A Supplemental Interview Framework for Credit Suisse

An Interdisciplinary Qualifying Project report to be submitted to the faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirements for the Degree of Bachelor of Science

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10/15/2015

Abstract

We developed a framework for Credit Suisse to gather additional relevant information about software-developer applicants, eliminate the bias that could be caused by nervousness or introversion, and standardize the process to make it easier to compare applicants. We created an interview supplement and evaluation framework based on the traits that our sponsor has found useful within his team, mock interviews we conducted with Credit Suisse hiring managers, and results we obtained from tests of our supplement. We recommend continued development through additional research behind effective wording of questions, testing with additional subjects, and creating a software tool to automate distribution and display trends in the data collected.

Acknowledgements

We would like to thank Souleymane Bah, our host at Credit Suisse, for the support, constant tutelage, and never-ending flow of espresso.

We would like to thank Prokop Kazil, our Credit Suisse sponsor, for his consistent helpfulness as we attempted to survey all of his employees, his complete cooperation throughout our data collection process, and his constructive criticisms that always served to better our project.

We would like to thank our project advisors, Kathi Fisler and Dan DiMassa, for their invaluable assistance in turning the writing of four engineers into a well-articulated report.

- *Kurt, Jeff, Alex, Dan*

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Executive Summary

The IT department at Credit Suisse tasked us with developing a framework to improve three specific aspects of their current interview process:

1. Their current process covers only technical information and therefore doesn't assess hidden talents or skills that applicants may have.

2. Interviews can differ from one interviewer to another. Because there is no guaranteed consistency, comparing results is difficult.

3. They were concerned that some applicants may have been good fits for positions but were overlooked due to poor performances in interviews.

These problems highlight three goals: gather additional relevant information about candidates, eliminate the bias that could be caused by nervousness or introversion, and standardize the process to make it easier to compare similar applicants.

After analyzing the current interview process, we developed a supplemental framework of questions for Credit Suisse to ask applicants. It consisted of our own questions and our own system for analyzing answers to avoid some of the shortfalls of popular personality tests today. Many tests force applicants into answers that may not accurately represent them by using certain answering mechanisms like true/false or multiple choice. Additionally, most tests make it easy to "game the system", containing answers that are clearly more desirable than others.

Drawing from existing personality tests and our background research, we developed a framework of 6 open questions and 30 trait-related statements. Using this combination of question types puts a little more responsibility on the interviewer to extrapolate from the answers, but gives a more authentic representation of the candidates. We determined that the best

way to administer our supplement would be online or through another means of self-assessment by the candidate. This meets the objective of lessening the effects of nervousness and introversion by eliminating the pressure of interpersonal questioning.

We tested our questions amongst social media users, other students, and Credit Suisse employees. We used answers from these tests to gauge attitude towards our questions, effectiveness at eliciting the types of answers we wanted, and how well the answers displayed the traits of the responders. We followed up our tests with rounds of revisions to finetune our questions.

Our final deliverable to Credit Suisse is a digital copy of the entire framework. Questions and the reasoning behind them are available for future reference (see section 4.6). Interviewers are provided with instructions for administration of the supplement along with a rubric for evaluating the responses (see Appendix A).

1. Introduction

Credit Suisse is a Switzerland-based bank, headquartered in Zurich, that has over 46,000 employees and deals with hiring processes on a daily basis. Each candidate goes through a rigorous hiring process which includes a review of resumes, structured interviews, technical reviews with subject matter experts, and an assessment to evaluate his or her potential. This process is effective for Credit Suisse, as indicated by their turnover rate of less than 5% and virtually nonexistent terminations. However, Credit Suisse does not allocate a formal section of their interview for non-technical analysis. A personal analysis of the candidate's non-technical skills could help draw conclusions regarding the overall quality and fit of an applicant.

This project entails the development of a framework for a questionnaire and interpretation guideline that supplements the current hiring process for software developers at Credit Suisse. This framework arose from a simple list of desirable traits in combination with existing knowledge of personality tests. Our group followed a reasoning process aided by feedback advisors and sponsors to develop a unique set of questions to reveal these traits within potential Credit Suisse software developers. The question set is accompanied by an interpretation framework for the answers received as well as visual and conceptual prototypes for software implementation of our tool.

This framework aims to reduce the amount of wrongfully-rejected candidates by increasing the interviewer's awareness of the candidate's applicable skills, eliminating the factors of nervousness and introversion, and providing results that are easily comparable across all applicants. The question set will reveal applicants' soft skills and hobbies that would not have been made apparent through the current interview process that Credit Suisse implements. This

take-home questionnaire allows applicants to respond to questions without the pressure of an in-person interview. As every new applicant will be taking this questionnaire we are providing a guideline for interpreting answers to Credit Suisse that they can easily compare across all candidates.

This report details the development of our project as well as the revisions and test results that refined our tool. We have also included our final question set accompanied by detailed justifications for each question as well as the type of question used to measure the applicant's aptitude for the traits being measured.

2. Literature Review

2.1 Common Interview Techniques

The most widely used hiring practices include personal interviews, personality tests or inventories, sales preference questionnaires, honesty tests, assessment centers and simulations, letters of recommendation, reference checks, graphology, physical appearance, and experience checks (Randall, 2001). These hiring practices were the basis for our research as we needed to have a deep understanding of basic interview practices before we could try to understand the process that Credit Suisse implements.

The Personal Interview is a simple and inexpensive way to lower the cost of hiring, reduce turnover, shield employees from violence in the workplace, and prevent theft. The current drawback regarding such a hiring process is that it is often misused and abused as a selection technique (Niam, 1998). The Patterned Behavior Description Interview (PBDI) technique draws upon critical incidents from the interviewee's experience that might be predictive of future job behavior (Orpen, 1985). PBDI questions require interviewees to describe how they acted in various job-related situations. This could be useful for revealing behavioral traits of interviewees in order to find better fit employees for the IT team (Day; Carrol, 2003).

The typical one-on-one interview can often cause a misinterpretation of the interviewee's qualities. A digitally evaluated supplement can eliminate this problem by providing a set of responses that can be easily compared across applicants. Most interviewers make their decision in the first five minutes and try to find supporting evidence for the rest of the interview, typically being drawn to applicants with communication skills, self-confidence, and decisiveness (Feiertag, 1994). By supplying a digital supplement prior to Credit Suisse's interview, certain

traits of the applicant are made apparent to the interviewer before they can form a personal opinion on the interviewee.

Personality tests are slowly becoming more popular in the workforce and can be effective predictors of employee performance. "Personality refers to an individual's unique constellation of consistent behavioral traits" and "[e]motional intelligence consists of the ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion." By using a scientific approach in hiring, employers can increase the number of successful hires, which allows them to match their business culture to an individual's personality (Baez, 2015). Places of employment are not all the same, each having their own different culture. Likewise, people are not all the same, each individual brings their personalities to the workplace (Baez, 2015). When using a personality test, it is more beneficial to tailor the testing instrument to relate to the specifics of the job that the company is recruiting for (Bertrand, 1990).

Written tests created by the employer and tailored to the job being applied for are the most valid predictors of success in the workplace (Hunter, 1984). It was concluded that all large sample studies across the years have shown that written tests are excellent measures of ability and that other types of tests are typically more expensive and produce less valid results (Keirsey, 1998).

More recently, researches have put together "Low Fidelity Simulations" (LFS), which are similar to assessment center simulations. These simulations provide the applicant with a written series of situations one might face on the job. Despite the fact these simulations have similar predictability as assessment centers, they lower administrative costs and require less time

commitment than assessment centers (Silvia, 2006). Computer assisted interviews are very similar to LFSs in that interviewees are shown a video with three scenarios for assisting a customer, and they must choose the scenario they deem best. Such techniques pinpoints applicants' strengths and weaknesses that are related to the job being applied for (Taylor, 1999).

Often, the interviewer can extract more pertinent information from the applicant's past employer(s) by asking them questions such as "How has [applicant] performed?", "Would [company referenced] consider rehiring this employee?" and "Is additional training needed to make [applicant] more effective?" (Berman, 1994). Questions like this give the employer a better perspective into the type of worker each applicant is.

2.2 Existing Personality Tests

In order to develop an understanding of questions that can be used to determine personality traits of applicants we researched existing tests that use these type of questions. The most popular tests proved to be the Big-5 Personality Test and the Myers-Briggs Type Indicator (MBTI). We also researched the special interests that are typically associated with certain personality traits as well as introversion which can cause seemingly poor performance within interviews.

2.2.1 The Big-5

The Big-5 Personality Test is one of the most effective tests for measuring traits that can describe a personality profile. The five traits can be remembered by the acronym OCEAN (Atkinson; Smith, 2000).

- *Openness to Experience (sometimes referred to as Intellect)*

- *Conscientiousness*

- *Extraversion*

- *Agreeableness*

- *Neuroticism (sometimes referred to as Emotional Stability)*

The Big-5 is the result of decades of overlapping psychological research that slowly reduced massive lists of descriptive adjectives to five large, overarching themes that can be used to evaluate how someone may interact with their environment and peers.

Openness refers to the willingness to have new experiences. Those who score highly in openness can likely show a heightened interest or appreciation for art, music, and new adventures. They can have more creative tendencies than their peers and may be more curious or prone to having unusual ideas. This is useful for innovation and approaching development problems in ways that most employees wouldn't think of.

Conscientiousness is a measure of how people regulate their impulses. Those who score highly in this category are likely to be organized and disciplined individuals. They motivate themselves and strive to meet goals given to them by others. They also tend towards structured environments with easy guidelines to follow and easy targets to shoot for. Complying well with project managers and being self motivated are ideal traits for employees working on a project team.

Extraversion can be described as surgency from external activities. Extraverts love to engage with the outside world. They are assertive and energetic, often posses public speaking and presentation skills, and are very action-oriented. Working in a group environment, extraverts

typically show better communication skills. Introverts can appear less energetic and less socially engaged. They tend to be more considerate of others and more deliberate in their actions. Introverts may display less communication skills, yet their deliberacy and thoughtful actions serve well to creating meaningful work.

Agreeableness is how well an individual gets along with others. Applicants with high scores are good fits for leadership roles that require leading a group through a change rather than standard project management. Those with high scores in this section are generally considerate and trusting as well as helpful and willing to compromise their interests for those of others.

Neuroticism is a measure of one's tendency to feel and act upon negative emotions such as anger, frustration, or anxiety. Applicants with high scores in this section are easily excitable and can often use ineffective approaches to handling conflict within a group.

2.2.2 Myers-Briggs Type Indicator

Because of its long-time standing as a workplace tool designed to identify personality types, we intend to use similar questions as seen in the Myers-Briggs Type Indicator (MBTI). The Myers-Briggs test was derived from the work of Carl Jung, and has been used for years for career counseling decisions. It holds some value (and fosters some criticism) in the world of psychology today (Myers-Briggs Foundation, 2014). The Myers-Briggs test is meant to define how a person perceives the world and makes decisions. It splits perception into four psychological functions: sensation, intuition, feeling, and thinking (Kaplan, 2009), and four attitudes: perception, judging, introversion, and extraversion. The MBTI today further splits the four functions into four dichotomies:

1.   sensing/intuition: how one focuses their attention.

2.   feeling/thinking: one's decision preferences.

3.   perception/judging: how one handles complexity.

4.   introversion/extraversion: how one interacts with others.

With sensing versus intuition, MBTI attempts to define a preference for how one gathers information. Those who prefer sensing trust concrete information such as things they can see, touch, or verify in some way. They also tend to be distrusting of hunches and gut feelings (Myers-Briggs Foundation, 2014). Those who hold a preference for intuition, on the other hand, may be more interested in underlying theories and principles than in facts and details. They can also be more interested in looking at future possibilities and hypothesizing.

Feeling and thinking affect one's decision-making process. Those who value thinking are very rational and objective. They may have a hard time working with people who are illogical or inconsistent with their decisions. "Feelers" are more personally associated with their choices. They are subjective and empathetic, and more readily factor in their own opinions.

Perception and judging define a preference for one of the first two dichotomies. Sensing and intuition are perceptive functions while feeling and thinking are judgmental functions. This tendency, whichever direction it goes, is paired with introversion or extraversion to define one's "dominant" and "auxiliary" functions (Myers; McCauley, 1998).

Introversion and extraversion, like in the Big-5, highlights a tendency to interact with or avoid the outside world and other people. By the MBTI metric, extraverts feel more energized by spending time with others while introverts recharge by spending time alone. Extraverts tend to

act, reflect, then act again, while introverts will consider carefully before making decisions. Tendencies towards one or the other also aid in clarifying one's dominant or auxiliary function.

MBTI defines each preference by letters, so there are sixteen combinations that can be described by sixteen 4-letter combinations. For example:

- ENFJ: Extraversion, Intuition, Feeling, Judging
- ISTP: Introversion, Sensing, Thinking, Perception

All sixteen combinations, or temperaments, have been given their own names by the Keirsey Temperament Sorter theory (Keirsey, 1998), which is widely used by companies such like Coca-Cola, Bank of America, AT&T, IBM, and the U.S. Air Force (Guide to Online Schools, 2015). By the Keirsey Temperament Sorter, the first example above would be a "Teacher" while the second would be a "Crafter".

Mentioned above were the terms dominant and auxiliary traits. In extraverts, their tendency toward perception or judging decides which one is their dominant function, or the one that is more readily shown to the world. In introverts, this tendency defines their auxiliary function, or the one that is eclipsed by their dominant function. There is an additional tertiary trait, which exists to differentiate from the weakest trait, the exact opposite of the dominant. The first example provided above, ENFJ, would result in :

1. dominant extroverted feeling
2. auxiliary introverted intuition
3. tertiary extroverted sensing
4. inferior introverted thinking

The important difference that must be noted between Big-5 and MBTI and is that Big-5 measures aptitude for certain traits. MBTI merely measures the preference for a given function. A high-scorer in agreeableness under the Big-5 system would be more agreeable than a low scorer, whereas someone who tends towards intuition with the MBTI scheme is not necessarily *more* intuitive than anyone else (Myers; McCaulley, 1985). It will be important for us to keep in mind that these tests should be viewed with some skepticism, especially the MBTI. They are not accurate all the time, and sometimes practice and common sense lead individuals to cheat the tests and produce the results they want. Because the tests rely on the full honesty of the test-taker, they are inevitably doomed to be flawed. Insight we gain from using questions derived from these tests can be used as relevant information, but certainly should not be considered fact.

2.3 Special Interests

Special Interests can hold correlations to someone's vocational skill sets. A person's interests can hold important clues as to what their brain is naturally wired for (Silvia, 2006). For example, a competitive scrabble player may be a good writer or a person who has played piano for years may have more creative tendencies than their peers. Simple questions about leisure activities and hobbies can be used to gain insight into what someone might be naturally good at. No definitive conclusions can be drawn, and the questions again rely on the honesty of the person being asked, but these too have the chance to help discover unknown talents that a person may have.

2.4 Introversion

Traditional interview processes can pose an advantage to extroverts because introverts sometimes do not perform well under these high pressure situations. Research indicates that introverts can be better engaged by allowing them ample time to formulate their responses. While extraverts typically think out loud and respond to feedback from others, introverts prefer to find solutions to problems in their own mind first (Schwegman, 2013). Introverts are challenged when they are thrust into gatherings designed for networking with strangers. Extroverts thrive on being out among people, love meeting new ones and packing a lot into a day (Kahnweiler, 2015).

3. Methodology

Our objective was to develop a framework consisting of a strategic Q&A analysis that supplements the current hiring process for software developers at Credit Suisse. Creating a supplement that will identify applicants' hidden talents and relevant soft skills requires an understanding of valuable traits, as well as knowledge of the current interview process. Our framework is designed to cover the subjective side of the interview process rather than the technical side, and as such we had to identify what Credit Suisse was looking for in their candidates and what gaps existed in their current interviews.

The best way we could help Credit Suisse was by creating an interview supplement. Alternative methods could have been remodeling the current interview process, but the interview process as it stands does a terrific job at collecting the necessary technical data on a candidate. A supplement focused on providing subjective information about candidates to the interviewers gives them additional knowledge they didn't have access to previously. Having this supplemental information allows interviewers to better identify candidates that may be similar, to look for candidates that are better fits for the job, and to make more informed decisions during their final assessments.

Our sponsor has a top-level view of how his team interacts and operates, providing him with the most accurate working knowledge of what traits and skills are valuable. Our primary source of background information was therefore our sponsor's insights on what traits make an effective Credit Suisse employee. He provided a list that served as a starting point, which we refined over the course of our project through our other methods.

Interviewing current employees to profile their personality traits initially seemed like a useful data source, but this method was eventually dropped. We initially thought that with profiles of current employees, it would be easier to evaluate new applicants based on a standard set by the current workforce. However, we took two issues with this approach. Firstly, our sponsors did not want personalized profiles of current employees to be created. Our sponsor wanted to avoid making his employees think that we were somehow assessing their performance, since this could have caused them undue stress. Secondly, it is necessary for applicants to be evaluated regardless of the current standard of employees, as the workforce will change over time.

In addition to observations from our sponsor, gaining direct experience with Credit Suisse's interview process provided a better understanding of the strengths and weaknesses of their current practices. By having Credit Suisse interviewers run mock interviews with two members of our team, we had had the opportunity to carefully observe what information is currently gathered. The remaining two members of our team took note of the questions asked, which skills were assessed, and how personality traits were recognized in Credit Suisse's regular interview, all the while looking to identify gaps in the gathering of non-technical data on candidates.

Our set of questions and how to analyze the answers is customized for Credit Suisse, influenced both by existing personality tests and our research throughout the project. We dismissed the idea of directly sampling questions from popular personality tests. By using our data and analysis mixed with other tests to develop questions, our supplement is able to provide the valuable information Credit Suisse interviewers want about their applicants while avoiding

some of the setbacks that come with many popular personality tests today. Many existing tests pigeon-hole and profile test-takers by supplying structured answers that test-takers must choose from. They also often using wording that clearly makes some answers better or worse than others, heavily influencing test-takers to answer in a certain way.

  After developing initial question sets, pilot tests through surveying provided valuable information on the effectiveness of trait-identification questions. Because the questions were developed specifically for this project, they needed to be tested for accuracy. Running pilot tests had the benefit of revealing how subjects interpret the questions and what correlations exist between the subjects' traits and their responses to the questions.

4. Data and Analysis

The objective of the data acquisition and analysis phase was to collect and convert data into credible evidence supporting our framework and its performance. This section details the collection of valuable traits, the development and implementation of questions related to those traits, and the results of testing their effectiveness.

4.1. Traits

In trying to fill software-developer positions, Credit Suisse has certain traits that they are looking for in candidates. Up to this point, it generally has been the job of the interviewers to identify desirable traits in applicants. The effectiveness of that task depended on the interviewer in question and how the applicant responded to the interview process. Our supplement was designed to add a uniform process that would identify non-technical traits Credit Suisse is looking for. Those traits are displayed in Table 1.

The origin of each trait and our method to assess it are shown in the second and third columns of the table respectively. We received a list of traits from our sponsor that he felt were consistent among effective members of his team. We also added some of our own over the course of our project that we believed would be beneficial for Credit Suisse. We selected Motivation as helpful supplemental information. Avocational interests were included to meet a specific objective from our sponsor: finding connections between outside hobbies and work-related skills. Stress response was included at the advisement of the Credit Suisse interviewers themselves. More information on these traits and why they are included can be found in section 6.

Table 1: *Non-technical traits, their origins, and how they were addressed*

Trait	Origin	Question Type
Creative	Manager	Free Response
Innovative	Manager	Free Response
Able to Abstract	Manager	Multiple Choice
Communicative	Manager	*Trait Removed*
Attentive to Detail	Manager	Free Response
Diligent	Manager	Multiple Choice
Pragmatic	Manager	Multiple Choice
Responsible	Manager	*Trait Removed*
Collaborative	Team	Multiple Choice
Extroverted	Team	Multiple Choice
Motivated	Team	Free Response
Avocational Skills	Team	Free Response
Response to Stress	Interviewer	Free Response

Extroversion we also added ourselves, since providing prior information to the interviewer about the level of extroversion or introversion of the interviewees could be useful in analyzing how they will interact with their peers if hired. Additionally, for reasons that will be explained in sections 4.2 and 4.4.1, we removed two traits from the original list provided by the sponsor, as shown in column three.

4.2. Mock Interview

We participated in mock interviews to identify gaps in non-technical information gathering in Credit Suisse's interview process. Two members of our team, one very outgoing and the other more introverted, were interviewed by project managers from the platform development team while the remaining two members observed. It was apparent that the interviews conducted by Credit Suisse are largely technical. The only non-technical questions seemed to be related to ambition: general questions such as why is the candidate interested in the particular position, why are they leaving their previous position, and what is driving them to work at Credit Suisse in particular.

The interview revealed that our interviewers in particular were highly intuitive. In conversations with one of the interviewers afterwards, we learned that he had correctly inferred that one of our team members has an appreciation for up-front project requirements. Experienced team managers were able to extrapolate most of information they felt was relevant from the interview, but one of the main objectives of this project was consistency. Our tool needed to supply some amount of comparable information from candidates, since the current interviews were unscripted and therefore tended to vary from applicant to applicant and interviewer to

interviewer. By using standardized questions from our framework, Credit Suisse can ensure that all the interviewers, at least in the terms of non-technical skills, will have access to the same information.

Considering the need for consistency and the lack of questions that address non-technical skill, we determined at this point that all traits need to be assessed by our framework, except for communication, as a candidate's ability to communicate is typically reflected in the interview. As a result, we removed it from the list of traits that needed to be assessed.

4.3. Supplement Design

In designing our supplement to solve the problems that Credit Suisse has with its current interview process it became clear that there was a lot of nuance in what types of questions we chose to include and how they would be administered. The ramifications of both those decisions would have effects on how effectively our framework collected the specific information we were looking for, and on how closely we met our sponsor's objectives.

4.3.1. Administration Method

The format of our supplement is an important factor in the development of interview questions and the type of information we hope they'll collect. Although we won't be implementing the final tool ourselves, we recommend that it be administered outside of the traditional interview setting.

When deciding how the supplement would be completed, we considered two options: having a "take-home" questionnaire, or having an additional set of questions be asked during the

regular interview. The first option has the advantage of affording the candidate time and space to think and answer the questions independently. This negates the effects of nervousness or introversion by eliminating the pressure of person-to-person questioning in a traditional setting. The downside, however, is that the candidate then has the ability to research existing answers to the question. The research-ability of the questions would need to be minimized through wording and overall question type to combat any dishonesty. The second option has the advantage of revealing how quickly the candidate can think on their feet; however, this was not a prerequisite and it does not lessen the effects of nervousness or introversion. Also considering that the interview is limited to a time slot of 30-60 minutes, we decided that the first option would prevent any time having to be taken away from the necessary technical questions.

We considered the idea of a combination of both methods, but although combining them brought together the advantages, it did the same for the disadvantages. We decided on the "take-home" option and designed our supplemental questions to be administered in that manner. We envision Credit Suisse interviewers being able to then have access to the responses to our questions during the phone and/or in-person interview later on, allowing them to interpret and use the information as they see fit and ask further questions if so desired.

4.3.2. Question Type

In researching existing personality tests, we came across many different types of questions. We realized that some types of questions limit the individuality of the answers. An example of this is MBTI, which uses 50/50 questions to place subjects into four sets of personality dichotomies. In contrast, a Big-5 test uses Likert scales to produce a numerical result

for each trait. More information can be found in the Literature Review section. Due to the nature of an interview, these differences can also influence the accuracy of the questions. We don't want candidates to pigeonhole themselves into a profile that they believe the employer would want. For this reason we looked for questions that don't limit the candidate to fit a certain personality type.

We ranked typical question types based on how much they pigeonholed the person taking the test. The most restrictive types of questions are 50/50 questions, where the candidate has to choose between two options. This could be a choice between two adjectives, or a statement that he or she believes is true or false. Multiple choice questions are slightly less restrictive, allowing a candidate to select one of a handful of statements that best describes his or her personality. We feel that both of the aforementioned question types are too limiting to the candidate, which places pressure on them to align themselves with what they believe the employer wants to see. Another common question type, the Likert scale, presents a single statement to the candidate along with a range of options—typically 5—as to how strongly the candidate agrees or disagrees with the statement. Even less restrictive are multiple response questions, where candidates are presented several statements, and they can choose to identify with as many or as few as they want. We feel that this question type leads applicants to answer honestly rather than trying to provide responses that they deem "correct." As compared to the Likert scale, where the candidate has to affirm or deny a statement, there is no expectation associated with the questions; the candidate can affirm those he or she is most comfortable with and simply ignore the rest. The least restrictive of all question types is open response, where the candidate may fill in their own original answer. We feel that this type is also valuable because it encourages the candidate to

think and engage the question, and because supplemental open response questions parallel what you would expect in a traditional interview.

While discussing the restrictiveness of different question types, we also considered the ability to quantify the results. One of the most important objectives is to enable Credit Suisse to compare two or more candidates. This is easy to do with a traditional MBTI personality test consisting of 50/50 questions, where the result is a simple calculation of how many statements of each personality trait were selected. For open response, the results are far more subjective and will require a set of general guidelines rather than a concrete rubric.

4.4. Question Development and Analysis

Our supplement was designed using a combination of open response and multiple choice questions. We began with just open response questions, because these give applicants the opportunity to be expressive and develop their own responses. However we discovered that some traits do not lend themselves to that style of question: the answers would be too easy to fake or would require extensive analysis of the open response. Additionally, some traits are already explored in existing personality tests, which was a great foundation for the development of our tool. This section goes into detail about how traits were allocated to each question type.

4.4.1. Open Response

We decided to use open response questions because they prevent pigeonholing by allowing candidates to create their own answers instead of forcing themselves into a slot designated by the question. We recognized the lack of quantitative comparison that would be

available with this sort of question, but felt that trying to quantify a candidate's personality was an objective that we were able to meet with the multiple-selection section. For this reason we wanted to ensure that a part of our question set provided answers that are unique to each candidate and open to interpretation by the interviewer.

Through research, we developed open-response questions designed to target the following traits:

- *Creativity*

- *Innovation*

- *Attentiveness to Detail*

- *Motivation*

- *Avocational Interests*

- *Stress Response*

It was during this process that we removed Responsibility from the list of traits. It was apparent that any open-response question addressing responsibility would encourage them to answer as positively as possible, rather than as honestly as possible. The amount of bias in any answer to a question of that nature would make that information significantly less valuable, so we discarded the trait on the grounds that we couldn't accurately measure it.

4.4.2. Multiple Selection Statements

After completing our open response questions, our remaining traits were:

- *Pragmatism*

- *Abstraction*

- *Collaboration*

- *Extroversion*

- *Diligence*

These traits were not lending themselves as well to open-response type questions. For example, we couldn't design an open-response prompt to measure how diligent an applicant is without leaving a wide-open opportunity for the applicant to brag about their work ethic to a prospective employer. In order to create a mechanic in which candidates would honestly display their affinity for these traits, we decided to add another section of questions that fit the multiple selection paradigm mentioned above. This also helped us to be able to better compare candidates' answers, another role our sponsor was hoping our supplement could fill.

Through more research, we connected each trait we were looking for with the closest correlated trait we could find in existing personality tests. By doing so we gained intimate knowledge of the way questions for those traits are designed. We then used that insight to construct our own questions for our similar traits.

- Pragmatism holds some resemblance to Sensing from the MBTI.

- Abstraction is related to Reasoning from Cattell's 16 Personality Factors and loosely to Intuition from the MBTI test.

- Collaboration is linked to Agreeableness from the Big-5 test.

- Extroversion is directly assessed in almost every existing personality test.

- Diligence is very similar to Conscientiousness from the Big-5.

Our original objective was to select existing questions that we felt would fit our model. These types of questions failed either because the answer had to be on a Likert scale or because the statements were too leading. For example, in searching for collaboration questions, lots of agreeableness statements were written like:

"I care about others" or, *"I am sympathetic towards others' feelings"*.

We couldn't imagine anyone who would possibly disagree with those sort of statements in an interview setting, so we decided to instead use our research as background information and invent our own statements that would better fit our parameters.

Our methods were as follows: each team member invented 4 statements for one of the traits. They had to be worded in such a way that their base meaning wasn't readily apparent to the candidate and so that it wasn't clear what the "right" answer would be.

Credit Suisse employees come from diverse backgrounds, and many are not native english speakers. Because of this, it was important to limit difficult vocabulary and keep the statements concise to prevent issues from arising due to language barriers.

Once we had preliminary statements, we refined them as a group. Most were discarded immediately, some were reworded. Each statement received extensive attention until it was unanimously checked off as being ready. Common issues were wording, too much of an obvious "correct" answer, or a lack of connection with the original base trait. The sixteen questions we started with were soon narrowed down to five that we liked, one each for diligence, collaboration, and abstraction, as well as two for pragmatism.

We remodeled our short term goal at this point, lowering our original goal of four to five questions per trait. We decided it might be better to have two statements per trait, specifically

one affirmation statement and one negation statement. If a candidate selected only one, we could recommend that they might have an affinity or aversion for that trait. If they selected neither or both, we wouldn't be able to provide auxiliary information.

This method worked reasonable well, and we were able to create the 10 statements we wanted for our first round of testing:

1. *My best work is usually done in groups. [Affirm Collaboration]*

2. *I like to solve problems independently. [Negate Collaboration]*

3. *Too many possibilities can be intimidating. [Affirm Pragmatism]*

4. *I value an exciting project over a high reward. [Negate Pragmatism]*

5. *I can't leave things unfinished. [Affirm Diligence]*

6. *I don't mind handing an assignment to someone else. [Negate Diligence]*

7. *I like concepts more than implementation. [Affirm Abstraction]*

8. *If someone else's method works well, I don't need to create my own. [Negate Abstraction]*

9. *I enjoy speaking in front of large groups. [Affirm Extroversion]*

10. *I prefer to listen to others' ideas before presenting my own. [Negate Extroversion]*

Detailed descriptions of the reasoning behind the choice of these statements can be found in sections 4.6.8 - 4.6.11.

4.5. Testing And Revisions

While developing our interview supplement we had to test its effectiveness to ensure that our tool would be useful to Credit Suisse. We drew opinions and sample responses from as many

people as possible, ranging from social media experiments to piloting our tool with our WPI

peers and current Credit Suisse employees. This section outlines the useful information that we

gained from our test responses.

4.5.1. Social Media Test

In order to get useful results, there needs to be a wide variety in the responses from

candidates. In order to quickly test the variety of answers we could obtain with one of our

questions, we performed an ad-hoc uncontrolled experiment through social media. We chose our

attentiveness to detail question, "Describe how toast is made", and sent it out to a total of

approximately 50 Facebook friends from varying backgrounds and collected the responses.

Although the experiment had numerous bias factors and can't be considered statistically

significant, we received exactly the sort of responses we wanted, ranging from 6-word answers

such as:

"By toasting some type of bread."

to complete chemical analysis of how bread becomes toast:

"Toast is the result of applying an external heat flux to the surface of a piece of bread. Absorbed

heat is first absorbed by the liquid in the bread, experiences a phase change to gas, and then

escapes the bread, resulting in dryer bread. With increasing time, the bread continues to dry out,

eventually with heat now flowing into the other components of the bread, like the flour. As this

energy is absorbed, a color change may be observed. A result of thermodynamics may be toast."

Following the facebook test we concluded that this question can easily be answered with varying levels of granularity. Furthermore, it is effective in identifying people who are very attentive to detail, but a less detailed response does not concretely indicate that the person is not.

4.5.2. IQP Group Survey

We ran the first pilot of our statements and open response questions by using Qualtrics and distributing them anonymously to the other 19 IQP students in Switzerland. We hoped to receive feedback on the effectiveness of our questions from our peers as they were aware of the goals of our project. We didn't expect to receive responses similar to those of potential Credit Suisse employees as many of our peers are not experienced in software development. Most of the open response answers we received were unuseable as reference data. Although we had asked students to view the questionnaire as if they were in an interview setting, we received many one-word answers or personal complaints unrelated to the questions being asked. The most useful information came from the statements and the question we included at the end asking for feedback. This question gave the students the opportunity to tell us if they thought anything on our survey was too leading or poorly worded.

A fair number of the students who completed the questionnaire singled out one or two of the statements as being too leading or unreasonable, saying they either felt they had to select them or that no one would ever select them. In every case though, it was a different statement referenced, and their opinions were nullified by the responses of their peers. For example, a student said that the following statement seemed too negative for anyone to ever say they identify with it:

"I prefer concepts over implementation."

However, the previous three students to complete the questionnaire had selected that statement. This contrasting feedback actually served to validate our statements. If some people thought that some statements were absurd while others happily identified with those exact statements, that means the questions effectively identified different personalities.

4.5.3. Question Expansion

The original test conducted with WPI students contained only ten multiple selection statements from section 4.4.2. Our sponsor recommended that we increase our number of multiple selection statements to the thirty that now appear in our supplement (three pairs of affirmation/negation statements per trait). This change was made in order to improve the granularity and statistical significance of results, and you can see this change reflected in the results from the Credit Suisse test in section 5.4.

Existing statements were organized into five groups by trait, and a trait capturing the "other side" of the scale was explicitly named. Each trait received a word that articulated its opposite:

Pragmatic vs. Idealistic

Abstract vs. Concrete

Collaborative vs. Independent

Extroverted vs. Introverted

Diligent vs. Casual

Since candidates were going to be able to be "scored" from -3 to 3 on each trait, it made more sense to describe the negation scale as something other than "Not Diligent", for example. These opposite traits were carefully selected to remind interviewers that being the opposite of the target trait is not necessarily a negative thing. Having an apparent aversion to pragmatism, for example, does not disqualify the candidate from being able to do the job. It simply means that the candidate is likely more idealistic, which could very well still make them a good fit for a position within Credit Suisse.

After returning to our brainstorming and review formula, a larger set of thirty statements that met our sponsor's requirements was agreed upon. The statements and the reasoning behind them are described in section 4.6.

4.5.4. Credit Suisse Survey

The expanded set of questions and statements were piloted on Credit Suisse employees to gauge their accuracy and effectiveness. We distributed a complete questionnaire to twelve employees, four in the Zurich office and eight from the Poland office where the other half of the software development team is located. After the question set had been expanded, there was more opportunity for the interviewees to identify with statements that correlate to certain traits they may have. The previous version of the questionnaire that had be piloted with the other WPI students was meant to obtain feedback on the existing questions. For this reason, we included the option to provide feedback in the survey; however, this was not necessary for the Credit Suisse trial.

In developing the survey for Credit Suisse, we had the challenge of deciding how to present a much larger number of multiple selection statements. Rather than attempt to organize in them in some subtle layout, we decided that they should be displayed randomly. This would maintain the scalability of the framework should Credit Suisse choose to expand the question pool further or replace any questions in the future. We used a random number generator to scramble the order of the questions and then arranged them into six groups of five. A sample of a few of the survey questions can be seen here:

Please select any statements you identify with.
- [ ] I tend to recognize trends.
- [ ] I enjoy having a wide circle of acquaintances.
- [ ] I prefer to set high goals.
- [ ] I prefer to solve problems independently.
- [ ] I prefer to work in a quiet setting.

Please select any statements you identify with.
- [ ] My goals tend to be incremental and focused.
- [ ] I think deadlines are of relative rather than absolute importance.
- [ ] I like concepts more than implementation.
- [ ] Too many possibilities can be intimidating.
- [ ] I don't mind if others are late to meetings.
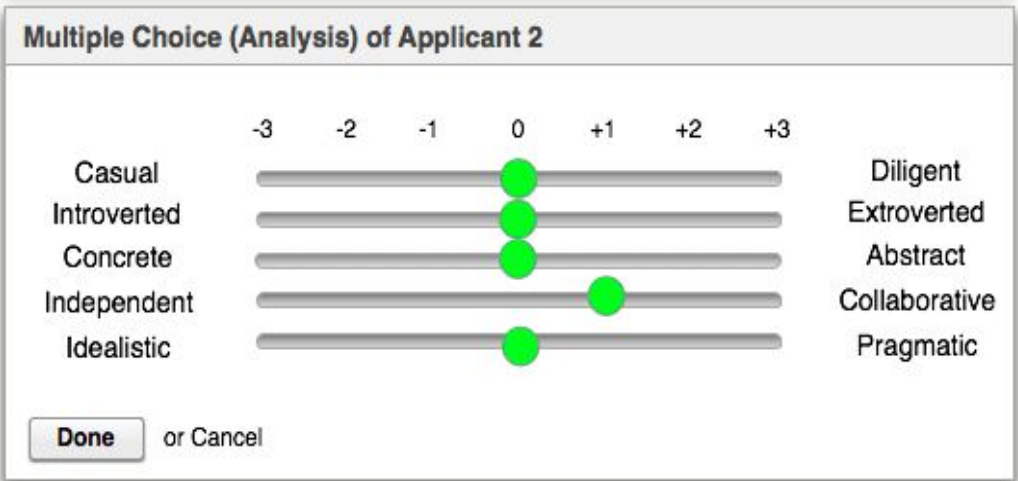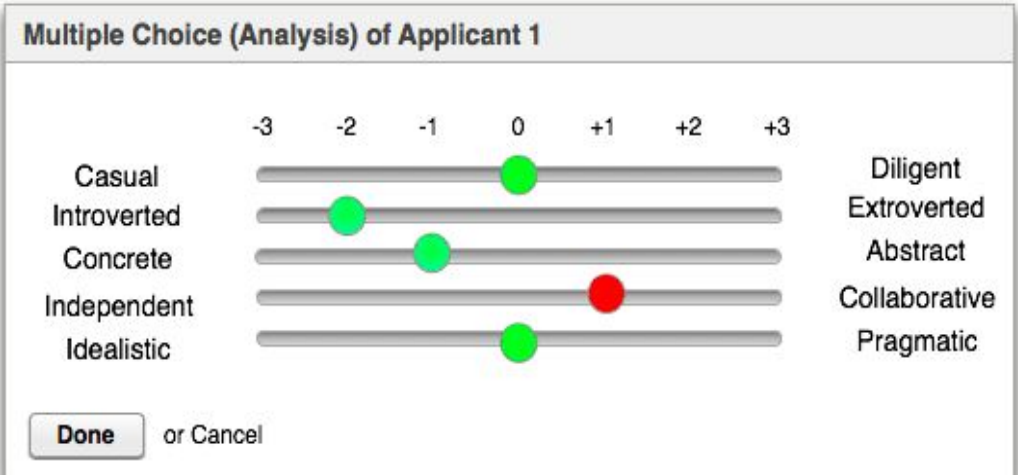
Please select any statements you identify with.
- [ ] My thinking tends to deal with objects and actions, rather than theories and possibilities.
- [ ] If someone else's method works well, I don't need to create my own.
- [ ] It's easier to focus when I work alone.
- [ ] I rapidly get involved in the social life of a new workplace.
- [ ] I can't leave things unfinished.

Seven of the dozen employees who received the survey answered it. Again, the open response answers were not very helpful. Most were one or two sentence answers, some of which explicitly said that the employee in question was not putting any effort into the survey. We attributed this to the fact that for full-time employees, our survey may have seemed like a nuisance and something that they wanted to complete quickly.

The multiple selection section, in contrast, elicited useful data. Prior to distributing the survey, we asked our sponsor to compile short profiles on each of the employees we were surveying. After receiving the results, we compared the quantifications from the multiple selections statements with the profiles of the employees. There turned out to be a strong correlation between the measurements from the survey and our sponsor's evaluations of his employees.

The results from our seven responses are summarized in the diagrams that follow. For the purpose of this assessment, we ignored the provided score for each trait; if an employee was recognized by the manager as being diligent, any numeric score from one to three towards diligence in our assessment was marked as *accurate*. For the sake of the visual representation, nodes that are highlighted in green represent an accurate measurement (relative to our sponsor's assessment), nodes highlighted in red indicate an inaccurate measurement. One set of results was omitted, since we couldn't compare due to a lack of information in the employee profile we were provided.

Multiple Choice (Analysis) of Applicant 1

	-3	-2	-1	0	+1	+2	+3	
Casual				●				Diligent
Introverted		●						Extroverted
Concrete			●					Abstract
Independent					●			Collaborative
Idealistic				●				Pragmatic

Done or Cancel

Multiple Choice (Analysis) of Applicant 2

	-3	-2	-1	0	+1	+2	+3	
Casual				●				Diligent
Introverted				●				Extroverted
Concrete				●				Abstract
Independent					●			Collaborative
Idealistic				●				Pragmatic

Done or Cancel

Multiple Choice (Analysis) of Applicant 4

	-3	-2	-1	0	+1	+2	+3	
Casual						●		Diligent
Introverted						●		Extroverted
Concrete			●					Abstract
Independent				●				Collaborative
Idealistic			●					Pragmatic

Done or Cancel

Multiple Choice (Analysis) of Applicant 5

	-3	-2	-1	0	+1	+2	+3	
Casual							●	Diligent
Introverted				●				Extroverted
Concrete				●				Abstract
Independent					●			Collaborative
Idealistic						●		Pragmatic

Done or Cancel

Multiple Choice (Analysis) of Applicant 6

	-3	-2	-1	0	+1	+2	+3	
Casual					●			Diligent
Introverted			●					Extroverted
Concrete			●					Abstract
Independent					●			Collaborative
Idealistic				●				Pragmatic

Done or Cancel

Multiple Choice (Analysis) of Applicant 7

Though this was a limited data pool due to our dependency on voluntary answers, the measurements were significantly more accurate than we expected. Disregarding data for one candidate whose personality tra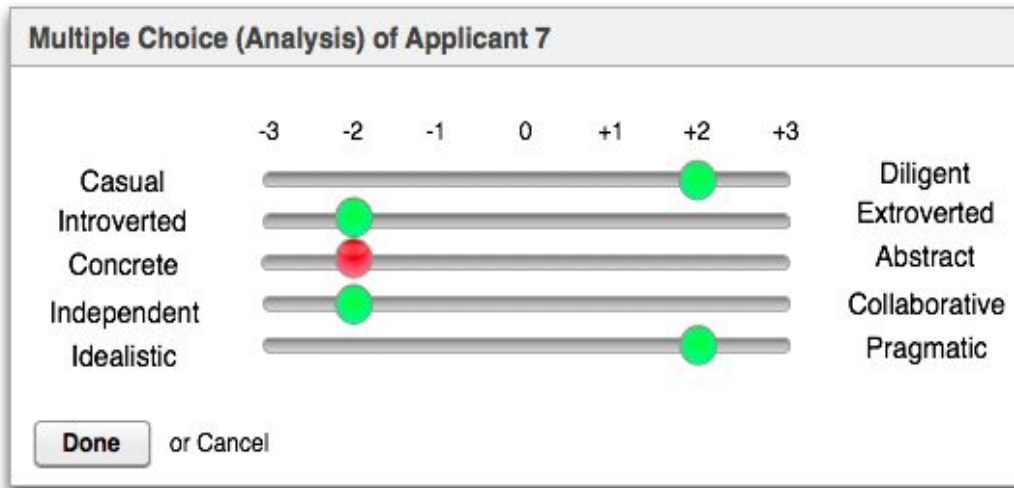its were unknown, our questions accurately assessed 28 of the 30 traits we were able to compare with employee profiles. Given this 93.3% correlation, very few revisions were needed. Due to time constraints and the inability to survey more employees, we did not conduct any additional surveys following these minor revisions which are mentioned in detail in the following section.

4.5.5. Question Rewording and Replacement

Early iterations of our questions contained such open-response questions as:

● *"Have you ever played on a sports team?"*

● *"If you were an animal, what would you be and why?"*

● *"If you had to redesign the computer, what would you do differently?*

The sports team question was originally meant to identify candidates who might be more inclined to work on teams, based on prior life experiences of working with others to achieve a

common goal. It was removed on the grounds of possible gender bias, as well as the realization that the multiple selection statements were already addressing teamwork through the collaboration statements.

The animal and computer questions were both original iterations of the creativity question. For the former, the choice of animal and especially the reasoning behind that choice was meant to provide opportunity for candidates to answer in a uniquely creative way. However, after our test with the Credit Suisse employees, it became apparent that this was a very unpopular question. Our sponsor pointed out the similarities it held to something a psychiatrist might ask; questions like that can sometimes be used to evaluate the mental state of patients. The employees who were surveyed seemed to recognize that quality in this question, and we removed it following the pilot test, replacing it with the creativity question that is now included.

For the latter, our sponsor believed the question was too broad, and wanted to narrow it to be only one particular aspect of a computer rather than leaving open the entire entity. When we developed it, the question was supposed to provide applicants with the opportunity to recreate part of a technology they use almost every day, while also staying close to the technical interests of the average candidate for a software development position. Though we were optimistic about the original question, the process of narrowing its scope made it more technical than we liked, and we opted to replace it entirely.

Small changes were also made to our multiple selection statements as results came in. We quickly realized the ambiguity of the verb "like" in a number of our statements and changed almost all occurrences to "prefer" as we felt it better captured the mindset we were looking to identify.

Individual statements were reviewed and reworded throughout the development and testing process. Oftentimes with a fresh set of eyes or a new day we would notice a statement that was too leading, or worded too strongly or not strongly enough, and it would be immediately revised and integrated back into the statement pool.

As we evaluated the answers from Credit Suisse employees we noticed there were some significantly popular and unpopular statements. Some statements were selected by everyone, while others were selected by one or none of the employees. For example, the following statement, a measure of how casual a candidate is as opposed to diligent, was not selected by any of our seven responders:

"I think deadlines are of relative rather than absolute importance."

These results may have happened because the statement is worded poorly, but it could also be because the seven particular people who responded to our survey all happen to be very deadline-oriented.

In contrast, the following phrase which is ironically a statement that ranks positively for diligence, was selected by all of our responders:

"I can't leave things unfinished."

Again, this could indicate a statement that is phrased in such a way that anyone who reads it feel like that must associate with it in order to look good. Or, especially when you consider the previous example, it could just mean that Credit Suisse platform development team tends to be comprised of very diligent workers.

We felt that because we had only received seven responses, rewording or replacing the statements based on the data we collected would be overfitting to a data pool that was not sufficiently large enough to warrant such changes.

4.6. Detailed Question Rationale

Because the supplement we designed was meant to identify personality traits in candidates, it was important to have concrete reasoning behind our work. The following section details, for every question and statement, our rationale behind why they were included in our supplement and what makes them good representatives of their respective traits.

4.6.1. Innovation

The goal with the innovation question was to pose a challenge that could be solved in many different ways. The task had to be simple enough that it wouldn't take too long to come up with an answer, while leaving room for originality. With those objectives in mind, we decided upon this question:

How would you count the number of leaves on an oak tree?

Answers to this question could provide an interviewer with the candidate's ability to problem solve in an innovative fashion. It's fairly clear that counting all the individual leaves of a tree would be time consuming and boring, so the solution given by a candidate can help to recognize how they would look for more efficient solutions to problems. Given the software-oriented nature of the position within Credit Suisse, we specify with the word *oak* that we are referring to a living organism, as compared to a data structure commonly used in computer science.

4.6.2. Creativity

The challenge of this question was to inspire a candidate to have a little fun writing an answer while not making it feel like an essay. We chose the following question for this trait:

If you had 24 hours left to live, what would you do?

This question provides an opportunity for creativity, should the applicants choose to use it, but doesn't necessary force them to think creatively. An answer about spending the day with family isn't inherently creative, but it is certainly reasonable. This sort of question is the best that we could identify without moving too far into themes that mirror psychiatric analysis.

4.6.3. Attentiveness to Detail

To measure attentiveness to detail we looked for a simple process that everyone has gone through, a sort of daily routine, that could be easily explained with varying levels of granularity. We chose the following prompt based on those criteria:

Describe how toast is made.

It's incredibly simple in its presentation, and leaves plenty of room for a candidate to elaborate as much or as little as they please. However, because this question is so open-ended, it's our best example of a question that can measure strength, but not weakness. A very detailed explanation of the process of toast-making would indicate a strong attentiveness to detail, but because of possible variance in interpretation, a less granular answer does not necessarily correlate with a lack thereof.

4.6.4. Hobbies

Rather than looking at a particular trait, this question provides purely auxiliary information to the interviewer about how a candidate spends his free time. It simply asks:

What is your favorite pastime and why?

As explained in section 2.3, avocational activities can correlate to vocational strengths. Almost any hobby or free-time activity may correlate to a number of work-related talents depending on the interpretation of the interviewer. If the information is helpful then the question serves its purpose well. If the information provided doesn't factor into the hiring process it raises no concern as the question is entirely supplemental.

4.6.5. Motivation

It can be helpful to have an understanding of what makes employees work hard. The interview questions that Credit Suisse already asked were designed to inform them of exactly why candidates were seeking the positions they were applying for, but we were looking to have a wider scope. We use the following question:

How do you define success?

By looking at how a candidate defines success, an interviewer can see how the candidate creates goals and what sort of outcomes will increase their positive outlook on the work they do. When placing employees it can help immensely to understand what type of work and success will motivate them, make them feel like they are contributing, and make sure they are happy in their work environment.

4.6.6. Stress Response

This question was provided to us from one of the Credit Suisse interviewers who assisted with our mock interviews. The interviewer told us that this was a question he wished was asked more often in interviews, since he found the answer he received from it to be helpful. Including it in our supplement ensures that every candidate will answer it. It was presented to us as follows:

Describe a stressful situation you've been in. Would you want to be in that sort of situation

again?

Being asked about a stressful situation is common in interviews. The more significant part of this question is the second half. Candidates for jobs that are high-pressure and require long hours or real-time response to issues should be comfortable dealing with stressful situations. This question can provide insight into how a candidate deals with unexpected circumstances and more importantly if they are comfortable operating in those types of scenarios.

4.6.7. Extroversion

Extroverts and introverts are crucial to a good office environment but each type of person works very differently. It is generally accepted that the primary difference between extroverts and introverts is how they get their energy: extroverts feel energized when they are part of a group or crowd while introverts like to recoup on their own. Most people fall somewhere in the middle of this scale, so the following statements were designed to identify how a candidate interacts with their work environment in terms of their level of extroversion:

1.   *I enjoy speaking in front of large groups.*

2.   *I enjoy having a wide circle of acquaintances.*

3.   *I rapidly get involved in the social life of a new workplace.*

4.   *I prefer to listen to others' ideas before presenting my own.*

5.   *I prefer to work in a quiet setting.*

6.   *I'm not easily excitable.*

The first three statements should identify extroverts, people who generally want to interact with others. They prefer public speaking, they are social and outgoing, and may even be viewed as loud at times. These statements are very straightforward. Our reasoning for statements one through three are as follows:

I enjoy speaking in front of large groups.

Extroverts are comfortable with public speaking and many will actively seek opportunities to do so. Being the center of attention is fine with them and they can make very adept presenters. An extroverted candidate will likely identify with this statement.

I enjoy having a wide circle of acquaintances.

Extroverts like to have friends and be friends. They draw their energy from being in contact with others, so they naturally gravitate towards being in contact with as many people as possible. Extroverted candidates would likely identify with this sort of statement since they enjoy creating relationships with their peers no matter what sort of setting they are in.

I rapidly get involved in the social life of a new workplace.

This statement goes hand in hand with the previous one. One typically becomes acquainted with extroverts faster than they would with an introvert. Extroverts are more likely to immediately acclimate themselves to a new work environment, make friends and get to know all of their coworkers.

The other three statements are meant to indicate introversion. Introverts have different social tendencies that typically have an effect on how they work and think. Introverts can oftentimes be some of the most creative and meticulous workers in an office, as well as some of the most soft-spoken. Our reasoning for the "introverted" statements are as follows:

I prefer to listen to others' ideas before I present my own.

Introverts prefer to have time to formulate their thoughts before speaking. If an introvert does not have to speak first, he will take the time to refine a quality response (see Literature Review, section 4). This also allows him to take other opinions into account and listen to others' feedback on preliminary ideas. An introvert would likely look at this statement as common sense when it comes to brainstorming or meeting scenarios.

I prefer to work in a quiet setting.

Introverts feel more energized when they have time to themselves to recuperate and organize their thoughts. An introvert would feel more comfortable working in a quieter place, perhaps their own cubicle or office, than in a team room where they're in constant contact with others.

I'm not easily excitable.

This statement requires a second level of abstraction to relate to introversion. Extroverts tend to be very outgoing and aggressive with their ideas. They are also very easily excited by breakthroughs and new developments, and just as easily by delays and unanticipated difficulties or setbacks. Introverts don't tend to display their emotions as readily and are more likely to think carefully before responding to surprises than extroverts.

4.6.8. Pragmatism

In creating statements for pragmatism, we looked for how realistic and results-oriented candidates are. Very pragmatic people deal with anything that can be considered tangible; they don't have time for things that aren't rooted in the present and they are very down to earth. In contrast, we identified the opposite of pragmatic as "idealistic". Idealistic candidates would be more likely to have a wider view of the world. We designated the following six statements to recognize pragmatic and idealistic candidates:

1. *Too many possibilities can be intimidating.*

2. *My goals tend to be incremental and focused.*

3. *I consider myself a realist.*

4. *I value an exciting project over a high reward.*

5. *I tend to set high goals.*

6. *I am often recognized for my optimism.*

The first three statements count towards the pragmatic side of the scale. Pragmatic employees work with the facts. They set realistic goals and don't overreach what they view as the realms of reality. They can be a great voice of reason if sometimes a little short sighted. Our reasoning for the statements are as follows:

Too many possibilities can be intimidating.

To a pragmatic person, an influx of options can be stifling. They would much rather deal with a handful of the most reasonable or profitable possibilities rather than waste their own time sifting through choices that aren't feasible. A pragmatic candidate should identify with this statement

because they would easily see why it isn't realistic to always work with all available data as opposed to the most pertinent data.

My goals tend to be incremental and focused.

A pragmatic person will set smaller, realistic goals as they work. This doesn't mean that they don't reach for success, but rather that they break objectives down into a set of smaller tasks rather than viewing them as large unattainable goals. This helps a pragmatic worker keep track of their progress and constantly update an inventory of their accomplishments.

I consider myself a realist.

Pragmatism and realism are usually considered synonyms. The reasoning behind the previous two statements outline a pragmatist's inclination towards realism while this statement simply puts it into words. A pragmatic person would easily identify himself as being a realist since they are one and the same.

The final three statements are designed to identify idealism. Idealistic people are often more inclined to think outside the box. They can be more optimistic and like to set high goals for themselves to constantly push for higher achievements even if they don't always achieve those goals. Our reasoning behind these last three statements are as follows:

I value an exciting project over a high reward.

Pragmatic workers tend to think that the ends justify the means. They find it easier to work on a less engaging project for the sake of a beneficial conclusion. Idealistic people relish the process more than the reward at the end. They put more value on the mental income earned from an engaging journey and may even feel disappointed when a challenging project is completed.

I tend to set high goals.

To an idealistic person a goal is a bar to constantly reach for. They prefer to always move that bar higher, constantly striving for new or greater success. Reaching the goal is less important than the experience accrued and achievements made along the way.

I am often recognized for my optimism.

This particular statement is more of a negation of pragmatism than an affirmation of idealism. An idealistic person is certainly more likely to be an optimist, but the former does not imply the latter. However, because pragmatic people often maintain such a staunchly realistic point of view, it would be rare for an especially pragmatic person to identify with this statement. A pragmatic person would be much more likely to select this statement, since there's a higher probability of them being an optimist.

4.6.9. Abstract Thinking

Abstraction, the ability to think in an abstract way, was one of our more difficult traits to create statements for. There were very few sources to extrapolate from in existing personality assessments and identifying a candidate's order of thought proved to be a challenging task. The statements we eventually developed measure between "concrete" and "abstract" thinking and though they are still indicators of their traits, the following statements are expected to be less predictive than the statements for our other traits. These six statements are meant to recognize a candidate's level of thinking:

1. *I like concepts more than implementation.*

2. *I prefer to see the big picture, then find out the details.*

3. *I tend to recognize trends.*

4. *If someone else's method works well, I don't need to create my own.*

5. *I understand new concepts better when I have concrete examples.*

6. *My thinking tends to deal with objects and actions, rather than theories and possibilities.*

Statements one through three indicate a stronger level of abstraction in a candidate. Abstract thinkers recognize trends and patterns more readily and prefer conceptual ideas and theories to dealing with details or hard data. This trait can lend itself to management or planning, but doesn't discount lower-level involvement. Our reasoning for these statements are as follows:

I like concepts more than implementation.

An abstract thinker is likely to prefer the theories, or design process, behind a project than he is to enjoy being a part of the development. An abstract thinker would likely identify with this statement because he would naturally gravitate towards the higher level perspective than the hands-on side of a project.

I prefer to see the big picture, then find out the details.

Abstract thinkers like to know where their work fits into the overall objective and more importantly want to have a good understanding of that objective as well. Abstract thinkers work better when they know how everything around them is working.

I tend to recognize trends.

Abstract thinkers, sometimes at the expense of understanding the nuances of their work, find it easier to recognize overarching trends or patterns in data. Abstract thinking in this way can lend itself to high-level analytics and sometimes management roles. An abstract thinker would

identify with this statement based on their history of recognizing and extrapolating from trends in their work.

Statements four through six are designed to be identified with by concrete thinkers. Candidates who think in this way are often detail-oriented and prefer to work in a very hands-on manner. They prefer action over debate and like to see the direct results of their work. Our reasoning behind these statements are as follows:

If someone else's method works well, I don't need to create my own.

A concrete thinker believes in results. If someone has already developed a working method for doing something, a concrete thinker will happily use that method while an abstract thinker is more likely to believe that there is always a better way to complete a task and keep working on development. In this way concrete thinkers have the potential to save time and work more efficiently, but may also miss opportunities for innovation.

I understand new concepts better when I have concrete examples.

A concrete thinker appreciates solid reasoning when it comes to new ideas. Having an example in front of them that they can study will help concrete thinkers understand and implement new concepts faster. This ties in well with a tendency towards hands-on learning and working.

My thinking tends to deal with objects and actions, rather than theories and possibilities.

This statement defines the difference between abstract and concrete thinkers. An abstract thinker will want to consider the overarching theory. When working on a task, considering multiple possibilities and methods will be mandatory to an abstract thinker. A concrete thinker will be more trial-and-error oriented and will prefer to learn as they go using their own successes and failures as data points to improve their work.

4.6.10. Collaboration

For the collaboration trait, our goal was to measure how inclined a candidate is to working with others. Our scale therefore measures from "independent" to "collaborative". Both types of workers are effective in their own way but each type is better for certain types of tasks. A collaborative person is a good fit for team-oriented work spaces while an independent worker is a better fit for specialized or sensitive tasks. The following six statements were designated as related to collaboration:

1.   *My best work is usually done in groups.*

2.   *I enjoy brainstorming ideas with others.*

3.   *It's important to receive opinions from everyone.*

4.   *I prefer to solve problems independently.*

5.   *I prefer having my own personal objectives.*

6.   *It's easier to focus when I work alone.*

The first three statements, if selected by a candidate, would count towards the "collaborative" side of the scale. They were designed to be statements that would only be identified with by candidates who strongly believed that they worked best with the company of their peers, or that the best work in an office setting is done in groups. Our reasoning behind each is as follows:

My best work is usually done in groups.

Candidates who identifies themselves as a strong collaborators are likely to believe their time is used most effectively when working with others. They would find that the collaboration helps to increase their work ethic.

I enjoy brainstorming ideas with others.

Candidates who identify with this statement would strongly appreciate the input of their peers while ideas are being developed. The interest in immediate input from others indicates collaborative interests.

It's important to receive opinions from everyone.

This statement has an extra level of abstraction, but the sentiment behind it remains the same. Collaborative people are more likely to value the opinions of their peers. In contrast, more independent people would likely think that too many people giving input would be a hindrance to efficient progress, and wouldn't identify with a statement like this one.

Statements four through six would count towards "independent" if selected by a candidate. They were designed to be associated with people who find themselves doing their best work when they have space and time to themselves. This is similar to, but not the same as introversion. We view independence in this setting as a stronger confidence in one's own work, untainted by others' criticisms until it is complete. Our reasoning for these statements are as follows:

I prefer to solve problems independently.

This statement doesn't need much explanation. A candidate who prefers to work on tasks independently should find it natural to identify with this statement.

I prefer having my own personal objectives.

Independent workers are more likely to enjoy having their own tasks and working towards their completion on their own. They may feel that working alone helps them work faster, or they may appreciate receiving direct credit for their achievements.

It's easier to focus when I work alone.

This statement directly targets the "white noise" view that an independent worker might have of too many voices being involved in a task. It is close to being an opposite of statement three. Candidates who strongly prefer working alone to with a team may find it is because they can focus better without the extra input, making their time more effective and quality of work stronger.

4.6.11. Diligence

In addressing diligence, our objective was to recognize tendencies in candidates towards meticulous work ethic. Our primary obstacle was properly defining the other side of the scale. Being a diligent worker is an obviously positive trait, and it was difficult to find an opposite trait that wouldn't be viewed as negative. After we had already created some of the statements designed to negate diligence as a trait, we realized the word we were looking for was "casual". Casual in this sense does not mean lazy, but rather a comfortable level of laid-back that in an office setting could be crucial to maintaining a low-stress environment. We created the following six statements to gauge diligence:

1. *I can't leave things unfinished.*

2. *I judge myself primarily by the quality of my work.*

3. *A strict schedule motivates me to get things done.*

4. *I don't mind handing an assignment to someone else.*

5. *I don't mind if others are late to meetings.*

6. *I think deadlines are of relative rather than absolute importance.*

The first three statements should be identified with by candidates who are very focused workers. They work hard to finish their assignments quickly, they aren't finished until their tasks are completed to the best of their abilities, and they measure their own value on those criteria. Our reasoning for these statements are as follows:

I can't leave things unfinished.

Diligent workers may have trouble putting something down for another day. They might find that they work best if they keep the momentum going and complete their task, even if it means staying late to finish work or refusing to hand off a difficult assignment.

I judge myself primarily by the quality of my work.

Members of an office can have many ways of gauging their value. Employees are instrumental to the comfort and stress levels of their peers, the level of cohesion amongst teams, and the of course the quality of the work done. Very diligent workers would likely find the latter to be of the most significance. They would measure their value based on the quality or quantity of completed objectives.

A strict schedule motivates me to get things done.

Diligent workers are more likely to respond well to scheduled deadlines. Knowing exactly what they have to do and when they have to be done provides a level of structure and comfort that helps them improve their own personal goals of efficiency and high quality deliverables.

The second three statements are meant to be identified with by more casual workers. As stated above, casual in the case is not synonymous with laziness or carelessness. A casual worker will be just as valuable as a diligent worker, but may be more lenient or understanding of others

who don't display a tenacious work ethic. The reasoning behind our "casual" statements are as follows:

I don't mind handing an assignment to someone else.

Casual workers are likely to have no qualms about handing off an assignment to a peer if the situation demands it. While diligent workers may become slightly protective of tasks assigned to them, casual workers would be more understanding if tasks would be completed better by another member of the office, or if their time may be better spent on something else.

I don't mind if others are late to meetings.

Casual workers are less stringent when it comes to schedules and timetables. To diligent workers, time is money and wasted time is lost productivity. Casual workers are more likely to be understanding of issues or delays coming from their coworkers, and won't see their time as being wasted if progress is waylaid for a short while.

I think that deadlines are of relative rather than absolute importance.

The most important part of this statement is the second adjective, "absolute". Diligent workers stick to their deadlines. If a task is meant to be completed by a certain date, then that is when it will be completed. Casual workers would be more understanding and less stressed about delays if they appear. That is not to say that they would be unconcerned with meeting deadlines but rather that they would not be quick to assume that laziness is the reason for a missed deadline.

5. Conclusion

The questions we developed for Credit Suisse are original and justified by the work we completed before and during our time in Switzerland. In comparing the results received through our tool with the profiles provided by Credit Suisse managers we observed a 93% accurate correlation. Though the sample size was small, having this data from actual Credit Suisse employees was helpful in determining the effectiveness of our questions in revealing certain traits. The strength of the comparison, despite the small data pool, indicates that the questions in our framework form a strong basis for Credit Suisse to improve on in the future if they so choose.

The evaluation methods in our framework, found in Appendix A, should also be very effective in guiding interviewers through the use of our tool, even those with no prior exposure to it. They will be able to use the information provided by the supplement to make more informed decisions throughout the hiring process, including but not limited to what positions applicants are best suited for and comparisons between similar applicants. Our report also provides the in-depth reasoning behind our framework that Credit Suisse will need if they choose to expand upon our supplement.

6. Recommendations

Our supplemental interview framework is an ideal basis for an advanced interview analysis. In our seven weeks at Credit Suisse we were able to develop enough questions to run tests and begin to recognize some patterns in our data. However, there are several actions that could be taken to make this supplement more reliable and more informative.

6.1. Continued Background Research

Given the duration of Worcester Polytechnic Institute's Interactive Qualifying Project we were able to perform a beneficial amount of research. Regardless, there is an immense amount of material that still could be studied. The psychology side of personality tests is a very dense field, and requires years of research to strengthen correlations between questions and traits. Question wording is incredibly delicate especially in the multiple selection statements. Ensuring that the wording of questions and statements is neutral would require more research and likely more rounds of testing with larger data pools, as mentioned in the next recommendation.

6.2. Data Pool Expansion

The continuation of this project would require tests on a larger sample size. Unfortunately, seven responses is not as much data as we would have hoped to draw conclusions from. A larger sample size would allow more accurate revisions and a better test of our supplement's reliability. For example, there were some statements in our multiple selection section that appeared to be largely avoided, and some that were selected in every or almost every response (see section 4.5.5). However, with only seven responses we didn't have enough data to

make an observation on the neutrality, or lack thereof, of those statements. More answers would give more insight into how those statements are viewed. If a certain statement is never selected over the course of numerous responses, either all the of applicant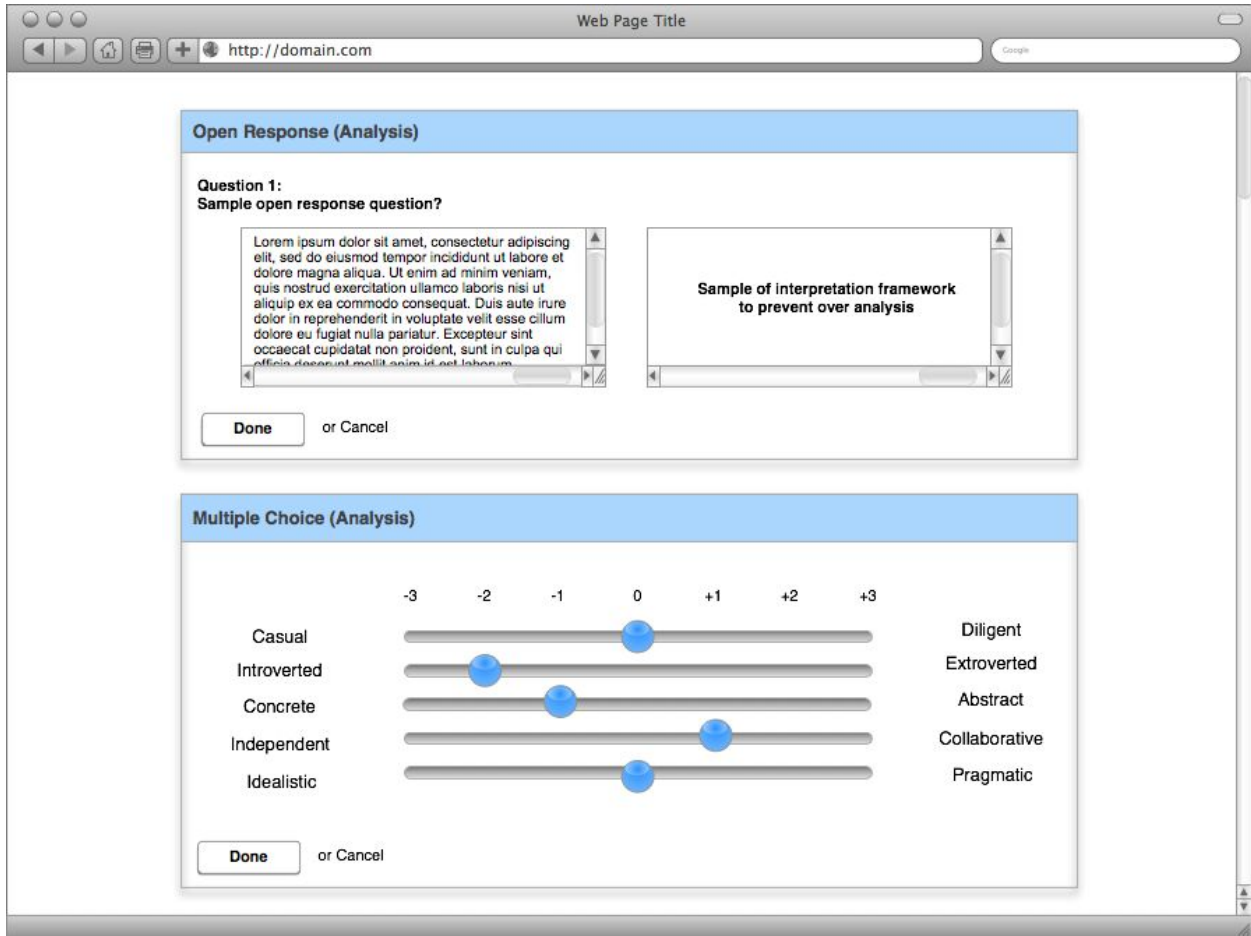s and employees at Credit Suisse are remarkably similar or it likely needs to be reworded. The same could be said for a statement that is selected by everyone.

6.3. Automation

Developing client-facing applications for Credit Suisse would require code that follows the many security standards set forth for banks; our time constraints limited us from tackling the software ourselves. Automation allows for a more efficient way to distribute the supplement. A digital supplement would be able to be distributed over the internet, allowing more participation, resulting in a larger applicant pool. The larger the applicant pool, the greater the chance for beneficial employees. The following figure is a supplement prototype of what Credit Suisse could distribute to applicants.

Web Page Title

◄ ▶ ⌂ 🖨 + 🌐 http://domain.com   Google

Open Response

Question 1:
Sample open response question?

Enter Text Here

[Done] or Cancel

Multiple Choice

Question 1:
Select all that apply

     ◯ Sample characteristic
     ◯ Sample characteristic
     ◯ Sample characteristic
     ◯ Sample characteristic
     ◯ Sample characteristic

[Done] or Cancel
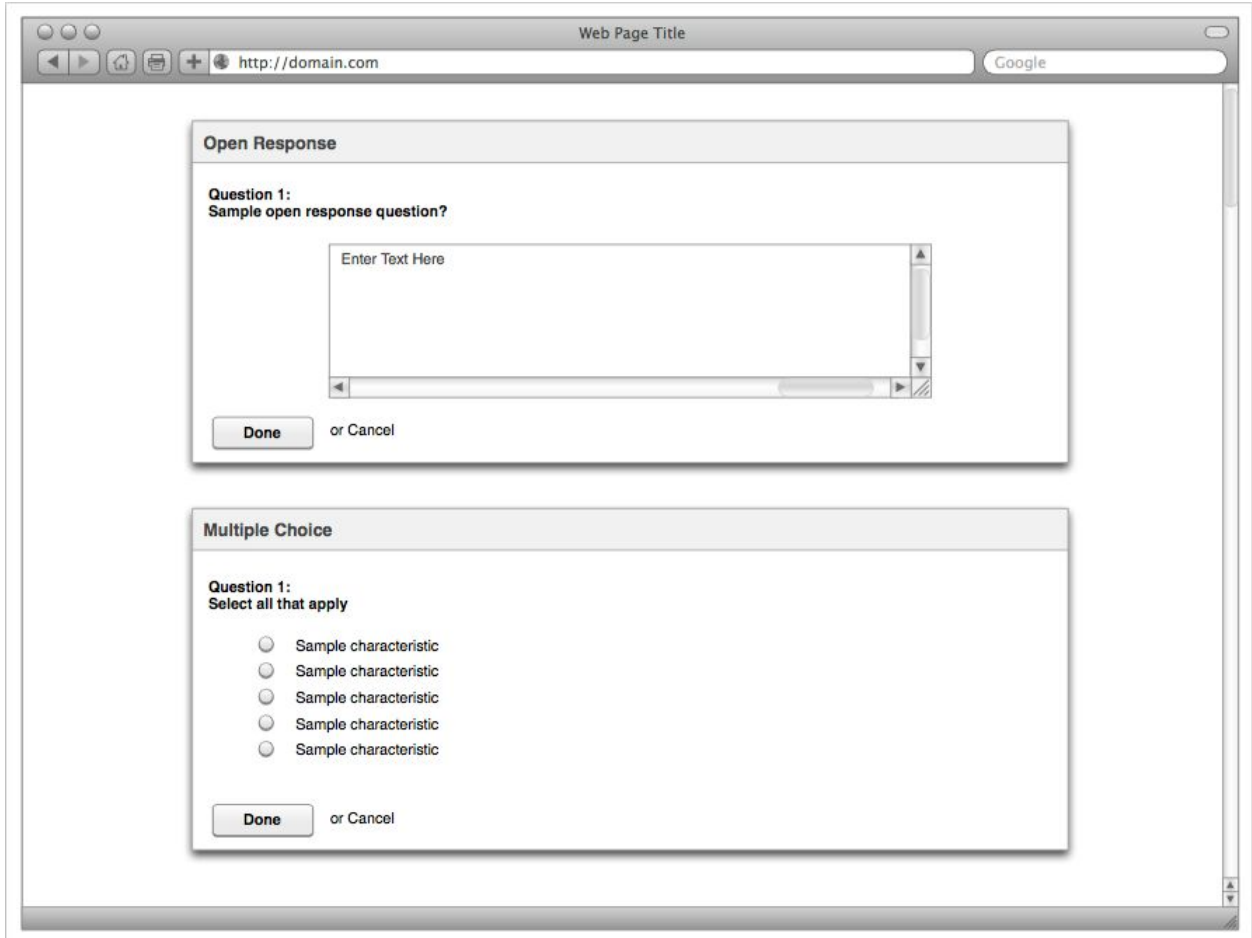
Automation allows for a more efficient way to analyze the supplement. The following figure is an example of what the interviewer could receive once an applicant has completed the supplement.

Web Page Title

http://domain.com

Open Response (Analysis)

Question 1:
Sample open response question?

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

Sample of interpretation framework to prevent over analysis

Done   or Cancel

Multiple Choice (Analysis)

	-3	-2	-1	0	+1	+2	+3	
Casual				●				Diligent
Introverted		●						Extroverted
Concrete			●					Abstract
Independent					●			Collaborative
Idealistic				●				Pragmatic

Done   or Cancel

The applicant's open response answer, next to our suggestion of how to analyze the response, allows for efficient conclusion creation. The visual representation of the applicant's selected multiple choice statements is a clear and concise way to analyze the results. This web app is also modular. Other forms of analysis can be implemented into the code and user interface, such as clustering, trends, etc.

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Appendix A: Credit Suisse Deliverable

The document beginning on the next page is intended to be distributed to the interviewers at Credit Suisse. It lists all 6 open response questions and all 30 personality statements, along with a description of what each is intended to measure. The document also explains how to administer the questions and provides directions for evaluating the responses.

Credit Suisse Supplemental Interview Framework

A framework consisting of a strategic Q&A analysis that will supplement the current hiring process for Software Developers at Credit Suisse

DISCLAIMER: Measuring an applicant's personality traits is not an exact science. This supplement has been tested and has shown an ability to draw correlations between the information it provides and the personalities and work habits of those who answered the questions. However, the information received from this supplement is not guaranteed to be accurate at all times and should be viewed as contributory data. It is open to bias based on the interpretation by those answering the questions and any self-interests they choose to manifest in their answers.

Open Response Analysis

Applicants will receive six open-response questions. Because they are open-response, it is largely up to you to extrapolate from the information you receive. Each question is meant to draw out certain types of answers, but each candidate can interpret questions differently. The questions, and how they should be interpreted, are explained as follows:

How would you count the number of leaves on an oak tree?

This question measures innovation. Look for answers that you find interesting or unique. There are many ways to answer this question, and applicants will see different ways to optimize this process. Some people may have more efficient or innovative ideas than others.

If you had 24 hours left to live, what would you do?

This question provides the opportunity for applicants to supply creative answers, but doesn't necessarily force them to. Answers about spending a day with family are just as likely as answers about skydiving, and an "unimaginative" answer does not indicate a lack of creativity. However, for those candidates who do choose to answer in a unique or clever manner, you may be able to learn something of their ingenuity from their responses.

Describe how toast is made.

This question gauges attentiveness to detail. Making toast is a very simple process, but it can be described with varying levels of granularity. More descriptive, process-oriented answers indicate a strong attention to detail in a candidate. However, it is important to note that a less detailed question does *not* indicate a lack of attentiveness to detail. A simpler answer could just as easily come from a lack of interest in the question or a different interpretation of what it is asking.

How do you define success?

This questions tells you what motivates an applicant. This can be important in knowing how he or she will fit into the office or team culture. Everyone is motivated in different ways, and everyone defines their success in different ways. If you understand what makes someone feel like they are contributing and doing well, you can help them find a good fit where the work they will be doing will line up with their image of success, improving their work ethic and positivity.

What is your favorite pastime and why?

Some of these answers may be more helpful than others. This question provides an opportunity to learn about how applicants spend their free time, which can give you insight into some skills they may have that could be transferable to the work environment. It's also an easier question than the others for applicants to "shape" their answer to fit the job profile, so keep that in consideration when reading these answers.

Describe a stressful situation you've been in. Would you want to be in that sort of situation again?

This questions is designed to show how an applicant reacts to a stressful situation. However, rather than asking how he or she dealt with the situation, the question is more concerned with the applicants level of comfort. Working for a company like Credit Suisse will come with stressful moments, and knowing how well applicants will handle those scenarios can tell you about the effect they'll have on other members of the team and how quickly they'll be able to recover. The candidate may also describe a better way that the situation could be handled, which would indicate something that they've learned and how well they can adapt to their work environment.

Multiple Choice Analysis

There are 30 selectable statements in this supplement. There are five pairs of traits (relative opposites) the statements are designed to identify. Each trait pair has six statements, or three statements per trait. When presented to applicants, they should be randomized so as to keep their associated traits unclear. They are as follows:

Independent:
- I prefer to solve problems independently.
- I prefer having my own personal objectives.
- It's easier to focus when I work alone.

Collaborative:
- My best work is usually done in groups.
- I enjoy brainstorming ideas with others.
- It's important to receive opinions from everyone.

Concrete:
- If someone else's method works well, I don't need to create my own.
- I understand new concepts better when I have concrete examples.
- My thinking tends to deal with objects and actions, rather than theories and possibilities.

Abstract:
- I like concepts more than implementation.
- I prefer to see the big picture, then find out the details.
- I tend to recognize trends.

Casual:
- I don't mind handing an assignment to someone else.
- I don't mind if others are late to meetings.
- I think deadlines are of relative rather than absolute importance.

Diligent:
- I can't leave things unfinished.
- I judge myself primarily by the quality of my work.
- A strict schedule motivates me to get things done.

Introverted:
- I prefer to listen to others' ideas before presenting my own.
- I prefer to work in a quiet setting.
- I'm not easily excitable.

Extroverted:
- I enjoy speaking in front of large groups.
- I enjoy having a wide circle of acquaintances.
- I rapidly get involved in the social life of a new workplace.

Idealistic:
- I value an exciting project over a high reward.
- I tend to set high goals.
- I am often recognized for my optimism.

Pragmatic:
- Too many possibilities can be intimidating.
- My goals tend to be incremental and focused.
- I consider myself a realist.

Answers can be evaluated on a scale by adding and subtracting selected statements from the same group. For example, if an applicant selects three statements from the Diligent category above, and one from the Casual category, their final "score" on that pair would be "+2" towards diligence.

This way of quantifying results requires that you keep certain things in mind. For example, it will be very valuable to still look at exactly which statements an applicant identifies with, not just the numbers. A score of "+1" towards Independence can be received by an applicant who selects all three independence statements and two collaborative statements, and by an applicant who selects only one independence statement and nothing else from that trait pair. On a similar note, consider that a candidate can select all three pragmatic statements, for example, but still receive a "0" in that trait pair because they also selected the all three idealistic pairs. The numeric indicators are useful guidelines, but you must examine exactly which statements were selected by an applicant to get the most detailed information.