

Bridging the Data Gap for a more Equitable, Diverse and Inclusive Future in Geotechnical Engineering: Survey Design and Ethical Considerations



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ABSTRACT

As the benefits of increased Equity, Diversity, and Inclusivity (EDI) in the geotechnical engineering field become more apparent, organizations need to find ways to collect representative data from their members/employees, most often through the use of surveys. The combined demographic and experiential data collected within these surveys provides valuable information to enable organizations to implement changes that promote EDI efforts, attracting candidates, enhancing performance and improving retention for a diverse range of employees. To maximize the value of the information collected, surveys must be designed such that the right information is being collected in the right way with the right intentions. This paper introduces the motivation for EDI initiatives, guidelines for the implementation of a successful EDI cycle, the technical foundations of survey design and specific considerations that should be made when developing an EDI survey.

RÉSUMÉ

Alors que les avantages des initiatives d'équité, de diversité et d'inclusion (EDI) dans le domaine de l'ingénierie géotechnique deviennent plus apparents, les organisations doivent trouver moyens de collecter des données représentatives auprès de leurs membres/employés, le plus souvent par les biais d'enquêtes. Les données démographiques et expérientielles combinées recueillies dans le cadre de ces enquêtes fournissent des informations précieuses pour permettre aux organisations de mettre en œuvre des changements qui favorisent les efforts EDI, améliorant les performances, les expériences et la rétention des employés pour un large éventail d'employés. Pour maximiser la valeur des informations collectées, les enquêtes doivent être conçues de manière que les bonnes informations soient collectées de la bonne manière avec les bonnes intentions. Cet article présente la motivation des initiatives EDI, les lignes directrices pour la mise en œuvre d'un cycle EDI réussi, les fondements techniques de la conception de l'enquête et les considérations spécifiques à prendre en compte lors de l'élaboration d'une enquête EDI.

1 INTRODUCTION

Increased Equity, Diversity, and Inclusivity (EDI) leads to a broader range of perspectives, increased creativity and collaboration and a larger pool of potential employees for a company to hire from (National Engineering Month, 2023). As these benefits become more apparent in the geotechnical engineering field, organizations need to find ways to collect representative data from their employees to establish a baseline of its status of EDI indicators, develop strategies to improve the employee experience, and then evaluate progress. This is most often done by distributing confidential and anonymous surveys asking a variety of questions about demographics, job satisfaction, workplace experiences and workplace culture. These provide valuable information to enable organizations to identify and implement changes that promote EDI efforts, thereby improving employee performance and retention for all employees. To maximize the value of the information collected, surveys must be thoughtfully designed such that the right information is being collected in the right way with the right intentions.

1.1 Principles of EDI

Equity, diversity, and inclusivity (also referred to as inclusion) are values that are closely connected within organizations, including engineering corporations, government agencies and academic institutions. These elements of an organization's culture need to be prioritized in order to ensure that employees are empowered and feel like part of the team, without discrimination.

EDI initiatives have existed since the 1960s when they were initiated during the civil rights movement in the United States (Equal Justice Initiative, 2021). In recent years, this work has been reignited due to ongoing issues related to EDI and its implementation within the workplace. With more organizations taking on various initiatives to engage in EDI-related advancements, including formulating and administering surveys, it is important to have a common understanding and definition of the terminologies that guide this practice. The following are the definitions defined by the Government of Canada (n.d.):

- **Equity:** "The principle of considering people's unique experiences and differing situations, and ensuring they have access to the resources and

opportunities that are necessary for them to attain just outcomes. Equity aims to eliminate disparities and disproportions that are rooted in historical and contemporary injustices and oppression.”

- **Diversity:** “The variety of identities found within an organization, group or society. Diversity is expressed through factors such as culture, ethnicity, religion, sex, gender, sexual orientation, age, language, education, ability, family status or socioeconomic status.”
- **Inclusion:** “The practice of using proactive measures to create an environment where people feel welcomed, respected, and valued, and to foster a sense of belonging and engagement. This practice involves changing the environment by removing barriers so that each person has equal access to opportunities and resources and can achieve their full potential.”

There are numerous other terminologies that define and are related to EDI. For a more extensive list of terminology and definitions, refer to the Guide on Equity, Diversity and Inclusion Terminology under the Resources section of this paper. This is an emerging space and as these topics are explored, the terminologies and their definitions will also change.

1.2 Motivation for EDI

There are two value systems that drive the promotion of EDI in the workplace (Byrd and Sparkman, 2022). The moral case (or social justice) for EDI states that equality for all (and necessarily, diversity and inclusion) has value in and of itself, and the promotion of these ideals in the workplace is a moral obligation. There is also an increasing societal pressure on organizations to take a stance on social issues, as current and potential constituents want to align themselves with organizations that connect to their values.

The business case states that a diverse workforce provides value in the form of creativity, innovation, and different perspectives. We would also argue that increasing the diversity of the workforce lends resilience and adaptability to an organization. This rationale for the values of EDI is tied to the economic goals of a company and so may be used to justify the expense of EDI efforts (educational materials and training opportunities, surveying expenses and the cost of individual support). Byrd and Sparkman (2022) state that neither of these values can successfully exist in an organization without the other, despite the business case often being the only justification used.

When a diverse workforce is not supported by and included in the higher levels of an organization, a number of potential outcomes arise. The categories identified by Beniest et al. (2023) include:

- Leaving current employment and/or considering a career change;
- Avoiding colleagues and/or supervisors;
- Declining professional opportunities for career development or advancement and/or skipping

professional activities such as field work, conferences and meetings;

- Increased awareness of appearance and clothing;
- Concern for physical safety;
- Loss of confidence and/or lowered work productivity.

Beniest et al. (2023) provided some early analysis of data collected from an ongoing survey of European geoscientists which indicates that almost half of the respondents have “sometimes experienced a) disrespectful comments or actions, b) people questioning the respondents’ professional expertise, and c) sexist or racist language in their workplace”, with the result that 40% have considered leaving their employer or changing careers. These findings point to the need to ensure that organizations take actions and make policy changes to improve the culture surrounding EDI at all levels.

1.3 EDI Success Cycle

The success of EDI efforts within a given organization relies on buy-in at all levels. From the upper levels of decision makers to daily operational staff, this involves creating strong principles and committing to making the organization a place of trust and safety for everyone.

Implementing changes that provide a positive impact on the organization cannot happen without a sound plan. An EDI success cycle (Figure 1) provides a guide for deciding how to plan and implement changes while effectively communicating with and engaging all stakeholders.

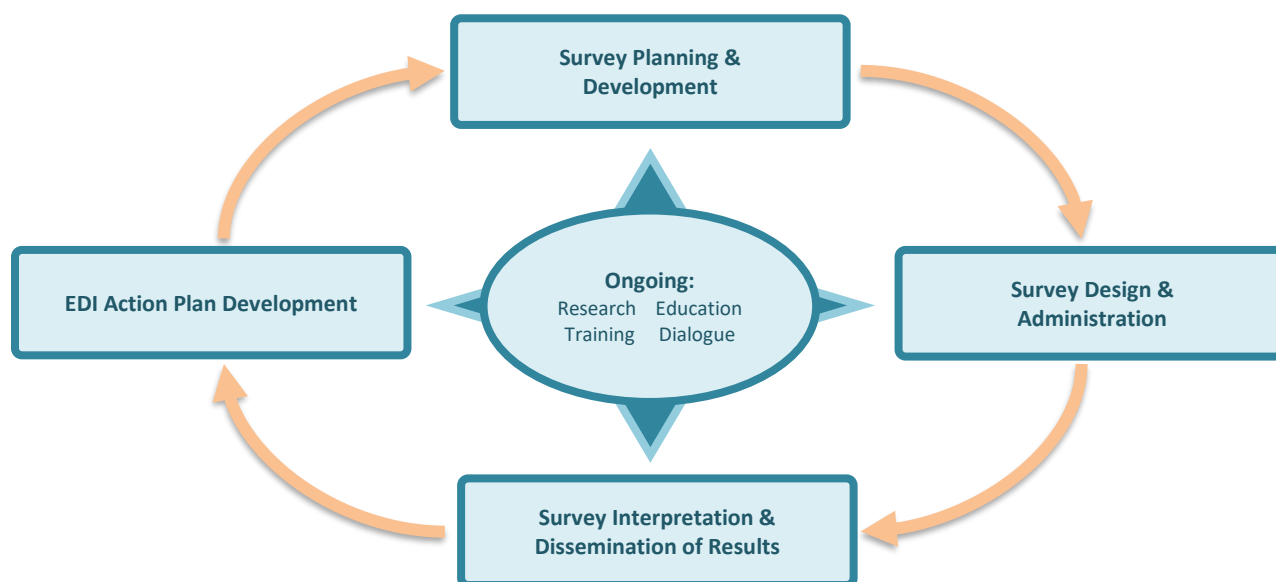
In any part of the cycle, the process may be difficult and even triggering for individuals as it may bring unpleasant or harmful experiences to the surface. It is important to have in place a support system that can be offered to the survey’s participants and to ensure safety for the participants with a disclosure of how the data will be handled and used.

Although this paper focuses on this cycle’s survey planning and development, all parts are equally important. The next subsections explain the importance of each component in broad terms.

1.3.1 Training and Education

Training and education span the entire EDI success cycle. This is a critical component in engaging all stakeholders within the organization and providing a common and mutual understanding of the terminologies, establishing the purpose of the survey, and setting expectations for implementing changes to the organization.

The individual understanding of topics related to EDI may vary greatly from one to another. Having a common ground where individuals can learn in the way that suits them best and express their thoughts and opinions is crucial in developing a collective desire to make impactful changes related to EDI issues in an organization. Training and education opportunities are also great avenues to disseminate information and communicate with the stakeholders. Along with the critical need for sponsorship



Ongoing: Research, Education, Training, and Dialogue			
Survey Planning & Development	Survey Design & Administration	Survey Interpretation & Dissemination of Results	EDI Action Plan Development
What do we need to know, in order to: - Assess our company demographics, culture, and employee experience? - Determine the effectiveness of EDI programs? - Define concrete plans to implement employee/company programs?	How will we ensure that: - Responses are anonymous and confidential? - Results do not identify any individuals? - Questions are inclusive and unbiased? - Employees can follow up / seek support if they wish?	How do we ensure that: - We understand the range and mean of quantifiable results? - We do not report results that could be linked to an individual? - The results reflect the goals of the survey plan? - The results can be interpreted to define key action plans?	- Does the demographic profile of the company match the available group of professionals in society? - Does the company culture, processes, and system support equity, diversity and inclusivity? - Is there a similar feeling of belonging and being valued amongst all employees? - When will action plans be initiated, by whom and how will their success be evaluated?

Figure 1: Considerations for EDI Success Cycles.

at the leadership level, this continued learning should be encouraged for everyone, regardless of their position and responsibilities.

Given the importance of engagement and participation of all levels of stakeholders, it is advised that sufficient time and resources are formally provided for individuals to complete the surveys and training required (i.e., having the employees' time be compensated or setting aside a designated class time for the students). This reduces the extrinsic burden of those who are being asked to participate (Qualtrics, 2019). It is also advised that experts who are familiar with topics related to EDI are consulted

within the process to provide deeper knowledge and perspective. Employees for whom EDI is not a job focus, especially employees of equity-deserving groups, should not be asked to perform this educational labour as it unfairly places the burden of resolving workplace inequity on those most affected. Whether it is a mandatory training or a request for voluntary participation, desired participation rates should also be communicated to the constituents.

1.3.2 Survey Planning & Development

The motivation to conduct a survey – in various forms, such as an anonymous form, confidential interviews, or a focus group – and collect information on an organization's members/employees may vary from one organization to another. However, in general, demographic and experience information give an insight into the makeup and the current state of the organization's environment and can uncover issues that may not be apparent. The initial development of the survey takes careful consideration, and the developer must be mindful of the sensitivity of what is being asked of the participants to share. The design of EDI-related surveys should be considered a skilled task, and a subject matter expert be consulted during the process of survey planning and development. Further considerations and technicalities of survey questions are elaborated in Sections 2 and 3.

1.3.3 Survey Administration

When administering the survey, it is important to preface and give a clear explanation of the motivation behind the survey, the importance of participation, and how the information will be collected and used. Highlighting anonymity, or in the case of interviews and focus groups, confidentiality is crucial and will allow the participants' psychological safety to openly share their personal experiences.

1.3.4 Survey Interpretation & Dissemination of Results

The interpretation of the survey comes in two folds: statistics and relationships. Statistical data represent the demographic questions being asked. This is typically presented in figures and tables of percentage responding. It is important that any figures that are presented have statistical significance in order to maintain the anonymity of the participants.

Relationship data requires associating the demographic data to one another, or to the experiential responses. This process requires careful consideration and may take considerable time to do. Both interpretation processes provide the makeup of the organization and give insight into the individual demographic groups' experiences. This information will guide future development and implementation of changes within the organization.

Dissemination of the survey results and the findings should be widely shared within the organization, as it follows through with the commitment to the respondents on how the collected information was used. In addition to a formal document, the information should also be presented in a collective setting that allows for follow-up questions to be asked. Focus groups to discuss specific aspects of the results can be a productive way of communicating information and receiving feedback that can be analyzed later using qualitative thematic analysis.

1.3.5 EDI Action Plan Development

The EDI action plan development stage is a (re)evaluation stage that allows the organization to reflect on their current practices, culture, and alignment with how its members/employees are feeling. Does the demographic profile of the organization match the available talent pool and the industry target? Is there a similar feeling of belonging and being valued amongst all employees? These are the questions that can help develop what comes next.

Action items that arise from the survey findings will vary from one organization to another. A few of these may be:

- Time-based goals: what is achievable within the short (less than 12 months), medium, and long (five or more years) term.
- Benchmarks for the success of the initiatives.
- A champion that will be responsible for the delivery of the action.

During the process of carrying out the action items and implementing changes, it is important to check in with the constituents to make sure the changes are having a positive impact and to continue engagement with the work overall. One of the ways this can be accomplished is by re-surveying. Though there are no specific guidelines on the frequency, it should be after sufficient time has passed since the implementation of any changes and when meaningful engagement can be made with employees (i.e., not conducting the survey so often that the participants become disinclined to participate).

2 CONSIDERATIONS FOR QUESTIONS - DEMOGRAPHICS, PROVING THOUGHTFULNESS

2.1 Pre-Survey Testing

When planning to implement a survey, researchers should take care to create an effective survey through thorough research and by following best practices but should also make time to test the survey amongst themselves, the EDI Committee members, or a small test group of employees before distributing the survey widely. This will help to catch any issues in wording and to have a preview of the data collected in case there are missing data points that can be added before the official survey. It can give insights into the potential for respondents to experience fatigue during the survey. An accurate time estimate for the completion of the survey determined through testing can help alleviate frustration and promote completion while helping manage project costs. An accelerated iterative design process such as this can increase the utility of the survey results without increasing the burden on the participants.

2.2 General Considerations: Question Phrasing and Language Precision

When wording the questions for a survey, the researcher should take care to use language that is easily understood by the target audience (i.e., the intended

participants of the survey), while also avoiding ambiguous wording or regional or colloquial terminology that may not be familiar to the entire pool of participants (Tourangeau et al., 2000). General and broadly distributed surveys should not be exclusionary. It may be appropriate to use highly technical language if the intended participants are a particular group of subject experts, and that is a decision the researcher can make with that prior knowledge. Unsuitable language may cause participants to avoid certain questions or not complete the survey overall due to frustration.

In the context of EDI-related surveys, it is also of particular importance to display the care you are taking to develop the survey through your word choice. Using the correct, community-accepted terminology to refer to minority groups is of the utmost importance to ensure both the comfort of the participants and their continued participation in the survey. For example, when discussing the gender of participants, using words such as woman, man, or non-binary person rather than male and female is more inclusive. It is important to acknowledge that trans people are already included within these gender categories. If you would like information specifically about the experiences of trans people within your company, it is best practice to ask that in a second question surrounding that topic specifically (e.g., “*Do you have lived experience as a trans person?*”) When asking questions around disability and accessibility, it is important to use words accepted by the community and do not attempt to use euphemisms (e.g. “special needs”). When in doubt, consult experts with lived experience in equity-deserving groups. As mentioned in Section 1.3, it is important to provide training and education to those whom the survey is intended for prior to distributing the survey and where possible, to include definitions and examples within each question to prime the participants for answering without any confusion or ambiguity. As the knowledge of EDI advances and subsequent iterations of surveys are created, it is important to note that the language and terminology used may evolve. There may also be geographical differences in communication and understanding that need to be considered depending on the makeup of your constituents (Engineers Canada, 2023).

A specific consideration for EDI-related surveys is to ensure that the questions you are asking support the mandate of the survey. It is important to not undermine the impact of the survey and initiatives within the context of the survey. An example of this is asking questions related to employee perceptions of EDI initiatives:

- Option1:
I think EDI surveys are important.
[Yes, No, etc.]
- Option 2:
I understand why EDI surveys are important.
[Yes, No, etc.]

In the above examples, Option 1 has the potential for a majority demographic who have not experienced marginalization in the workplace may answer in the negative, overwhelming the responses of people for whom

EDI efforts would make major differences to the quality of their work experiences. This does not provide productive information. Option 2 asks a similar question but reinforces company commitments to the initiative and provides an avenue for researchers to discover a need for training or other educational materials.

2.3 Demographic Questions

A demographic question asks the respondent to detail some aspect of their identity. This might include age, race, or gender among other variables (Patten, 2014). These questions most directly respond to the “diversity” aspect of the EDI umbrella. The information collected through this type of survey can also be used to create a profile of the overall organization, the respondents of the survey in general, or provide context for a cluster of responses. These questions are very important in EDI surveys in particular, as they can illuminate patterns in the identities of respondents who share similar positive or negative experiences and identify areas of improvement in the inclusivity of an organization’s culture. However, for equity-deserving individuals, these questions can target sensitive topics, particularly if a list of identifiers is long, but not fully inclusive. As a result, demographic questions must be approached with care to avoid discouraging participants from responding to these questions, or to the survey overall (Patten, 2014). Researchers need to take care to word these questions using currently acceptable language in a way that displays thoughtfulness. It is important with questions that may request responses along a spectrum of social desirability or respectability that a researcher (and their wording of questions) does not cast judgment on any particular identity or answer (Tourangeau et al., 2000).

According to Patten (2014), it is best practice to limit the demographic information to only what is needed to satisfy the goals of the survey. In EDI research, there are often assumptions made about what information may be important to collect, but this may result in missing hidden or previously unidentified patterns or intersections in experiences in a given organization. A potential solution to this is reducing the granularity of the responses requested. Information can still be collected about a participant’s inclusion in an equity-deserving group, but fewer options reduce the intrusiveness of the question. For example, instead of asking a participant to give a specific description of their sexual orientation, it may be more appropriate to ask whether they identify as belonging to the LGBTQ2SIA+ community, as a whole. To further limit the potential for discomfort to participants in answering questions of this type, some questions may warrant a “prefer not to say” option, as it allows respondents to skip questions they are not comfortable answering, even with guarantees of anonymity. In addition, if questions are too detailed and specific, it may be possible to identify an individual from the anonymized results, especially in smaller organizations. An example of this may also include requesting information about a participant’s age. A question that asks for responses within range categories would be much less likely to single out participants than asking for exact numerical values (you may only have one employee born in a given year). Another approach is to collect granular

data, but not analyze the groups below a certain threshold. Where appropriate, groups can be re-aggregated for analysis and reporting purposes. In both approaches, it is recommended that the direct responses (raw data) be only accessible to an external third party to maintain the anonymity of the participants. This should also be communicated to the participants prior to and during the survey, and when the analyzed information is presented.

Demographic information can also be used to determine the relevance of a respondent's answer. For example, a person with a disability will likely have more useful insights into the accessibility of a workplace or the organization's attitude towards disability. This type of information can be used after the survey has been completed to filter responses, or during the survey to display different questions to different participants.

2.4 Experiential Questions

Often in EDI surveys, the workplace experiences of the participants, both positive and negative, are of interest to paint a picture of the impacts of organizational culture on individuals. The information to be gathered from this section of the survey is crucial to gauging the state of equity and inclusivity within the organization. However, requesting participants to think about potential negative experiences may risk furthering the harm of that experience and so should be approached thoughtfully and with care to provide opportunities to skip these questions if necessary and to provide resources for participants who would like support in processing these experiences.

When asking about experiences in the organization, it is important for the researcher to consider exactly what they would like to learn. It is possible to be too broad and miss critical details that could shape future training or initiatives. A sample of a question that may produce this outcome is as follows: *"Have you ever experienced or witnessed harassment at this organization?"*

This question has a few issues. It does not distinguish experiences a respondent may have had as the target of harassment from events they may have witnessed as a bystander. The results of this question, with demographic information, might allow researchers to determine (a) if there are particular identities or intersections of identities who experience discrimination or harassment in the workplace at higher rates and (b) if there are differences in the recognition of discrimination or harassment between demographic groups. In the case of (a), an organization or employer should develop support systems for equity-deserving people. Conclusions from both (a) and (b) will help to identify future educational initiatives to educate employees on behaviour that is not appropriate in the organization and how to respond to it, and to identify it as an ally. Secondly, there are no time boundaries on the responses to this question. This means that a researcher has no way of determining if an event occurred recently (potentially after the implementation of an EDI intervention of interest) or in the relatively distant past, nor how often the person has encountered such experiences. Simply asking *"Tell me about your experiences relating to harassment at this organization"* as an open-ended question might provide the most details but will take a lot of

time for respondents to give and for researchers to process this information. Instead, it might be best to break the original question into a series of simplified questions that revolve around the original theme (Schaeffer & Presser, 2003). This specific example may be reformatted into the following statements and responses (among others):

- a) *In the past year, I have experienced harassment or discrimination at work.* [Never, Rarely, Sometimes, Often, Almost constantly]
- b) *In the past year, I have observed harassment or discrimination happening to others at work.* [Never, Rarely, Sometimes, Often, Almost constantly]
- c) *In my time at this organization, instances of harassment or discrimination have become less frequent and less severe.* [Strongly agree, Somewhat agree, Neither agree nor disagree, Somewhat disagree, Strongly disagree]
- d) *I have experienced harassment from the following categories of colleagues (check all that apply):* [Managers, Peers, Subordinates, Individuals, Groups, Other: (type)]

For questions of this importance and complexity, providing a place for respondents to indicate that they would like to follow up with researchers further (either by allowing for long answers or opportunities for interviews) may be appropriate.

3 TECHNICALITIES OF SURVEY QUESTIONS

This section provides descriptions of several common survey question formats and examples of appropriate usages and formatting.

3.1 Multiple-Choice Questions

Multiple-choice questions allow the researcher to provide the participant with a finite set of options to select from. Multiple-choice questions can be thought of as a tool for grouping participants based on prior knowledge about the population or the context in which you are asking the question. When choosing the potential responses for a multiple-choice question it is important to balance the goals of providing an exhaustive list of options with minimizing confusion or frustration. It is not ideal to have a huge list of options as it can both confuse participants (too many options may create non-meaningful distinctions if participants are forced to choose between similar options) and lead to fatigue within the survey (risking non-completion). A good rule of thumb is to aim for approximately five options to avoid overtaxing the working memory capacity of respondents (Mattarella-Micke and Beilock, 2012). This can be achieved by simplifying the choices into broader categories or by creating a non-exhaustive list with an option for participants to write in their own "other" responses. In some cases, such as demographic questions about ethnicity or religion, it can be harmful to create cases where some groups are excluded or aggregated, and so well-researched care should be taken to make sure the question does not alienate any respondents.

Researchers can allow for several selections (multiple-answer) within a set or restrict the participant to making a single choice (single-answer). These two options for responses give the researcher flexibility to ensure that the question collects the most useful information from the participants, but also must be used correctly to avoid frustrating participants or resulting in missing information. For this, it is important to have enough background knowledge of the question being asked to know if the potential responses are mutually exclusive or not. If there is no possibility for a respondent to need to select more than one answer to accurately describe their response, a single-answer format would be appropriate and can prevent errors in response. Otherwise, a multiple-answer format is necessary.

An example of a reasonable single-answer multiple-choice question may be as follows, where each choice is clear and there is no overlap among categories or unaddressed gaps:

How long have you been employed at this company?

- (a) *Less than 1 year*
- (b) *1-5 years*
- (c) *6-10 years*
- (d) *More than 10 years*

While there are many examples where multiple-answer questions are appropriate, often questions surrounding identity or experience have the potential for more complex answers than a single choice can represent. It may also be possible to turn a multiple-answer question into a single-answer by consolidating potential responses into a larger category if a lesser amount of granularity in response is acceptable. For example, the following question requires a multiple-answer format to allow for intersections to be represented:

What is your sexual orientation?

- (a) *Heterosexual or Straight*
- (b) *Homosexual or Gay/Lesbian*
- (c) *Bisexual*
- (d) *Asexual*
- (e) *Other (written response)*
- (f) *Prefer not to say*

By changing the question to be more inclusive but less detailed, you may capture just as much useful data from the response for your survey purpose but can simplify the question to allow for a single answer. The following example question may be appropriate, but this type of decision requires some thought into the current culture of your organization and how you will be using the data.

Do you identify as a member of LGBTQ2SIA+ communities?

- (a) *Yes*
- (b) *No*
- (c) *Prefer not to say*

3.2 Scale or Rating Questions

Questions that allow participants to provide a rating, or an answer along a scale, can quantify perceptions of a given variable. These can take the form of Likert-Type questions as described in the following section or can be

numerical. For these questions, it is important to make sure that the scales can be easily understood by the survey respondents, and that the categories give meaningful and consistent results. The typical variables used in these questions (favourability, relevance, importance, frequency, value) are subjective and may require baselining to achieve useful or accurate results. Care should be taken when determining the granularity of the scale and when describing the question and the meaning of ranges on the scale.

Scales can be dichotomous or include huge ranges of values. These two ends of the spectrum have advantages and disadvantages that should be balanced to optimize the question. Dichotomous scales include opposite options (in effect, True or False) and so create very little ambiguity. Participants should have a very clear idea of what each response indicates, and responses will be very accurate. This extreme of a simplified scale can erase the precision and nuance of a scale. There is significantly more judgement required on the part of the participant faced with a percentage than a smaller range with larger divisions. The accuracy and reliability of a scale of this large range may be reduced in the name of assumed precision. To strike a balance between these two, scales with 5-9 bins should be used (Qualtrics, 2019). If possible, try to keep scales consistent between similar questions to avoid increasing the participant's mental load of interpreting the scales.

3.3 Likert-Type Scale Questions

A Likert-type scale question aims to evaluate a participant's feelings on a given statement or topic using descriptive categories along a spectrum. This type of question in EDI surveys is commonly used to assess participants' perceptions of the impact of an aspect of organizational culture or responses to a given statement. Generally, the options are defined as follows:

- *Strongly Disagree*
- *Somewhat Disagree*
- *Neutral*
- *Somewhat Agree*
- *Strongly Agree*

This question format can also be used to obtain estimates of perceived frequency by asking participants to tell the researcher how often an event occurs, with the following scale:

- *Almost Never*
- *Rarely*
- *Sometimes*
- *Often*
- *Almost Always*

It is best to use words such as "almost" or "strongly" to temper the extremes of your responses in a Likert-Type scale as participants are unlikely to select answers that imply 100% certainty (Patten, 2014), and the responses may be artificially clustered as a result.

A potential variation to the scale is the "forced choice" format, which removes the neutral option from the survey and requires that a participant responds to a question with

a more binary choice. This is inappropriate in questions where there may be a reasonable neutral answer as it may create a “false truth” result, but appropriate in situations a neutral result does not provide sufficient information for critical decision-making. If a forced choice format is selected, it is good practice to allow participants to skip the question to avoid erroneous selection.

A note in processing Likert-type scale data is that averages are not necessarily meaningful depending on the distribution of the data (Sullivan and Artino, 2013). There is an assumption within an average calculation that categories are equidistant in value, which may not be the case for all questions. Standard parametric tests can be used for comparison (Norman, 2010); however, the bimodality of responses may provide valuable information about the experiences participants are sharing and researchers must be careful not to lose the nuances of unexpected distributions.

3.4 Ranking Questions

A ranking question asks a participant to organize objects or options according to a given criteria. This might include favourability, relevance, or importance. Ranking questions are most useful when there is real-world relevance to the comparison between options. Again, care should be taken to make sure that the number of options strikes a reasonable balance between having a large enough number of options to allow for nuance and variability and few enough options to ensure reliability and avoid fatigue. The data collected from ranking questions are often more reliable and consistent than rating question responses but may be more difficult to interpret and analyze, particularly when strict choices between options are unimportant.

3.5 Open-Ended Questions

Open-ended questions are invaluable for collecting nuanced stories. There is a plethora of experiences that cannot be accurately captured into multiple-choice or other closed-ended questions. Oftentimes, these are the experiences that can reveal deeper issues with the implementation of EDI initiatives and protections for marginalized individuals, but they do require thoughtful implementation and anonymization as individuals may be more readily identifiable from these responses. They also require more time to appropriately process the data and find themes between responses. In these types of data collection, depending on volume of responses, qualitative data analysis software (such as NVIVO) that allows for thematic coding and compilation can aid in finding meaningful conclusions.

3.6 Focus Groups and Individual Interviews

Focus groups or individual interviews are another method of collecting information. This technique provides a qualitative methodology to explore the opinions, knowledge, perceptions, and concerns of individuals (Glitz, 1997). Participation in the survey, focus group(s), or individual interviews do not need to be mutually exclusive,

as together, they provide critical nuances and context to the experiences shared by the participants. There is no set rule on the number of participants in focus groups, but Glitz (1997) suggests six to ten individuals, plus a moderator. Like the survey, focus groups and individual interviews should ensure confidentiality and provide a safe and supportive space for the participants. As such, these sessions should be facilitated by an external third party (hopefully in coordination with the survey facilitator) without the presence of hierarchical presence or power dynamic, such as the organizational management or human resources. For focus groups, careful consideration should be made to create appropriate community groups that provide a safe space for individuals to come and share their experiences (i.e. women, those dealing with mental health, or Black, Indigenous, or people of colour groups). The questions asked should be open-ended to encourage discussion amongst the participants and in line with the themes presented within the survey.

3.7 Sampling Considerations for Representativeness

It is possible to collect the most accurate data points in the world and not be able to draw any representative conclusions about the organization itself if the sample of participants does not contain: (a) enough people to make valid inferences and (b) enough diversity of individuals to reflect the population of the organization. To address (a), the researcher needs to know the ideal confidence interval to which they would like to report results to. For smaller organizations (<200 employees/members), it is likely that the goal will need to be to collect as many responses as possible, but in very large organizations, a fraction of the employees (evenly distributed across job classes and demographics) may be sufficient. When attempting to draw conclusions within different demographic groups (b), it benefits the researcher to think of each group as a sub-population to be sampled. From here, it can be inferred that the same principles for number or proportions of respondents in each major demographic category should be the goal.

4 RELEVANT QUESTION CATEGORIES IN GEOTECHNICAL ENGINEERING

Geotechnical Engineering field work often presents challenges for equity-deserving people. Increasing market availability of diverse individuals trained in Geotechnical Engineering subjects, development of more equitable hiring practices and evolving and more inclusive company cultures have all resulted in increasingly diverse employee pools in the Geotechnical Engineering field in Canada. Training (Hutchinson and Diederichs, 2022) and development of company policies are an essential component of this work. However, Geotechnical Engineering field work still frequently presents challenges for equity-deserving people at all levels of organizations, and if EDI work is not continually prioritized, these gains in diversity will be lost.

4.1 Psychological Safety in the Field

Fieldwork is common in geotechnical engineering and may result in individuals working in environments that introduce additional stress as a result of the potentially remote location or interactions with people from outside of the organization. Health and safety (H&S) programs have become mandatory in almost all situations and ensure that the organization's participants can perform their duties without harm. However, most H&S programs refer to physical aspects and may not explicitly include the psychological safety of the individual, which can be negatively impacted by EDI-related issues. To capture the experiences unique to fieldwork, it may be worth considering developing questions that are specific to this topic in the survey in collaboration with the health and safety team within the organization.

4.2 External Players in the Field

It is possible that an organization can have well-developed EDI protections and a positive environment internally, but when employees work offsite, this may differ. Fieldwork often requires communication and interactions with other workers, contractors, client representatives, and the general public. Although it may be difficult to directly control the actions of those external players, it is important to capture relevant experiences to inform how to better prepare employees for such situations, and to ensure a support system is in place proactively.

4.3 Accessibility in the Field

In geotechnical engineering, in both academia and industry, the field is often promoted to be better suited for able-bodied individuals. However, not all fieldwork requires full mobility, and the industry should certainly be more inclusive. The same can also be applied to those with “invisible illnesses”, such as mental illness, chronic pain, and hearing loss. Those who require accessibility assistance may either be excluded altogether or face difficulties in the field. These experiences should be considered and captured within the survey. Given the traditional makeup of geotechnical engineering, those individuals experiencing these challenges may be few and far between and so particular care must be taken to ensure the anonymity of these individuals when soliciting information and sharing the results.

4.4 Potential Questions

As a result of this ongoing challenge, the questions included in an EDI survey related to workplace culture and safety should poll employee experience in the field explicitly, in addition to other locations. In the EGU survey (Beniest et al, 2023), respondents are asked to identify the location of their experiences as occurring in one or more of: the “office, common workspace, laboratory, work social event, classroom, field setting, work-related travel, conference or professional society event, meeting, other (please specify)”. Field work often involves working with employees of other companies, may involve long periods

of time away from home living and working on a remote job site, and often presents challenges for regular communication with supervisors, mentors and allies. Therefore, the list of locations given above may be expanded to include: remote work camps, remote field work, and any other location where your employees work. Best company practice should include the development of a specific policies and practices to support employees working in the field, to inform employees, clients and sub-consultants of EDI expectations, responsibilities, reporting, development of response plans to rectify the situation in the field, and sanctions for non-compliance. This may include ensuring that individual employees are not deployed solo, and that they are supported to leave unsafe situations if there is no possible and timely resolution to issues that have the potential to create physical and/or mental harm.

Some of the EDI survey questions may address issues related to whether employees feel safe, both physically and mentally, by evaluating some of the following issues: inappropriate comments; negative references to physical or mental ability, race or sexual orientation; sexual harassment including constant staring, touching or pressure to date someone; suggestive stories or offensive jokes; exposure to inappropriate materials; and any other observed issues in the workplace and environment. Additional questions should be developed to understand whether employees requiring accommodation for disabilities and illnesses – physical and mental – are supported in these workplaces.

5 HELPFUL RESOURCES

- [Guide on Equity, Diversity and Inclusion Terminology](#) (Government of Canada, n.d.)
- [Questionnaire Research: A Practical Guide](#) (Mildred Patten, 2014)
- [“Question and Questionnaire Design” in the Handbook of Survey Research](#) (Krosnick, Jon A. and Stanley Presser, 2010)

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