participated in other programs that provide mentorship such as Google Code-In, The Ascent Project (Mozilla), Linux Foundation mentorship, and coding experiences by Igalia.

Table 6

Survey: Participation in Other Open Source Related Mentorship Programs (N=101). Participants could select multiple answers.

Response	Percentage
GirlScript Summer of Code	1.98%
Google Summer of Code	5.94%
Major League Hackers Internship	1.98%
No	83.17%
Other	8.91%

Notice Table 7 and you see that a vast majority of the survey participants were underrepresented based on their gender (78.22%), followed by their sexuality (21.78%), their race (20.79%) and age (16.83%). People mentioned other forms of underrepresentation such as their religion, or having studied subjects such as humanities before getting into tech. Almost half of the respondents were White (44.55%), followed by Black (23.76%), Asian (22.77%), and Hispanic/Latino (14.85%). ‘Others’ was comprised of people stating they are of mixed race, African or Arab; however in the questionnaire it was addressed how to categorize such cases.

Table 7

Survey: Breakdown of Types of Underrepresentation and Racial Designation. Participants could select multiple answers.

Underrepresentation Factor (N = 101)	Percentage
Age	16.83%
Disability	4.95%
Gender	78.22%
Scheduled Caste/Tribe	2.97%
Sexuality	21.78%
Race	20.79%
Prefer not to say	1.98%
Not Underrepresented	7.92%
Other	4.95%
Race (N =101)	**Percentage**
White	44.55%
Black/African-American	23.76%
Asian	22.77%
Hispanic/Latino Origin	14.85%
Other	5.94%

In Table 8 we confirm that the largest portion of respondents work in the tech industry (90.43%), while we see that over half (62.77%) of those working in the tech industry have been doing so for less than five years.

Table 8

Survey: Participants Working in Tech and Career Age

Currently working in the tech sector (N= 94)	**Percentage**
Yes	90.43%
No	9.57%
Tech Career Length in Years (N=94)	
<5 years	62.77%
5-15 years	24.47%
16 years and above	12.77%

As some people are no longer in the tech industry, we also try to see if there were any interruptions within the respondents in Table 9. From the 48 respondents that had a career interruption 32.86% of them took a break in their career to pursue further education, but another 27.14% took a break in their career because of involuntary unemployment.

Table 9

Survey: Career Interruption Breakdown (N=48). Participants could select multiple answers.

Response	**Percentage**
Leave	14.29%
Continued education	32.86%
Changed sectors voluntarily	11.43%
Changed sectors involuntarily	5.71%
Voluntarily unemployed	8.57%
Involuntarily unemployed	27.14%

When asked how long these interruptions were we see in Table 10, most of the respondents have an interruption that spanned six to twelve months (33.33%), leaving the remaining respondents with longer or shorter interruptions.

Table 10

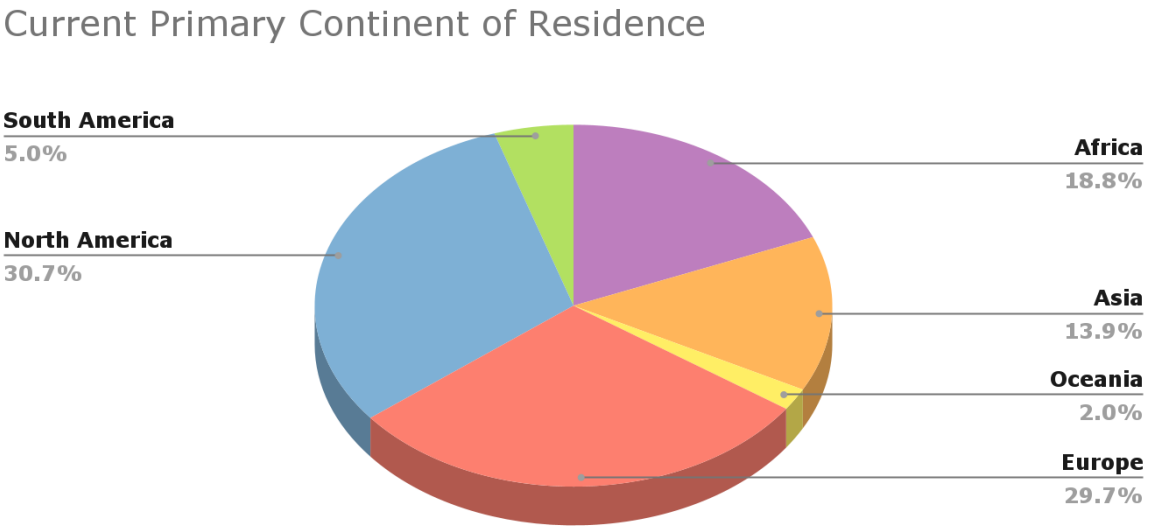
Survey: Duration of Tech Career Interruptions (N=51)

Response	Percentage
<6 months	27.45%
6-12 months	33.33%
1-2 years	19.61%
2-4 years	15.69%
4 years and above	3.92%

In Figure 8 we see the current primary residence of the respondents. This assisted me in exploring the dimensions of interests which I explained in the research methodology. Majority of the respondents were based in Europe (29.70%), North America (30.69%), followed by Africa (18.81%), Asia (13.86%), South America (4.95%), and Oceania (1.98%).

Figure 9

Survey: Country of Residence of Respondents (N=101)



In Table 11 we see that a large number of our respondents have at least a technical bachelor's degree (47.52%); however, there is a significant number of people who have no formal tech education (21.78%), the “other” category comprises people who have tech-related certifications such as scrum master.

Table 11

Survey: Level of Tech-Related Education of Respondents (N=101). Participants could select multiple answers.

Response	Percentage
Vocational School	2.97%
Tech Boot camp	17.82%
Associate technology-related degree	6.93%
Bachelor’s technology-related degree	47.52%
Master’s technology-related degree	22.77%
Ph.D. technology-related degree	0.99%
No technology-related degree	21.78%
Other	2.97%

Through the Likert scale conversion in Table 2 in Section 4.5 I could convert certain values on the validated questions of the survey to identify some patterns which are illustrated in Table 12 and Table 13. Looking at Table 12 first, explains the relationship between Outreachy and non-Outreachy survey participants’ scores in the Likert scale capability questions. In Table 12 when we look at the majority of the questions, people are overall in agreement with most statements. However, when we look at the scores of the questions related to networking individually we notice that the values there have a much bigger difference. It appears initially that Outreachy participants utilize their network to advance in their careers, but in contrast with the non-Outreachy participants, they do not build their contacts as much for the purpose of networking and do not necessarily try to be well-connected professionally.

Table 12

Outreachy vs Non: Scores of Capabilities After Likert Scale Substitution

	Outreachy	Non Outreachy
Career Confidence	3.70	3.89
[1. I am capable of successfully managing my career.]	3.77	4.03
[2. When I set goals for my career, I am confident that I can achieve them.]	3.81	3.80
[3. I believe that I can successfully manage career-related challenges.]	3.84	3.93
[4. I can successfully develop my career.]	3.39	3.80
Career Clarity	3.39	3.56
[1. I have a clear understanding of what I want to achieve in my career.]	3.61	3.50
[2. I have clear career goals that reflect my personal interests and values.]	3.34	3.67
[3. I have clear career goals.]	3.20	3.50
Networking	3.18	3.36
[1. I always try to be well connected in my professional field. / I always try to be well connected in my aspired professional field.]	**2.95**	**3.57**
[2. I frequently build contacts with other people who are important for my career development.]	**2.75**	**3.40**
[3. I frequently utilize contacts with other people to advance in my career.]	**3.83**	**3.10**
Learning	3.94	4.07
[1. I use every opportunity to expand my professional knowledge.]	3.83	3.97
[2. I continuously develop my work-related abilities.]	4.08	4.13
[3. I make sure that my work-related abilities and knowledge are up-to-date.]	3.92	4.10

In Table 13 we notice a similar occurrence when we compare underrepresented people and non-underrepresented people who filled out the survey. People underrepresented in tech score lower in the networking questions but the distribution of where they score lower changes. In this case, underrepresented people try to be well-connected, but do not actively build or utilize their network as much as their non-underrepresented counterparts.

Table 13

Underrepresented vs Non: Scores of Capabilities After Likert Scale Substitution

	Underrepresented	Non Underrepresented
Career Confidence	3.85	3.78
[1. I am capable of successfully managing my career.]	3.97	3.88
[2. When I set goals for my career, I am confident that I can achieve them.]	3.74	3.88
[3. I believe that I can successfully manage career-related challenges.]	3.87	3.63
[4. I can successfully develop my career.]	3.83	3.75
Career Clarity	3.43	3.83
[1. I have a clear understanding of what I want to achieve in my career.]	3.38	3.75
[2. I have clear career goals that reflect my personal interests and values.]	3.60	4.00
[3. I have clear career goals.]	3.31	3.75
Networking	3.03	3.50
[1. I always try to be well-connected in my professional field. / I always try to be well connected in my aspired professional field.]	**3.26**	**3.75**
[2. I frequently build contacts with other people who are important for my career development.]	**2.98**	**3.50**
[3. I frequently utilize contacts with other people to advance in my career.]	**2.84**	**3.25**
Learning	3.89	4.13
[1. I use every opportunity to expand my professional knowledge.]	3.75	4.25
[2. I continuously develop my work-related abilities.]	4.06	4.13
[3. I make sure that my work-related abilities and knowledge are up-to-date.]	3.86	4.00

As we can see in the tables above the scores observed in networking seem to be much more different between the underrepresented/Outreachy and non-groups. This indicated that it is a good thing to explore during the interviews.

My primary findings are sourced from the survey and interviews. As a reminder, survey participants are respondents and interview participants are interviewees. Next, I evaluate the findings of the interviews, we can find a breakdown of which of the interviewees were Outreachy participants and which were not, in addition to who requested the transcript of their interviews in Table 14.

Table 14

Overview of Study Participants Interviewees

Interviewee #	Acknowledged Factor of Underrepresentation (as specified by interviewee)	Outreachy Alumni (Yes/No)	Transcript Requested (Yes/No)
1	Gender (Woman), Brown/Indian	Yes	No
2	Black Woman in User Experience (UX) Design	No	Yes
3	Gender	No	Yes
4	Woman, Age	Yes	No
5	Woman, Socio-economic background (does not consider themselves to be from a middle-class family)	Yes	Yes
6	Woman	Yes	Yes
7	Gender (Woman), Black/Being from a Caribbean Island	No	Yes
8	Gender, Sexual orientation	Yes	Yes
9	Hispanic, Woman	No	Yes
10	Cisgender Woman	Yes	Yes
11	Woman, Non-Monogamous, Bisexual/Pansexual	Yes	No

To analyze the interview transcript I conducted a thematic analysis. After performing thematic analysis I have grouped the codings into 10 main themes. The thematic analysis resulted in 246 codings associated with the main theme or sub-themes. The main themes are shown in Table 15, while the complete codebook can be found in Appendix E.

Table 15

Simplified Table of Codes and Sub-Codes

#	Main Themes/Codes	Sub-Codes
1	Advice	_
2	Capabilities for Success	Inclusion
3	Challenges Faced	Ease Journey
4	Journey into Tech	_
5	Measure of Progress	_
6	Motivation for Success	Meaning of Success
7	Networking	Approaches to Networking
8	Outreachy	Challenges After Outreachy Impact of Outreachy Feedback
9	Underrepresentation Factor	Impact of Underrepresentation
10	Work Environment	Profession

The code *Underrepresentation Factor* was used to describe the factors by which the interviewees consider themselves as underrepresented. During the survey stage, I allowed people to select being underrepresented based on "Gender;" however, I did not explicitly request them to select a specific gender. Coincidentally, most of the people who were interviewed referred to being underrepresented because of their gender, with the majority explicitly saying they are a woman. In certain cases, people did not clarify their exact gender but mentioned that they felt underrepresented because of their race or sexual orientation, or other reasons. Example illustrations of this code are shown below:

> *"I'm a woman. Yeah, maybe also the socio-economic background? I don't consider myself to be from a middle-class sort of family. Like, I'm from a more humble, sort of background socio-economically than, like most, I think.*" - Interviewee 5

"If we look at the numbers, definitely my gender and my sexual orientation." - Interviewee 8

As a subcode to Underrepresentation Factor, we have *Impact of Underrepresentation* which describes the ways by which being underrepresented have affected the interviewees. Speaking of the impact underrepresentation had on them, some mentioned it affected their confidence, and as a result of being the minority, their needs were not a priority. The fact that they are underrepresented also made them withdraw.

"If you're a minority in a particular situation, it works both for the group and for yourself, where there is a certain amount of confidence that goes away." - Interviewee 3

Several interviewees especially spoke about how the presence of representation encouraged them in their journey. Also, they spoke about how the lack of representation either discouraged them, caused hesitation and doubts, or made them try harder.

"Um, sometimes it was hard initially to really find the motivation to continue to go [on]...I didn't really see that many people who looked like me. So it was like, okay, realistically, can I achieve this?" - Interviewee 2

The code *Journey in Tech* describes the trajectory that led or introduced the interviewees to the tech industry. Most of the interviewees have had formal technical education, however, aside from that the most successful alternative way to formal technical education was through boot camps. Some were unaware of tech as a viable career for them but met people who influenced their decision to move into that field.

"So for my first university degree, I went completely in the humanities direction, and I graduated in social anthropology. And after that, I started working in a tech sector in a non tech role. And bit by bit, I discovered, there are some tech parts that I do really enjoy here, you know. So I tried, again, to re-educate myself and do some informal training. Then I decided to do some more formal training, and I landed back in the tech industry. " - Interviewee 8

The code *Motivation for success* describes what was or is the motivation that allowed them to succeed in technology. The motivations varied, with some mentioning wanting to succeed to help others such as themselves do the same. Some mentioned wanting to prove they are capable, financial reasons, their love for what they do, or wanting to become the representation they lacked.

> *"Well, what became my motivation is, I realized, most of the time, we as Black people sometimes don't really know the exact strategy you need to succeed. So it's like, okay, if I figure it out for me…I'm gonna tell as many people as I can, once I do get my foot in the door."* - Interviewee 2

> *"I think for me, the motivation is quite clear, it's just about fulfilling my own potential, as well as I also think partly, it comes from the culture of being from being a developing nation. So you, you have ambition, you have the strive to excel, fueled by your financial background, fueled by how opportunities come along, from where I grew up...And lately, especially in last few years of my career, one of the motivations for me as well [was the lack of representation], because I don't have a lot of role models in my career look like me."* - Interviewee 3

What do the interviewees mean by success? We figure that out through the subcode of Motivation for Success which is called the *Meaning of Success*. That subcode explains what the interviewees consider as success in their careers. Some see moving up the corporate ladder as a sign of success, the amount of people they helped, while others mentioned being happy in their job is what matters to them.

> *"It could be one of two things. So one thing could be that if I am a CIO…or board of director … of [a] mid to large sized organization… And a second one…if I have realized that I've developed something, or I've been part of a group that has solved a very fundamental human problem, like in healthcare, education, or with world hunger or something like this, then I'm very satisfied."* - Interviewee 3

"Okay, this is kind of subjective…as long as I am happy with something I think that for me is okay, I have been successful in this job or in this role.". - Interviewee 1

"There was a quote I read a couple of weeks ago, it was basically like, your success is measured by like, the amount of people that you help. And I think that's how can I measure it. " - Interviewee 2

The code *Measure of Progress,* explains what the interviewees consider being a measure of their progress in their career, and how they know they are doing well, or are succeeding. Several interviewees expressed their acquisition of new skills as a measure of their progress, some mentioned they look at how they do in comparison to their peers and others indicated things such as compensation or increase in confidence.

"I think I measure the progress based on the skills I have strengthened and the skills I have gained. " - Interviewee 2

"I think for me, it's looking at people, others who have had similar qualifications, or even more, or people of my similar age, and seeing how far ahead I am, and that's the first part…I think it's twofold. It's what I've contributed and where I came across from my own career, but also the impact I have around on the others around me." - Interviewee 3

"It starts with salary….[A] career progression was that I am making good money, like I can support myself, I can support my family…I started discussing salaries with my friends who were in similar industry that I realized were making so much more." - Interviewee 1

The code *Work Environment* describes how people feel about their work and if they feel like they can be themselves there. When asked if they have experienced or are in a role that makes them feel like they can be themselves, most of the interviewees mentioned they feel they can be themselves at work, several emphasized the importance of having a professional self, and that being ourselves does not mean we may bring part of us that may

create a toxic work environment. Some also explained how sometimes they have also felt like they had to hide part of their identity. An example of this is presented in the next page.

> *"I had that one year contract with the enterprise company, that was the first job in UX where I really felt like what they told me about the work culture in the interview was actually reflective to like day to day…That was the first time I felt like my full authentic self, working with so many people….And so because of that, it was so impactful and that's kind of what I look forward to going forward."* - Interviewee 2

Interviewees also mentioned that certain social movements made the organization they work for more active in focusing on attracting underrepresented people. One in specific mentioned:

> *"I think a lot of companies did feel the pressure to make sure that their quota was correct and accurate…Hiring more women, hiring more Black people. And I don't know whether that would have happened if the Black Lives Matter movement didn't take over sort of the agenda in 2020."* - Interviewee 7

A subcode to Work Environment is *Profession,* which explains the type of job or position one holds within a company. All of the interviewees work in the tech industry in various roles spanning from UX designers to engineers to managers.

> *"I'm a part-time role for a small business, and I'm their UX researcher and their community manager."* - Interviewee 2

The code *Challenges Faced,* describes the challenges they faced in their career and education. Financial challenges made them have to struggle more than they would have otherwise, and having troubles with their family understanding what they do were some of the mentioned challenges.

> *"Barriers are certainly there. The university that I went to is, it was a public university, but it was not cheap.…But my parents, like, right after I got it, like my offer letter, they were like, you know, what, we can't pay for this you have to do it yourself. So I remember from like, the very start, I had to take an education loan to pay for my*

university, and that sort of just weighed really heavily on me for the next four years…A lot of times some things are just so inaccessible, just because of money. Like, there was this conference I really wanted to go to. And it was in Berlin. So there was no travel costs involved, but the ticket was like 300 euros." - Interviewee 1

"I hit obstacles personally, and professionally, personally, because, you know, my family, they cared about me, I didn't have a job at the time, I was still in the boot camps, they were like stability, you need to get a job…They didn't understand UX, didn't understand what I wanted to do. " - Interviewee 2

An especially prominent challenge mentioned having to work twice as hard because of belonging to a minority group,-in order to acquire respect.

"I feel that as a person of the minority gender and sometimes also minority race, you have to work twice as hard and be much more resilient in a situation compared to you know, someone who's in the majority." - Interviewee 3

"I think from the very beginning, you have to work twice as hard to be able to prove yourself half as capable of other people, right? And you always have to be the best in everything to be just taken or to be given the same respect that other people in the industry might get." - Interviewee 1

An interviewee also spoke about the challenges faced during their education, discrimination from professors and having to take up the role of the caretaker as the eldest female sibling.

"Men usually they're left alone when they are studying or when they are doing anything, it's their thing. So but if you're like [me] I am also the older sister, and [my] mum would be working all day. So if we had anything to be done, like the groceries or anything like that I would be the one responsible for that. So I already had more responsibilities that would take time from my studying time when I was home. Even though I was privileged to not having to work throughout most of my [studies]... In that sense, I still had home responsibilities, house responsibilities that made me have less time to study." - Interviewee 11

Job hunting was also something that was seen to be challenging, causing stress or anxiety. Even after getting a much-wanted job sometimes they faced strict discriminatory rules, bias.

> *"After I graduated, when I go to the job market, and try to get my first job, some, some company [that] even asked me, 'Do you think you can do that? Because you are a woman, you will have to take care of your family'. So do you have time to go overtime and kind of that?...One of my company back there also asked me to sign a commitment that I will not have [a] pregnancy within two years after I started working for them. I only can have [a] pregnancy after I worked for them like at least two years. Otherwise, I will lose all the bonus and the bonus equal to the base salary. So basically, I lose 50% of the income."* - Interviewee 6

Aside from the external challenges interviewees also mentioned struggling with internal negative thoughts and impostor syndrome.

> *"I never thought I was a programmer. Like, I never thought like ever since that lecturer said you did not do this work. I was like, Okay, I'll just get into project management, I'll just drift into requirements engineering, I'm never going to code again."* - Interviewee 10

The code *Ease Journey* is used to describe what the interviewees feel would have or has eased their journey in tech despite the challenges —sponsorships, scholarships, diversity tickets for conferences, raising awareness among their parents about opportunities that could be available to their kids, and support from their close network.

> *"Specific things like diversity tickets…Even [programs like] Outreachy… Before Outreachy I was working like 16 hours a day just to, you know, own just enough so that I can pay for food… I think these programs and these opportunities that are specifically targeted towards providing financial help and scholarship, or just even fair pay to underrepresented communities, I think that that for me it makes the process easier."* - Interviewee 1

Here it is important to address that interviewees also expressed the fact that even though they might consider themselves to be underrepresented that does not mean they are underprivileged.

> "*I mean, just because I'm a woman of color does not mean that I don't have privilege. "* - Interviewee 3

> "*Being White, I have some privilege and non White folks, Indigenous folks or Black folks have way less place in the tech world. So in this regard, I'm privileged.*" - Interviewee 11

The code *Capabilities for Success* defines which are the capabilities observed to lead to success. Networking which was specified above has been one in addition to various soft and hard skills.

> *"I really made an effort to show that I'm approachable. I'm willing to take constructive feedback. I want to help other teams that they needed extra research if I had some downtime. So just really being someone who's willing to learn and willing to help… I really rely [for my job as UX researcher] on I don't want to say disarming people emotionally….I rely on being organized…What else do I rely on? Data analysis, once I get all the data, I rely on active listening during like my research, because sometimes I have to ask questions that I may not have initially drafted in my script, but I need them because I need the participants to kind of elaborate a little bit more on their response…And so whenever I have a meeting, I never just straight jump into whatever we're supposed to talk about is I spent a couple of minutes just getting to know the person asking how their day was just typical questions to just kind of get everybody relaxed..."* - Interviewee 2

Key point

Observe that the capabilities mentioned in the quote above are a mix of skills (e.g. being organized, data analysis), behaviours (e.g. get people relaxed), and personal attributes (e.g. being approachable).

Subcode to Capabilities for Success is *Inclusion* which embodies aspects of inclusive leadership and others. Aside from the quotes we see the interviewees expressed the importance of having an ally from the majority, having people who will advocate for them, empower them, ask about their culture but also allow them to showcase unique skills to them in a professional setting.

> *"When I was in high school, I had one professor who she told me, why don't you try system analysis? I think you would be really good at that. And, and she was a woman and also a Black woman. So I think she has a different perspective on what we could be. Instead of being just a man, you know, she saw something that I think no one had seen me before. I had one professor, one teacher when I was in seventh grade or something, who was a math teacher. And he used to say that he wanted to have a daughter like me. But he never said you should pursue this. This woman was the only one who said you, you could be good at that. So she planted the seed, and she was the only one." - Interviewee 11*

> *"With the first team, he, meaning my manager, who was the hiring manager at that time, he was really focused on people from non traditional backgrounds, and he wanted a diverse culture. So for me, I was the only Black woman on the team, we had another woman who was an Indian descent, we had another guy who was Hispanic and part of the gay community, we had two White women. And so it was just like, it was just like, beautiful just to see all the different cultural experiences and, and lives just represented on the group. So that was nice, because it was intentional. I didn't feel like a token person."* - Interviewee 2

Key point

In the example quotes above we notice some of the elements that made the people in the examples be inclusive is 1) their faith in the competencies of the interviewees and encouragement to pursue something that felt unconventional. 2) actively seeking to create a diverse team in a way that did not make the interviewee feel like a token.

From the survey results we have some interesting insights regarding capabilities that enabled success. The top six co-occurrent capabilities that were found to enable success were *learning, perseverance, work experience, communication, curiosity and empathy*.

> *"Even as a neurodivergent person, the characteristics that have helped me the most in my career are undoubtedly my social/communication skills and my eagerness to learn. The social skills were hard-won throughout my childhood and adolescence….My open communication during that tech screening demonstrated my ability to think programmatically…my eagerness to get the most out of it as a learning opportunity convinced the developers on that call to hire me. These characteristics continue to serve me well 2 years into the job."* - Respondent 1

> "*Empathy - I want to understand other people's perspectives. This helps whether I am designing software, a website, or a process people will go through.*
> *Curiosity - I want to know why something is designed a particular way. What are the design constraints? What are the resource constraints?*" - Respondent 2

> *"My persistence to complete a task and find solutions for blockers has helped me make the most in my career. I leverage the tools that are available to me and provide the best work possible and my habit of never giving up has helped me make a great career so far."* - Respondent 3

The top five co-occurrent capabilities that the survey participants mentioned they need to improve were, *networking, technical (skills/knowledge/expertise), communication, management skills (time/team management) and their confidence.*

> *"More networking and outward confidence. I need to be publicly vocal about my field, have opinions and the courage to stand by them and not be afraid of public-facing opportunities that may invite discourse."* - Respondent 4

> *"I always feel like there's plenty of room for improvement with regard to my technical abilities. I do algorithm problems and use the Gang of Four design patterns textbook for reference to strengthen those skills."* - Respondent 5

The code *Networking describes* what is the interviewee's impression of networking. Overall networking has been beneficial, however, there are people that still find it uncomfortable or dislike it. Those who seem to feel confident in their networking skills experience the most success with it.

> *"In my circle…I'm the number one networker. I think networking is like imperative to success in any industry really. Because…it's not what you know, it's who you know…When I got offered my job, and they did the references, the restaurant gave me like five stars and all of my references. And I think, for me, that's like a really good example, because it's two separate industries that have nothing to do with each other, like my manager at the restaurant could have been like, well, she's going, I'm not even going to fill that in. But because I'd had a really good professional relationship with them, or even a personal relationship with them, then professionally, they would support me, because because I have done all that can do for that department."* - Interviewee 7

> *"It's scary. It's very scary, because I never know which personality to put forward…So networking? Honestly, not. It's not fun for me. It's something that I'm trying to get better at. "* - Interviewee 10

Key point

Top 6 Capabilities that enabled success: learning, perseverance, work experience, communication, curiosity and empathy.

Top 5 Capabilities to improve: networking, technical (skills/knowledge/expertise), communication, management skills (time/team management) and their confidence.

Subcode to Networking is *Approaches to Networking, which explains the methods people use to network.* This was something especially asked about by people who felt fairly confident or had established networking approaches that have been helpful to them. Techniques such as greeting someone we often see, being part of networking schemes, networking online if introverted, being in employee resource groups and connecting to people through mutual hobbies were some methods utilized.

"I'm really good with networking online through LinkedIn. Doing engagement on people's posts and things like that. I'm good like that, but also in person. I have a really great personality and not trying to gloat or anything. But people very naturally like talking to me. And I really make a great effort to ask questions to show that I'm listening and active listening as well when we're having conversations. So I would say networking for me, is umm intentionally going to events with a purpose in mind. Just to get to know people. [You] don't really have [to be] like, I'm trying to get a job by the time I'm done at this event. No. Because people can read that off by your body language. So really know that. And then also social social media, like professionally, like LinkedIn, or any other kind of professional networks, and also for tech specifically, for me, UX research and UX design, Slack Workspaces are a great way to meet other people, as well as learn about freelance and contract opportunities." - Interviewee 2

"The way to do it, for me…is to be part of [an] employee resource groups, or …initiatives at work…I've also realized a lot of times, you also come across opportunities through your networks… rather than you applying." - Interviewee 1

"I was part of a scheme called RISE, which was a networking scheme for women in media, I can send you the link to actually afterwards. But it was really good, because they had a lot of networking events, a lot of mixers, a lot of sessions where it's like, you'd go and there'd be loads of different women in tech from the industry all up and down in the UK….And I think, as well, like, just small things, like when you go to the canteen at work, just say morning to someone…just small things like that about actually being more more personable, more approachable." - Interviewee 7

Suggestions were also given in regards to approaches to networking at a tech conference; minding the standing formation of the group we are with is important but also in a male-dominated space an interviewee recommended that it helps when one is socially open.

"*Always leave an open space for a person to come into a conversation…And so [when] someone comes into that conversation, the circle opens again. And there's*

always space for someone else to come and join. And so you never feel awkward because it's like the, they're inviting you. Like there's a space right there for me to go walk [in].” - Interviewee 4

“Yeah, as far as tech conferences go…I would say as a woman, you need to be very social and very open. Like, a man can get away being shy and being introvert in the industry. But for an introvert and shy woman, it's very hard. Very, very hard. Like you, you sort of you need to have those skills and be very, you know, deliberate in, in that.” - Interviewee 11

The code *Outreachy* describes all things Outreachy. It has subcode *Challenges After Outreachy, Impact of Outreachy, and Feedback.* The subcode *Challenges after Outreachy* focuses on the challenges experienced by the interns after the program ended. Overall most of the interviewees who were Outreachy alumni could not recollect any significant challenges; however, some mentioned a few, which include struggling to get a job after the program ended due to issues unrelated to their technical skills, and then others experienced nothing that could not be considered normal life challenges.

“*I don't remember any specific challenge from that point on that cannot be described to you know normal life challenges.”* - Interviewee 8

“So after I finished the internship, I started to find a full time job. And yeah, at that time, I [got] many interviews but I was rejected in all of them. So I start I register for YWCA Tech Connect. And in that program, I see many people, many other woman and I talked to them and chat and that's how I felt that the problem is like my English is not good enough. So all of my friends have much better English than me even they also immigrants… I registered for English, three English courses in like six month…I came back to interview and I got a job full time job right immediately for the first interview. So yeah, I think so with Outreachy, I have the confidence that okay, my technical skill as good enough. So what made me fail in the interview, should not be the technical skills.” - Interviewee 6

The subcode *Feedback* comprises the feedback they had in relation to features of the program or tools they were using such as Zulip. The website was overall helpful however challenges in navigation surfaced when one was more than just an alumni. When someone became a community manager or mentor in addition to being an alumni it seemed that navigation became harder.

> *"I think the website has so much potential…My dashboard looks like a mess. Because first it starts with my internship, like, at the very top, then after that, I have my mentorship, then I have my second mentorship, then I have my coordinatorship, and everything is just there, like, all of this information, no visual hierarchy, like nothing. I can navigate if I had like different tabs from a different experiences with Outreachy…There is also a better way to organize them so as to not overload people who are currently participating or like trying to, you know, apply. And even I got the feedback from people who were applying that this is very hard to navigate…I think if you take input from different stakeholders, which are like the interns, the applicants, mentors, coordinators, and then of course, like, in general, other like sponsors, then I think that you will have a very nice website."* - Interviewee 1

> *"Yeah, yeah, the application process was very straightforward. The website is clean. It's very organized. And this just I wish I could just open it now and just reference to the things that I like. But I just like that. To get information about mentors, you click here to get information about previous interns you click here. It was very straightforward, very well designed. And the application process itself. If I recall, we just we had to put in personal information, and then write a few things about ourselves. And it straightforward for me, so I had no problem with it."*- Interviewee 10

Outreachy uses a platform called Zulip to have frequent chats with current interns, mentors, and/or alumni. When the alumni were asked about it it appeared as if many do not use it frequently but several see the value of it. The responses were quite mixed, that is showcased in the quotes below.

"Actually, I don't use [Zulip] that much, because it's not very common…I installed it once when I was in the internship, but then I didn't use it much." - Interviewee 6

"Oh, I like Zulip, but I like the fact that we can see all the threads…And you can have this bigger community, right. So you can see all the past applicants are there…So you have this huge community of past Outreachy participants and mentors and that is cool. If you want to for some reason to reach out to anyone you potentially could." - Interviewee 11

"*I don't like Zulip. In fact, it's funny that I deleted the app from my phone yesterday, because I was like, I'm not gonna use it, I'm not gonna use it at all…Okay, I have like 500 messaging apps, I just, like downloading one more. And then like, keeping up with it was not, for me the best form of communication. I do appreciate like that. Thread sort of organization, really, we have different threads for different things, you know, so if I'm specifically interested about something I could go and you know, ask questions. So I do appreciate that.*." - Interviewee 1

"I think zulip is the best, best chat platform that they could use. But it would get a bit overwhelming with scrolling through messages, because now there is a sort of like side panel…It was confusing, but I can't think of an alternative to it, because it did what it was supposed to do. " - Interviewee 10

However, all the alumni found the mailing list to be helpful, while most mentioned not having gotten any particular opportunity from it, they felt it kept them connected to the program, that it was not as busy as Zulip, so it ended up not being overwhelming. All this said, some interviewees mentioned they understand the purposes of each platform are different, and perhaps each has its own place.

"Hmm. I think that for things where they really want our attention, the mailing list is good. Because I won't always go to Zulip. But when something arrives at my mailbox, I will check it. If we had. Sorry. I was just going to add that if I had big

amount of messages on the mailing list, that would feel overwhelming as well. So I think I like having both channels with different purposes, you know." - Interviewee 11

For further improvement of the program, some suggestions mentioned by the interviewees were resources such as crash courses to introduce people to the common tools used by open source communities or providing more resources that apply to people outside of North America.

"I always felt like having like a crash course on just like the, like tech part of open source, you know, Git commits, pull requests, stuff like that, that is still something that I struggle with just because I never got my base right with this…I think that would be nice, just to get the basics of it. Because I think this is like something very like common to most of the open source communities." - Interviewee 1

"*[Outreachy] needs… like maybe a volunteer to go and surf the web, to look for opportunities that are more tailored to perspectives that are not from the global North, like people in Brazil, people in Uganda, South Africa…Jjust to get different perspectives, because what I've noticed is most of these resources that are shared during the site are specialized to people in the global North."* - Interviewee 10

Impact of Outreachy is a subcode of Outreachy, and it explains what was the impact of the Outreachy program in the alumni life. Overall the program has been life-changing, some participants mentioned the fact that the internship was well compensated, allowed them to pay off loans, experience better living conditions, get the current job they are doing, and even when it did not give them a job overall it opened several doors. The program provided them with a network, something tangible they could show to future employers but also support through mentorship.

"It [Outreachy] changed my life. Like, if I had not done Outreachy, I would not have the job that I have today. I would not. It was one of the very critical aspects of where I am today, it literally changed the trajectory of my life…Because of Outreachy, I was able to network with somebody and meet somebody who then knew about this other position, like it just it had to happen or what not. And it gave me that little glimmer of competence." - Interviewee 4

> *"I have my career right now where I am because of Outreachy. Like I, I got both of my jobs because I was involved in open source. This is not an exaggeration [Outreachy] changed my entire life. I was able to pay off my student loans, I was able to get good jobs, I was able to move halfway across the world. And all of it is a direct consequence of Outreachy…I honestly cannot imagine where I would have been without Outreachy and I try to think of it, but I just can't, because my life would have been so different. And I don't know what I would have done."* - Interviewee 1

It appeared though that those who had the chance to stay at the organization they interned with could continue their journey without the immediate stress of job seeking, which was something they appreciated. Some got more confident in their skills; however, this did not fully eliminate the internal feelings of inadequacy.

> *"Before the internship ended, they had offered another three months internship with the same pay…So I didn't have for instance, struggles connected to finding a job. I experienced the anxiety of having to because before they told me that they would extend internship or that they would hire me, I started to think, Alright, what will I do…I have to start applying again, and all those things that make me anxious because it's overwhelming and difficult. But other than that, I still feel many times that I'm not good enough."* - Interviewee 11

The code *Advice* describes any advice that the interviewee felt was important to share with others. Example illustrations of this code are shown below:

> *"Even if you are fresh out of college, fresh out of a boot camp, yes, it's gonna be a struggle. But if you can negotiate jobs where you get paid, even if it's low, a low rate per hour [do so]. Because you need to show yourself that you deserve to be financially compensated for your newly acquired skills and knowledge."* - Interviewee 2

> *"If you ask for help, and you show that you're willing to put into in the work to figure it out. You just don't really know where to start, more people are willing to kind*

of help…When you come to ask for help, you have to be like really direct so that, you know, the person can help you get you on your way, and they can go back to doing whatever they need to do." - Interviewee 9

"Being selective, and learning that you are like good enough at your job that you can negotiate. And that it's not just that they are providing you with something, you're also providing them with something." - Interviewee 1

"Keep trying, because you're gonna get no, you're going to interview, you're not going to get a call back, which I think is terrible. You get interviews, they decide to go with someone else, they don't move you along. You have to just keep just being tenacious, keep trying…Self Advocacy is really important." - Interviewee 4

"I could give myself you know, advice, I would say, don't jump from profession to profession, pick one profession and stick with it. " - Interviewee 5

"If I can do [it] again, I wouldn't try to put the career behind, like, always pursue it, not give up. When I got married, and I had a kid…I moved to another job not directly related to computer science…It was far from like, how the actual developer everyday kind of job [is]…And then after like, I think five years not working in software engineering I feel like I lost all my, my confidence." - Interviewee 6

"The advice I got was networking. That's the greatest advice I can give to anyone that's trying to get into tech, that's trying to transition into tech, network!" - Interviewee 2

Key point

The advice given was: Require pay even if working on small projects. — Be direct when requesting help. — Be selective when choosing a job, know you have a lot to offer too. — Keep trying and advocate for yourself. — Try to stick to a profession. — You do not need to abandon your career to have a family. Maintaining both can help you stay confident in your skills. — Network!

Lastly, as a bonus, it is worth closing this chapter by mentioning that several interviewees felt this research was helpful and this adds to the necessity of this research.

> *"I just want to say thank you, for you, because I think the topic is very important… I think it would be very useful."* - Interviewee 6

7. Discussion

In this chapter, the empirical data shared previously is discussed and related to existing literature. The research goal of this study was to analyze how underrepresented people in technology launch their careers in tech — to do that I first discuss the challenges that affect their career success followed by explaining the ways by which they harness their potential to succeed drawing upon experiences primarily of Outreachy participants, but also insights from underrepresented people who face success without participating in the program. The chapter concludes with addressing how organizations can create inclusive leadership and how the Outreachy program can improve its offerings to its community.

7.1. Developing Potential

The first aim of the study is to address RQ1: How do individuals who participate in Outreachy harness and develop their potential? Individuals who participated in Outreachy used a number of approaches to harness their potential:

- Approach 1: Persevered
- Approach 2: Embraced Learning
- Approach 3: Ramped up on work experience
- Approach 4: Communicated effectively
- Approach 5: Remained curious
- Approach 6: Were empathetic

Approach 1: Perservered

Challenges had to be overcome to succeed, and for that to happen perseverance was necessary. Interviewees expressed that belonging to a minority group made them aware that their needs may not be prioritized. Bias, negative thoughts, financial challenges, and troubles in navigating the job market were challenges that affected the Outreachy participants. Underrepresented people are still getting rejections despite the efforts of several companies to diversify their workforce. The cause for the lack of diversity is not just the leaky pipeline, by means of attrition, nor the reduced enrollment of people from minority groups in computer science programs (Scott et al., 2018). The constant need to prove oneself and the feeling of having to work twice as hard was echoed by several of the interviewees. Unfortunately, the notion of working twice as hard is something passed on not only in the work environment but also from people closer to us such as family (Lui, n.d.). Based on the findings of this study

working twice as hard was done in hopes of achieving respect and equal treatment. However, racial minorities are still found to get less compensation than Whites, even with twice the effort (DeSante, 2013) which indicates that overexerting oneself does not result in equity. The narrative of having to work hard stems from forms of suppression, where a person belonging to a minority group needs to gain approval from the majority “Blacks and other minorities must earn their social status, and should do so without preference.” (Carter, 2007, p. 21). The pressure that one gets from applying immense effort for their work to be acknowledged, can cause impostor syndrome, racialized stress, anxiety and other health issues — e.g. weight gain (E. O. McGee et al., 2019). Racial minorities not only have to battle societal inequalities, they also need to go above and beyond to prove their worth in a professional setting (DeSante, 2013). However, interviewees also admitted that there are privileges to being a White woman in tech, in comparison to other minorities, they were not being subjected to certain disadvantages. This highlights the power of intersectionality where a combination of various factors can lead to an underrepresented person experiencing greater benefits than another (Clauss-Ehlers et al., 2019).

Impostor syndrome and internalized negative thoughts were some of the hardest challenges to deal with as it affects one's self-perception (Young, 2011). Interviewees often felt that their negative self-perception was a self-generated problem, however, microaggressions can cause psychological and emotional pain which gets passed on through the generations affecting ones’ self-image (Martin, 2018). Women have had to exhibit persistence, boldness, and detachment to succeed in the open-source field (Singh & Bongiovanni, 2021), thus the need for perseverance is necessary to enable one to overcome their challenges. Negative thoughts and impostor syndrome persisted even after our interviewees achieved great success through promotions to senior roles. When one struggles with impostor syndrome they are keen to attribute their success to other factors (Martin, 2018). While the interviewees mostly identified as women and studies often point to women when discussing impostor syndrome there are some who do not suffer from it (Tulshyan & Burey, 2021). Respondents mention the need to not give up, to problem solve amidst challenges and find solutions. Affirming oneself to not give up could be helpful. Internal dialogs can aid or hinder one’s success, therefore challenging negative thoughts or reframing them into positive self-talk are some of the therapeutic methods used to mitigate these thoughts (Clance & Imes, 1978; Gesell, 2007).

Approach 2: Embraced Learning

In this today's fast-paced world, continuous learning and upskilling allows us to adapt to changes and stay informed (Diaconu, 2015). Learning was a key component in helping our interviewees succeed. Interviewees measure their career progress through the acquisition of new skills, and strengthening existing ones. Educating oneself on work-relevant skills through learning, career satisfaction and a good salary are ways to represent career success (Hirschi et al., 2018). The findings reported in Table 9 indicated the pursuit of education as one of the top reasons people interrupt their career; this shows that whatever it was that they were pursuing to study was demanding enough to require their full attention. This is further confirmed in Table 11 that showcases the educational breakdown of the respondents. The majority had a Bachelor followed by a Masters at a technical degree program. These findings support the suggestion that the pursuit and completion of higher education leads to success for people who are underrepresented (Engle & Tinto, 2008). Respondents sought materials to allow them to learn a new method or technical tool that they could use in their personal projects or workplace. The acquisition of new skills is important especially with the current technological evolution and introduction of emerging technologies. Organizations are facing problems that require the adoption of new skills, and continuous learning is a way by which people succeed and adjust to the demands (Li, 2022).

Approach 3: Ramped up on work experience

As implied by Table 11, technical boot camps appear to be the alternative pathway to a formal degree and self-learning. Boot camps provided faster entry to a tech career for interviewees who did not have a technical bachelor degree. This allowed them to not need to spend an average of three to four years in higher education in order to pivot into technology. It provided interviewees with the skill sets that were in demand for the career path they were pursuing and relevant experience. Boot camps have been attracting many women who realize their interest in technology at a later stage of their career and have a better understanding of the demands of the industry (Seibel & Veilleux, 2019).

Interviewees mentioned comparing their progress to that of their peers as a way of knowing they are doing well in their career; this indicates that they look up to what others do within an organization as a benchmark or if they are doing what is necessary to do well in their job. An interviewee, through self-reflection, utilized this method to improve her career progress. Peer evaluation is a component utilized by organizations to benchmark how well one does their job; when one applies this method they need structure to avoid bias (Norcini,

2003). Structure is something that could be considered to allow people to increase the consistency of their self evaluations.

Internships, mini projects, and programs such as Outreachy are other examples through which people gained experience. Open-source communities are often a great way to connect with fellow learners and increase one's skills (Singh & Bongiovanni, 2021). Aside from work experience as it has been expressed so far, the experiences that one has at work are important. Interviewees spoke about a positive professional environment enabling them to do their best work.

Approach 4: Communicated Effectively

Equipping people who belong in minority groups with inclusive leadership skills such as good communication and empathy is a component of success. Open communication allowed respondents to exhibit prowess in their job. Effective communication and being aware of cultural nuances that affect diverse teams can help organizations handle miscommunication better (Jones et al., 2020). Looking at the nature of the open-source community where teams work distributedly, the chances of working with someone from a different culture is high. Interviewees had to relocate to a different country or continent and deal with adapting to the new cultural norm. For some that meant improving their English, for others applying intercultural communication. An interviewee expressed the challenge of getting a job after the Outreachy program; her technical skills were not the problem, upon improving her English language skills she got hired. Communication can open doors especially in a foreign country and for certain industries it is essential (McHugh & Challinor, 2011). Interviewees participating in programs where they share about their experiences in intimate professional support groups enabled them to feel supported in challenging times. As culture plays an integral part in life it is connected to one's social identity and affects their social interaction; social interaction is fostered through communication (Kim, 2000).

Approach 5: Remained curious

For the respondents, curiosity is a key factor to learning, fairness, and thus career advancement. An interviewee mentioned how she ensures she gets fair compensation by exchanging salary information with her friends.

"*I started discussing salaries with my friends who were in similar industry that I realized were making so much more.*" - Interviewee 1

Asking questions is a way to exhibit curiosity and in this case allowed for better pay; transparency in organizations has introduce fairness to the work environment and increase gender balance in talent hiring pools (Chamberlain, 2015). Curiosity fuels the interest to learn and explore the world and it urges us to acquire new skills (Kashdan et al., 2004). It drives people to seek knowledge about things that are unknown or partially known (Litman et al., 2005). An interviewee spoke about the need to do your research before asking questions; this demonstrates ability to problem solve, which is an essential component of software engineering. Tech organizations often offer documentation to allow the maintenance of projects. Interest in reading and maintaining documentation is essential for the livelihood of technical projects (Forward, 2002).

The journey to tech of Outreachy participants varied. Some interviewees were encouraged to follow their interests, without prejudice towards any field, from their loved ones. Interviewees who pursued their interests appeared pleased with their choices. Those who were not entirely sure of what they enjoyed were often influenced by input from those around them. Several of them had a rough time explaining how an education in a university is economically viable. Some encountered difficult circumstances that caused them to have less access to technology gadgets and thus make the possibility of them pursuing a tech career occur later than it might have otherwise. Based on the layers of digital divides it is obvious that in this case, having access to tech was a partial issue but then even after having access to the technology it was hard to get the full benefits of it, which include raising awareness that a career in tech was possible (Kalyanpur & Kirmani, 2005). Curiosity for the field was one of the motivations that allowed them to gain access to the technology field even with the limited exposure. When their support network was not provided with the knowledge of the field the interviewee wanted to pursue, their progress was hindered, but through proper counsel they were able to overcome those roadblocks to seek what they aspired to. Class, socioeconomic status and parental education, have an influence in the future outcomes such as educational trajectory and well-being of students who belong to minority groups (Battle & Lewis, 2002; Kaushal, 2014). Counselors can be critical in sustaining or increasing women's interest in the tech industry by educating and providing guidance to them and their loved ones (Milgram, 2011). Interviewees sought out ways to educate themselves and their families and in several instances were able to get more support. In the situation when they could not, they sought for external support. Curiosity has enabled interviewees to overcome challenges and make things happen.

Approach 6: Were empathetic

Work in many organizations is team effort; therefore being empathetic allows one to be able to see things from the view of their clients or coworkers. Empathy is essential to avoid misunderstandings (Sergey et al., 2020). For our respondents, exhibiting empathy allowed them to do their best work, understand others perspectives, and deliver better products as a result. Empathy cultivates deep connections leading to improved communication between leaders and followers (Runde, 2016). Empathy paid dividends at tech conferences too; being aware of other attendees and thinking of ways to make it easier for them to join the conversation was proven to be an effective way to network. An interviewee explained how they made it comfortable for people to join in conversations through standing in an almost closed circle but leaving a bit of space — this is called the Pac-Man rule [8] as the shape of the standing formation resembles the Pac-Man character.

For the interviewees, having innovated something significant for society, and having helped people in their community are some ways they experience success and elements of empathy can be seen in that. The eagerness to help others who may be struggling with similar challenges is important. Several of the interviewees had achieved senior roles within their organizations, but often looked for representation which they could not always find. Sometimes the missing representation became fuel to them to become the role model they wished they had, other times it affected their confidence, leading to discouragement and withdrawal. Representation and positive role models are essential in attracting and keeping women in the field of technology. Successful campaigns promoting messages that empower women have proven to increase their participation in the industry (Milgram, 2011). Mentors to people who participated in the Outreachy program that were supportive and encouraging were often provided as examples when interviewees were asked for examples of inclusiveness; community members who served as role models became representations of success that our interviewees could relate to. Women who participate in open-source communities expressed the usefulness of being exposed to seeing successful mentors and having guidance (Singh & Bongiovanni, 2021).

Summary

Overall, these findings confirm that one's environment can affect their success, and ability to utilize or express their capabilities. That being said, those who do not exhibit the

[8] *The Pac-Man rule at conferences*. (n.d.-a). Eric Holscher. Retrieved July 31, 2023, from https://www.ericholscher.com/blog/2017/aug/2/pacman-rule-conferences/

approaches mentioned earlier could benefit by cultivating them, in addition to improving confidence, and skills such as networking, technical knowledge/expertise, communication, and time/team management. While this study investigates the interviewees on the premise that they lead a successful life there are people who still struggle in the industry. Researchers argue it is wrong to be an idealist thinking that others can achieve success just because of one's success; we need to be aware of it if we are looking at the exceptions rather than the rule (Lucas et al., 2006), and this is a complex phenomenon when engaging with people who belong to groups who are prone to suffer from social injustice.

7.2. Outreachy and Its Effects on Its Alumni

The second aim of this study is to address RQ2: What additional program assets and technology can be designed to cultivate inclusion in diverse organizations and further contribute to societal change?

The answer to this question is:

- Recommendation 1: Provision of materials or courses and infrastructure improvement
- Recommendation 2: Support networking
- Recommendation 3: Cultivation of inclusivity

Recommendation 1: Provision of materials or courses and infrastructure improvement

The provision of materials, or courses related to common tools utilized for open-source projects such as Git[9], was suggested as a beneficial addition to the Outreach internship preparation for the pre and post-internship periods. Feedback on the infrastructure of the Outreachy program was provided, indicating a need to improve the navigation for people who play more than one active role in the community, such as having been interns, community managers, and mentors. The opportunities mailing list that Outreachy has, has been particularly helpful, in comparison to the tool used for chats, due to the limit of information overload. All the alumni felt the mailing list was easy to follow and was a satisfactory way to keep in touch with important news or opportunities within the community. Numerous open-source related studies have used mailing lists to examine various factors, behaviors, and communication styles to explain phenomena observed within open-source

[9] *Git*. (n.d.). Retrieved July 31, 2023, from https://git-scm.com/

communities (Guzzi et al., 2013; Rigby & Hassan, 2007; Tourani et al., 2014). Mailing lists in the open-source community can be a source for important information. Overall, interviewee's consensus on the mailing list was positive, which could indicate the current information shared is in line with the type of content that alumni want to receive through it.

Recommendation 2: Support networking

Networking was identified as an important factor for success yet several of the interviewees expressed discomfort in practicing it. Some interviews spoke about how the Outreachy program connected them to people who helped them find their current job. Networking is most effective when there is familiarity. This finding is supported by studies that suggest that internal networking (networking via maintaining one's contact) leads to a higher level of career success than external networking (networking with people outside of one's work) (Wolff & Moser, 2009). Therefore a technological solution was suggested, as a program asset, in Section 4.6 and Chapter 5 to encourage prolonged networking, growth, and peer support among the alumni of the Outreachy program. Being part of a community can open doors to unique opportunities that one might be unaware of and offer a support network. An example of that is echoed in this sentiment:

"*I recently became part of the pyladies community here in Kampala. And they have been an excellent community, they are the people who told me about Outreachy. And obviously, that community impacted me greatly. The people I met through Outreachy, my fellow intern, she's from Kenya, and she changed my life in so many ways. She told me about the R contributors platform, how to start contributing to R putting me in touch with so many communities….I think the communities have really impacted me because they've put me in touch with so many opportunities that have really changed my life. Yeah."* - Interviewee 10

Recommendation 3: Cultivation of inclusivity

In the Section 7.1, we mentioned communication and empathy attributed to our interviewees' success. The leadership-related skills that were identified by the majority of the respondents are linked to inclusive leadership qualities. As we know, one's social environment can affect the expression of one's capability (Nussbaum, 2016). While a set of characteristics could indicate one's propensity for success, the findings indicate that there are characteristics that are more frequently utilized, therefore gaining them might be more likely to lead to success (Hirschi et al., 2018; Joseph et al., 2012). One's ability to select which of the tools within their capability set applies to their current circumstance and environment can help in enabling them to achieve their goal of career success might be the most important

element. That does not stop the fact that society has to change to create room for people to express their capabilities equally instead of fighting with the various elements that hamper certain groups (Martin, 2018; Nussbaum, 1999).

Women experienced increased scrutiny when their code was evaluated in comparison to that of men. This led to hampering the performance of women, making it hard for them to do well in their job. The heightened scrutiny in code contribution within the open-source community is not a new phenomenon; women's code contributions are less likely to be accepted than those of men (Terrell et al., 2017). Women also felt they had to sacrifice part of their life by working in organizations that do not have inclusive policies. An interviewee mentioned having to agree to not get pregnant before getting hired. Such policies make the work environment difficult. Instead, having childcare support can aid in attracting parents into a company. Family-friendly policies and specifically ones that are geared towards the type of demographic an organization wants to attract makes the work environment more inclusive (Grandey, 2001). In addition to that, being allowed to be themselves, express their cultural heritage and being in diverse teams created a comfortable work environment for the interviewees.

Outreachy has an overall positive impact, leaving some participants seeking a similar experience of being in a supportive environment while also being well compensated by organizations. Mentorship and sponsorship provided interviewees with additional support for skill improvement and expanding their network in the industry. This is something for organizations to consider; creating opportunities that change their employees' life in such a way that they seek this similar experience again and do not want it to end. Internships in open-source projects helped boost people’s confidence in their skills by providing them with relevant work experience (Pinto et al., 2019), and employment (Hawthorn, 2008). While all Outreachy alumni did not necessarily end up with a job right after the internship, it opened many doors and connections, providing them with tools that could equip them to pursue their goals more effectively. For some it allowed them to resolve some of their financial circumstances like paying off loans, for others it allowed them to better their living conditions.

Inclusive leadership, while not necessarily a characteristic of success on its own, is one way by which people have been allowed to thrive. We see interviewees often attribute their success to people acknowledging the quality of their work, representation, an ally amplifying their voices, or unique opportunities. Through literature about inclusive leadership

we addressed some of the qualities that are often seen in inclusive leaders, one of them was being a change agent (Booker & Williams, 2022). This is in line with the hypothesis expressed in the theory; change agents play a key role in leveling the playing field by being intentional in ensuring they encourage inclusive practices within their organizations and they not only push for diversity but also create a more welcoming environment. Several of the interviewees demonstrated experiencing feelings of comfort when being in an environment that allow them to be themselves.

Through this research it has been demonstrated that investing in cultivating inclusive leaders might be beneficial for organizations, in order to experience the benefits of diversity. That will help mitigate the challenge where organizations recruit unique profiles but do not experience the performance improvement that studies indicate would work for diverse teams (Randel et al., 2018).

7.3. Limitations and Threats to Validity

Lincoln and Guba (1981) discussed the four concerns that need to be addressed to ensure the thoroughness of a study, namely, truth value, applicability, consistency, and neutrality. They assign each to a qualitative and quantitative descriptor. For the quantitative, the concerns are expressed as internal validity, external validity, reliability, and objectivity. Guba (1981) goes on to assign qualitative descriptors of establishing the trustworthiness of a research. Credibility, which is similar to internal validity/truth value, investigates how confident one can be in the findings. Transferability, which is like external validity/applicability, looks into the extent by which the findings of the research can be reproduced. Dependability, which is similar to reliability/consistency, seeks to ensure the findings are consistent and replicable. Confirmability, which is similar to objectivity/neutrality, investigates the extent to which the research findings are neutral and objective, not affected by research bias. I will discuss the limitations and threats to validity of each research method in turn.

Qualitative Limitations (Interviews and Free-form Survey Responses)

To ensure the credibility of the study, I performed member checking, peer debriefing, and triangulation. Asking participants to review their narratives, or accuracy checking, is a form of member checking (Birt et al., 2016). Member checking was done by emailing participants their transcripts for review. Peer debriefing was conducted by asking for frequent

feedback from supervisors and academic tutors. Methodological triangulation is achieved by using various quantitative and/or qualitative methods (Guion et al., 2011). Methodological triangulation was performed through the utilization of a mixed-method approach.

Transferability was ensured through the use of purposive sampling and the provision of descriptive data. Purposive sampling was done through the creation of dimensions of interest to assist in selecting a sample that was diverse for interviewing (see Section 4.3). Descriptive data can be found in Appendix A and Appendix B where I share the reasoning behind the questions for the interview and survey.

To ensure dependability, I used overlapping methods and provided an audit trail. Method overlap was performed through methodological triangulation. An audit trail was provided by thoroughly documenting my methodological process (see Chapter 4).

Lastly, confirmability was also ensured through the provision of an audit trail. As this is a master thesis conducted solely by me an interrater agreement, which would have allowed me to ensure the codes were fully mature and confirm the accuracy of the codebook, were not calculated at this stage. Due to time constraints, I was unable to reach saturation. Suggestions for future work (Section 7.5) are largely focused on extending the research in this direction.

Quantitative Threats to Validity (Survey)

Internal validity refers to the degree to which the observations of a researcher and the theoretical conclusions they develop match (Bryman, 2016). It is threatened by experimental mortality i.e. attrition, and biases such as instrumentation bias, social desirability bias, and non-response bias (Campbell & Stanley, 1963). Instrumentation bias was addressed by using validated instruments in the survey design, which were developed by other researchers. The attrition rate was 32.67%, which means that a significant amount of people did not fully complete the survey, which could introduce bias by altering the results. To reduce the level of attrition the incentive to receive a copy of this research was provided, and one to two reminders were posted both on LinkedIn and Outreachy mailing list. Non-response bias refers to participants being unwilling or unable to answer certain survey questions (Berg, 2005). Social desirability bias is when participants are motivated to make themselves appear in a more favorable light (Bryman, 2016). Both of these biases could potentially occur given the nature of the questions, which may have caused participants who had been less successful in their careers to feel shame and to mitigate that by either not answering or by answering more positively than they actually felt. To try to reduce these forms of bias, participants were

assured that the survey results were anonymous in the survey consent documentation, and informed about the purpose of the survey through recruitment materials.

External validity refers to how generalizable the findings are (Bryman, 2016). External validity is threatened by selection bias (Campbell & Stanley, 1963) and attrition. Attrition can impact generalizability due to the loss of data. The methods used to counteract the attrition were described earlier. To reduce selection bias, the survey was not restricted; anyone who saw it could complete it or pass it on to other potential participants. However, with a population of an unknown size, and an open call to participation, it is certain that only a subset of potential participants was aware of the study. In order to reach a wider audience, the survey was advertised in multiple locations. Regarding the sub-population of Outreachy participants, the population size is known, and it can be expected that the appeal reached most participants. However, because no tracking was used for the sake of participant anonymity, it is unclear if those who responded were in some way different from those who did not respond, e.g., people who feel less successful in their career might avoid the survey. In order to improve generalizability, it would be desirable to receive more responses to the survey, both from the Outreachy sub-population and the broader population under study.

Reliability refers to how replicable the study is (Bryman, 2016). It is threatened by inconsistencies in instrumentation measurements (Kimberlin & Winterstein, 2009). To ameliorate this threat, a validated instrument was utilized to avoid multiple-indicator i.e. Likert scale errors. Each Likert scale question in the survey had at least two other questions measuring the same attributes. Questions pertaining to the same indicator were demonstrated to measure the same factor using Chronbach's alpha, as per Hirschi et al. (2018) research findings which were the basis for the Likert-based questions.

Objectivity indicates that there is transparency in the research process (Bryman, 2016). Objectivity is threatened by a lack of transparency. To improve transparency I include the full survey alongside the reasoning behind each question in Appendix A, and the co-occurrence analysis code (written in Python) in the supplementary material.

7.4. Future Work

Research on other areas related to the Outreachy community may lead to beneficial insights that could benefit or encourage the creation of other such programs. Therefore it is

suggested to further look into the differences between people who did not participate in any mentorship or paid programs and those who did ones like Outreachy.

The mobile application conceptual design provided in this research is a good starting point, however, as an extension further interviewing for usability testing purposes is suggested. Applying techniques such as direct observation and the “think aloud” method (a method in which the researcher requests users to verbalize their thoughts as they test a user interface (Nielsen, 2012)), with five or fewer participants is ideal. It is argued that when one has more than five testers one does not find new insights that can compensate for the cost of more testing to allow for the gathering of inputs on the user needs or blind spots of such solutions (Nielsen, 2000). Additional study is also recommended after implementing new technological solutions to understand if they help the community grow and thrive as intended.

To further extend this study it is suggested that the survey gets repeated but left open for a longer time to allow for a higher number of submissions from Outreachy alumni. Lastly, performing similar research as a form of longitudinal study will allow for prolonged engagement and persistent observation which could lead to more insights over a longer amount of time.

8. Conclusion

IT lacks diversity, which is bad for several reasons. Recognizing the systemic issues that contribute to the problem, people have proposed various solutions, among them internship/mentorship programs. However, the effectiveness of these in the long term needs further research, given the pressures which exist leading to a high dropout rate of women, from university to their professional journey (Scott et al., 2018). To address these issues, I conducted research on people in the tech industry focusing primarily on underrepresented and marginalized groups and the Outreachy community. For that, I employed a mixed methods approach, comprising surveys and interviewees. That was done in order to allow me to reach my research goal and provide answers to the research questions. The goal of this study is to analyze how underrepresented people in technology launch their careers in tech, focusing on Outreachy, a program designed to provide underrepresented people in technology across the world with paid internships. The research questions to allow me to reach my research goal are

- How do individuals who participate in Outreachy harness and develop their potential? (RQ1):

  Individuals who take part in the Outreachy program harness and develop their potential by utilizing skills that feel the most appropriate to them in their current setting. The most dominant capabilities that enabled their success were continuous learning, perseverance, gaining work experience, effective communication, curiosity, and empathy.

- What additional program assets and technology can be designed to cultivate inclusion in diverse organizations and further contribute to societal change? (RQ2)

  Through the findings we see that networking is one aspect that Outreachy alumni do not seem to utilize as much or have a system of approaching. Creating an alumni network application is one of the proposed solutions; however, additional courses on that, technical tools, inclusive leadership, and takling negative thinking could be beneficial. To benefit diverse organizations it is advisable that organizations understand the importance of diverse teams but also know how to fully optimize their

strengths, otherwise they might not reap the expected benefits. Cultivating inclusive leaders within one organization is a good start, and perhaps is a way to influence societal change.

Overall, the Outreachy alumni harness and develop their potential by being resourceful and making the best out of the opportunities they get from the program and the resources they have at hand. This is something that underrepresented people who consider themselves to be successful exhibited in the interviews too; being resourceful, and seeking the best. One important element is also finding oneself amid allies who can acknowledge one's contribution and use their privilege to advocate for the talented marginalized or underrepresented person.

To conclude, the contribution of this study was to highlight how underrepresented people and especially those from the Outreachy community develop their potential to enable them to succeed. The findings of this research provide guidance and ideas that could benefit others within their community to do even better in their careers. The Outreachy program gave people tools, and opportunities to thrive and while that does not deter the systemic challenges that the participants may have to face after the Outreachy program, it provided what many referred to as a life-changing experience.

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10. Appendices

This appendix consists of the survey questions in addition to the reasoning behind the question and descriptions such as if it is a multiple choice and conditional question. The questions are broken down into five question groups, which are: Involvement in internship/mentorship programs, Demographics, Education Level/Current Career & Employment History, Capabilities, and Final Questions.

10.1. Appendix A: Survey Questions

Involvement in internship/mentorship programs

These questions allow us to determine if the treatment (Outreachy or similar program) is correlated with desired outcomes.

1. **Have you completed participation in the Outreachy program (as Outreachy or under the previous names of GNOME Outreach Program for Women and Women's Summer Outreach Program)?**
    - *Outreachy is the primary focus of this study, however, we also want to compare participants against those who are disadvantaged but who have not participated in Outreachy or similar programs.*
    - [Mandatory] Multiple-choice, single answer, options are:
        - Yes
        - No (if selected, skip to #3)
        - Other (please specify) [text box]

2. **What year did you participate in the Outreachy program?**
    - *Year of participation would help us identify any trend changes related to their year participation. Outreachy introduced new changes to the program such as higher payment, career support or opening up the eligibility rules after 2015.*
    - [Optional] Drop-down, single answer, range of years 2006-2022

3. **Have you participated as a mentee/intern in any formal programs or mentor-based internships centered around open source software? [Select all that apply]**
    - *Outreachy is not the only program which aims to help get people involved in software. If a person participated in one of these other programs they may have more in common with Outreachy participants if there is an effect. This allows us to compare Outreachy (#2 Yes) vs non-Outreachy (#2 No), formal program (Outreachy+RG+GWC+GS+GSoc+MLH+Other) vs no*

participation (No to this question), and participation in program designed to advance underrepresented groups (Outreachy+RG+GWC+GS) vs participation in a general program (GSoc, MLH).

- [Mandatory] Multiple-choice, multiple answer, options are:
  - Yes, GirlScript Summer of Code Women
  - Yes, Girls Who Code
  - Yes, Google Summer of Code
  - Yes, Major League Hackers Internship
  - Yes, Rail Girls Summer of Code
  - No
  - Other (please specify) [text box]

Demographics

4. **Do you feel that your identity is under-represented in the tech industry in your region in any of the following categories [Select All Applicable]?**
   - *Allows us to determine if gender for example is a moderating factor (e.g., does gender affect the experience that one has in career? - we expect yes, in line with previous studies) and if formal programs benefit women/nb (e.g., did women/nb who participated in a formal program have a better outcome than women/nb who did not participate in such a program?).*
   - [Optional] Multiple-choice, multiple answer, options are:
     - Yes, Age
     - Yes, Disability
     - Yes, Gender
     - Yes, Scheduled Caste/Tribe
     - Yes, Sexuality
     - Yes, Race
     - Prefer not to say
     - No
     - Other (please specify) [text box]

5. **Which of the racial designations below best describes you? You can choose all that apply.**
   - *Same as question #4, but with race.*
   - [Optional] Multiple-choice, multiple answer, options are:
     - White
     - Black / African-American
     - American Indian (Native American) / Alaskan Native
     - Asian
     - Hispanic / Latino Origin
     - Native Hawaiian or other Pacific islander

        - Other (please specify) [text box]

6. **Current Primary Continent of Residence**
    - *Determine if there is variation in outcomes of western continents (EU+US+CA+Aus+NZ) vs other continents; variation developed vs developing. Treat the continent as a moderating factor to determine if results are generalizable or regional. If there are continents where we have a large number of participants, we can also get a better idea of which factors influence outcomes by examining only people from that continent.*
    - [Optional] Dropdown Menu, include "prefer not to answer"
        - Dropdown Menu of continents

Education Level, Current Career & Employment History

7. **I have received the following software/technology related degrees or certifications:**
    - *This will allow us to understand what was the participant's formal technical educational background prior to embarking a career in technology. This allows us to distinguish which of the participants have had technical-related higher education and explore if that could contribute to better networking opportunities or career progression. It can also allow us to look into if there is any correlation with how long it took someone to be hired in a technical role and their type of education.*
    - [Optional] Multiple-choice, multiple answers, options are
        - Vocational School
        - Tech bootcamp
        - Associate technology-related degree
        - Bachelor's technology-related degree
        - Master's technology-related degree
        - PhD technology- related degree
        - No technical-related formal education
        - Other (please specify) [text box]

8. **In what year did you begin looking for a job (not an internship) in technology?**
    - *Knowing the participant's "career age" allows comparison with others in a similar cohort. For example, we might compare WoC who started in 2018 with White women who started in 2018.*
    - [Mandatory] Drop-down of years, 1950-2023, also include option "Have not yet started/am still studying" and "Never sought a job in technology" [skip till 17]

9. **How long did it take you to find your first job in the technology sector?**

- *This will enable us to understand how easy or challenging it was for the participant to acquire a job in tech.*
- [optional] Multiple-choice, single answer, options are:
  - <6 Months
  - 6 Months - 1 Year
  - 1 Year and above

10. Are you currently in paid employment in the technology sector?

- *This will allow us to know if the person is working in a technical field or they abandoned it. If they left tech it raises questions as to why. This field should be one explored when selecting interviewees to make sure we get a diverse set of people who are or have left tech, and gain an understanding of why (to answer RQ2).*
- [Mandatory] Multiple-choice, single answer, options are:
  - Yes (skip to 13)
  - No (skip to 16)
  - Other (please specify) [text box]

11. When did you leave the technology sector?

- *This will allow us to get an idea of how long it was since they left technology. If they left recently, it could be that they are still in an exploration stage. When it comes to Outreachy demographic, it will be particularly important to see which of those who participated in these technical internships actually remained in the field.*
- [optional] Multiple-choice, single answer, options are:
  - Less than a year ago
  - 1 - 2 Years Ago
  - Over 3 Years

12. How long have you approximately worked in the technology sector?

- *This question allows us to evaluate how long this person has worked in the industry and categorize if there are early-mid, or late-career professionals in regard to work experience in the field of technology. We can explore if someone who has been in the industry has developed certain capabilities i.e. being better in utilizing their network or having a larger network, expressing a higher level of career confidence, and clarity.*
- [Mandatory] Multiple-choice, single answer, options are:
  - *[Skip if user selected, never sought a job in technology in question 8]*
  - < 5 years
  - 5-15 years
  - 16 years and above

13. **Have you had any interruptions in your career in technology lasting more than 2 months? [select all that apply]**
    - *This will allow us to determine if they have any career gaps, intentional or not. Career gaps can be a reason why it might be hard to re-enter or gain employment, especially non-intentional ones. By understanding the nature of their interruption we can identify if this is one of the factors that led them to leave the field of technology.*
    - [Mandatory] Multiple-choice, multiple answer, options are:
        - Yes, on leave (parental, medical, sabbatical)
        - Yes, continued my education
        - Yes, chose to work in another sector
        - Yes, had to work in another sector because I was unable to find work in the technology sector
        - Yes, did not work in paid employment (by choice)
        - Yes, unemployed (not by choice)
        - No
        - Other (please specify) [text box]

14. **How long would you say that each of these interruptions applied (provide an estimated sum of those instances):**
    - *This helps us understand how significant the career interruptions were. We can then look at this data and check whether we see one's career confidence is affected by long-term interruptions. Also, look into if they continue learning despite the interruptions/upskilling.*
    - [Optional] Multiple-choice, single answer, options are: [skip tp 17 regardless of answer]
        - < 6 months
        - 6-12 months
        - 1-2 years
        - 2-4 years
        - 4 years and above

15. **Was it by choice that you did not pursue technology as a profession?**
    - **Yes (if selected skip to 25)**
    - **No**

Capabilities

16. **Career confidence**
    - *This refers to the belief of someone as being capable of successfully developing their career. This is tied to the capability approach. We want to see if someone's confidence could potentially be a reason why they had more*

favorable career outcomes, or perhaps if favorable outcomes correlate to career confidence. For those with low career confidence, we want to see if it has affected their career trajectory eg. causing them to leave the tech field.

- [Mandatory] Likert Scale - 1 (strongly disagree) to 5 (strongly agree)
- 1. I am capable of successfully managing my career.
- 2. When I set goals for my career, I am confident that I can achieve them.
- 3. I believe that I can successfully manage career-related challenges.
- 4. I can successfully develop my career.

17. Career clarity

- *This refers to one's clarity and self-determination of their career goals. This is also tied to the capability approach. We want to see if having clarity of what you want career-wise leads to better outcomes in a similar way as #16. This will allow us to get an understanding that having career clarity makes you take better decisions about your career, leading to a long-term career in technology if they are still working in the tech industry.*
- [Mandatory] Likert Scale - 1 (not true at all) to 5 (completely true)
- 1. I have a clear understanding of what I want to achieve in my career.
- 2. I have clear career goals that reflect my personal interests and values.
- 3. I have clear career goals.

18. Networking

- *This refers to the extent to which one's contacts are built, maintained, and utilized to promote one's career development. With this, we are trying to see if those with higher perceived networking skills get to have fewer career gaps or if those who have spent more years working in the technology sector often utilized it to expand or benefit from their network.*
- [Mandatory] Likert Scale - 1 (not true at all) to 5 (completely true)
- 1. I always try to be well connected in my professional field. / I always try to be well connected in my aspiring professional field.
- 2. I frequently build contacts with other people who are important for my career
- Development.
- 3. I frequently utilize contacts with other people to advance in my career.

19. Learning

- This refers to the extent to which work-related skills are enlarged and updated, and will allow us to check if there is any correlation of contrast and strive to learn with career confidence.
- [Mandatory] Likert Scale - 1 (never) to 5 (often)
- 1. I use every opportunity to expand my professional knowledge.
- 2. I continuously develop my work-related abilities.

- 3. I make sure that my work-related abilities and knowledge are up-to-date.

20. What are the characteristics, circumstances, or attributes you possess that you feel helped you the most in your career?

- *This is asked to allow people to perhaps share other types of capabilities they currently possess, and through this we can evaluate if there are any recurring themes of capabilities between participants.*
- [optional] Text Field

21. What are the characteristics, circumstances, or attributes you need to develop that you feel will help you thrive in your field of work?

- *This is asked to allow people to perhaps share other types of capabilities they do not currently possess but feel are beneficial to develop, and through this we can evaluate if there are any recurring themes of capabilities between participants.*
- [optional] Text Field

22. Would you like to participate in a 1-hour interview (online) as part of this research (interviews can be anonymized if requested)?

- *This is asked to recruit people for the interview part.*
- [Mandatory] Multiple-choice, single answer, options are:
  - Yes
  - No (skip to #24)

23. What name do you prefer to be called by:

- [Optional] Text Box

24. Would you like to be sent the final paper?

- [Optional] Multiple-choice, single answer, options are:
  - Yes
  - No (Skip to End)

25. Please provide your Email: (yes to no 22 or yes to no 24)

- [Mandatory] Text Box (with email validation)

End

10.2. Appendix B: Interview Questions

This appendix consists of the interview questions, prior to the beginning of asking the interview questions, verbal consent was recorded. The questions are categorized as General and Outreachy Specific. The General ones were asked to everyone, and the Outreachy Specific ones were asked only to Outreachy alumni. For the questions that are relevant to a theory used for my analytical framework, I denote the theory in brackets in the notes section.

General (Outreachy plus Non-Outreachy)

What aspects of your identity do you feel are underrepresented in the tech industry?

How do you think your career has been impacted by these aspects of your identity?

Can you provide a summary of your overall experience working in the tech industry? - *Notes:* [Systems Theory] How have they viewed their trajectory in the tech industry. Some of those who will be interviewed might have left the industry, so getting their overall impression of it and their experiences can help me evaluate if there are any differences between underrepresented and non-participants.

What motivated you to excel in your [career|education]? - *Notes:* [Capabilities] It is unclear to me whether intrinsic or extrinsic motivations lead to more success, in the case of underrepresented groups. The standard literature suggests that intrinsic motivation is more sustainable in a programming career, but this is based on studies looking at the dominant group - White, middle-class men. Underrepresented people may face more financial and other pressures which drive them to overcome hostility; is intrinsic motivation necessarily the key reason for early career success? Is intrinsic/extrinsic really the right way to describe it - if money is the path to independence, is it really extrinsic, or is it intrinsic?

How do you measure your career progression? - *Notes:* [Capabilities] In this question, I am looking to see what metrics make someone feel that they are progressing in their career. Through the literature, we have been given certain attributes that lead to career success, but it

would be interesting to know if the interviewee is aware of those or makes mention of other things as metrics for their success.

What would make you feel like you have succeeded in your career? - *Notes:*[Capabilities] I want to know what translates as success to the individual person to get an understanding of what the overall consensus is of the interviewees, but also to understand at which state someone would consider themselves as having harnessed their potential and if there are any differences in how each perceives success.

Reflecting on your career thus far, what are some important insights that you've gained along the way? - *Notes:*[Capabilities] In my research, I want to collect best practices for underrepresented groups, so that people in this situation can potentially apply these practices to their own lives.

(follow-up with this if it is not naturally addressed with the prior question) **Is there anything you wish you had known earlier that you had to learn through experience?** - *Notes:* [Capabilities] Reasons for asking this are the same as above, the difference is this specifically asks for things that would have been helpful if they knew ahead of time in order to have a better impact.

How have your professional relationships with others affected your career? - *Notes:* Networking is considered one of the attributes that leads to a successful career, my hypothesis is that participants who feel successful (Q2) will also report strong networking experiences. Outreachy participants scored slightly lower in the networking category so it is a point worth investigating further.

Looking back on your educational and career path in technology, are there any challenges that you faced in your path to achieving your goals? - *Notes:* I want to know what are the challenges (if any) that one has needed to overcome, through leveraging their capabilities, control over one's environment is one of Nussbaum's ten central human functions capabilities which explores what are the freedoms one has within their environment that allows them to achieve the type of life they want and thus harness their potential,

- **What obstacles did you encounter?** *Notes:* (clarifying questions if they do not understand the question above or did not answer well.)

(Follow up question if they do not expand naturally to this in the previous question) **What do you think could have made your journey smoother?** *Notes:* Looking at Nussbaum's capability, by asking this I am trying to see if these challenges are within or outside one's control to fix them. My hypothesis is that those who thrive have either not experienced any significant challenges in their career, or they have experienced challenges that they were able to overcome on their own or with external support.

Which of your skills (use abilities if a question needs rephrasing) do you regularly rely on in your [career|education]? - *Notes:* This question allows me to investigate if there are any specific capabilities that are used more often than other

To what extent do you feel that you are able to bring your full self to work? - *Notes:*[Inclusive Leadership] Trying to see to which extent people feel they can be their true selves at work allowing them in this way to express their full capabilities.

Do you remember a situation where a professor/manager has made you feel included or welcomed? - *Notes:*[Inclusive Leadership] Perhaps some of these can be learnable and can be suggested as things people can put under consideration when trying to be more inclusive.

(Follow-up to the previous) **Can you share more about that experience?** *Notes:* For example, the personality traits or characteristics of that person?

Outreachy Specific

Outreachy uses Zulip for online chats. Do you find this effective?

(followup) How would you prefer to communicate?

Outreachy has a mailing list to communicate opportunities. Do you find this effective?

(followup) How would you prefer to communicate?

Outreachy uses a website to provide information and accept applications. Do you find this effective?

(followup) How would you prefer to obtain information/apply?

- *Notes:* With the above two questions I am trying to see if there is any technical infrastructure feedback that the participant might have that could help improve the platform.

Did you ever have any troubles in regards to the accessibility of the website?

(followup)Example: language, usability?

Outreachy provides career talks and ensures every organization gives a mentor to their intern. Do you find this effective?

(followup) What other forms of upskilling would you like? - Trying to see if there is any feedback regarding the training or mentorship aspects of the program

After completing the Outreachy program, did you encounter any particular challenges in your career? If so, could you describe what they were and how you addressed them? - *Notes:* Looking to see what type of challenges still persist after participating in such a program. That is to help identify if there are other ways by which these people could be supported if these challenges are solvable.

(Follow up if not addressed by previous answer) **Have you experienced any particular benefits or positive outcomes as a result of your participation? If so, could you describe them?** - *Notes:* Looking to see what type of benefits persist after participating in such a program.

Looking back on your experience with Outreachy, how has completing the Outreachy program impacted your [personal|career] development? - Notes: With this question, I am trying to see how significant has the program been to those who participated in it and if they will attribute any positive improvements in their trajectory to the program.

[Thank them and explain the process of what will happen next, in the end, eg. transcripts sending]

10.3. Appendix C: Recruitment Emails, Social Media Posts, and Calendar Invite

This appendix consists of the templates of the various recruiting emails I sent both for the survey and the interviews. In this appendix I also have screenshots of the post I shared on LinkedIn, the distribution text used in the online mailing list that featured the survey but also text that was on the calendar invite tool I used for scheduling the interviews.

Survey Pilot Study Participant Email

Dear [Recipient],

Thank you for agreeing to participate in the pilot survey. I would kindly ask for it to be completed ASAP.

Before you start with the survey please remember to time yourself and provide me with how much time it took you to complete it. This information will help me to determine the average completion time and ensure that the survey is not overly time-consuming for participants.

As you complete the survey, I kindly request that you let me know:

- If you encounter any possible errors
- If any questions that are confusing, or any other possible feedback you have.

Your input is important, as it will help me to refine the survey and ensure that it accurately captures the information we need.

Thank you for taking the time to participate in this survey. If you have any questions or concerns, please do not hesitate to contact me.

Survey link:

Best,
Gloria

Initial LinkedIn Distribution Post

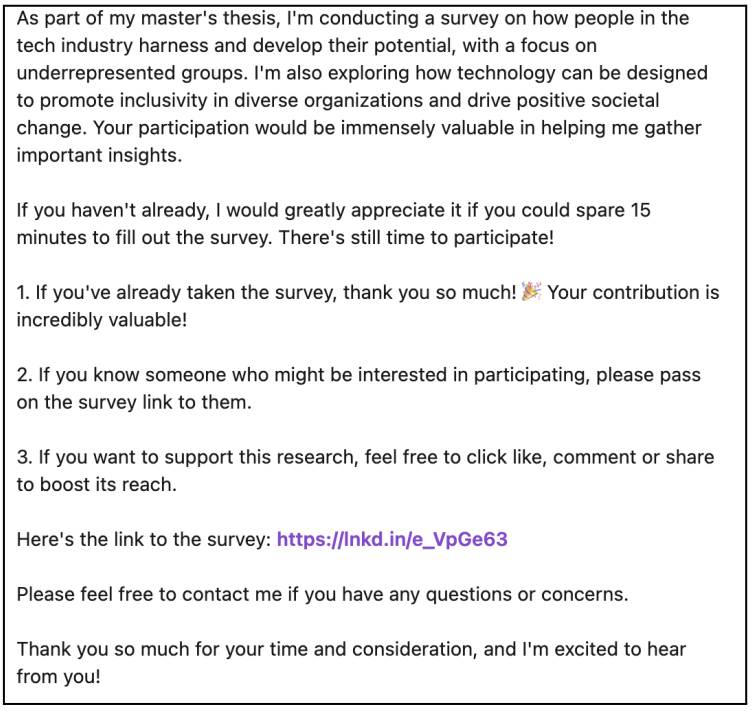
I'm looking for individuals with experience in the tech industry to participate in a survey as part of my master's thesis on how people in tech harness and develop their potential, with a particular focus on underrepresented groups. My research also explores how technology can be designed to promote inclusivity in diverse organizations and drive positive societal change.

No matter who you are, your capabilities and experience in the tech industry are valuable and can contribute to a more equitable and inclusive tech community.

1. If you're interested in participating in the survey please find the survey here: [LINK]
2. If you know someone who might be interested pass on the link to this survey.
3. If you want to support this research, feel free to click like, comment or share to boost its reach.

Thank you for your time and consideration, and I'm excited to hear from you!

Screenshot: Follow-Up LinkedIn Distribution Post



Screenshot: Survey Participant Recruitment Through Diversify Tech Newsletter

> 🙏 Gloria Dwomoh, a master's student at Aalborg University, is looking for individuals with experience in the tech industry to participate in a survey as part of her master's thesis. Take her survey **here**.

Interview Request for Outreachy

subject: Invitation: Interview for Master Thesis Project for Outreachy Participants (v1)

Hello!

Recently you responded to our screening survey stating that you were willing to talk to me about your experience in the tech industry. I would love to hear from you and would like to invite you to an interview.

As a quick reminder, my thesis is focused on how people in tech harness and develop their potential, with a particular focus on underrepresented groups. I am especially interested in investigating the effects of internship programs such as Outreachy.

Please sign up for one of the time slots that is most convenient for you: [LINK]

If none of the time slots work, please let me know, so I could plan something that can work.

Thank you for your time. If you have any questions or need any special accommodation do not hesitate to ask.

Sincerely,
Gloria Dwomoh

Interview Request for Non-Outreachy

Subject: Follow-up Invitation: Interview for Master Thesis Related to People in Tech(v1)

Hello!

Recently you responded to our screening survey stating that you were willing to talk to me about your experience in the tech industry. I would love to hear from you and would like to invite you to an interview.

As a quick reminder, my thesis is focused on how people in tech harness and develop their potential, with a particular focus on underrepresented groups.

Please sign up for one of the time slots that is most convenient for you: [LINK]

If none of the time slots work, please let me know, so I could plan something that can work.

Thank you for your time. If you have any questions or need any special accommodation do not hesitate to ask.

Sincerely,
Gloria Dwomoh

Text on Calendar Scheduling Page

Thank you for taking part in this research focused on how people in tech develop and harness their potential.

The interview has a timeslot of 60 minutes to make sure we have enough time.
You will receive an email with the meeting invitation and a consent form before the meeting takes place.

If you have any questions don't hesitate to ask.

10.4. Appendix D: Interview Informed Consent

This appendix consists of the informed consent form sent to the interviewees to sign before the interview. For the survey in order to proceed they had to agree with their anonymous data being processed, therefore everyone who proceeded to fill the survey explicitly gave consent by ticking a checkbox.

Checkbox had to tick before proceeding to fill survey

Interview Consent Form

Page 1 (of consent form)

Interview Consent Form

This consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask.

Please take the time to read this carefully and to understand any accompanying information.

Research project title: Analyzing How Underrepresented Groups of People Launch Their Careers in Technology

Subtitle: How Outreachy Affects career launch and drives social change through their organizational commitment.

Research investigator: Gloria Dwomoh (student).

This research is being supervised by Professor Lene Tolstrup Sørensen (Aalborg University Copenhagen, Denmark) and Professor Birgit Breninger (University of Salzburg, Austria).

Participation is entirely voluntary and will remain confidential. Your name is retained on the consent form in order to ensure compliance with research ethics, but the interview transcript will be anonymized and not associated with the consent form directly.

Purpose of the Study

The purpose of this study is to explore how people belonging to underrepresented groups in technology harness and develop their potential, with a particular focus on the Outreachy community. The research also explores how technology can be designed to promote inclusivity in diverse organizations and drive positive societal change.

What Will I Be Asked To Do?

1. You are asked to participate in an interview with a duration of approximately 1 hour. The interview will be recorded in order to create a transcript record for analysis. While the recording may be done as a video recording, only the audio is required for analysis, and you may opt to turn off your camera for the duration of the interview.

Page 2 (of consent form)

2. You will be asked questions about your experience in the tech industry, particularly experiences relating to your motivations in your career or education, the tools you use, the skills you use for your work, and how you approach various scenarios for your work. Outreachy participants will also be asked about their experience in the program and given a chance to provide feedback on what could be improved about it.

Participation in this study is completely voluntary and you may refuse to participate completely or refuse to participate in parts of the study. You may decline to answer any and all questions.

You may withdraw consent within two weeks of the interview by emailing the researcher.

What Type of Personal Information Will Be Collected?

Should you agree to participate, you may be asked to provide information about your experiences, as well as your gender, and time in the tech industry. Although these questions were asked in the screening survey, the interview will be kept completely separate from the screening survey. These questions are asked in order to provide aggregate information about study participants.

When you sign this form to certify that you approve the following:

1. You have read and agree to the contents of this document.
2. The interview will be recorded and a transcript will be produced.
3. Third-party software will be used for the purpose of interviewing, transcribing, and processing the transcript:
    a. Recording and transcribing: Microsoft Teams or Zoom
    b. Transcription: Fireflies.ai, trint, avrio, otter.ai
    c. Analysis: Nvivo or Taguette
    d. Storage of anonymized transcripts: Google Docs
4. Access to the interview transcript will be limited to Gloria Dwomoh and academic supervisors/tutors with whom Gloria might collaborate as part of the research process.
5. Any summary interview content, or direct quotations from the interview, that are made available through academic publications or other academic outlets will be anonymized so that you cannot be identified, and care will be taken to ensure that other information in the interview that could identify yourself is not revealed.
6. The actual recording will be kept for up to 5 years to ensure the soundness of the research.
7. Any variation of the conditions above will only occur with your further explicit approval.

Page 3 (of consent form)

Quotation Agreement

I also understand that my words may be quoted directly. My words will be attributed to an anonymized participant (e.g., a pseudonym or descriptive phrase like 'interviewee 1').

All or part of the content of your interview may be used:

1. In academic papers or news articles.
2. In other media that may be produced such as conference presentations, social media posts, or featured posts on third-party websites, podcasts, and videos as a process of dissemination.

By signing this form I agree that:

1. I am voluntarily taking part in this project. I understand that I don't have to take part, and I can stop the interview at any time.
2. The transcribed interview or extracts from it may be used as described above.
3. I have read the Information sheet.
4. I don't expect to receive any benefit or payment for my participation.
5. I can request a copy of the transcript of my interview and may make edits I feel necessary.
6. I have been able to ask any questions I might have, and I understand that I am free to contact the researcher with any questions I may have in the future.

Page 4 (of consent form)

10.5. Appendix E: Codebook

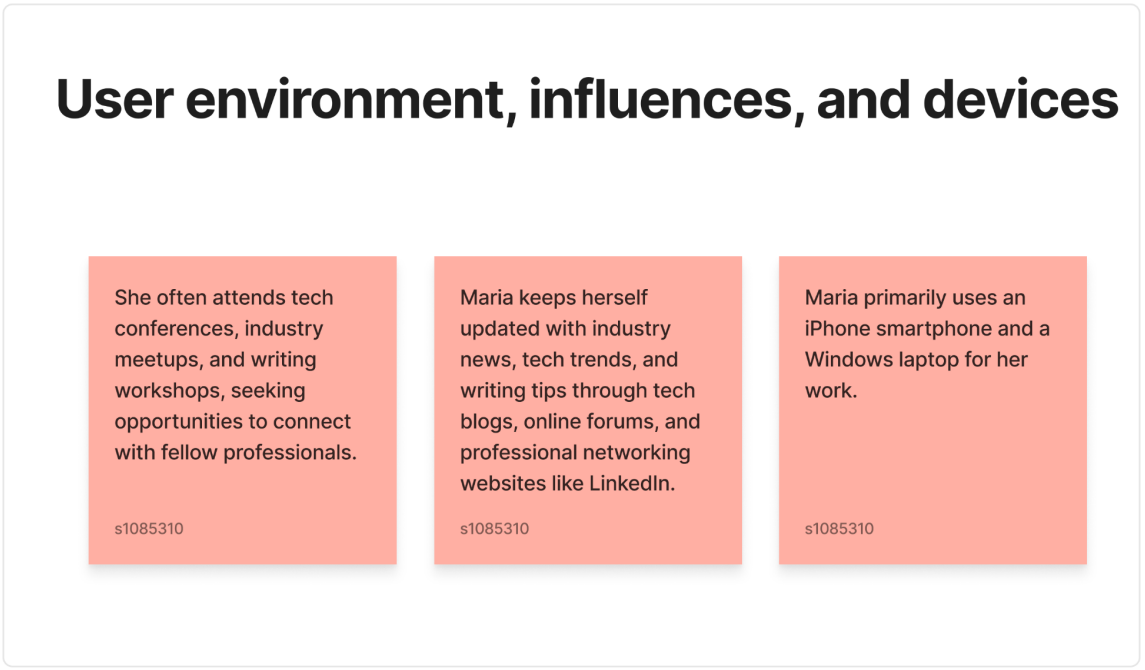
This appendix consists of the codebook alongside with their description, the number of files that have been coded with this code/subcode-, and the amount of references/codings related to this code/sub-code.

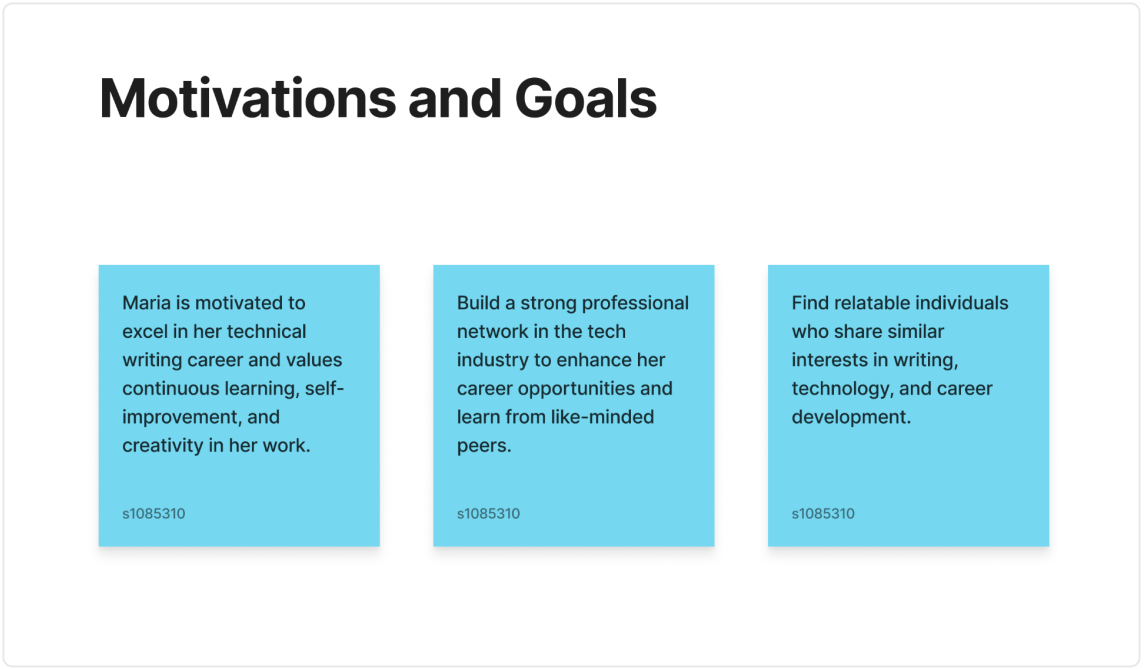
Code Name (Sub-codes included)	Description	Files	References (Codings)
1. Advice	This code described advice given by interviewee for themselves or for others as best practices for their career.	10	15
2. Capability for Success	This code describes which characteristics contribute to one's success.	10	16
2.a Inclusion	This sub-code describes when someone was made to feel included or had seen someone being inclusive.	11	24
3. Challenges Faced	This code describes the challenges faced in their career and education.	11	47
3a. Ease Journey	This subside explains what would have or has made their journey easier.	3	3
4. Journey into Tech	This code describes how they got introduced into the field of technology.	9	10
5. Measure of Progress	This code looks into what metrics or attributes one looks into to measure their career progression.	9	11
6. Motivation for Success	This code explains what motivated the interviewee to succeed in their career.	7	8
6a. Meaning of Success	This sub-code explains what success means to the interviewee.	9	10
7. Networking	This code focuses on what is the interviewee's impression about networking.	10	19

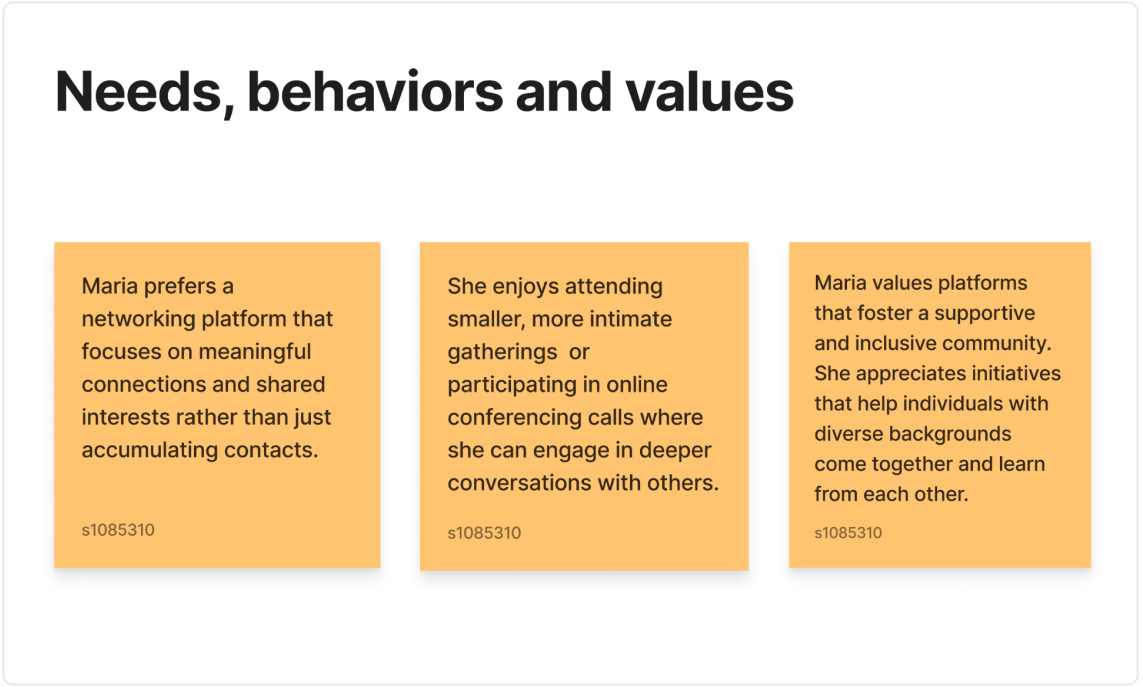
7a. Approaches to Networking	This sub-code explains the methods people utilize to network.	5	8
8. Outreachy	This code envelopes feedback, positive and negative impact of Outreachy	7	39
8a. Challenges after Outreachy	This sub-code explains the challenges experienced by the alumni after the program ended.	3	3
8b. Feedback	This sub-code contains feedback on the Outreachy program, and technical infrastructure.	7	20
8c. Impact of Outreachy	This sub-code explains what was the impact of the Outreachy program in the alumni life.	7	16
9. Underrepresentation Factor	This code is used to explain by which ways a participant considers themselves to be underrepresented in the tech industry.	11	11
9a. Impact of Underrepresentation	This sub-code explains what was the effect of someone's underrepresentation in their career journey.	9	14
10. Work Environment	This code explains how people feel about their work, if they can be themselves or how one should compose themselves.	10	18
10a. Profession	This sub-code explains all details surrounding their profession.	5	7

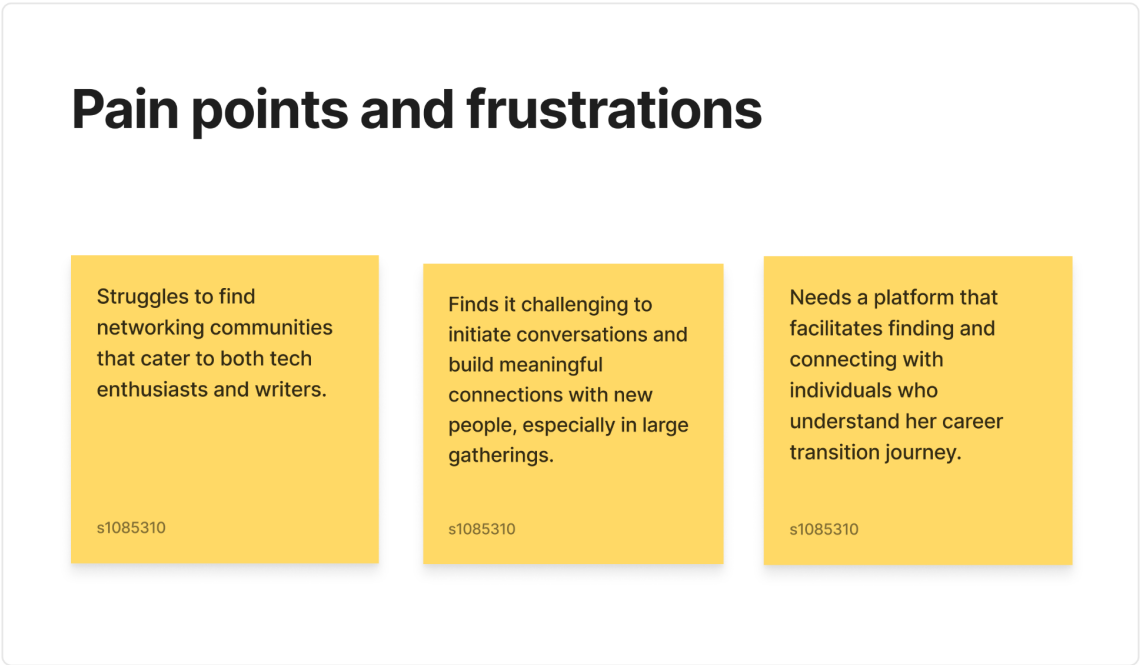
10.6. Appendix F: Additional User Persona Figures

This appendix contains additional information about the persona called Maria Mendes, such as the pain points she experiences, her values and motivations.






Needs, behaviors and values
Maria prefers a networking platform that focuses on meaningful connections and shared interests rather than just accumulating contacts.
s1085310
She enjoys attending smaller, more intimate gatherings or participating in online conferencing calls where she can engage in deeper conversations with others.
s1085310
Maria values platforms that foster a supportive and inclusive community. She appreciates initiatives that help individuals with diverse backgrounds come together and learn from each other.
s1085310


Pain points and frustrations
Struggles to find networking communities that cater to both tech enthusiasts and writers.
s1085310
Finds it challenging to initiate conversations and build meaningful connections with new people, especially in large gatherings.
s1085310
Needs a platform that facilitates finding and connecting with individuals who understand her career transition journey.
s1085310