Onboarding of Software Engineers Hired Through Staff augmentation Mechanisms in multicultural, Remote Teams

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Abstract. *Staff augmentation is when a company hires an outsourcing firm to supply them with extra workers. This practice has become increasingly common when hiring software engineers due to high demand. Staff augmentation companies are turning to emerging markets in order to find talent. After being hired, software engineers must undergo an onboarding process to learn about the company and their responsibilities. The multiculturalism and remote nature of the teams built like this may introduce more complexity to the onboarding process. Therefore, we perform a qualitative study in this paper to better understand the onboarding process in such scenarios. The study relies on feedback from multiple professionals from two medium-sized companies. Specifically, we performed a survey with 23 software engineers who were hired by staff augmentation services. Some engineers pointed out, for instance, the influence of language barriers and timezone differences. We also conducted semi-structured interviews with five managers about onboarding challenges and strategies. Finally, based on insights from the qualitative study, we introduce a preliminary guide for the onboarding process, focusing on remote and multicultural teams. We evaluate the guide by relying on feedback from two executive-level managers.*

1. Introduction

For the last few years, the demand for Information Technology (IT) workers has been higher than the number of candidates available [Hired 2022]. This high demand pushed organizations to depend on outsourcing and staff augmentation solutions. In the context of software development, Tayntor (2001) defines *staff augmentation* as a mechanism organizations use to "supplement existing IT staff". Specifically, the organizations incorporate

workers hired by a distinct company that provides such services. Companies that provide staff augmentation services have resorted to emerging markets, due to cost reduction prospects and low supply in bigger or near-shore markets [Dhar and Balakrishnan 2006]. This approach makes teams more globalized. It also may introduce challenges to engineers working within this context, e.g., cultural differences and language barriers. In addition, onboarding is the process where new team members adapt to their new work environment, becoming active contributors [Saks et al. 2007]. In this context, other investigations focusing on staff augmentation and multiculturalism may help better understand this scenario.

A large number of papers focus on the remote onboarding of software engineers [Ju et al. 2021, Saks et al. 2007, Buchan et al. 2019, Rodeghero et al. 2021, Rastogi et al. 2017]. The different approaches to onboarding that are more commonly used in software development are also comparatively covered by Ju et al. (2021). Studies about the effects of outsourcing IT-related job positions in companies are likewise numerous [Tayntor 2001, Dhar and Balakrishnan 2006, Bass et al. 2018, Looi and Szepan 2021, Prikladnicki and Audy 2012]. However, there is a gap in the literature on how they intersect, especially regarding the challenges introduced by the growing globalization of the industry. Thus, the problem this paper seeks to solve is **the lack of knowledge about onboarding of software engineers hired through staff augmentation mechanisms in multicultural, remote teams**.

Despite outsourcing software development being a reality for decades, globalization has advanced further, and events like the COVID-19 pandemic have contributed to accelerating the process [Kelly 2022]. Therefore, organizations that rely on staff augmentation are expected to become increasingly multicultural. Because of that, the effects of this practice in software development are just beginning to appear. In addition, cost reduction is important when organizations choose to hire software engineers through this process [Dhar and Balakrishnan 2006], and turnover is a challenge not only to the industry but specifically to outsourced projects [Bass et al. 2018]. Therefore, improving the efficiency of the onboarding process is directly related to the better rationalization of resources. It could impact, for instance, turnover rates [Bass et al. 2018] and the amount of time an engineer takes to reach its final checkpoints [Buchan et al. 2019].

In this context, the general goal of this paper is to **identify issues faced by software engineers hired through staff augmentation mechanisms and members of their teams during their onboarding process**. Specifically, we aim to (i): investigate if cultural differences and language barriers are the main issues for these software engineers; (ii): evaluate the effects, in this specific context, of the implementation of different onboarding practices already described in the literature; (iii): provide insights into what practices could be adopted to improve onboarding of Software Engineers in such environments.

The data collected by the research proposed in this paper derives primarily from interviews and a survey. The main subjects are software engineers and managers working in multicultural teams for organizations based in different countries. Consequently, insecurities in dealing with other cultures and daily communicating using a second language are expected to be considered concerns for the engineers surveyed and interviewed. Regarding the usage of proven practices in onboarding these engineers, it should also in-

dicate that the methods that appear more sensible to the challenges faced by this specific group may yield better results.

The remainder of this document is divided as follows. Section 2 presents the background, in which we define the essential concepts, explaining the context of the study. In section 3, we discuss related work, focusing on onboarding of software engineers, outsourcing, and staff augmentation services. Section 4 presents the methodology of the research. Then, we discuss the results in Section 5. Based on insights, we propose a preliminary guide in Section 6, which includes suggestions to improve the onboarding process, mainly on remote and multicultural teams. Finally, in Section 8, we discuss the threats to validity, making a brief conclusion in Section 9.

2. Background

This section presents the main study concepts. Specifically, we define onboarding, outsourcing, staff augmentation, and multiculturalism.

2.1. Onboarding

Onboarding is the process an employee goes through when joining a new team, in which they are expected to adjust to their new context and develop the skills needed to perform their tasks [Saks et al. 2007]. In Software Engineering, there are specific challenges related to this process, including the cognitive overload of working on a new system, the social challenges related to adjusting to a new team, and the pressure associated with having to prove themselves [Rollag et al. 2005].

Three different methods have been proposed to focus on the more technical aspects of the onboarding process of software engineers[Ju et al. 2021]:

1. *Simple-complex*: is the most commonly used, consisting of assigning the engineer tasks that become increasingly more complex, starting from simpler ones.
2. *Priority-first*: adopts priority as the main criteria for assigning tasks to the new engineers, as a means of focusing on them becoming acquainted with the team's reality and making them generate value faster.
3. *Exploration-Based*: is a strategy where managers assign loosely-defined tasks to onboarding engineers, intending to encourage exploration and experimentation. It has been documented to be primarily used when onboarding more Senior engineers [Ju et al. 2021].

Moreover, managers — the ones that ultimately determine the criteria for onboarding - generally agree that independence is the final checkpoint to consider the process finished. However, some factors drive an engineer to this state, such as learning crucial information about the team and the project, developing confidence, and socialization [Rastogi et al. 2017].

2.2. Outsourcing and Staff augmentation

Outsourcing and staff augmentation are mechanisms used by organizations to supplement their unmet demand for services and labor, respectively. They are generally provided by specialized companies. Outsourcing consists of delegating day-to-day operations to a contractor company, where the measurement of success is more bound by compliance with service level agreements than individual tasks. Staff augmentation is a mechanism that

involves a contractor firm supplying a client company with workers. The new software engineers are integrated as members of departments, with their day-to-day responsibilities differing very little from actual employees.

Beyond cost reduction, development in markets close to North America and Western Europe, such as Latin American countries, has led to increased hiring in these regions [Krishna et al. 2004]. Generally, the literature defines a timezone difference equal to or below five hours as near-shore outsourcing. Temporal distance is becoming increasingly important to companies due to better-observed results, as shown in the literature [Looi and Szepan 2021]. Within this context, there are observable cultural differences in these interactions, which should be expected to be a factor for these projects [Prikladnicki and Audy 2012].

2.3. Multiculturalism

Multiculturalism can be defined as the coexistence of multiple cultures in the same context [Hofstede 1993]. This paper analyzes culture as a concept that defines human behaviors, differing from group to group, seeing groups as national and regional identities [Hofstede 1993]. We aim to analyze multiculturalism from the perspective of software development. Many engineers are either relatively new to the concept of culture and how it affects their work - or simply not very concerned about it. This unawareness could be a challenge for them to adapt to contexts that involve multiple cultures coexisting [Prikladnicki and Audy 2012].

Although the concept of culture is very broad and the literature usually focuses on this wider aspect, most studies focus on how cultural differences affect social relations in software development teams. Cultural differences are particularly relevant when are concerned with work relations. Therefore, the effects observed by other studies should also translate to onboarding [Krishna et al. 2004].

3. Related Work

In this section, we discuss studies that aid in explaining the context this paper focuses on, in conjunction with studies that analyze the same process or use similar methodologies that we propose to use. The first paper provides elements to define and understand the specificities of Staff Augmentation (SA). The second paper, on the other hand, compares the effects of two different types of offshoring, providing information about the impact of multicultural work relations in a software development environment. Then, the three following papers discuss the process of onboarding software engineers into development teams: the first being broader, the second focusing on remote teams, and the third discussing different task-based strategies that are often used.

Tayntor (2001) is one of the authors in the literature that comprehensively defines SA and its relation to outsourcing and global software development. Focusing on determining the main benefits and risks of SA, the article reviews the literature and provides anecdotal evidence to help characterize these variations of outsourcing, characterizing SA as a less risky and easier-to-implement mechanism. Even though the study focuses more on the management and business decision aspects of outsourcing, it is tightly related to this article since it thoroughly describes many of the ways SA influences the work relations with people hired through this mechanism. In their turn, these specific work relations

affect how software engineers hired through SA interact with their work. Hence, this paper aims to connect the definitions proposed by Tayntor (2001) with a more up-to-date reality of software engineering.

In the same way that we aim to analyze the effects of SA on the onboarding of software engineers, we also aim to investigate cultural aspects' role in creating these specific environments. In a study by Prikladnicki and Audy (2012), , the researchers delve into how cultural differences heavily influence Global Software Engineering (GSE). Through a qualitative case study, the researchers could observe, amongst conclusions regarding the comparison between two forms of offshoring, that cultural differences impact not only socialization but also technical aspects of software engineering work. Thus, the current paper aims to expand on the cultural analysis made by Prikladnicki and Audy (2012), connecting it to the SA context, chiefly focusing on the onboarding process.

Hiring mechanisms and cultural differences are relevant elements to understanding and defining the context of software engineers working on multicultural remote teams hired through staff augmentation. The onboarding process has also received attention from literature separately from the aforementioned context. Buchan et al. (2019) worked on analyzing the onboarding process of software engineers in teams using agile methodologies. Through an interview survey, the researchers aimed to better define a set of higher-level objectives for engineer onboarding and to accurately determine which practices work best and the main criteria to determine when an engineer has finished their onboarding. Since agile methodologies are rather ubiquitous in software development, the paper by Buchan et al. (2019) can be seen as more agnostic regarding the environment. Thus, in this study, we aim to verify if the conclusions brought by the researchers transpose to the more specific setting on which it intends to focus.

Rodeghero et al. (2021) looked at onboarding within a specific - and, for Software Engineering, never seen before - context, that being the COVID-19 pandemic. Through a survey conducted inside Microsoft, the researchers sought to investigate the impacts of remote work on newly hired software engineers going through the onboarding process. The findings point to the fact that the remote nature of work created many challenges to the onboarding process on its own, such as reduced socialization and lower perceived reachability of colleagues. Based on how strongly the remote work setting proved to influence the onboarding process, our research should incorporate many of the findings from the paper in question. Additionally, our study analyzes how unique elements, such as hiring mechanisms and cultural differences, and remote work interact with each other to influence the onboarding of software engineers.

At last, the work published by Ju et al. (2021) compares and analyses different strategies used to onboard software engineers. Based on a literature review and a case study conducted within Microsoft, the authors surveyed software engineers and managers within the company. They sought to discuss how different strategies for task-driven onboarding worked and influenced the results of the process. In their review of the current literature, the researchers provided relevant definitions and insight into already well-used techniques for software engineer onboarding. Thereupon, the current paper seeks to analyze if those strategies yield similar results and perceptions from engineers and managers when used in a different context.

4. Materials and Methods

We perform a qualitative study to characterize the software engineers' onboarding processes. Specifically, we focus on engineers in multicultural and remote teams who were hired through staff augmentation services. The study involves two real-world medium-sized companies [Ardic et al. 2011] that we named *Client Company* and *Staff Augmentation Company* in this paper. The Client Company is the digital branch of a USA-based media company. The software engineers are hired through staff augmentation services, which the Staff Augmentation Company, an outsourcing firm from Estonia, provides. The Staff Augmentation Company includes software engineers from multiple countries with diverse cultures and languages. In the following subsections, we detail the main steps and details.

> *Summary: Staff Augmentation Company* provides outsourcing services by hiring software engineers to work on a distinct company. *Client Company* hires software engineers by relying on services provided by *Staff Augmentation Company*.

4.1. Proceedings

This study comprises two main steps. In the first part, we perform a survey with software engineers hired through staff augmentation working at the Client Company, asking about their onboarding process. We also conduct semi-structured interviews with managers, focusing mainly on the challenges and strategies used during onboarding.

Finally, inspired by insights from the qualitative part, we produce a preliminary guide to improve the onboarding process of engineers focusing on remote and multicultural teams, in the context of staff augmentation services. We contact two executive-level managers from both companies, asking for feedback regarding the suggestions and findings.

4.2. Metrics and Methods

In this paper, we focus on three essential metrics [Saks et al. 2007, Dagenais et al. 2010, Ju et al. 2021], aiming to evaluate the software engineers' onboarding process :

1. *Learning:* how much knowledge the engineer has accumulated about their team and the domain;
2. *Confidence:* how the developer feels about the process, especially to how able they feel to execute their tasks;
3. *Socialization:* refers to the engineer's communication skills. The capacity of the engineer to properly communicate and establish channels, on which they can rely to ask questions and seek help.

We use these metrics to investigate the perceptions of software engineers and managers. We rely on the Likert and Numerical Rating (NRS) scales to organize the survey, creating questions to collect data about said metrics. In addition, we also provide an open (and optional) question in which engineers may share other comments. For NRS, we discuss the average rating and frequency of maximum and minimum values. For Likert scale, we associate the answers with a scale ranging from -2 to 2, grouping strong and medium feelings. For example, we group "strongly agree" and " agree" answers, as usual

in surveys [Boone Jr. and Boone 2012]. For both scales, we ignore "Not applicable / No opinion" responses. We conduct a semi-structured interviews [Wohlin et al. 2012] with managers, asking questions about the criteria used to assign tasks to a software engineer and possible challenges that may arise from the context.

4.3. Material

Contacting Engineers. In March 2023, we contacted 34 engineers via Slack, a popular messaging app. In the messages we sent them, we added a brief description of the study and a link to the survey. Appendix A includes the survey questions. We focused mainly on learning, confidence, and socialization metrics. There are also questions about the Staff Augmentation Company participation and perceptions about multiculturalism.

Contacting Managers. Additionally, in April 2023, we contacted five managers (three from the Client Company and two from the Staff Augmentation Company) that worked directly with the software engineers. In the case of managers, we perform a semi-structured interview (approximately 20 minutes long), seeking to understand the strategies they prefer to use when assigning tasks for onboarding engineers. We also asked about their main goals and concerns during onboarding, as well as the influence of multiculturalism and hiring mechanisms. Appendix B includes the questions to managers.

Contacting Executive-level Managers. Lastly, in May 2023, we contacted two executive-level managers, asking for their feedback about the proposed guide to improve the onboarding process. Appendix D includes these questions.

5. Results

In this section, we present the results of our study. We characterize the participants in Section 5.1. The following sections show the survey and semi-structured interview results.

5.1. Characterization of Participants

Among the 34 software engineers working in the Client Company—hired through staff augmentation, we received 23 answers, representing a response rate of 67%. We only contacted and surveyed engineers who still worked there. The results include participants with diverse nationalities. For example, nine software engineers (39%) declared being originally from Turkey, while nine participants are from the Dominican Republic (39%). We also had respondents from Brazil, Great Britain, Colombia, Haiti, and Iran. Regarding their roles, nine engineers are working as developers, and 14 as Quality Assurance (QA) engineers. When quoting their answers individually, we use labels from E_1 to E_{23}.

In the case of the managers interviewed, three are from the Client Company, and two managers are from the Staff Augmentation Company. On average, each manager leads about 16 software engineers. The two managers from the Staff Augmentation Company also played supporting roles in the Client Company. The Client Company's managers are from the United States of America. In the case of the Staff Augmentation Company, the managers are from Turkey and the Dominican Republic. We interviewed two executive-level managers: a US-American, from the Client Company and a Turkish from the Staff Augmentation Company. When quoting answers from managers, we use labels M_1 to M_5, and EM_1 to EM_2 for executive-level managers.

5.2. How do cultural differences impact the software engineers' onboarding process?

In this first research question, we start reporting the software engineers' perspective regarding the onboarding process. The following paragraphs discuss the answers, focusing on learning, confidence, communication, and cultural factors.

Cultural and regional aspects. We asked developers how much, on a scale from 1 to 5, they believed certain aspects influenced their onboarding compared to how they believed it would have been in a company from their own country. Onboarding on a company from another country received an average rating of 2.78. On the other hand, being hired through an intermediator, like Staff Augmentation Company, received 2.57, while the timezone difference amounted to an average of 2.64. Working with colleagues from different cultures had an average of 2.65 and daily usage of English 2.91. As presented in Figure 1, language appears to be the most influential factor for software engineers. Only four subjects indicated that language aspects do not influence the onboarding process. The other elements are still noticeably above the lowest possible value (1), which suggest that cultural differences and hiring mechanisms also play a significant role.
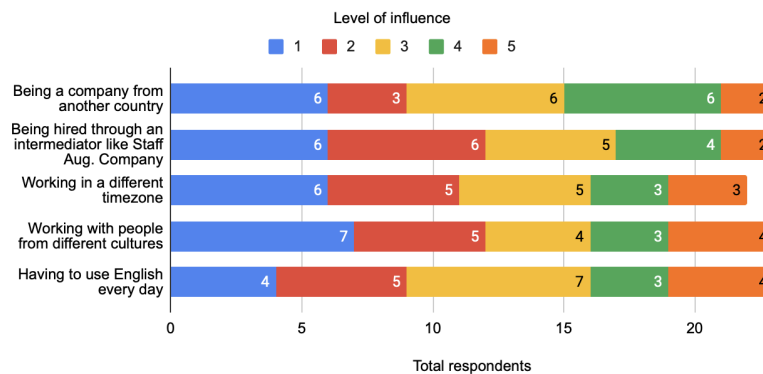

Figure 1. Distribution of ratings (cultural and regional aspects)

Socialization. Regarding socialization aspects, subjects were asked about how different they believed the process was, still in comparison with how it would have been in their own country. They gave socialization an average rating of 3.48, while how different the technical challenges were received 2.19, as shown in Figure 2. This difference suggests that, although engineers recognize cultural differences as a factor in their onboarding (as seen in the responses in Figure 1), it is easier to point out practical differences generated by multiculturalism, such as socialization.

Learning and confidence. Figure 3 shows the learning and confidence metrics questions. As we can observe, the results do not point to a relevant amount of learning problems about the subjects' domains, although some engineers mentioned documentation issues. For instance, Engineer E_{16} noted that the onboarding process *"could be easier if we had updated documentation in a central source document"*.

The questions about the team and working at a reasonable pace averaged a high level of agreement of 1.3, without responses disagreeing. In contrast, technical aspects of the project averaged 0.61, suggesting a perceivable effect on engineers' confidence.

This assumption relates to the third statement, in which a significant amount of software engineers mentioned difficulties in solving problems (6 occurrences, 26%), resulting in an average disagreement value, of -0.43.

The results for the second-to-last statement suggest positive feelings regarding language skills (1.3 points). Only two engineers disagreed, while 13 participants strongly agreed with being confident in their English skills. In the last statement, among the answers, ten subjects mentioned a need to adapt to a different form of working. This statement averaged zero points, indicating a level of division between subjects that, if linked to the discussion of Figure 2, points to the cultural differences being more visible in work relations.
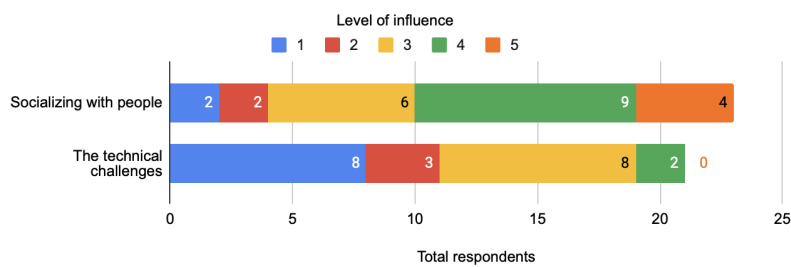

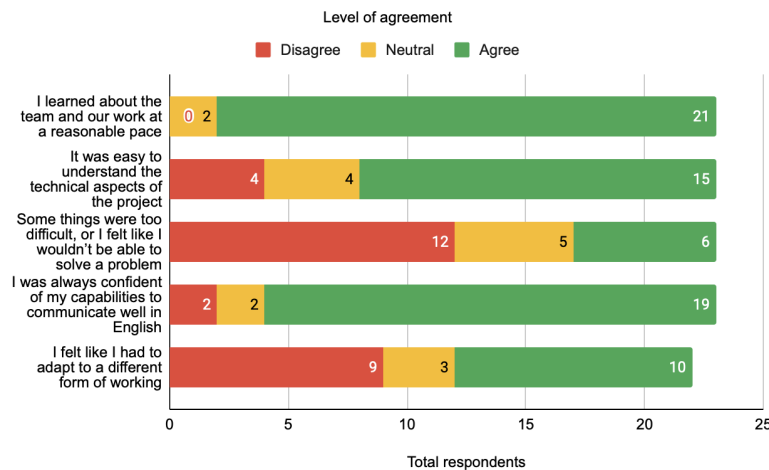**Figure 2. Distribution of ratings (socialization aspect)**

Figure 3. Statements about software engineers onboarding process

Communication. There are also positive results regarding communication skills, as shown in Figure 4. All statements averaged positive numbers: 1.5, 0.95, 1.55, and 1.68, respectively. Among the answers, a significant amount of software engineers state that it was very easy to communicate with people (12 occurrences for team communication, 7 for communication with a different team, 15 with their manager, and 16 with the Staff Augmentation Company). There are a few occurrences of difficulties in communication with a different team.
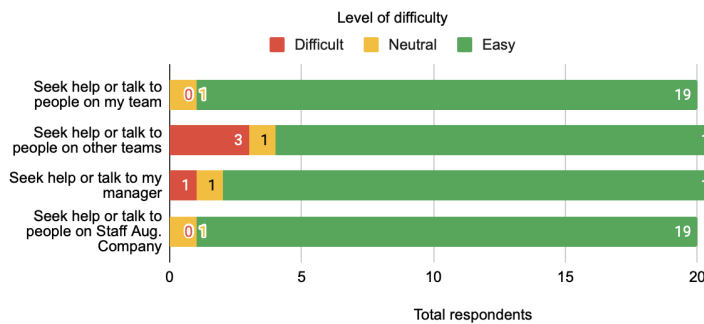
Figure 4. Perceived difficulty of communication

5.3. What is the managers' perception regarding cultural differences during the onboarding process?

This second research question includes answers regarding the impact of multiple cultural backgrounds on the onboarding process, considering the managers' perspective. All five managers agreed that cultural differences do not generate conflicts. Most challenges relate to language barriers or timezone differences. As an example, manager M_1 said that it is *"hard to tell if [culture] has an effect"*.

Regarding language barriers, three managers made considerations about accents. For example, manager M_4 mentioned that accents could be challenging, especially between non-native speakers from different regions. There is a similar statement from another manager:

"It is not in the sense of how you talk about code sometimes. That is the easiest thing. When I worked at a big company as an auditor, there were several people, and it was so hard to get the finance people I worked with to not talk in idioms. When talking to even the people that worked in [country name] (...), they spoke English, but they did not have the same understanding of these kinds of [country name] business idioms." (M_5)

Similarly to the engineers' perceptions, there seem to be no difficulties in communication about the technical aspects. However, conversational issues can be possible, when engineers go beyond that, as exemplified by the account made by M_5.

Three managers mentioned challenges with different time zones. For example, manager M_1 mentioned issues with software engineers that are not available during regular office hours at the Client Company. It is also a relevant aspect when scheduling meetings, as mentioned by manager M_5. This creates the need for "awareness" when scheduling meetings and being clear about what timezone is being used. Manager M_4 also mentioned the difference in holidays.

Three managers also acknowledged the positive aspects of the cultural differences, citing a *"cultural exchange"* (M_2) and a *"curiosity about other cultures"* (M_3), which incentivizes socialization. Manager M_5, for instance, mentions an experience during the FIFA World Cup in 2022 when different employees interacted in a Slack channel to talk about the event. The manager mentioned the World Cup as an example of socialization being boosted by the multicultural aspect of the company, with a goal of *"making everybody feel like they are more part of the team"*.

Managers M_1, M_3, M_4, and M_5 also provide insights regarding the influence of the hiring mechanism on the onboarding process. Due to less strict hiring criteria, they mentioned that engineers' technical capabilities and cultural fit must be assessed as part of their onboarding. M_5 reinforces this observation regarding software engineers' technical capabilities. It is an *"ongoing conversation"* due to possible company requirement changes and lower contract stability.

5.4. What is the effect of different onboarding practices on remote and multicultural teams?

In this last research question, we evaluate the effects of distinct onboarding practices, relying on managers' perspectives. In the following paragraphs, we discuss the five managers' answers, highlighting their experiences and perceptions regarding well-known strategies. We also ask about their main concerns during the onboarding process.

Main onboarding objectives. Regarding the main onboarding goals, four managers (80%) mentioned that they assess the engineer's technical and interpersonal skills during the process. M_2 and M_4 also discussed having the engineer understand general workflows and processes within the company. M_1 and M_5 cited the build-up of domain knowledge, with M_5 mentioning *"understanding the scope and size of the application"* and a *"smooth onramp into the system"*. Having engineers socialize with coworkers was brought up by M_4, who mentioned pairing the engineer with someone more senior than them.

All managers believed the onboarding strategy choice heavily depended on the context. According to the managers interviewed, engineer seniority, the complexity of the project, and current team need are three of the most important criteria.

Simple-complex. All managers agreed that the *simple-complex* approach is the better one. When commenting on the other strategies, the managers talked about what criteria they would use to pick them *instead* of simple-complex. Managers M_2 and M_4 cited lower risk when delegating simpler tasks to newcomers, and M_3 expanded on the subject, explaining that they give the engineers tasks that they (M_3) already know how to fix:

"I am not going to tell the engineer how to solve it, but I'm going to give him an idea of where to look and more or less what he needs to do. Then I will give him some time and observe his answer. So that way, it's easier for me to tell him what he did." (M_3)

Priority-first. In the case of *priority-first*, all managers said it was less than ideal, while two managers admitted it could be used depending on the team's needs. As an example of when this approach can be necessary, M_4 mentioned an episode when the company lost a senior developer and had to replace them quickly. As M_5 said, *"in some cases, you just need it"*. On the other hand, M_1 uses an example to illustrate why they believe the approach, as a rule, does not work:

"You know, we had a scenario in the [team], where we had one engineer come in, and because of the time crunch, [...] they didn't have as much time to start with small tickets and kind of get familiar with the code. It was this larger thing. We had [developer] who was helping them out as well, just kind of getting them up to speed. So a lot of his time was spent just kind of helping them [...], and, because of the timing, it's only one ticket

they got a chance to work on. So that was just, I think, unnecessary stress for the engineer [...]. Also, I don't think it probably produced the right level of output." (M_1)

Exploration-based. Finally, all managers described *exploration-based* as a strategy generally reserved for more senior engineers. One manager talked about how lack of domain knowledge can lead an engineer to take excessive time with their first tasks, getting into what they called a "rabbit hole". Seniority, thus, must be combined with adequate domain knowledge to justify using the exploration-based strategy. Nevertheless, due to the less strict hiring processes Staff Augmentation companies have, as outlined by managers, the need to assess the technical knowledge and general fit of the engineers with their positions might indicate that, in the case of contractors, they could favor this strategy less.

While discussing the different onboarding strategies, M_5 mentioned that *"it's really about the individual"*. Characteristics such as seniority, domain level, and interpersonal skills are considered when determining what strategy (or combination of strategies) to use. The engineer being a contractor is also a factor, which suggests that the context which this study focuses on does, indeed, influence how managers think of onboarding and determine what tasks to delegate to new engineers.

Engineers' perspective. In the engineers' survey, we asked the subjects what their strategy of choice would be if they were deciding how to onboard a new engineer. Instead of using the names found in the literature, we attempted to summarize what each strategy was in a short sentence to make each method more intelligible for anyone who was not as familiar with onboarding concepts. Respondents were given the three main options and could also respond with "other", explaining their preference, as presented in Figure 5.

Overall, engineers prefer simple-complex and exploration-based strategies. In the other category, we had one engineer answer *"Simple tasks first, as long as they are tied to a relevant project"*, denoting they would consider a combination of simple-complex and priority-based. Another software engineer answered *"It will depend on dev's experience and adaptive abilities, but I would say most important to the team first"*.
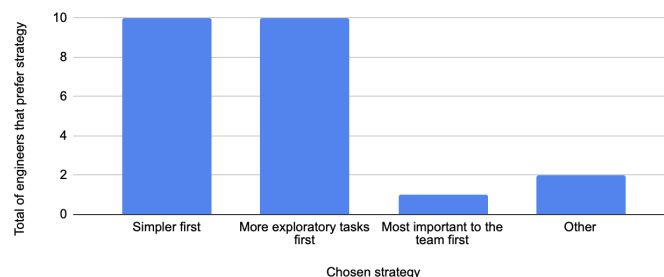

Figure 5. Strategies preferred by engineers

6. A Preliminary Guide for Onboarding Process

Finally, based on the survey and interviews, we create a preliminary guide to improve the onboarding process (see Appendix C), focusing on multicultural and remote teams. In the following paragraphs, we present the document overview and an initial evaluation based on feedback from two executive-level managers.

6.1. Guide Overview

The document includes general suggestions to plan the onboarding of software engineers. It proposes actions that software augmentation companies and companies that hire through software augmentation services can take. All of the suggestions are based on onboarding metrics discussed in this paper. It is also intended to be supplementary to the current onboarding processes the companies already have. Specifically, the guide suggest the following actions:

- Personalized documentation, containing a checklist of day-one tasks as well as information on team and organization structure;
- Mentoring from other engineers;
- Introducing the engineer to the team in a way that embraces their diversity;
- Regular meetings between the engineer and Human Resources from the Staff Augmentation Company during their onboarding
- Provide the newcomer with contacts from the Staff Augmentation Company company that speak their native language or have the same nationality, to act as support
- Have the newcomer also introduce themselves to their colleagues

6.2. Guide Assessment

To evaluate the guide, we collected feedback from two executive-level managers from the Client and Staff Augmentation companies. Overall, we received positive feedback. The first executive-level manager outlined that the suggestions are practical and straightforward to implement, saying:

"(...) very easy to accomplish, so there's a big value you get in return. I absolutely think these suggestions will have a positive impact. The HR bit requires a bit of process definition, but that is also worth it." (EM_1)

EM_1 also expanded upon the suggestion to make regular meetings between the newcomer and Human Resources (HR), saying that these meetings may happen both sides, HR and managers. For example, these meetings could be helpful to collect information during a probation period at the Client Company. Also, it can increase the quality of the onboarding process for those who pass initial probation.

EM_2 focused on the side of the Client Company. Adding to our disclaimer that the suggestions of the preliminary guide are meant to be supplementary, EM_2 made it clear that they believe the suggestions are insufficient by themselves, adding that other measures must be taken to ensure a good onboarding process. Specifically, the executive-level manager outlined how their current process works and how crucial one-on-one meetings are. They also mentioned that they have a probation period for contractors and employees hired directly. EM_2 made an observation about transparency over the evaluation, and how it intersects with confidence:

(...) "Usually, people are coming in from another job and fear that they will not do well coming into a new one because it is all new. The pressure to perform in the first week is huge. That is why I recommend saying that they have 90 days, and that it is a slow build while they become comfortable and walk them through the expectations over that time period. Without that, I find that people are very stressed." (EM_2)

7. Discussion

In this section, we discuss the main results and implications of the study.

Multicultural teams. Analyzing the results of the survey and the interviews, we observed that working in multicultural, remote environments may, in fact, influence the onboarding process. For example, there are issues related to insecurities, timezone differences, language barriers, and specific needs companies may have when hiring engineers through staff augmentation services. However, those characteristics do not make the process harder or worse; they only introduce specific challenges.

Confidence, learning, and socialization challenges. When determining objectives for onboarding, companies have different goals. However, there are key objectives that all onboarding processes need to have. These objectives are linked to onboarding metrics vastly discussed in the literature [Saks et al. 2007, Dagenais et al. 2010, Ju et al. 2021]. For example, *confidence* may be affected by the insecurities engineers already have when starting a new job that can be augmented by dealing with different cultures and another language. *Learning* capacity can also be affected by insecurities. Interestingly, some software engineers mention the usage of documentation to help in this process. Finally, for *socialization*, the results indicate that most perceived cultural differences refer to work relations. For example, 45% of the participants said they believe they had to adapt to a "different form of working". It reinforces the importance of focusing on this metric when designing the onboarding processes.

Staff augmentation companies. There are also notable observations about the hiring mechanism. Most respondents (56%) said they did not have to onboard in the Staff Augmentation Company, even though the company does have a process in place. The day-to-day work happening on the client company side could lead to developing this feeling. In this context, there are strategies the companies can take to improve their employee's experience. We report some suggestions in the preliminary guide introduced in Section 6. Therefore, we envision new research lines involving field experiments based on the guide recommendations.

8. Threats to Validity

As with most software engineering studies, the results in this paper cannot be generalized to other scenarios. We focus on a specific context created by multiculturalism and staff augmentation, looking at two specific medium-sized companies. However, the results rely on responses from engineers and managers from seven different nationalities.

The second threat relates to number of subjects, since might not be a representative sample. Specifically, the results focus on software engineers working in multicultural and remote teams. However, the results involve participants from distinct nationalities and roles. We also conducted the qualitative analysis from two perspectives, relying on surveys and semi-structured interviews. Additionally, for the data analysis, the study focused on the distribution of the answers using Likert or numeric rating scales.

Another possible threat relates to multiple submissions and reliability of responses. For the managers, we performed consistent interviews, focusing on the same general topics, which also helped preserve anonymity. Finally, to mitigate personal con-

cerns involving the survey, we assured software engineers about the anonymity. We also configured the form to guarantee unique responses.

9. Conclusion

In this paper, we investigate the challenges and characteristics of the onboarding process. Overall, onboarding is a process that involves various subjective factors. Particularly, we focused on the context of multicultural and remote teams, which are hired by staff augmentation services. We performed a qualitative study to achieve these goals, considering three different levels inside organizations—engineers, managers, and executives.

We conducted a survey with 23 software engineers, collecting their perceptions about the onboarding processes. Later, we conducted semi-structured interviews with the five managers responsible for designing and conducting these onboarding processes, focusing on understanding how they think multiculturalism and staff augmentation influence their methodologies and concerns. In summary, the survey results show that software engineers perceive the impacts of the context mostly when it comes to language barriers and socialization with colleagues from different cultures. In the case of managers, they discussed, for example, how they have different expectations for contractors and how the criteria for determining onboarding strategies are affected by the context this study analyzes.

Finally, we elaborated a preliminary guide with suggestions to increase the efficiency and quality of the onboarding of software developers from diverse cultures hired through staff augmentation. The material was evaluated by executive-level managers and received positive feedback.

Future research can consider other relevant aspects, such as the impact timezone differences may have in the first weeks of onboarding. Researchers can also evaluate the proposed guide, applying the suggestions during the onboarding process of engineers. Other studies can focus on specific measures that can be taken to reduce the average duration of the onboarding process.

Replication Package

The replication package is publicly available at:

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github.com/ICEI-PUC-Minas-PPLES-TI/plf-es-2022-2-tcci-5308100-
pes-thalles-sales
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A. Questions for Software Engineers

1. Your nationality
2. Your native language
3. Team(s) you work on
4. Your role
5. Please, indicate how long you believe it took you to onboard in Client Company/Staff Augmentation Company
6. Have you ever worked for a company like Staff Augmentation Company? In other words, a company that acts as an intermediate between you and a company in another country?
7. During your onboarding, you also had to onboard in Heimatlas
8. Comparing your onboarding in Comoabny A/Staff Augmentation Company to how you believe it would have been in a company in your own country, how much do you believe the following aspects influenced your onboarding?
   NRS 1-5 (not influential - very influential)
   (a) Being a company from another country
   (b) Being hired through an intermediator like Staff Augmentation Company
   (c) Working in a different timezone
   (d) Working with people from different cultures
   (e) Having to use English every day
9. Still in comparison between Client Company and Staff Augmentation Company and how you believe onboarding would have been in companies in your own country, how much would you say the following aspects differ?
   NRS 1-5 (the same - very different)
   (a) Socializing with people
   (b) The technical challenges
10. How much do you agree with the following statements? Please, consider your feelings and perceptions during the onboarding process.
    (a) I learned about the team and our work at a reasonable pace
    (b) It was easy to understand the technical aspects of the project
    (c) Some things were too difficult, or I felt like I wouldn't be able to solve a problem
    (d) I was always confident of my capabilities to communicate well in English
    (e) I felt like I had to adapt to a different form of working
11. Regarding communication with colleagues, how difficult was it to:
    (a) Seek help or talk to people on my team
    (b) Seek help or talk to people on other teams
    (c) Seek help or talk to my manager
    (d) Seek help or talk to people on Staff Augmentation Company
12. Based on your own experiences, if you were to pick the first tasks a developer would take during their onboarding, what criteria do you think is better?

13. (Optional) Please provide details on what you think about onboarding in a new company. What aspects could have improved your onboarding in Client Company, Staff Augmentation Company? What would you focus on if you were to plan an onboarding process? Please, feel free to comment on positive/negative aspects, challenges, suggestions to improve, etc.

B. Questions for Managers

1. What are your main concerns when onboarding an engineer to your team?
2. What criteria do you use to assign the first tasks to a software engineer during the onboarding process? Out of the three presented strategieis, which one do you prefer, and what are your comments on each one?
3. Do you believe having engineers from multiple cultural backgrounds makes a difference to the onboarding process?
4. Is there anything else you find interesting to comment on this topic?

C. A Preliminary Guide for Onboarding Process of Contractor Software Engineers from Multiple Cultural Backgrounds

This document is a set of general suggestions for onboarding, focusing on software engineers from multicultural backgrounds. It was developed after a study investigating how being contractors from different countries and cultures can affect software engineers' onboarding processes. As such, the propositions described below only refer to specific aspects of the process. In other words, this model includes recommendations that can be adapted according to the context and team needs, and it is not meant to be a complete or inflexible guide.

The points outlined in this document aim to improve relevant onboarding metrics: learning, confidence, and socialization. For example, the actions related to socialization may help software engineers' confidence in their language skills. Other suggestions will focus on learning and confidence, which can directly affect the duration and efficacy of the onboarding process.

Actions

First, we recommend creating a specific document for each onboarding software engineer, including instructions, essential links, tools, and expectations of what they should achieve in their first days or weeks. The company should create a template to use as a base for these documents. It should contain the following:

Day-one checklist. [Learning, confidence] We recommend providing a checklist, including everything engineers must do during their first day. For example, services they need to get access to and what tools they are expected to have installed.

Other teams and organization structure. [Learning, confidence] Describe to newcomers the key people to seek help from in other teams and the other teams' responsibilities.

Additionally, we also suggest including the following steps in the onboarding process:

Mentoring software engineers. [Learning, confidence, socialization] We suggest having another engineer, ideally from the same team, assist the newcomer in their onboarding.

This person can be responsible, for example, for showing codebases, explaining how to set up local environments or workflow-related topics, i.e., a reference contact on the company for technical issues. The pair engineer could also provide feedback about the new engineer to their manager, reducing dependency on them for this process.

Introduction to the team. [Learning, confidence, socialization] We suggest introducing the software engineer to the team, which can promote their socialization. For example, in a team's daily meeting, ask the newcomer to introduce themselves since it may be an opportunity to ensure they feel comfortable and welcome. The colleagues could also be introduced to encourage socialization so the software engineer understands everyone's roles. Notably, we suggest steps such as: (i) invite the engineer to talk briefly about their country, culture, and skills; (ii) invite everyone (including the engineer) to say something about themselves, such as "one fun fact about yourself" or any other topic that could incentivize socialization.

Suggestions to staff augmentation company

The staff augmentation company can also contribute to the onboarding of the software engineers in the client company, increasing their chances of success. Therefore, we also suggest the following guidelines:

1. Schedule check-in meetings between the software engineer and a representative from Human Resources (HR) or a manager from the company, and let them know in advance. It could be an opportunity for newcomers to ask questions;
2. Inform newcomers if there are people available that speak their native language or are from the same nationality. These people could answer, for example, general questions regarding technical issues or about how the work arrangement works;
3. Invite the software engineer to introduce themselves to their colleagues from the staff augmentation company. For example, using a channel in a messaging service like Slack.

D. Questions for Executive Managers

What feedback do you have on the general guide? Do you believe following its general recommendations could positively impact the onboarding process of software engineers? Do you think the suggestions are practical?