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## How job function characteristics impact performance of diverse teams in high-tech industry

Angela Fong

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**HOW JOB FUNCTION CHARACTERISTICS IMPACT PERFORMANCE  
OF DIVERSE TEAMS IN HIGH-TECH INDUSTRY**

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**A Research Project  
Presented to the Faculty of  
The Graziadio Business School  
Pepperdine University**

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**In Partial Fulfillment of  
the Requirements for the Degree  
Master of Science  
In  
Organization Development**

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**by  
Angela Fong  
November 2022**

This research project, completed by

ANGELA FONG

under the guidance of the Faculty Committee and approved by its members, has been submitted to and accepted by the faculty of The Graziadio Business School in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE  
IN ORGANIZATION DEVELOPMENT

Date: November 2022

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## **Abstract**

This study examines the effect of diversity in the technology industry across different technical job functions and the possible moderating factors. One-on-one interviews were conducted with 16 participants who have different demographic characteristics and different job roles across multiple companies in the United States. It was found that about two-thirds of participants do not perceive diversity as having any positive or negative impact on the outcomes of work teams. The other participants believe that there are positive effects, but it is inconclusive when it comes to whether certain types of diversity result in better team outcomes. The results also reflect how one's job function might affect his or her view on the effect of diversity. The study findings and their implications may be useful to practitioners working on DEI initiatives in the technology industry.

*Keywords:* diversity, inclusion, team performance, technical job functions, task characteristics

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## Chapter 1: Introduction

Diversity, Equity, and Inclusion (DEI) have received more attention in recent years as social justice movements and the economic impact of COVID-19 on minorities brought to the limelight many ongoing social disparities (Stengel, 2020). Some studies showed that women and people of color were laid off disproportionately during pandemic-related workforce reductions (Garcia-Alonso et al., 2020). Others pointed out that there was still a lack of racial diversity at the top management level in industries such as investment banking and technology, even though many corporations stated that racial equity was a priority (Chan & DiMauro, 2020; Hecht, 2020). This has led to increased pressure on companies to demonstrate visible progress in having a more diverse workforce and being more inclusive in hiring and promotion practices.

Technology companies are under scrutiny because of their powerful reach into our everyday lives through data mining and artificial intelligence. People have come to realize these companies' enormous influence in the form of overt shaping of opinions and quick dissemination of biases through their platforms (Griffy-Brown & Chun, 2020). Despite the impression of being open-minded and outspoken about social good, big technology companies' DEI commitment is constantly challenged by high-profile discrimination lawsuits (e.g., *Brougher v. Pinterest*, 2020; *Ellis v. Google*, 2017; *Liu v. Uber*, 2020). The power center in the technology ecosystem (i.e., venture capitalists and C-suites) is still predominantly a white-male club that has remained in the planning phase of its diversity effort for far too long (Brin, n.d.; Pardes, 2021). Hunt et al. (2020) pinpointed "a disconnect between what the company says and the progress it is making on the ground" (p. 30), in turn resulting in eroded credibility and a lack of inclusion and belonging. In fact, some articles about workforce diversity in business and technology

publications indicate that there is a phenomenon of ticking the box, meeting diversity quota, or making token hires when companies face hiring or promotion decisions that involve female or people of color candidates (Evans, 2020; Kurter, 2021; Rooney & Khorram, 2020).

One way to understand the paradox is to examine what motivates technology companies to bring in people of different cultures and backgrounds. Apart from fulfilling social responsibility, a key incentive for workplace diversity touted by management and organization consultants is better organization performance. Prabhakar et al. (2019) reported that “organizations with diverse leadership teams out-innovate and outperform the others; these organizations are 45 percent more likely to report growth in market share and 70 percent more likely to report capturing a new market” (p. 5). Despite the anecdotal evidence, academic research has so far shown mixed results in the relationships between diversity and performance. In meta-analyses of diversity studies, researchers have identified several psychological factors (e.g., social biases and subgroup categorization) that impact the dynamics in heterogeneous teams; there are also many moderators and mediators such as task interdependence and complexity, power differentials, and industry and organization contexts that can make diversity impact more salient or muted (Bell et al., 2011; Choi, 2007; Haas, 2010; Joshi & Roh, 2009). More recent studies began examining the underlying mechanisms that contribute to team behaviors to reconcile inconsistent research findings and understand circumstances that affect team performance (Holmes et al., 2020; Stahl & Maznevski, 2021; Triana et al., 2021). The relationships between task characteristics and productivity were particularly hard to establish because of the different types of tasks used in research studies. While empirical studies are often constrained to use contrived tasks or only subsets of real-

world duties for measuring team outcomes, modern-day organizations have become more horizontal, and work team members often perform a wide variety of tasks that demand cross-functional interactions and multiple competencies (Keller, 2001). With these complexities in mind, it is conceivable that the claim of workforce diversity yielding better performance might not have strong support in the field yet as suggested in multiple studies (Holmes et al., 2020; Pittinsky, 2016; Zouaghi et al., 2020).

### **Purpose**

Given the lack of clarity in how team heterogeneity may positively impact performance and the technology industry lagging in their diversity endeavor, I am interested in gaining more insight into the benefits or challenges experienced by people in the field. The success stories may provide new pointers for reconciling the conflicting findings on the relationship between task characteristics and performance. Perspectives from technology professionals may also be useful for uncovering any alternative constructs in understanding the correlation between diversity and team performance. The specific research questions for this study are:

- What are the relative benefits of different types of diversity for high-tech job functions based on the experiences of practitioners in the field?
- How exactly do the relevant diversity attributes (e.g., gender, ethnicity, education) positively or negatively affect the outcome of teams performing high-tech job functions?
- Would some type of job function-level characterization be more effective than task-level measures such as routineness and complexity for predicting diverse team outcomes?

## **Significance of Study**

By studying the effect of diversity in a specific industry and its representative job functions, the analysis can be performed without having to consider other factors such as job characteristics and norms across different industries that may be in play as well. The study will also allow this researcher to compare the positive and negative impact of diversity in the particular field with the findings from empirical research. More importantly, the relevant impact can be qualified in more precise terms rather than “black box” outcomes such as “smarter team,” “more creativity,” and “better problem-solving ability.” The result can potentially provide more insights for OD practitioners in their DEI efforts related to the tech industry and job functions. Managers and leaders of the industry can also better appreciate the pros and cons of diversity and be more prepared for the challenges involved.

## **Organization of Thesis**

Chapter 1 provided the background for the motivations of the research topic, the purpose and significance of the study, and questions to be answered. Chapter 2 covers the literature review of foundational theories that are relevant to the research topic, including operational definitions. Chapter 3 describes the research method, assumptions, and precautions. The chapter also covers the interview design, participant characteristics, and data collection procedures. Chapter 4 captures the research findings and provides a qualitative analysis of the data collected, including exceptions and data anomalies. Chapter 5 summarizes the findings and relates them back to the research questions. The chapter also discusses the implications of those findings for organization development practitioners and provides several suggestions for future research.

## Chapter 2: Literature Review

In this chapter, I review a variety of studies conducted by academic and industry researchers related to the effect of diversity on interpersonal behavior, performance, and other team outcomes. While there was a relatively small amount of academic research on the subject matter in the high-tech industry, a few research papers from major consulting companies have been included to supplement the prevailing theories and sentiments in the field. They served to provide more context and were not used for drawing any conclusion in this study. The focus of the review was on how different types of diversity affect group dynamics, cognition, and social interactions. Close attention was paid on studies about the relationships between task characteristics and diverse team performance and any gaps in findings. In the following sections, I summarize the key theories from the various diversity studies by their respective themes. They represent an interesting intersection of insights from the domains of social psychology, personnel management, business ethics, and behavioral science. The information will be leveraged in the investigation of challenges faced by high-tech organizations in their efforts to realize the performance benefits of diverse teams.

### **Multi-facet Impact of Team and Task Characteristics on Performance**

A *team* represents a small group of people who work together towards achieving a common goal and contribute their work product, knowledge, or skills that can influence the overall team outcome (Jarrell, 2002). It is the key construct for delivering the products and services in modern-day organizations. The terms team and group are used interchangeably in this research paper to represent this construct regardless of its lifespan. Technology companies in particular have embraced the project team or workgroup

concept and are often governed by matrix reporting lines or flat organization structure (Byrne, 1993; Jehn et al., 1999; Keller, 2001; Pless & Maak, 2004). Prior to the remote-working trend necessitated by the COVID-19 pandemic, team-based organizations were often characterized by their open office layouts to facilitate team work. In the cases where a collection of workers is grouped together based on functional similarities but have no influence on each other's work (e.g., sales representatives who manage their own geography independently), they do not fit the definition of work teams in the context of this research paper.

Based on the above definition, interdependence is implied in the relationship among members of a team and the tasks they perform. It is considered one of the more important moderating factors of task performance. Research on team tasks has identified three distinct types of interdependence: task, goal, and team.

- *Task interdependence* is defined as “the extent to which team members rely on each other to complete their task” (Joshi & Roh, 2009, p.610). It can be manifested as sequential, iterative, or highly dynamic workflow steps performed by different team members or reciprocal exchanges among them to accomplish the task required (Jarrell, 2002; Van de Ven et al., 1976). The significance of task interdependence is grounded in the fact that it necessitates information exchange, which in turn creates the potential for process conflicts (Jehn et al., 1999).
- *Goal interdependence* is about having collective goals, rewards, or feedback on the work achieved by the team as a whole (Joshi & Roh, 2009). It does not necessarily entail task interdependence if the tasks are designed in a way that team members can independently complete their assigned work and the individual

work products are aggregated to accomplish the team goal. Even though goal dependency may not directly impact information exchange and task process, it affects the team dynamics when the contributions of individual team members are used to assess fairness or when the goals present incentives or disincentives for members to take on more or fewer responsibilities.

- *Team interdependence* is a broader construct that goes beyond task and goal interdependence (Joshi & Roh, 2009). Team interdependence represents the kind of community-level reliance such as psychological support among team members, social status acquired by being members of the team, or the critical mass needed for collective bargaining. Like goal interdependence, team interdependence has no direct effect on task accomplishment but can influence the group dynamics positively or negatively which in turn impacts members' commitment and their work performance.

Although the three interdependence types all contribute to team outcomes, task interdependence appears to receive more attention in academic research because of its theoretical relationship with increased task conflicts in heterogeneous teams. The prevailing theory is that higher task interdependence results in more process loss due to coordination and cooperation and thus a bigger negative impact on task performance (Horwitz & Horwitz, 2007). However, the theory does not account for the amount of professional practice that is in place to control task workflow and decision-making. For structured or well-understood tasks, there are often 'run books' or computer systems in place to facilitate coordination, enforce standards, and put in guardrails against

miscommunications and personal biases. A good example is surgery teams that follow strict protocols so that they can work in lockstep with minimal conflict.

Task complexity is another important factor often researched as it relates to task performance in teams. The hypothesis shared by several studies is that team composition matters only for complex tasks as they require diverse expertise (Horwitz & Horwitz, 2007; Jehn et al., 1999). Task complexity is assessed based on several different measures such as the number of steps or subtasks involved, routineness, process clarity, and outcome predictability. *Routineness* is defined as “the extent to which a task has low information processing requirements, set procedures, and stability” (Pelled et al., 1999, p.7). The related foundational theories postulate that routine tasks are less intellectual and subject to fewer complexities, therefore have fewer task conflicts. Several studies of workgroup performance used task complexity and routineness interchangeably and produced unexpected findings. Pelled et al. (1999) found that task routineness negatively affects social conflict but positively impacts task conflict as team members “seek opportunities to debate about their tasks to make their work more exciting” (p. 8). However, Jehn et al. (1999) arrived at a different conclusion when they observed that there was little variability in routine task performance among teams of different gender make-up. The contradictory findings perhaps have to do with how task complexity was derived from routineness. First, routine tasks are not necessarily simple or certain in nature; when they are subject to weak process enforcement or external influence, their outcomes can become highly variable. As an example, a cardiology surgery team may consider coronary bypass surgery a relatively routine treatment even though it is a rather complex procedure. Second, the measurement of routineness can be subject to different



interpretations when it is determined through self-assessment. In the research conducted by Jehn et al. (1999), they applied Perrow's index of routinization and Van de Ven et al.'s (1976) dimension of task variety and had participants provide their assessment with questions such as "The methods I follow in my work are about the same for dealing with all types of work, regardless of the activity," "My job is very routine," and "I feel like I am doing the same thing over and over again." If such survey questions are posed to someone who works in the area of IT helpdesk support, it is conceivable that the person would rate them high since there are usually templated responses or standard operating procedures for addressing common requests. However, as human interactions are heavily involved in the job, even a small percentage of novel questions or unexpected customer behavior can present many uncertainties that affect the performance of the helpdesk team.

### **Challenges with Defining Team Performance**

While task performance is often the basis for assessing team outcomes in academic studies, there are other performance measures beyond productivity or quality of task outcomes. Hackman and Katz (2010) partitioned the purposes of groups into three distinct categories: (1) accomplishing the work of the group, (2) strengthening the capabilities of the group itself, and (3) fostering the well-being of individual group members. The second and third aspects of team accomplishments are difficult to be measured objectively and are not always considered in quantitative research on diversity and team performance. Similarly, performance gains in qualitative outcomes (e.g., improved decision quality, more creative solution) are harder to assess as they are subjective in nature. They are sometimes referenced as mediating factors in research to explain the relationships between diversity and team performance (van Knippenberg et

al., 2004) instead of being treated as outcomes. Some researchers manage to use quantifiable measures (e.g., social integration, job satisfaction ratings, and employee turnover), but they are not considered as often in team performance metrics (Horwitz & Horwitz, 2007)

Productivity as a task performance measure is typically based on the number of work output units such as problems solved, new widget counts, points earned in games, or as ratings provided by observers such as researchers, supervisors, managers, or occasionally the team members themselves (Biga-Diambeidou et al., 2021; Horwitz & Horwitz, 2007; Jehn et al., 1999; Joshi & Roh, 2009; Kearney et al., 2009). At the organization level, task and team performance is viewed through the lens of financial outcomes (e.g., profitability) since it encompasses both the tangible and intangible aspects of performance and aggregates multiple tasks and teams within the organization. Moreover, profitability can be readily applied to investment decisions and used for comparing companies. Despite these advantages, researchers are cautious about the use of profitability in team diversity research because there are many other factors affecting profitability. Unless all these factors can be identified and made as control variables, measuring the exact effect of team diversity on profitability would be untenable.

Finally, it is important to note how team performance is also contingent upon the nature of the teamwork involved, as Hackman and Katz (2010) postulated. Based on their task type categorization, team heterogeneity matters more for complementary tasks and compensatory tasks. The performance of conjunctive tasks, disjunctive tasks, and additive task performance may be the highest with a homogeneous team of high-performing members and few outliers. These contingencies further illustrate the

complexities involved in team performance assessment since the choice of tasks to be used for measurement needs to be representative of the industry and job function in context. Solving fictitious intellectual problems or competing in business simulation games may be good enough approximations of real-world teamwork but not necessarily yield performance measurements applicable to particular industries. Besides applicability based on the nature of work, several studies called out contextual constraints such as limited social/financial incentives, team tenure, and inclusion measures in lab settings (Holmes et al., 2020; Joshi & Roh, 2009; Kearney et al., 2009).

### **Complexity of Team Diversity Measurement**

Team diversity is generally defined as the “aggregate team-level construct that represents differences among members of an interdependent workgroup with respect to a specific personal attribute” (Joshi & Roh, 2009, p. 600). Such attributes can be objective or subjective (van Knippenberg et al., 2004) which gives rise to heterogeneity in the team composition. Some of the common frameworks for diversity categorization are summarized below.

#### ***Surface-level vs. deep-level diversity***

Surface-level diversity is characterized by the objective personal differences in the protected categories under Title VII of the 1964 Civil Rights Act, namely, gender, race/ethnicity, age, sexual orientation, and disability (Jackson et al., 2003). Differences in the job-related background such as functional experience, educational background, professional expertise, and industry types are also considered surface-level diversity attributes for the purpose of this study as they are also objectively qualifiable. Deep-level diversity attributes are perceived differences such as values, attitudes, conscientiousness,

affect, creativity, and risk-aversion – all of which are subjective in nature (Bell et al., 2011; Harrison & Klein, 2007). Those attributes are the mediating variables that ultimately affect people's behavior (Horwitz & Horwitz, 2007; Shelma et al., 2014).

***Task/functional vs. relations/demographic diversity***

Another approach used for classifying diversity focuses on the objective measures of diversity and categorizes the factors involved under task/functional diversity versus relations/demographic diversity (Hass, 2010; Horwitz & Horwitz, 2007; Joshi & Roh, 2009). The former type of diversity contributes directly to job-related information resources and knowledge base which in turn increases the variety of ideas and solutions and improves the quality of team outcomes (Jackson et al., 2003). In other words, functional diversity generally has a positive impact on task performance. Demographic diversity, however, is more like a double-edged sword. On the one hand, it serves to improve task performance by way of increased resources and knowledge; on the other hand, it is directly linked to elevated social conflict, resulting in a negative impact on the relationships among team members which in turn adversely affects task performance. (Pieterse et al., 2013; Zouaghi et al., 2020).

***Social category vs. informational vs. value diversity***

Jehn et al. (1999) suggest that surface-level diversity does not translate directly to informational and value diversities. As such, they need to be treated as separate constructs in the context of team heterogeneity measurement.

***Separation vs. variety vs. disparity diversity***

Harrison and Klein (2007) put forward another model that also centers on the mediating effects. *Separation* is concerned with differences in opinions because of

values, beliefs, and attitudes. *Variety* is about different sources of knowledge, experience, and network ties. *Disparity* measures the differences in social assets (e.g., status, prestige, authority).

### ***Other concerns about team diversity measures***

Some researchers call out the different facets of social categorization at multiple levels: self-to-group, cross-subgroups, and group-as-a-whole. Because of this, there is a need to assess diversity beyond the conventional subgroup categorizations (Choi, 2007; Shemla et al., 2014). Self-to-group perception of demographic differences is contingent upon the cultural intelligence of individual team members whereas group-as-a-whole diversity is dependent on the specific team compositions (Stahl & Maznevski, 2021).

Another consideration for diversity is about where it happens in an organization. Based on the Upper Echelon Theory (Hambrick & Mason, 1984), which suggests that the background characteristics of top executives are strong predictors for overall organization performance, Top Management Team (TMT) diversity should result in more top-down influence and strategic commitment. TMT diversity has been referenced heavily in industry diversity scorecards created by consulting companies (Hunt et al., 2020; Lorenzo et al., 2018; Prabhakar et al., 2019). The related studies and academic research often consider only gender and race in the senior leadership (Bell et al., 2011; Biga-Diambeidou et al., 2021; Ruiz-Jiménez et al., 2016; Triana et al., 2019).

### **The Mixed Impact of Social Categorization on Performance**

The downside of diversity is often attributed to social categorization which leads to process loss in a work group (Stahl & Maznevski, 2021). The impact is manifested as open conflicts, overt biases, communication gaps, and lack of cooperation and

commitment between subgroups (Kearney et al., 2009; van Knippenberg et al., 2004). According to the social identity theory (Tajfel & Turner, 2004) and similarity-attraction theory (Byrne, 1971), homogeneous teams work more cohesively as they are more committed to preserving their identity and less prone to fault lines introduced by different demographic characteristics.

Although social categorization can negatively impact the relations aspects of group dynamics, it can positively affect the information and decision-making processes. Social categorization serves to counteract groupthink when open conflicts due to different perspectives are less likely to be superseded by the need for conformity or team cohesion. Disagreements may increase the comprehensiveness and extensiveness of decision-making when they are resulting from *cognitive diversity*, the variation in beliefs concerning cause-effect relationships and variation in preferences concerning goals (Miller et al., 1998). Some researchers suggest that cognitive diversity promotes creativity, innovation, and problem-solving (Horwitz & Horwitz, 2007). Finally, the Categorization Elaboration Model (van Knippenberg et al., 2004) proposes that categorization results in the elaboration of task-relevant information and perspectives, forcing the team members to examine information more thoroughly and to debate their decisions more vigorously instead of reaching consensus prematurely.

### **Other Moderating Factors for Team Performance**

Team longevity, the lifespan of a team, is believed to be a key factor for diversity salience. There are two opposing theories on team longevity. Some researchers believe that short-term teams are more focused on goal achievement and are able to set aside inherent differences or they have not reached the point where differences in values and

attitudes result in divides within the team; others suggest that long-term teams are more invested in achieving team identity and make more effort to accommodate differences for the sake of achieving their common goals (Joshi & Roh, 2009; Pelled et al., 1999).

Another two related concepts are the group development phase and *team tenure*, or the length of time members have interacted with one another in the team (Bell et al., 2011). The stage in which the team is at in their life cycle affects the maturity of their task and communication processes. Tuckman and Jensen's (1977) group development theory postulates that new teams always go through the forming and norming phases before they can become performant. Teams that have worked together for a longer period "tend to integrate and develop a sense of team identity over time" (Horwitz & Horwitz, 2007, p. 1007) and should perform better generally. Bell et al. (2011) however suggest that the positive relationship of tenure and performance is only valid when efficiency is the main criterion. The mix of more experienced and newer members, measured as team tenure diversity, is more relevant when innovation is concerned. Some studies found that team tenure has no effect on team performance; these studies did cite the little control they had over social integration and the lack of concrete ways to measure its extent as limitations (Haas, 2010; Horwitz & Horwitz, 2007; Jarrell, 2002). All in all, the moderating effect of team tenure on the relationship between diversity and team performance appears to be inconclusive.

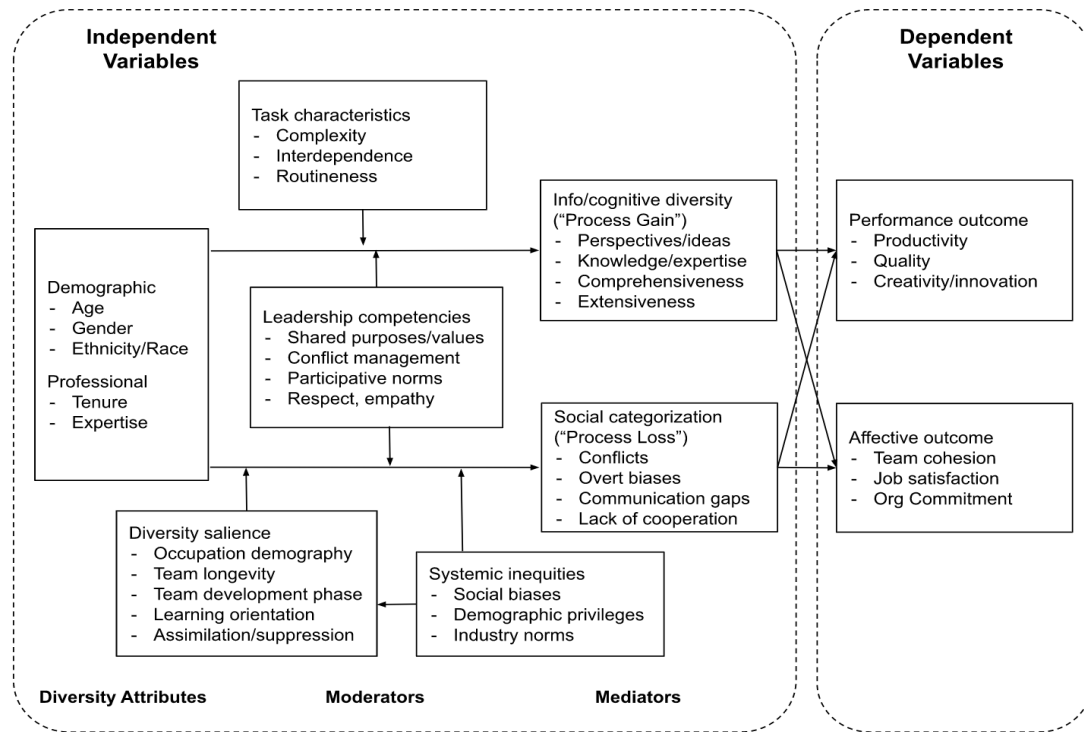
There are still other team or organizational-level factors such as team size, learning orientation, reward and feedback system, leadership style, and conflict management skills that can substantially influence the outcomes of diverse teams (Dwyer et al., 2003; Harrison et al., 2002; Lozano & Escrich, 2017; Pless & Maak, 2004; Rabl et

al., 2020; Triana et al., 2019). These factors may not be in play until any perceived privileges or prevailing disparities of the dominant subgroup trigger categorization-based processes (Stahl & Maznevski, 2021). Regardless of the trigger, there are certain possible responses of the underrepresented subgroup that can be detrimental to team performance: a) assimilate to downplay their differences and suppress different opinions, b) relegate themselves to demographic-stereotyped roles and hold back from their full potential, or c) become overly competitive to prove their competence against prejudice (Rudman & Phelan, 2008).

### **Summary**

The literature review presented highlights the many nuances in defining and measuring diversity and team performance. Moreover, the relationship between these two constructs is subject to many environmental and human factors. A good way to visualize the interactions among the many factors involved is to consolidate the categorization-elaboration model of van Knippenberg et al. (2004) on workgroup diversity and group performance, the multilevel framework of Jackson (2003) for understanding the dynamics of diversity, the process gain/loss assessment framework of Stahl and Maznevski (2021), and then build on top of them the additional forces identified in other literatures. A summarization of multiple sources is shown in Figure 1.



**Figure 1*****Team Diversity and Performance Model***

As with other issues in an open system, the effect of diversity on team performance needs to be examined with a contingency approach. Attempts to reduce their relationship into simplified models or predicting outcomes based on a small subset of the factors involved may result in inconsistent and unexpected outcomes. One way to reduce the number of contextual variables is to confine the research to a specific industry and a well-defined set of job functions and apply the results only to the relevant context. In doing so, we may be unable to identify general principles that can benefit other types of teamwork, but it is more prudent than assuming that there is a generic framework for getting better performance out of diverse teams. Furthermore, by analyzing task variables at the job function level, we can reduce the extent of subjective assessment when it comes to evaluating attributes such as task routineness.

### **Chapter 3: Method**

This research examines the state of workforce diversity in the high-tech industry and explores how different technical job functions may benefit from a diverse team composition from both the performance and affective perspectives. The research questions being studied are:

- What are the relative benefits of different types of diversity for high-tech job functions based on the experiences of practitioners in the field?
- How exactly do the relevant diversity attributes (e.g., gender, ethnicity, education) positively or negatively affect the outcome of teams performing high-tech job functions?
- Would some type of job function-level characterization be more effective than task-level routineness and/or complexity measures for predicting diverse team outcomes?

The research design, sampling strategy, instrumentation and measurement framework, data collection methods, and data analysis procedures are described.

#### **Research Design**

There are a multitude of contextual factors that affect researchers' ability to "generate evidence supporting or disconfirming the existence of any general principles about diversity's consequences" (Jackson, 2003, p. 818). For this reason, this study was designed to be exploratory in nature, extending the research effort in understanding the mechanisms and boundary conditions involved (Stahl & Maznevski, 2021). I took a qualitative approach to investigate through in-depth interviews how diversity played out at the workplace from a first-person perspective. Interview participants were asked to

describe any formal or informal diversity goals at their workplace, expected and actual outcome of those diversity goals, benefits and challenges they experienced with diverse teams, and their opinions on why and how different types of technical work might or might not benefit from diversity. The study approach allowed for a deeper understanding of how well diversity initiatives were executed in the field and how people actually perceived the pros and cons of heterogeneous teams.

Unlike jobs in mechanistic organization settings, modern-day technology companies are leaning towards more ‘full-stack’ engineering roles and cross-functional organizational structures to promote innovation and agility (Frazier et al., 2020; Granada, 2020). Such trends contribute to more enriched jobs which involve wider collaboration and responsibilities. As participants were asked to reflect on how diversity contributes positively or negatively to team outcomes for different types of technical work, there were two ways to go about it: (1) make observations and assessments based on job functions (e.g., customer support, system engineering) or (2) evaluate in terms of granular tasks performed within those functions (e.g., answering customer inquiries, troubleshooting system issues). Although the latter approach might generate more information for analyzing low-level team dynamics, it did not align with the real-world work contexts where teams are put together to solve problems or deliver solutions. As such, the interview questions for this study focused on commonplace technology industry job functions so that participants could speak directly to their day-to-day work experience without having to mentally analyze each task performed within a job function.

## **Instrumentation and Measurement Framework**

To assess how job function may be related to diversity outcome and the characteristics of such relationships, two frameworks were adopted in this study for: a) defining a set of representative job functions in the high-tech industry and b) identifying job function traits that embody task-related moderating factors in the diverse team performance conceptual model.

### ***Representative job functions***

To arrive at a list of job functions with meaningful distinctions, I collected the job descriptions in the information technology field from a variety of data sources (e.g., Bureau of Labor Statistics, Indeed, and technology career guidance published by coding institutes such as [girlsintech.org](http://girlsintech.org) and 23 Code Street). The job titles were then consolidated based on the responsibilities and skill requirements, as detailed in Appendix A. Table 1 showcases the resultant list of job functions:

**Table 1*****Representative Technical Job Functions***

<b>Job Function</b>	<b>Job Titles within this area</b>	<b>Major Tasks</b>
IT/System Operations	Operations Manager, Network Engineer, Database Admin, Security Specialist	Manage operations and maintenance, mitigate attacks
Data Analytics/ Business Intelligence	Data Scientist, Marketing Manager	Research data for business and marketing decisions
System Engineering	Research Scientist, Network Architect, Software Engineer, Security Specialist	Invent/innovate technologies, design/build systems
Technical Generalists	Quality Assurance, IT Technician, Copywriter	Support multiple projects, e.g. verify, document, and provide training
Functional Design	System Analyst, Product Manager	Study business problems, design solutions
Strategy Shaping	IT Director, Product Manager, Marketing Manager	Shape product directions, execution strategy
Human Interface Design	User Experience (UX) Engineer, UI Engineer	Build application user interface
Customer Liaison	Support Specialist, Account Manager	Help/advice customers, manage customer relationships
Project Management	Program/Project Manager, Marketing Manager	Coordinate dependencies, identify risks/contingencies
People Management	No specific title; basically any role that involves substantial supervisory duties	Supervise, provide guidance, manage performance

***Job function traits***

Based on the conceptual model from the literature, routineness, complexity, and interdependence of the work performed are the most relevant attributes as far as job nature analysis is concerned. However, there are several drawbacks with applying these constructs at the task level:

- Technology job responsibilities generally involve a wide variety of tasks as opposed to one or several monolithic tasks.
- Task routineness, complexity, and interdependence do not always relate to each other; they are distinct measures that predict the amount of communication, collaboration, and decision-making required to accomplish a task.

- Task routineness measures from Van de Van et al. (1976) and Gladstein (1984) focus on task repetitiveness and the presence of stable or set procedures but do not consider the extent of mitigations and controls in place for dealing with deviations.
- Increased cross-functional work necessitates intergroup dependence and stakeholder interactions, meaning that any social categorization effect that impacts team performance can be extended to parties outside of the team.

To avoid these shortcomings, I proposed two alternative constructs for characterizing job functions: Job Outcome Certainty and Social Orientation. They represent the primary factors that have the potential to trigger social categorization and incur process loss in team settings.

*Job Outcome Certainty* is defined as the degree of perceived variability in the outcome produced by a job function. It is measured in the form of self-assessment by interview participants using two of Aiken and Hage's *Formalization* subconstructs, job specificity and technology, that are considered to have moderate-to-good validity and reliability (Dewar et al., 1980). The two subconstructs, making up 10 items, can be seen in more detail in Appendix B. The 10 scores will then be aggregated to come up with the overall rating. This rating represents the perceived certainty for the technical job function performed by the participant interviewed.

*Social Orientation* is a measure of the relative proportion of social versus intellectual competencies involved in a job function. As opposed to task interdependence, which focuses on the extent of human interactions and emotional understanding among team members, social orientation encompasses external relationships involved in the job

function (e.g., customer engagement, vendor/partner relations, intergroup communications, employee management). I developed a set of tentative ratings based on the competencies published by industry groups in the descriptions and requirements for these job functions (Appendix A). Table 2 showcases the high-level categorization of the 10 representative job functions by their social orientation based on those ratings.

**Table 2**

***Technical Job Functions by Social Orientation***

<b>Low</b>	<b>Medium</b>	<b>High</b>
IT/System Operations Data Analytics/Business Intelligence System Engineering	Technical Generalists Functional Design Human Interface Design	Strategy Shaping Customer Management Project Management People Management

This construct serves as one of the dimensions used in the strategies for interview participant selection and data analysis.

### **Sampling Strategy**

Participants were selected following a stratified purposeful strategy with the goal of incorporating the perspectives of technology workers with different job functions and demographic backgrounds. The strata comprised of 16 unique combinations of gender, ethnicity, and job functions with distinct levels of social orientation as can be seen in Table 3.

**Table 3*****Participant Sampling Strata***

Ethnicity		Gender		Job Function	Social Orientation
Caucasians	Non-Cauc.	Male	Female		
X	X	X	X	People/Project Management	High
X	X	X	X	Customer Management	High
X	X	X	X	Systems Engineering	Low
X	X	X	X	IT/System Operations	Low

The targeted number of interview participants was 25 with a distribution that maximized the coverage of the strata above. As Caucasians were found to be the dominant demographic in the IT industry based on the U.S. Bureau of Labor Statistics for 2021 (BLS, 2022), the ethnic coverage was modeled to represent this group and as many underrepresented ethnic categories as practical. The selection of participants was optimized to include people working at both large/established and small/startup companies, with work experience in the industry for at least 10 years across different companies or functional teams.

**Data Collection**

I reached out to high-tech companies to identify individuals who met the sampling criteria and had an interest in participating in the study. The participant interviews were conducted in one-on-one settings over Zoom. During the interviews, responses were recorded primarily through note-taking. A consent form was shared with interviewees ahead of time. The consent form covered an overview of the purpose and logistics, participation consent, risks, and contingencies. The interview protocol used for conducting the interview included the actual diversity questionnaire, a self-assessment of



the job outcome certainty, a record of the personal information about the participant (e.g., gender, ethnicity, job role), and the team composition (e.g., extent of gender and ethnic diversity) in their most recent work environments. Some of the key exploratory questions included the current state of diversity at work and organization initiatives in place, the benefits and challenges involved in achieving a diverse workforce, and opinions on which types of diversity bring the most positive impact to what job functions. The complete interview protocol and consent form can be found in Appendix B.

### **Protection of Human Subjects**

To ensure the protection of human research subjects, I completed a web-based training course certified through the Collaborative Institutional Training Initiative (CITI) (certificate included in Appendix C). The training was done prior to any contact with the research participants.

Individuals participating in the interviews were asked to confirm their interest and participation by signing consent forms electronically. Data collected from the qualitative interviews were treated as confidential. All study data were stored in password-protected Microsoft Excel sheets. Hand-written notes and signed hard-copy forms were transcribed or scanned for electronic storage and shredded. All electronic notes, test data, test results, and analysis from the surveys and interviews were stored electronically with password protection. In all instances, only I had access to data related to this study.

Participants were advised that data from the research study would be maintained for a period of up to five years. Five years following the study, all documentation will be destroyed in a secure manner.

## Data Analysis

Interview results were analyzed to identify any patterns of success and challenge with heterogeneous teams. The positive and negative outcomes reported by participants were coded against a predetermined list as well as new items that emerged from the interviews (Table 4). The predetermined codes were derived from the diversity variables captured in the team diversity and outcome conceptual model in Chapter 2.

**Table 4**

### *Diversity Impact Coding Scheme*

<b>Positive Impact</b>	<b>Negative Impact</b>
More novel ideas or perspectives	More conflicts to manage
More representative of customer interests	More nuances in communications
More likely to challenge assumptions or status quo	Less intense/competitive
More in-depth examination of facts/data	Harder to establish norms
Less prone to bias/stereotyping	Harder to build trust or rapport
More risk-averse	Harder to achieve consistent work product

For challenges faced in elevating the positive impact of diversity and mitigating the negative impact, they were codified based on the moderating variables identified in the conceptual model as can be seen in Table 5.

**Table 5**

### *Diversity Moderator Coding Scheme*

Lack of corporate incentives or directions for achieving diversity
Senior management not serving as role models
Lack of inclusion skills at management level
Lack of cultural sensitivity among the general workforce
Inherent social inequity, e.g., biases, aggression, or microaggression towards minorities
Minorities proactively conform as they don't feel empowered/qualified
Minorities suppressing their opinions in favor of harmony
Team tenure too short to offset the longer norming phase

As part of the data analysis, the interview data was examined for two possible biases: (1) any tendency for participants who had manager roles to gravitate towards a positive view of diversity goal achievements and (2) any common themes among participants who consider themselves minorities. Such patterns might constitute limitations of using interviews as the only data collection method because all data were self-reported and subject to bias.

### **Summary**

This chapter provided an overview of the research methodology including instrumentation and measurements, sampling and coding strategies, and the complete interview protocol. This chapter also reviewed the steps that are to be taken to ensure confidentiality and protection of Human Research Subjects.

## Chapter 4: Results

I conducted interviews with 16 participants out of 23 people contacted. The distribution of the participants by gender, ethnicity, and job functions are summarized in Table 6 and 7.

**Table 6**

***Participant Demographic Distribution***

<u>Ethnicity</u>	<u>Male</u>	<u>Female</u>	<u>%</u>
Caucasian	5	3	50.00
Chinese	1	3	25.00
South Asian	1	1	12.50
Other	2	0	12.50
Total (N=16)	9	7	

**Table 7**

***Participant Job Function Distribution***

<u>Job Function</u>	<u>Manager</u>	<u>Non-manager</u>	<u>%</u>
People/Project Management	2	2	25.00
Customer Management	3	0	18.75
System Engineering	4	1	31.25
IT/System Operations	1	3	25.00
Total (N=16)	10	6	

All participants involved in this study had work experience in the technology industry for at least 10 years across multiple companies of different sizes. They were from different high-tech companies and most of them had over five years of supervisory and hiring experience. One limitation was that most of these individuals developed their career in organizations headquartered in the San Francisco Bay area. Their opinions

might not be representative of technology companies based outside of Silicon Valley.

Despite this, the companies in which the 16 participants worked had distributed workforces across the US and at least half had employees in other countries.

Most of the non-Caucasians interviewed were Chinese and South Asians; they represented a main cross-section of the technology workers in the field today. To ensure the participants were not making references to their working experience outside of the US, only participants who already lived and worked in the country for over 20 years were selected for this study.

### **Current State of Workforce Diversity**

To provide more context for their interview responses, participants were asked to indicate if they considered themselves minorities in their work teams and explained their rationales. Those in engineering and IT functions indicated that they still worked in teams dominated by Caucasian and Indian (South Asian) males. Half of the participants saw themselves as minorities. Table 8 showcases these results.

**Table 8**

#### ***Perception of Self as a Minority in Team***

<u>Ethnicity</u>	Minority in work team		Not a minority	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
Caucasian	0	3	5	0
Chinese	1	2	0	1
Indian (South Asian)	1	1	0	0
Other	0	0	2	0
Total (N=16)	2	6	7	1

The current state of diversity at workplaces was explored in the interview through the following questions:

- What is the general attitude toward diversity and inclusion at your workplace?
- How do people (top management, first-line managers, individual contributors) feel about the need and urgency of promoting workforce diversity?

All participants stated that there were ongoing initiatives to promote the diversity of their workforce demographics. These initiatives ranged from optional awareness training for managers to mandatory compliance training for all employees, and from informal hiring guidance to formal candidate selection processes and metrics. One participant said that her company allowed minority candidates to be “fast-tracked” in the hiring process. Another participant described how his company imposed the inclusion of “diversity candidates (i.e., additional candidates directed to the hiring managers by a central recruitment team). Both participants experienced the need to make elaborate justifications whenever they had to reject certain minority candidates, currently defined as female African or Native American qualified applicants. About half of the participants talked about open commitments by their top-level executives to bring more diversity to the C-level suite or their companies being intentional in hiring more female executives. However, almost all participants observed that there were no clear departmental-level diversity goals. Even though the organization’s overall workforce was becoming more diverse, their engineering and IT teams were still male-dominated whereas marketing and finance departments had a much higher proportion of female staff.

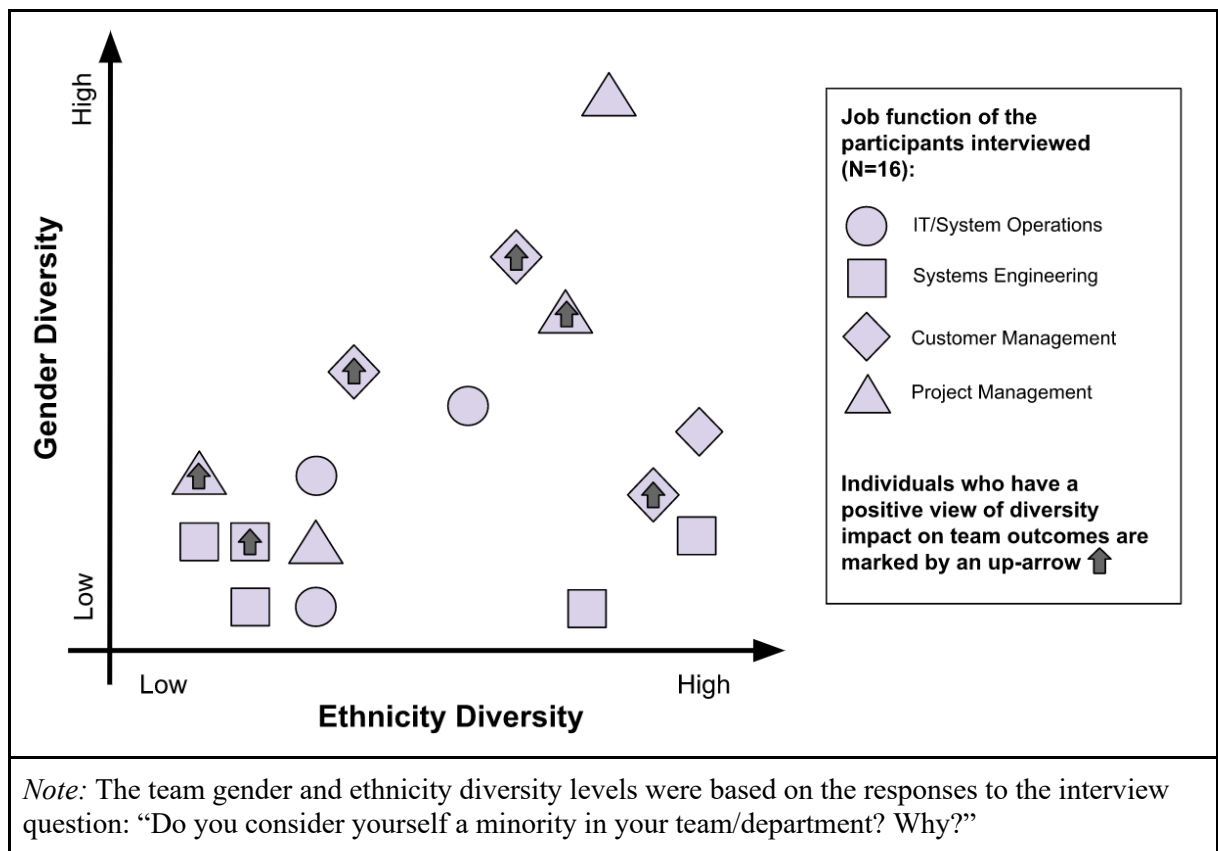
When participants were asked what the expected outcomes were of adhering to diversity targets, all said that the only reasons given were that it was the right thing to do

and it was good for the company. Five individuals elaborated on what that meant to them in one or more of these three interpretations: a) it would seem fair to have a workforce that reflects the demographics of the world they live in; b) it is important to provide more opportunities to the underrepresented communities; and c) it creates an environment where people can have a better sense of belonging. Two participants (both were Chinese females who moved to the United States after college) stated that their accent and lack of social connection could sometimes make them feel vulnerable because they found it difficult to speak up in group settings or break into the predominantly white or Indian inner circles. They managed to compensate for these disadvantages and did not think their own performance or team work was adversely impacted. One of them expressed, “As a minority, I just have to work harder and find my own allies in order to get information.” Nevertheless, they both believed that when there was no overwhelming majority in a work team, there would be less alienation and people would feel more comfortable speaking up. This sentiment was echoed by one other participant, who noted that “having monolithic teams seems like an unhealthy thing altogether.”

### **Diversity Impact on Team Performance**

In response to “Have you had any experience with diverse teams that perform better? What contributes to their success?” and “Have you observed teams which performance suffers from diversity? Do you know what difficulties they face?”, six of 16 participants said heterogeneous teams perform better. The other 10 participants stated that there was no observable performance impact from diversity in their experience. The gender/ethnicity mix of the teams in which the participants worked did not appear to affect their views, as shown in Figure 2.

Figure 2

*Diverse Team Performance Views by Participant's Work Team Composition*

The reasons given by the six participants in support of better team performance included:

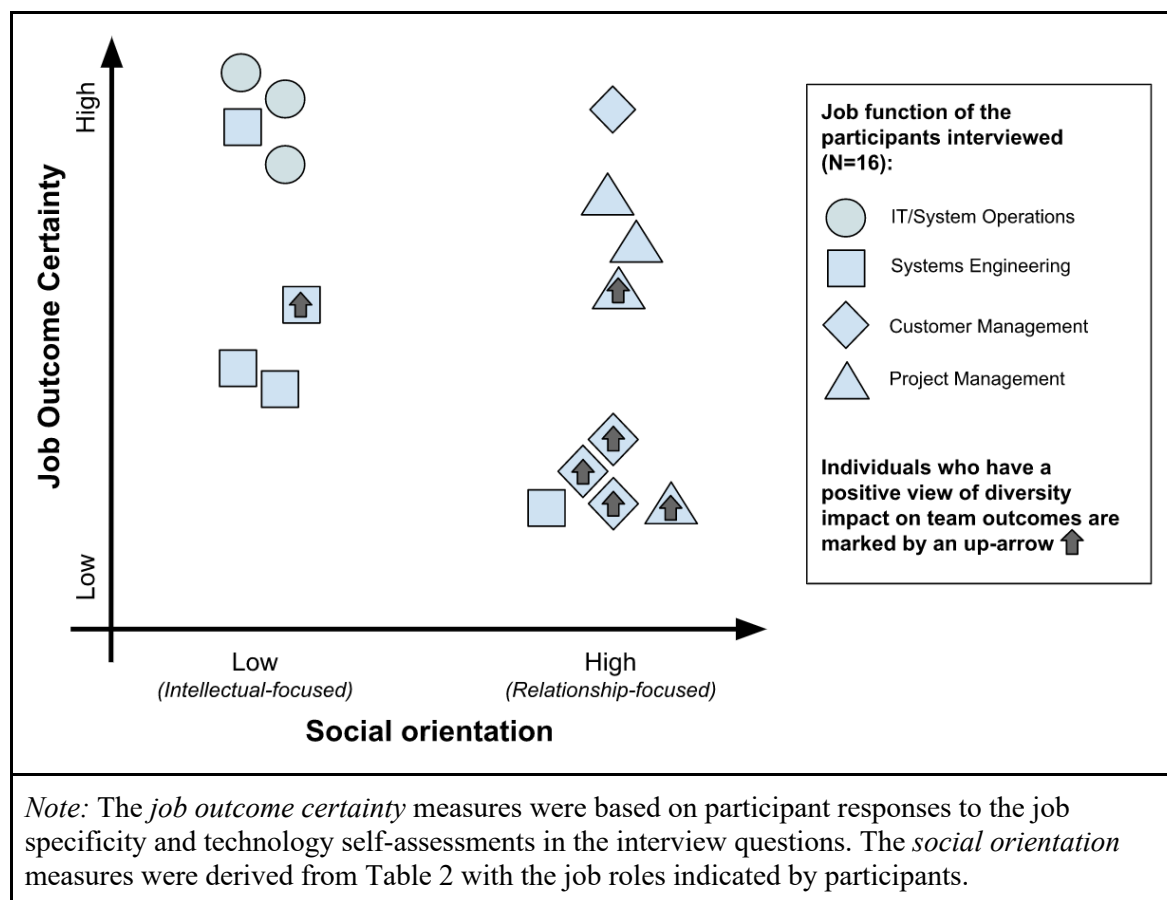
- Diverse workforce makes the company a better place to work
- Artificial intelligence algorithms are less biased when teams are more heterogeneous
- Products/services can better meet different user behavior or expectations
- Companies can have a broader pool of candidates by being diverse in their recruitment



Four of these six individuals happened to be working in roles that have a stronger relationship focus and lower certainty in outcomes, as indicated by the small cluster of up-arrows in the bottom right-hand corner of Figure 3.

**Figure 3**

*Diverse Team Performance Views by Job Function Constructs*



The other thing in common among them was that they were directly accountable for the quality of the products or services provided to customers, as reflected in how they described their main responsibilities (e.g., meeting customer needs, better product, higher quality). Four of six played a product or project management role, one managed quality engineering, and the other person oversaw customer support. The advantages cited are consistent with the positive impact suggested in academic research (Table 9).

**Table 9**  
***Positive Impact of Diversity in Work Teams***

<u>Impact</u>	Responses	
	<i>f</i>	<i>%</i>
More novel ideas or perspectives	6	37.50%
More representative of customer interests	4	25.00%
Less prone to bias/stereotyping	4	25.00%
More likely to challenge assumptions or status quo	1	6.25%
More risk-averse	1	6.25%
More in-depth examination of facts/data	0	0.00%
<hr/>		
<i>N</i> =6		

One participant commented, “If you are not careful, computer systems will have the personalities of their creators” in support of their belief in reducing biases with heterogeneous teams. Another participant pointed out that their current work, related to artificial intelligence, could greatly benefit from having more diverse point of views to uncover blind spots in product design.

For the 10 participants who stated that diversity did not appear to make any performance difference, eight mentioned that matching job-related skills was the most important factor. One person felt that homogeneous teams were not necessarily more cohesive whereas personalities of the team members mattered more. Two participants expressed that racial or ethnic culture did not quite affect the work culture in their experiences, but they still favored diversity in teams for reasons unrelated to work performance (e.g., more interesting social conversations, opportunities to learn about other cultures, and easier to provide 24x7 service coverage with globally distributed teams). Another two participants speculated that the candidate pool for hiring could be broadened when the team members were of more different backgrounds because "we

tend to hire people who are like us." However, their definition of background was not only about demographics (i.e., age, gender, ethnicities) but also related to education and work experience.

Fourteen of 16 participants said they had not observed or experienced any negative impact of diversity on work team performance. Two people mentioned that they had team members who were hired because of their demographic profiles instead of job-related capabilities. They did not favor having to “carry others in the team” when job-skill fit was sacrificed for the sake of diversity.

### **Factors Affecting Diversity Outcomes**

When asked “Are there obstacles in maintaining or promoting workforce diversity at your workplace?”, responses echoed most of the challenges highlighted in the literature research as can be seen in Table 10.

**Table 10**

#### ***Factors Affecting Diversity and its Impact***

<u>Factor</u>	Responses	
	<i>f</i>	<i>%</i>
Limited candidate variety	9	42.86%
Inherent social inequity, e.g., biases, aggression, microaggression towards minorities	4	19.05%
Minorities proactively conform as they don't feel empowered/qualified	2	9.52%
Lack of inclusion skills at management level	2	9.52%
Senior management not serving as role models	2	9.52%
Lack of corporate incentives or directions for achieving diversity	2	9.52%
Lack of cultural sensitivity among the general workforce	0	0.00%

*N*=16

Nine participants cited limited candidate variety as the top challenge. In their experience with technology companies, the candidates coming through regular recruitment channels were often too monolithic (i.e., mostly white or Indian men). Three

participants had gone out of the way to look for alternative candidates through referrals from their secondary professional or social networks, by scouting profiles on LinkedIn, or by prioritizing minorities during campus recruitment. Other participants admitted that they did not have the resources or time to diversify the candidate pipeline so they would only “prioritize within reason” to hire a minority (e.g., when “everything is equal” between the candidate and another white male).

Three female participants and one male participant pointed out that they had personal experiences of being, or witnessing a female coworker being, intimidated by a male counterpart and only speaking up in one-on-one settings. In some cases, it was perceived as a cultural norm (e.g., Indian women willingly held back her opinions in front of men). In other cases, it was attributed to stereotyping pressure when the discussions were about technical matters, a subject area in which men were usually more knowledgeable.

Two of the female participants said they tended to act more aggressively when dealing with their male counterparts but they would get unequal treatment for being harsh (e.g., they were told that they were “too direct” or “bitchy” by their managers or coworkers). One of them expressed that such “learned behavior of putting on men’s form for the sake of survival” caused her and other females at work to lose their own characteristics.

One participant, a Caucasian woman, shared how she caught herself prioritizing Asian resumes for a job opening that demanded good memorization skills. An Indian male engineering manager reflected during the interview how he often chose to assign urgent after-hours work to his male staff because the work would more likely get done. In

doing so, he understood he was not being inclusive but it was out of good intent, allowing his female staff to take care of family chores in the evening.

### **How Diversity Type and Job Function Affect Team Outcomes**

The opinions regarding the relationship between team outcomes and different types of diversity, in response to the question “In your opinion, which of the demographic diversity attributes, i.e., gender, ethnicity, age, have a more positive or negative impact on team outcomes?”, fell into three categories:

**Table 11**

#### ***Types of Diversity that Matter for Team Outcomes***

<u>Diversity type</u>	<i>f</i>
Demographics (e.g., gender, age, ethnicities, marital status, sexual orientation)	3
Personal differences (e.g., education, work experience, personality)	3
None	10
<hr/>	
<i>N</i> =16	

Of the six participants who believed that heterogeneous teams performed better, three stated that all types of demographic varieties were equally important because product team composition should be representative of the customers who used their products or services. The other three participants felt that other personal differences were as important but agreed that, generally speaking, there would be a better chance to get different viewpoints from a demographically diverse workforce.

From a job function perspective, the opinions were mixed towards the question “Have you observed any differences in the outcome of diverse teams based on their job functions” as can be seen in Table 12.

Table 12

*Relationship between Diversity and Job Function*

<u>Relationship</u>	<i>Responses</i>	
	<i>f</i>	<i>%</i>
Customer-facing roles are more likely to benefit from diversity	3	15.79%
Customer-facing roles are more likely to benefit from cultural alignment	1	5.26%
All job functions can benefit from diversity	2	10.53%
Technical roles are less likely to be impacted by diversity	4	21.05%
No opinion / no relationship between job function and diversity	6	31.58%
Customer-facing roles are more likely to benefit from diversity	3	15.79%

*N*=16

Three participants suggested that diversity is good for customer-facing roles (e.g., product management, marketing, customer service) through better representation of customers' interests. On the contrary, one person mentioned that the alignment with the dominant culture of the customer base was perhaps more important. As an example, he believed that white-male account managers normally worked better with US clients because they were able to build better connections through shared popular culture (e.g., making small talks about baseball and TV shows they grew up watching).

Four participants stated that skills and talents trumped all other aspects when it came to technical tasks and therefore diversity might be less relevant for such work. Unlike other participants, one proposed that "many small decisions are involved in every line of work, including technical work" and the only way to catch biases was to have a more diverse workforce in every job function. According to one participant, engineering teams "could do a good job only if they were to build a product for people like them."

## **Other Themes and Findings**

### ***Diversity is an outcome, not the goal***

One participant brought up the "human-first" core value in his organization and how diversity was blended into that theme. He observed that the enactment of this core value naturally led to diversity without the need to explicitly chase after certain diversity targets. This observation was supported by another participant who used to work for a company that was considered highly successful in their pursuit for diversity. She pointed out that this particular organization was intentional in recruiting people-oriented and open-minded individuals who in turn helped to create an environment that was conducive to learning, building trust, and psychological safety. The organizations which experienced positive outcomes from diversity focused on what they set out to achieve, be it a business capability or an issue at hand, and diversity followed.

### ***Diversity is more about social responsibility***

Participants were in support of workforce diversity because it was the right thing to do from a social responsibility perspective, regardless of their views on heterogeneous team performance. One participant suggested that companies could perhaps create more job opportunities for the underrepresented communities through some kind of internship program instead of focusing on hard-and-fast diversity hiring policies.

### ***Demographic diversity may not be the right emphasis***

One participant pointed out that outward demographic features did not necessarily reflect a person's ethnicity. In the organization she worked for, there were people who looked like minorities based on their skin color but were actually Caucasians and vice versa. There were also many second or third-generation immigrants and people of mixed

ethnicities in her workplace who had cultural behaviors that were substantially different from others in their demographic categories. She questioned whether it was more meaningful to pursue diversity based on different backgrounds versus superficial demographic attributes. Finally, the participant who had to deal with diversity candidates during hiring commented that “the pendulum has swung too far.” As an Englishman of Asian descent, he believed that there had to be more balance in his company’s hiring policies to avoid imposing higher bars on white-male applicants and over-generalizing actions towards poor performing minorities as discrimination.

***Women in leadership positions feel more strongly about diversity***

Among the seven females involved in this study, those who expressed very strong opinions on the need for demographic diversity were all females in leadership positions. They cited their personal stories and observations to support their arguments, occasionally applying projections of their own experiences of being discriminated against. As an example, one participant explained that having more females on staff was beneficial because, like her, they always work hard to prove themselves. Another individual believed that she was treated more favorably by her male peers after she had lost weight, a phenomenon she thought would never happen to men and, therefore, having a more heterogeneous team would lessen unfair gender-specific expectations.

**Summary**

This chapter presented the results of an exploratory study. Overall, there was some support for better outcomes from diverse teams in job functions related to customer interactions and those that represent customers’ interests. The types of positive impact cited by the participants were consistent with the academic research review, i.e., more



different perspectives, more representative of customers, and less bias/stereotyping being the top benefits. There was no consensus on which type of diversity contributed more to the positive outcomes but the majority of the participants suggested that non-demographic differences such as education, capabilities, and personality were important dimensions for them. There was no indication from the interview findings that teams perform worse when the members are more heterogeneous in demographics. About one-third of participants believed that such teams perform better. All participants affirmed that there is a need to provide more opportunities to the underrepresented communities in the tech industry but they diverged on the ways to fulfill that need. The top two factors affecting the achievement of diversity at the participants' workplace were limited candidate variety and social biases and/or stereotyping.

## **Chapter 5: Discussion**

The interview findings in this exploratory study confirm the lagging behind state of the high-tech industry in DEI. Many of the people interviewed for this study still work in teams made up of dominant demographics. Female participants in leadership positions felt strongly about the need to increase diversity at their workplaces. As far as the performance of heterogeneous work teams is concerned, the benefits brought up by some of the interview participants also match closely with academic research. The lack of conclusive opinions on the types of diversity contributing to better team performance is not a surprise given the many factors involved at the individual and team level.

A more detailed discussion of the implications of the study findings, conclusions, and limitations of this study are presented in the following sections.

### **Implications**

The questions being investigated in this study may be less relevant if diversity is driven solely by social responsibility instead of organization effectiveness. But for companies that see diversity as a way to become better at what they do and advocate this as a motivation, they need to be aware of the potential reservations their employees have on the claim of definitive performance or financial benefits. Instead, associating organization values with diversity initiatives may provide a stronger foundation for pursuing workforce diversity.

Another implication that can be drawn from the suggested trend in the small dataset is how the point of view towards diversity can be shaped by one's job function. The six participants who considered diverse teams better in performance had less job outcome certainty and higher social orientation in their work compared to other

participants. These constructs were meant for characterizing job functions in a way that allows me to understand which type of job functions benefit more from diversity. The two constructs showed up as potential factors that affect the perception of diverse team outcomes. One way to explain this is that the background of these individuals, as well as their accountability for the quality of the products they manage, appear to have elevated their sensitivity to what diversity can do for their organizations. As for the investigation of how job outcome uncertainty or social orientation associates with diverse team performance, there is no conclusive finding from this research. Two individuals went so far to say all job functions could benefit equally from diversity. But if low job outcome uncertainty and high social orientation make for more appreciation of diversity, why did these six participants not indicate their job functions as the ones that benefit more from having more heterogeneous team composition? To answer this question, it may help to relate the positive team outcomes back to what these participants highlighted as the contributing factors.

An advantage that companies can get out of more heterogeneous teams, as suggested by the findings, is better products and services. Apart from different demographic attributes, diversity in education, professional experience, and personality, other factors affecting the use of a product or service were deemed important by many participants. These individual differences can potentially contribute to higher quality in three distinct ways: a) people working on developing the product/service represent a wider variety of customer perspectives, b) team members of different backgrounds generate more ideas, and c) there is less bias and stereotyping in those perspectives and ideas. Less bias and stereotyping is particularly important in design thinking, whether it is

for a software program, an electrical appliance, a digital device, a search algorithm, or a recommendation generated using artificial intelligence. An example cited by a participant was the logic used in autonomous driving programs for accident response; should the system optimize for fewer total number of casualties versus prioritizing less harm inflicted on the pedestrians? In the realm of technologies, ethical decisions like these are sometimes buried in the programming logic and only the designers and engineers who work on it know that such rules even exist. Consequently, focusing only on job-related skills of members that make up technical teams not only masks the biases but also reinforces them if the teams are overly monolithic.

Given this understanding of how heterogeneous teams can produce better outcomes, it is conceivable that the benefits of diversity are not limited to the departments responsible for products and services. These individuals in turn consume services from other supporting departments such as program management, IT, Finance, and HR. These departments also have to be diverse in background to better serve their internal customers. The same logic applies to the leadership level in the organization, who own higher level decision-making because they too can better appreciate the interests of their staff and customers by being more heterogeneous in composition.

The findings in this study also show that even experienced professionals are still subject to alienation or biases from members of dominant demographics for being a minority in the team. When team compositions are more balanced, the resulting diversity climate can foster workplace belongingness which in turn enables more active participation and tacit knowledge sharing (Enwereuzor, 2021; Rabl et al., 2013). These

benefits further support the arguments against focusing only on job-related skills during hiring, or considering diversity irrelevant to technical job functions.

The above implications serve to reinforce several key DEI emphases that may be particularly important for the high-tech industry. First, it helps to be intentional in designing the organization with diversity as an outcome. Clearly articulated rationales for diversity, beyond generic statements such as “diversity is good for the company,” can help the organization to align those rationales with corporate goals that are supported by the overall organization design. Creating better products, making the company a better place to work, and bringing in the best talents are some examples of goals that can lead to a more diverse workforce. On the contrary, when diversity is viewed as an isolated goal rather than a part of the organization design, organizations may go down the path of compliance (e.g., mandating certain demographic attributes in their candidate selection process, introducing more bias awareness training). Such efforts also lead to the phenomenon of having to emphasize the E and I in DEI as additional aspects or even phases of the diversity pursuit. Equity and inclusion can become implicit in diversity conversations if systems and processes are aligned with values and purpose, creating the intrinsic motivations for members in the organization to treasure and leverage people’s differences.

Second, it helps for DEI practitioners to keep in mind some of the opposing forces to diversity in the high-tech industry: a) practices that are aimed at reducing certain dominant demographics in the profession can backfire as reverse discrimination, as one of the interview participants pointed out; and b) the common belief that technical talent trumps other qualities, according to most people interviewed. To overcome these forces,

practitioners may need to focus on changing the orientation of DEI efforts from problem fixing (e.g., prevent discrimination, reduce biases) to getting the desired outcome (e.g., more representative of our customers, better sense of belonging). Such a mindset is reflected not only in the language, but also the measurement of the outcomes. Therefore, apart from paying attention to just employee demographic metrics, organizations may also consider measuring their diversity achievement based on business goals (e.g., customer satisfaction ratings by user characteristics and employee engagement by their demographics).

Third, the findings confirm that social inequity is still a practical concern that can set back the progress of workplace diversity. Besides focusing the general workforce on the possibilities opened up by diversity, mindset changes may have a bigger impact when addressed at the managerial levels since several factors that impact diverse team outcomes are related to the leadership, specifically: a) lack of inclusion skills at management level, b) senior management not serving as role models, and c) lack of corporate incentives or directions for achieving diversity.

Finally, the study highlighted another limiting factor for technology industry diversity which is the lack of candidate variety. It confirmed the underrepresentation of minorities in computer science and engineering disciplines in higher education, a phenomenon that has been widely reported (Fry et al., 2021). The issue is beyond the scope of this research but points to the need for OD practitioners to consider environmental forces in their whole-system considerations of workplace diversity. Some participants indicated that it was helpful for their organizations to create or sponsor

programs that provide technological education and internship opportunities to the underrepresented groups, in support of their core values of giving back to the community.

## **Conclusions**

This study shows that the high-tech industry faces many of the same challenges as other industries in building a more heterogeneous workforce and realizing the desired outcome. The research reveals that the obstacles they face are exacerbated by uneven demographics in the industry, as well as the ambivalence in understanding what benefits organizations can get out of diversity. The majority of the participants in this exploratory study did not think that diversity had any positive or negative impact on the outcomes of work teams. The main motivation for the DEI initiatives at their workplace has to do with the conviction that diversity is the right thing to pursue. Consequently, the findings were inconclusive related to what types of diversity are more important for which job functions. Nevertheless, through the investigation of how one's job function might affect his or her view on the effect of diversity, several implications are drawn that help reinforce the prevailing or established opinions on how DEI initiatives can be made more effective in the tech industry. The key understandings include: a) tying diversity to organization goals and design so that they are not isolated end goals, b) adopting a positive posture by emphasizing the new possibilities versus problems solving, c) focusing on creating mindset changes among the leadership for bigger impact, and d) working toward a holistic design that addresses also the environmental factors. In all, organization design thinking needs to treat equity and inclusion as inseparable attributes of diversity, not the higher-level goals of diversity.

## **Limitations**

The representativeness of the research findings was limited by the small number of participants and the high concentration of work experience based in the Silicon Valley area. The sampling strategy only considered the coarse-grained demographic categorizations, specifically male versus female and Caucasian versus non-Caucasian. It did not cover other differences such as ethnicities, age, or educational background.

Another constraint with the research method was the potential for involving social desirability bias. People who had negative views towards diversity might have declined to join the study for the fear of being perceived as intolerant. Further, participants in this study may have suppressed certain opinions for wanting to stay politically correct.

From a research method perspective, a shortcoming with one-on-one interviews is that all data are self-reported and cannot be validated externally. As an example, individuals who expressed that they felt ostracized as minorities framed their experiences as discrimination when other factors might have been involved (e.g., communication issues, personality conflicts). These one-time interviews also did not allow participants to reflect on the subject matter in depth. Given more time or opportunities to revisit the topic, they might be able to elaborate their perspectives in more detail or support their opinions with more examples. Another major drawback of the research design is that there was no external validation of my coding to check for biases and misinterpretations.

## **Suggestions for Further Research**

In view of the limitations of this research, additional insights can potentially be gained from a similar study involving a larger number of participants, more minority ethnic groups, or companies based in different geographical locations. More in-depth



perspectives may also surface by conducting focus groups for participants to generate more discussion and reflections on the topic. Another approach that may yield more accurate data is by studying work teams real-time over a longer time horizon as opposed to recalling past experiences. Having multiple researchers involved in the study will also improve the validity and reliability of the data and analysis.

Another area of investigation informed by this research is the relationship between corporate values and diversity. It may be instructive to examine the long-term effect of employee well-being focus and customer focus on workforce diversity. Finally, it will be useful to take on an area of practical and urgent concern: the impact of work team diversity on the quality of recommendations generated by artificial intelligence software. The findings can potentially elevate the attention and momentum on workforce diversity in the tech industry.

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## **Appendix A: Information Technology Job Title Analysis**



The first step in coming up with a reasonably complete list of unique job titles is by reviewing the published job descriptions by government agencies as well as several commercial job placement and tech education bodies. The details from their websites are presented from Table 14 to 18 below:

**Table 14**

*Computer and Information Technology, Occupational Outlook Handbook, BLS*

Job Title & Summary	How to Become One - Education and Important Qualities
<p><b>Computer and Information Research Scientists</b></p> <p>Invent and design new approaches to computing technology and find innovative uses for existing technology.</p>	<p>Most require a master's degree in computer science or a related field. In the federal government, a bachelor's degree may be sufficient for some jobs.</p> <p><b>Analytical skills.</b> Computer and information research scientists must be organized in their thinking and analyze the results of their research to formulate conclusions.</p> <p><b>Communication skills.</b> Computer and information research scientists must communicate well with programmers and managers and be able to clearly explain their conclusions to people with no technical background. They often present their research at conferences.</p> <p><b>Critical-thinking skills.</b> Computer and information research scientists work on many complex problems.</p> <p><b>Detail-oriented.</b> Computer and information research scientists must pay close attention to their work because a small programming error can cause an entire project to fail.</p> <p><b>Ingenuity.</b> Computer and information research scientists must continually come up with innovative ways to solve problems, particularly when their ideas do not initially work as intended.</p> <p><b>Logical thinking.</b> Computer algorithms rely on logic. Computer and information research scientists must have a talent for reasoning.</p> <p><b>Math skills.</b> Computer and information research scientists must have knowledge of advanced math and other technical topics that are critical in computing.</p>

Job Title & Summary	How to Become One - Education and Important Qualities
<p><b>Computer Network Architects</b></p> <p>Design and build data communication networks, including local area networks (LANs), wide area networks (WANs), and Intranets.</p>	<p>Most have a bachelor's degree in a computer-related field and experience in a related occupation, such as network and computer systems administrators.</p> <p><b>Analytical skills.</b> Computer network architects have to examine data networks and decide how to best connect the networks based on the needs and resources of the organization.</p> <p><b>Detail-oriented.</b> Computer network architects create comprehensive plans of the networks they are creating with precise information describing how the network parts will work together.</p> <p><b>Interpersonal skills.</b> These workers must work with different types of employees to successfully design and implement computer and information networks.</p> <p><b>Leadership skills.</b> Many computer network architects direct teams of engineers, such as computer hardware engineers, who build the networks they have designed.</p> <p><b>Organizational skills.</b> Computer network architects who work for large firms must coordinate many different types of communication networks and make sure they work well together.</p>
<p><b>Computer Programmers</b></p> <p>Write and test code that allows computer applications and software programs to function properly.</p>	<p>Most have a bachelor's degree; however, some employers hire workers with an associate's degree. Most programmers specialize in a few programming languages.</p> <p><b>Analytical skills.</b> Computer programmers must understand complex instructions in order to create computer code.</p> <p><b>Concentration.</b> Programmers must focus their attention on their work as they write code or check existing code for errors.</p> <p><b>Detail-oriented.</b> Computer programmers must closely examine the code they write because a small mistake can affect the entire computer program.</p> <p><b>Troubleshooting skills.</b> An important part of a programmer's job is to check the code for errors and fix any they find.</p>
<p><b>Computer Support Specialists</b></p> <p>Provide help and advice to computer users and organizations.</p>	<p>Because of the wide range of skills used in different computer support jobs, there are many paths into the occupation. A bachelor's degree is required for some computer support specialist positions, but an associate's degree or postsecondary classes may be enough for others.</p> <p><b>Customer-service skills.</b> Computer support specialists must be patient and sympathetic. They often help people who are frustrated with the software or hardware they are trying to use.</p> <p><b>Listening skills.</b> Support workers must be able to understand the problems that their customers are describing and know when to ask questions to clarify the situation.</p>

Job Title & Summary	How to Become One - Education and Important Qualities
	<p><b>Problem-solving skills.</b> Support workers must identify both simple and complex computer problems, analyze them, and solve them.</p> <p><b>Speaking skills.</b> Support workers must describe the solutions to computer problems in a way that a nontechnical person can understand.</p> <p><b>Writing skills.</b> Strong writing skills are useful for preparing instructions and email responses for employees and customers, as well as for real-time web chat interactions.</p>
<p><b>Computer Systems Analysts</b></p> <p>Study an organization's current computer systems and find a solution that is more efficient and effective.</p>	<p>A bachelor's degree in a computer or information science field is common, although not always a requirement. Some firms hire analysts with business or liberal arts degrees who have skills in information technology or computer programming.</p> <p><b>Analytical skills.</b> Analysts must interpret complex information from various sources and decide the best way to move forward on a project. They must also figure out how changes may affect the project.</p> <p><b>Communication skills.</b> Analysts work as a go-between with management and the IT department and must explain complex issues in a way that both will understand.</p> <p><b>Creativity.</b> Because analysts are tasked with finding innovative solutions to computer problems, an ability to "think outside the box" is important.</p>
<p><b>Database Administrators</b></p> <p>Use specialized software to store and organize data.</p>	<p>Usually requires a bachelor's degree in an information- or computer-related subject, such as computer science.</p> <p><b>Analytical skills.</b> DBAs must monitor a database system's performance to determine when action is needed. They must evaluate complex information that comes from a variety of sources.</p> <p><b>Communication skills.</b> Most database administrators work on teams and need to communicate effectively with developers, managers, and other workers.</p> <p><b>Detail-oriented.</b> Working with databases requires an understanding of complex systems, in which a minor error can cause major problems. For example, mixing up customers' credit card information can cause someone to be charged for a purchase he or she didn't make.</p> <p><b>Problem-solving skills.</b> When database problems arise, administrators must troubleshoot and correct the problems.</p>
<p><b>Information Security Analysts</b></p>	<p>Most require a bachelor's degree in a computer-related field. Employers usually prefer to hire analysts with experience in a related occupation.</p>

Job Title & Summary	How to Become One - Education and Important Qualities
<p>Plan and carry out security measures to protect an organization's computer networks and systems.</p>	<p><b>Analytical skills.</b> Information security analysts must carefully study computer systems and networks and assess risks to determine how security policies and protocols can be improved.</p> <p><b>Detail-oriented.</b> Because cyberattacks can be difficult to detect, information security analysts must pay careful attention to computer systems and watch for minor changes in performance.</p> <p><b>Ingenuity.</b> Information security analysts must anticipate information security risks and implement new ways to protect their organizations' computer systems and networks.</p> <p><b>Problem-solving skills.</b> Information security analysts must respond to security alerts and uncover and fix flaws in computer systems and networks.</p>
<p><b>Network and Computer Systems Administrators</b></p> <p>Manage day-to-day operation of computer networks.</p>	<p>Most require a bachelor's degree in a field related to computer or information science. Others may require only a postsecondary certificate or an associate's degree.</p> <p><b>Analytical skills.</b> Administrators need to evaluate networks and systems to make sure that they perform reliably and to anticipate new requirements as customers' needs change.</p> <p><b>Communication skills.</b> Administrators must describe problems and their solutions to non-IT workers.</p> <p><b>Multitasking skills.</b> Administrators may have to work on many problems and tasks at the same time.</p> <p><b>Problem-solving skills.</b> Administrators must quickly resolve problems that arise with computer networks.</p>
<p><b>Software Developers</b></p> <p>Create the applications or systems that run on a computer or another device.</p>	<p>Usually requires a bachelor's degree in computer science and strong computer programming skills.</p> <p><b>Analytical skills.</b> Developers must analyze users' needs and then design software to meet those needs.</p> <p><b>Communication skills.</b> Developers must be able to give clear instructions to others working on a project. They must also explain to their customers how the software works and answer any questions that arise.</p> <p><b>Creativity.</b> Developers are the creative minds behind new computer software.</p> <p><b>Detail oriented.</b> Developers often work on many parts of an application or system at the same time and must therefore be able to concentrate and pay attention to detail.</p>

Job Title & Summary	How to Become One - Education and Important Qualities
	<p><b>Interpersonal skills.</b> Software developers must be able to work well with others who contribute to designing, developing, and programming successful software.</p> <p><b>Problem-solving skills.</b> Because developers are in charge of software from beginning to end, they must be able to solve problems that arise throughout the design process.</p>
<p><b>Web Developers and Digital Designers</b></p> <p>Create and maintain websites. Digital designers develop, create, and test website or interface layout, functions, and navigation for usability.</p>	<p>Educational requirements for web developers and digital designers vary, ranging from a high school diploma to a bachelor's degree.</p> <p><b>Communication skills.</b> Web developers and digital designers need to communicate effectively with coworkers to coordinate work on projects.</p> <p><b>Creativity.</b> Web developers and digital designers often are involved in creating the appearance of a website and must make sure that it is appealing as well as functional.</p> <p><b>Customer-service skills.</b> Webmasters have to respond politely to user questions and requests.</p> <p><b>Detail-oriented.</b> Web developers and digital designers must focus for long periods and write code precisely because a minor error could cause an entire webpage to stop working.</p> <p><b>Problem-solving skills.</b> Web developers and digital designers must check for coding errors and fix any that they find.</p>

*Note.* Adapted from United States Bureau of Labor Statistics webpage <https://www.bls.gov/ooh/computer-and-information-technology/home.htm>

**Table 15**

*Indeed - Career Advice - 21 Different Types of IT Jobs To Explore*

Job Title & Primary Duties	General Requirements
<p><b>Support specialist</b></p> <p>Review and solve computer network and hardware problems for a business. They can work in a variety of industries to provide general support to a company's employees, or they can work at a technology or software-as-a-service (SaaS) company and provide technical support on user experience issues that require technical assistance.</p>	<p>Support specialists typically obtain a Bachelor's Degree in Computer Science or Information Technology. Having a certificate or an associate degree paired with relevant professional experience may also be acceptable.</p>

Job Title & Primary Duties	General Requirements
<p><b>Computer Programmer</b> Write new computer software using coding languages like HTML, JavaScript, and CSS. Video game software can be updated to improve online gameplay, which is an opportunity for programmers to troubleshoot problems experienced by gamers after the game is released to the general public.</p>	<p>A programmer typically completes a Bachelor's Degree in Computer Science and an internship to build their skills. Certifications are also strongly encouraged, and there are many coding academies to choose from.</p>
<p><b>Quality Assurance Tester</b> Check software products to see if they're up to industry standards and free of any issues. This role is common for gaming systems, mobile applications, and other technology that needs further testing and maintenance when recommended.</p>	<p>Many have a Bachelor's Degree in Software Design, Engineering, or Computer Science. Testers can work on different software for IT companies, which may influence what degree or specialization they pursue. These professionals should also have excellent time management and communication skills to help document test cases.</p>
<p><b>Web Developer</b> Design the appearance, navigation, and content organization of a website. They use coding languages such as HTML, CSS, and JavaScript to manage graphics, applications, and content that address a client's needs.</p>	<p>Many earn an Associate Degree in Web Development or another relevant IT field. Some may pursue a Bachelor's Degree in IT or another business field. Others may develop their web design skills through certificate programs or self-paced learning. To secure employment, previous experience and a portfolio of work are often required.</p>
<p><b>IT Technician</b> Collaborate with support specialists to analyze and diagnose computer issues. They also monitor processing functions, install relevant software and perform tests on computer equipment and applications when necessary. They may also train a company's employees, clients, and other users on a new program or function as well.</p>	<p>IT technicians must earn an Associate Degree in Information Technology or a Bachelor's Degree in Computer Science or Networking. Technicians render services for IT companies depending on the industry they choose to work in and may need to learn more about database programming to give themselves an advantage in an entry-level role.</p>
<p><b>System Analyst</b> Review design components and use their knowledge of information technology to solve business problems. They identify ways that infrastructure needs to change to streamline business and IT operations. They can also assist technicians in training staff to implement the changes they propose.</p>	<p>A Bachelor's Degree in Computer Science or a related field is often required. Coursework in business administration, management, and finance may help these professionals better apply their IT knowledge to improving business practices.</p>
<p><b>Network Engineer</b> Work on the day-to-day maintenance and development of a</p>	<p>These professionals typically need a Bachelor's Degree in Computer Science and Information</p>

Job Title & Primary Duties	General Requirements
<p>company's computer network, utilizing their skills to make the network available and efficient for all employees within an organization.</p>	<p>Systems to understand the functions of a network and become familiar with potential solutions needed to maintain one. Some employers may also require a Master of Business Administration (MBA) for those who work with other internal stakeholders of the organization to determine the best technology practices.</p>
<p><b>User Experience (UX) Designer</b> Involved with all facets of product development regarding its purchasing, branding, usability, and functionality. They collect and review user feedback to determine what a product needs to be efficient, functional, and successful. They apply this feedback to the design, organization, and usability. These professionals then monitor the process of testing and revising products until they meet their consumers' high-quality standards.</p>	<p>Some may have an associate or bachelor's degree program in an IT field and pursue additional coursework or training in design, business, web development, and programming. Others may be self-taught in programming, design, and development. Many employers do seek previous experience, so an internship or portfolio may help these professionals secure employment.</p>
<p><b>Database Administrator</b> Employ specialized software to organize and keep track of data. The software can be associated with software configuration, security, and performance when applicable. These professionals frequently diagnose and solve complex IT issues related to the data infrastructure to ensure an organization's data is safe, accessible, and easy to navigate.</p>	<p>Typically need to earn a Bachelor's Degree in Computer Science or Management Information Systems. They often start as a database analyst or a developer before moving into this role so they can get experience in data collection and working within a network's databases.</p>
<p><b>Computer Scientist</b> Apply their technological skills and resources to solve IT problems for businesses; write new software to complete tasks in a quick and efficient period as well as develop new functions that can be of use for employees or clients. Some may also be application developers who help program software to serve users. IT companies heavily rely on computer scientists to create new programming languages and bolster the efficiency of hardware and software programs.</p>	<p>Most need to have a bachelor's degree, but many employers may require a master's degree as well. Previous work experience may also be valuable to prospective employers.</p>
<p><b>Software Engineer</b> Apply their knowledge of mathematics and computer science to create and improve new software. They may work on enterprise applications, operating systems, and network control systems, which are all examples of software that can be used to help businesses scale their IT infrastructure.</p>	<p>Most need both a bachelor's and a master's degree to become experts in software development and maintenance. They learn and practice skills in technical problem-solving, diagnosis, troubleshooting, and programming languages.</p>

Job Title & Primary Duties	General Requirements
<b>IT Security Specialist</b> Work in various industries to build and maintain digital protective measures on intellectual property and data that belong to an organization. They help companies create contingency plans in case information gets hacked from their networks and servers. These professionals also create strategies to troubleshoot problems as they arise.	A bachelor's degree or professional certification is often required. Courses may involve math, programming, operating systems, and certifications offered by the Information Systems Security Certification Consortium (ISC2).
<b>Data Scientist</b> Analyze and organize data to determine trends that can influence business decisions. Their methods and IT tools use statistics and machine learning to help collect and process a company's data such as financial records, sales, prospects, and lead generation. Some duties vary for specific industries. For example, data scientists in the healthcare industry keep electronic health records (EHRs) intact for hospitals to have access to confidential medical information. They may also use data to help healthcare organizations make sound business decisions.	Many of these professionals choose to pursue both a Bachelor's and a Master's Degree in IT or other business fields. Some pursue additional degrees, coursework, and certifications that relate to their specific industry, such as healthcare.
<b>IT Director</b> Oversee the strategy and execution of IT operations for an organization. They ensure that department tasks align with the company's goals and development. These professionals may also collaborate with other internal IT professionals as well as executive management to generate contingency plans, budgets, and development goals.	This position may require a graduate degree and relevant industry certifications, such as in certain programs or applicable management courses. Entry and mid-level roles in IT support and database architecture can provide these professionals with the well-rounded experience to help them advance to this management position.

*Note.* Adapted from Indeed webpage <https://www.indeed.com/career-advice/finding-a-job/types-of-it-jobs>

**Table 16**

*Medium - 23codestreet - Tech Career Guide - Non-technical Roles in Tech*

Job Title & Primary Duties	Good for those who ...
<b>Product Manager</b> Lead the success of a new product and work cross-functionally with several teams such as tech, marketing, and sales.	<ul style="list-style-type: none"> <li>● Enjoy working collaboratively with several teams</li> <li>● Are creative but also analytical</li> <li>● Have strong communication skills</li> <li>● Can empathize with others &amp; understand</li> </ul>



Job Title & Primary Duties	Good for those who ...
<p>Make sure the product is being made as efficiently as possible; listen to the product users to understand what features they want; gather and analyze customer feedback to make future decisions about the product.</p>	<p>different peoples' needs</p>
<p><b>User Experience Designer</b></p> <p>A UX designer is responsible for making digital products such as apps or websites usable and effective. A UX designer asks why certain parts exist, how they work, and what they add to the product. UX designers make sure the product is accessible to their audience, i.e. they keep in mind those who may have impairments, different sized devices, feature phones, etc. They have a mixture of responsibilities and tasks such as talking to clients about their requirements, conducting user testing, re-designing apps to make them responsive, and building wireframes. It is a user-centric role and, therefore, requires insight into the psychology of consumers.</p>	<ul style="list-style-type: none"> <li>• With a design background, interested in design</li> <li>• Comfortable working with data</li> <li>• Enjoys testing out new ideas and analyzing the results</li> <li>• Likes working in a collaborative environment</li> </ul>
<p><b>Copywriter</b></p> <p>A copywriter at a tech company has the important job of communicating what a company does internally and externally with language and tone that is representative of the brand. They, sometimes, have the job of transforming complex and confusing tech jargon into customer-friendly language. Depending on the size of the company, a copywriter's responsibilities may range from thinking of a brand's name and tagline to creating customer manuals, user guides, and product descriptions.</p>	<ul style="list-style-type: none"> <li>• Love writing or professionally write for a living already</li> <li>• Curious and excited about tech</li> <li>• Creative and full of new ideas</li> <li>• Likes to communicate and work with various</li> </ul>
<p><b>Operations Manager</b></p> <p>An operations manager gets stuff done- they ensure that the day-to-day operations of a business run smoothly and ensure deadlines are met. They are responsible for all the logistics of the organization such as preparing budgets and inventories and overseeing the supervision of employees. Within the tech industry, they could be responsible for planning and implementing the logistics of an app that delivers services and ensures customers have a good experience.</p>	<ul style="list-style-type: none"> <li>• Loves being extremely organized and able to work under pressure</li> <li>• Comfortable with making judgments and decisions quickly</li> <li>• Is a people's person — enjoys working and managing multiple teams</li> </ul>

Job Title & Primary Duties	Good for those who ...
<p><b>Account Manager</b></p> <p>Depending on the type of company you'll be working for, the responsibilities and duties of an account manager can vary. However, for most jobs, your main responsibilities would be managing and nurturing current customer relationships and proactively looking for new relationships and opportunities to grow the business and revenue. You may also have to demonstrate products to customers and explain how your specific product or solution meets customers' needs.</p>	<ul style="list-style-type: none"> <li>● people's people — they need great interpersonal skills and are comfortable talking to different parties</li> <li>● confident at multi-tasking and juggling different projects</li> <li>● excited by tech</li> </ul>
<p><b>Marketing Manager</b></p> <p>Marketing managers play a key role in helping businesses promote their products or services. You'll be responsible for thinking of new ideas and creating engaging content and campaigns for different audiences. As well as conducting research to build user personas and analyzing data to identify new opportunities. Depending on the size of the company, you may be working with the CEO or several other teams such as developers, PR, communications, and sales.</p>	<ul style="list-style-type: none"> <li>● Are full of new and engaging ideas</li> <li>● Are comfortable with data and understand the importance of it</li> <li>● Enjoy working collaboratively with others</li> <li>● are curious about tech and digital tools</li> </ul>

*Note.* Adapted from two career advice webpages: <https://girlsintech.org/tech-jobs-for-non-tech-people/>, and <https://medium.com/23codestreet/tech-career-guide-non-technical-roles-in-tech-c036475ec147>

We combined the three lists above to come up with a unique list of job titles that cover both technical and semi-technical roles, along with their key job duties and skill requirements:

Table 17

## IT Job Title and Skills

Job Title	Major Tasks	Intellectual										Relationships							
		Analytical Skills	Detail-orientation	Critical Thinking	Logical Thinking	Math Skills	Concentration	Creativity / Ingenuity	Problem-solving Skills	Troubleshooting Skills	Interpersonal Skills	Organizational Skills	Leadership Skills	Communication Skills	Customer-service Skills	Listening Skills	Speaking Skills	Writing Skills	Multitasking Skills
Research Scientist	Invent/innovate technologies	0	0	0	0	0	0	0						0					
Network Architect	Design/build system of networks	0	0								0	0	0	0					
Programmer	Write/test programs	0	0				0		0										
Support Specialist	Help/advise customers								0					0	0	0	0	0	
System Analyst	Study business problems, design solutions	0						0	0	0				0					
Database Admin	Design/build systems for data	0	0	0					0					0					
Security Specialist	Assess risks, predict issues	0	0					0	0	0									
Network Admin	Manage operations and maintenance	0							0					0				0	
Software Developer	Create applications	0	0					0	0	0	0			0					
Web Designer	Create application user interface		0					0	0	0				0	0				
Quality Assurance	Verify applications	0	0	0	0				0	0	0			0				0	
IT Technician	Monitor processes, install software, train users	0	0						0	0				0				0	
Data Scientist	Analyze and organize data for business decisions	0			0	0	0												
IT Director	Oversee strategy and execution		0	0								0	0	0					
Product Manager	Understand customer needs, give product directions	0	0	0	0			0				0	0	0	0	0	0		
Copywriter	Create user guides, prepare product descriptions							0					0	0			0		
Operations	Oversee operations and logistics		0															0	
Account Manager	Manage and nurture customer relationships													0	0	0	0		
Marketing Manager	Create campaigns, conduct market research	0						0			0	0	0	0		0	0		
Program Manager	Coordinate dependencies, identify risks/contingencies		0	0							0	0	0	0				0	

To turn the list above into function-oriented categories, we extracted the major tasks and grouped them across specialties based on the skill requirements. We have kept job functions separate if they have distinct operating environments or communication requirements (e.g., customer-facing vs non-customer facing). To account for the settings in smaller tech companies in which innovations and programming work is often performed by the same people - those who have the so-called “full-stack engineering” skills, we have classified Research Scientist, Programmer, and Software Developer as the same job function. We have also added a “People Management” function which generally exists in all jobs but is not called out as separate job titles. It represents a unique function of its own with different skill requirements than day-to-day tasks.

Finally, we evaluated the relative proportion of intellectual and relationship skills to derive the level of social orientation for each of the consolidated IT job functions:

Table 18

## Representative IT Job Functions and Social Orientation

Job Function	Job Titles within this area	Major Tasks	Intellectual													Relationships					Social Orientation
			Analytical Skills	Detail-orientation	Critical Thinking	Logical Thinking	Math Skills	Concentration	Creativity / Ingenuity	Problem-solving Skills	Troubleshooting Skills	Interpersonal Skills	Organizational Skills	Leadership Skills	Communication Skills	Customer-service Skills	Listening Skills	Speaking Skills	Writing Skills	Multitasking Skills	
IT/System Operations	Operations Manager, Network Engineer, Database Admin, Security Specialist	Manage operations and maintenance, mitigate attacks	0	0						0					0					0	Low
Data Analytics/ Business Intelligence	Data Scientist, Marketing Manager	Research data for business and marketing decisions	0	0	0	0	0	0							0						Low
System Engineering	Research Scientist, Network Architect, Software Engineer, Security Specialist	Invent/innovate technologies, design/build systems	0	0	0	0	0	0	0	0	0	0			0						Low
Technical Generalists	Quality Assurance, IT Technician, Copywriter	Support multiple application development projects, e.g. verify, document and provide training	0	0	0	0				0	0	0			0				0	0	Medium
Functional Design	System Analyst, Product Manager	Study business problems, design solutions	0							0					0	0					Medium
Strategy Shaping	IT Director, Product Manager, Marketing Manager	Shape product directions, execution strategy		0					0				0	0	0	0		0			High
Human Interface Design	User Experience Engineer	Build application user interface	0	0					0						0	0					Medium
Customer Management	Support Specialist, Account Manager	Help/advice customers, manage customer relationships							0							0	0	0	0		High
Project Management	Program Manager, Marketing Manager	Coordinate dependencies, identify risks/contingencies	0	0								0	0	0	0	0	0	0	0	0	High
People Management		Supervise, provide guidance, manage performance										0	0	0	0	0					High

## **Appendix B: Interview Protocol**

## Interview Consent

Please take a moment to review this content form and let me know if you have any questions or concerns before we proceed.



**IRB #: 22-02-1762**

### **Participant Study Title**

An examination of how well diverse work teams perform in the high-tech industry

### **Formal Study Title**

How Job Function Characteristics Impact Performance of Diverse Teams in High-Tech Industry

### **Authorized Study Personnel**

Principal Investigator: Angela Fong, MS, Mobile: (510) 386-1505

If you agree to participate in this study, here is what you can expect:

- An online interview with the investigator above, lasting for no more than 90 minutes.
- There is no greater than minimal risk associated with this study.
- You will be provided a copy of this consent form.
- You are eligible to receive a copy of the final report upon request

You are invited to take part in this research study. The information in this form is meant to help you decide whether or not to participate. If you have any questions, please ask.

### **Why are you being asked to be in this research study?**

You are being asked to be in this study because your professional background shows that you have meaningful experiences with demographically and professionally diverse teams in workplace settings. You will likely have the kind of insights that provide useful data for this study.

### **What is the reason for doing this research study?**

Academic research has so far shown mixed results in the relationships between work team diversity and performance. Researchers have identified a number of social and contextual factors impacting the dynamics in heterogeneous teams. Given the contingent nature of diverse team performance, this study will focus on a specific industry, technology job

functions, and seek to understand how diversity may positively or negatively impact the outcomes of work teams. The goal is for this study to provide organization decision-makers and practitioners a framework for prioritizing their diversity and inclusion efforts toward certain job functions and focusing on the aspects that provide the most added value.

**What will be done during this research study?**

Participants like yourself will go through an one-time interview that lasts up to 90 minutes to answer a set of interview questions. The questions are primarily about the state of diversity in your workplace(s), the sentiments of people you know towards such efforts, your personal experiences of working in and with diverse teams, and how diversity affects team outcomes from your perspective.

The interview with you will be recorded only if you provide your consent for it. During the interview, written notes will also be taken.

**How will my data be used?**

The interview results will be analyzed to identify any patterns of success and challenge with diverse teams and the implications. All of the above will be summarized in a research report in which recommendations will be provided and limitations will also be highlighted.

**What are the possible risks of being in this research study?**

There is no greater than minimal risk associated with this study. You may however be bored, fatigued, or uncomfortable with questions about your personal views of diversity and inclusion. In the event that such situations come up during the interview, you will have the option to pause or take breaks. There is also a risk of confidentiality breach despite the study team's best effort in protecting the identity of participants for this study.

**What are the possible benefits to you?**

You are not expected to get any benefit from being in this study. You will however know that you are contributing to a better understanding of efforts toward workplace diversity.

**What are the possible benefits to other people?**

The benefits to science and/or society may include better understanding of efforts toward workplace diversity and leveraging that information to achieve better outcomes from diverse work teams.

**What will being in this research study cost you?**

There is no cost to you for being a participant in this research study.

**Will you be compensated for being in this research study?**

There is no compensation to you for being a participant in this research study.

**What should you do if you have a problem during this research study?**



Your welfare is important to the research study personnel. If you have a problem as a direct result of being in this study, you should immediately contact the investigator listed at the beginning of this consent form.

**How will information about you be protected?**

Reasonable steps will be taken to protect your privacy and the confidentiality of your study data. Your identity as a participant will be protected before, during, and after the time that study data is collected.

All study data will be stored electronically through a secure server and will only be seen by the research team during the study and for 5 years after the study is complete. The only persons who will have access to your research records are the study personnel, the Institutional Review Board (IRB) of Pepperdine University, and any other person, agency, or sponsor as required by law. The information from this study may be published in scientific journals or presented at scientific meetings but the data will be reported as group or summarized data. Quotes will be cited without referring to any identifiable information and your identity will be kept strictly confidential.

**What are your rights as a research subject?**

You may ask any questions concerning this research and have those questions answered before agreeing to participate in or during the study.

For study related questions, please contact the investigator listed at the beginning of this form.

For questions concerning your rights or complaints about the research contact the Institutional Review Board (IRB):

Phone: 1(310)568-2305

Email: [gpsirb@pepperdine.edu](mailto:gpsirb@pepperdine.edu)

**What will happen if you decide not to be in this research study or decide to stop participating once you start?**

You can decide not to be in this research study, or you can stop being in this research study (“withdraw”) at any time before, during, or after the research begins for any reason. Deciding not to be in this research study or deciding to withdraw will not affect your relationship with the investigator or with Pepperdine University. You will not lose any benefits to which you are entitled.

**Documentation of informed consent**

You are voluntarily making a decision whether or not to be in this research study. Signing this form means that (1) you have read and understood this consent form, (2) you have had the consent form explained to you, (3) you have had your questions answered and (4) you have decided to be in the research study. You will be given a copy of this consent form to keep.

**Participant Feedback Survey**

To meet Pepperdine University’s ongoing accreditation efforts and to meet the

Accreditation of Human Research Protection Programs (AAHRPP) standards, an online feedback survey is included below:

<https://forms.gle/nnRgRwLgajYzBq5t7>

**Participant Name:**

\_\_\_\_\_  
Name of Participant: Please Print

**Participant Signature:**

\_\_\_\_\_  
Signature of Research Participant

\_\_\_\_\_  
Date

*Once all questions/concerns have been addressed, have the interviewee sign the form.*

**Personal demographic and job role information**

1. What is your job role? What functions do you and the team(s) you belong to perform?
2. Are you a people manager? If so, how long have you been working in a manager capacity?
3. Do you consider yourself a minority in your team/department/company? Why?

**Organization values and current state of diversity**

4. What is the general attitude toward diversity and inclusion at your workplace? How do people (top management, first-line managers, individual contributors) feel about the need and urgency of promoting workforce diversity?
5. Are there any formal or informal workforce diversity targets set at the corporate, department, or team level?
  - a. If so, what are those goals and how are they measured?
  - b. If not, have there been any previous attempts or considerations to maintain or promote diversity?

Following 5a,

6. What are the expected outcomes of adhering to the above diversity targets (e.g., improved financial performance, more diverse skills, better products/services, better teamwork, improved corporate image, etc.)?
7. How well are the diversity targets (stated in Q5) met currently? What helps to achieve them? What prevents them from being achieved?
8. How well is the expected outcome of diversity (stated in Q6) met? If they do not meet the expectations, do you know what contributes to the deviations?

Following 5b,

9. Are there obstacles in maintaining or promoting workforce diversity at your workplace?

### **Personal values and experience toward diversity**

10. What does workforce diversity mean to you? How do diverse teams look like to you (in terms of demographic/professional background or some other attributes)?
11. Have you had any experience with diverse teams that perform better? What contributes to their success?
12. Have you observed teams which performance suffers from diversity? Do you know what difficulties they face?
13. In your opinion, which of the demographic diversity attributes, i.e. gender, ethnicity, age, have a more positive or negative impact on team outcomes? Why?
14. Have you observed any differences in the outcome of diverse teams based on their job functions (e.g., customer-facing vs internal service teams, frontend vs backend system work, operational vs R&D work)? If so, do you know what may cause those differences?

### **Job outcome certainty assessment**

#### Job specificity

1. Whatever situation arises my team has procedures to follow in dealing with it.
2. Every member of my team has a specific job to do.
3. In my team, going through proper channels is constantly stressed.
4. My team keeps written records of everyone's job performance.
5. Members of my team are to follow strict operating procedures at all times.
6. Whenever members of my team have a problem we are supposed to go to the same person for an answer.

*Response set: 4, definitely true through 1, definitely false.*

#### Technology (the degree of task routineness)

1. Members of my team do the same job in the same way every day.
2. One thing members of my team like around here is the variety of work.
3. Most jobs of my team have something new happening every day.
4. There is something different for my team to do every day.

*Response set: 4, definitely true through 1, definitely false.*

**Appendix C: CITI Certificate for MSOD Human Subjects Training**



Completion Date 24-Jul-2021  
Expiration Date 23-Jul-2024  
Record ID 43739735

This is to certify that:

**Angela Fong**

Has completed the following CITI Program course:

Not valid for renewal of certification  
through CME.

**MSOD Human Subjects Training**  
(Curriculum Group)

**MSOD Human Subjects Training**  
(Course Learner Group)

**1 - Basic Course**  
(Stage)

Under requirements set by:

**Pepperdine University**

**CITI**  
Collaborative Institutional Training Initiative

Verify at [www.citiprogram.org/verify/?w2af20673-02e8-4239-b9f4-ca63b54a0c57-43739735](http://www.citiprogram.org/verify/?w2af20673-02e8-4239-b9f4-ca63b54a0c57-43739735)

**Appendix D: IRB Approval Letter**

**NOTICE OF APPROVAL FOR HUMAN RESEARCH**

Date: May 25, 2022

Protocol Investigator Name: Angela Fong

Protocol #: 22-02-1762

Project Title: How Job Function Characteristics Impact Performance of Diverse Teams in High-Tech Industry

School: Graziadio School of Business and Management

Dear Angela Fong:

Thank you for submitting your application for exempt review to Pepperdine University's Institutional Review Board (IRB). We appreciate the work you have done on your proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. Upon review, the IRB has determined that the above entitled project meets the requirements for exemption under the federal regulations 45 CFR 46.101 that govern the protections of human subjects.

Your research must be conducted according to the proposal that was submitted to the IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit an amendment to the IRB. Since your study falls under exemption, there is no requirement for continuing IRB review of your project. Please be aware that changes to your protocol may prevent the research from qualifying for exemption from 45 CFR 46.101 and require submission of a new IRB application or other materials to the IRB.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite the best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the IRB as soon as possible. We will ask for a complete written explanation of the event and your written response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the IRB and documenting the adverse event can be found in the *Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual* at [community.pepperdine.edu/irb](http://community.pepperdine.edu/irb).

Please refer to the protocol number denoted above in all communication or correspondence related to your application and this approval. Should you have additional questions or require clarification of the contents of this letter, please contact the IRB Office. On behalf of the IRB, I wish you success in this scholarly pursuit.

Sincerely,

Judy Ho, Ph.D., IRB Chair

cc: Mrs. Katy Carr, Assistant Provost for Research