User Experience Study & Appointment Module for the Social Needs Marketplace-Impact (SNM-I) Web Platform

PART A.
User Experience Study of Data Input

PART B.
Planning & Implementation of the Appointment Module

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May 8 2020

Table of Contents

PART A.
User Experience Study of Data Input for the Social Needs Marketplace-Impact Platform

1. Introduction

1.1. Supervisory Committee

This user experience study is supervised by Mark S. Fox, Professor of Industrial Engineering and Computer Science and Founding Director of the Centre for Social Services Engineering, and Daniela Rosu, a postdoctoral fellow with the Centre for Social Services Engineering.

1.2. Motivation

Presently, most social service agencies lack a definitively reliable and efficient means of providing goods and services to their clients. With Toronto being a major hub for newcomers (381,700 immigrated to Toronto between 2006-2011 [1]) along with its elderly (18% 65+ years of age in 2016 [2]) and low-income populations (20.2% in 2018 [3]), the need for a strong network is crucial. The Centre for Social Services Engineering at the University of Toronto has been developing an online platform called the Social Needs Marketplace Impact (SNM-I) that facilitates the transaction of resources including goods and services between providers and clients via social service agencies. The SNM-I platform will improve the way social service agencies satisfy the needs of their clients from a diverse user base by intelligently matching them to available resources throughout the city of Toronto.

The stakeholders of the project include social workers (referred to as the “users”) and social work agencies (which make up some of the “providers” who offer “services”). In addition, the clients they serve (referred to as the “clients”) have a vested interest as well as volunteers (who make up the rest of the “providers” who offer “services”).

The current iteration of the SNM-I platform has not yet undergone a user experience study or any kind of user-centric design research as part of the software development lifecycle. This gap affects whether the currently implemented design is optimal since shortcomings of the user experience have not yet been identified. Good user experience design provides meaningful and relevant experiences to users.

The current study will examine the usability quality of SNM-I by employing qualitative and quantitative measures. The specific functions that will be studied include “Add a new client”, “Add a new provider”, and “Add a new service”. These are fundamental functions which should be streamlined and provide a great user experience so that the user can work productively in inputting data for providers, clients, and services.

Web forms, the most important type of interaction for the user to populate the platform, when poorly designed, can lead to frustrated users who may be less inclined to adopt a new system. Thus the objective of this study is to discover user experience “pain points” in the overall schema and provide concrete recommendations to improve upon them and all future iterations of data entry forms on the platform.

1.3. User Experience Evaluation

The following hypotheses will be used to evaluate the user experience:

Form and input style

H1. Forms that are divided into smaller sections on multiple pages are preferred by more than 50% (a majority) of users over a single long form.

H2. There are no single long forms that should be replaced with shorter sections on multiple pages.

H3. Fields that provide predictive functionality such as auto-complete or pre-populated answers lead to higher user satisfaction for more than 90% (a high majority) of users.

H4. There are no non-predictive fields that should be replaced with predictive fields.

H5. Searchable inputs are preferred by at least 90% (a high majority) of users to unsearchable inputs.

H6. There are no non-searchable fields that should be replaced with searchable fields.

Aesthetic

H7. More than 50% (a majority) of users find that the layout of the interface is sufficient to operate the platform.

H8. All users find the aesthetic of the interface appealing.

Navigation

H9. More than 50% (a majority) of users find that the platform is easy to navigate.

Documentation and help

H10. The design of the forms is sufficient to be used in lieu of help or documentation for more than 50% (a majority) of users.

Error prevention

H11. Allowing system errors to occur in place of client-side error prevention does not undermine the task success rate.

Value

H12. The capacity to share providers and services between agencies has value to social workers.

1.4. Usability Evaluation

Two additional hypotheses, along with Nielsen's heuristics, as published in Nielsen's book *Usability Engineering* [4], will be employed for evaluation of the user interface design because they are a well-established broad standard and probably the most-used usability heuristics. In the post-test interviews, participants were asked to rate the platform (1-5) on each of these heuristics and provide comments about their reasons for their

ratings. They are denoted in this report by "**N*i***" (for example, "**N1. Visibility of system status.** *The system keeps users informed about what is going on through appropriate feedback within reasonable time.*")

Training

H13. Thirty seconds of training in software use for each of the three functions ("Add a new client", "Add a new provider", and "Add a new service") is sufficient for the user's ability to proceed with the operations.

Learnability

H14. With each task, as the user becomes more familiarized with the interface and workflow, there is a minimum 5% overall average reduction of seconds elapsed per successive task within each block of tasks.

Nielsen's Heuristics

N1. Visibility of system status. The system keeps users informed about what is going on through appropriate feedback within reasonable time.

N2. Match between system and the real world. The system speaks the user's language, with words, phrases and concepts familiar to the user, rather than system-oriented terms, and follows real-world conventions, making information appear in a natural and logical order.

N3. User control and freedom. The system supports undo and redo. Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue.

N4. Consistency and standards: The system has a coherent platform convention for language and signage and uses it consistently (Users should not have to wonder whether different words, situations, or actions mean the same thing.

N5. Error prevention. Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

N6. Recognition rather than recall. Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

N7. Flexibility and efficiency of use. The system provides accelerators that allow users to tailor frequent actions. Accelerators—unseen by the novice user—may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users.

N8. Aesthetic and minimalist design. Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

N9. Help users recognize, diagnose, and recover from errors. Error messages are expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

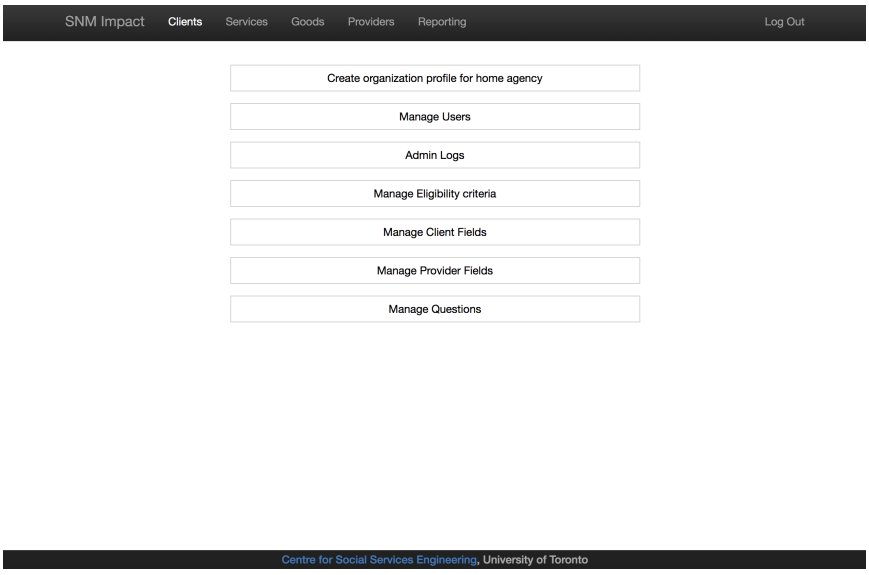
N10. Help and documentation. The system provides help/documentation. Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

1.5. Study Overview

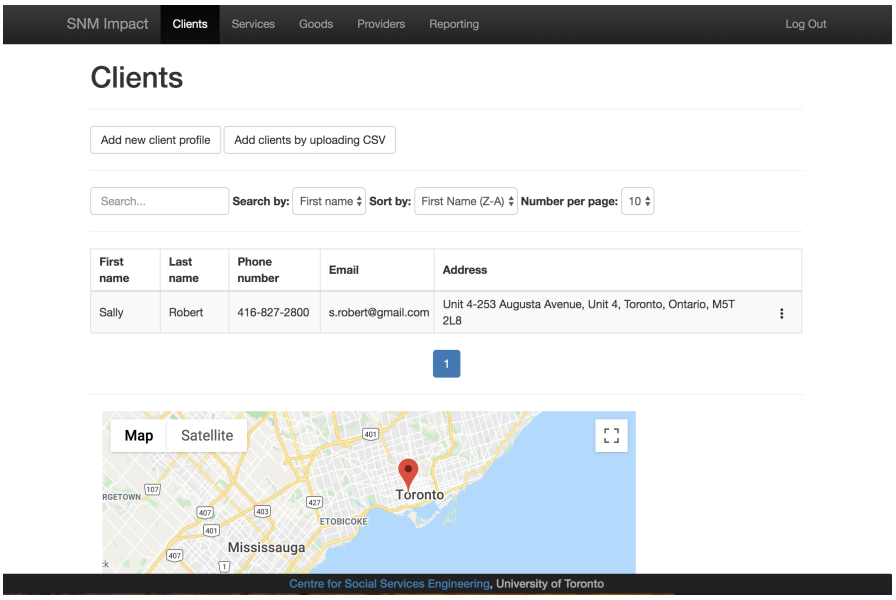
1.5.1 Primary Workflows Investigated

The study will investigate the following three primary workflows.

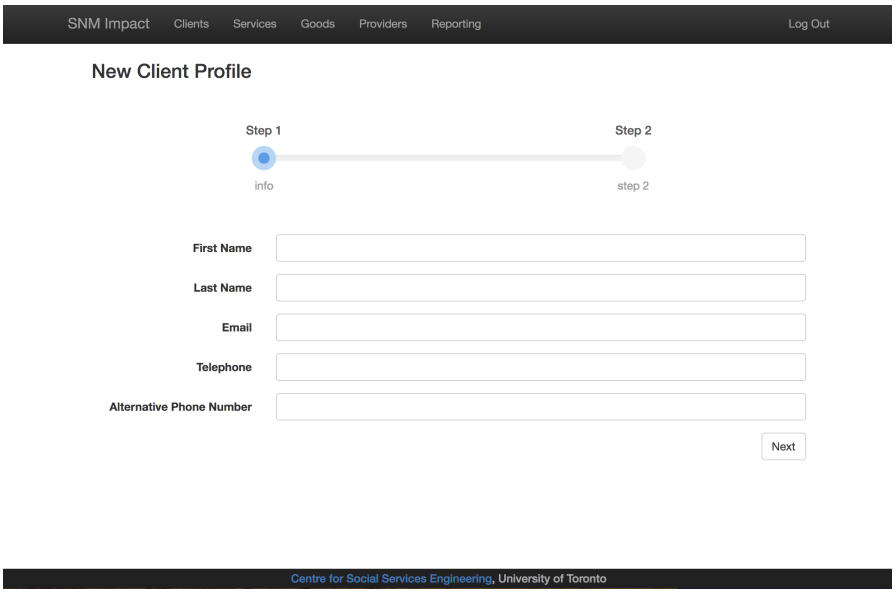
Workflow 1: Add a new client



Step 1. Click "Clients" in the top navigation bar.

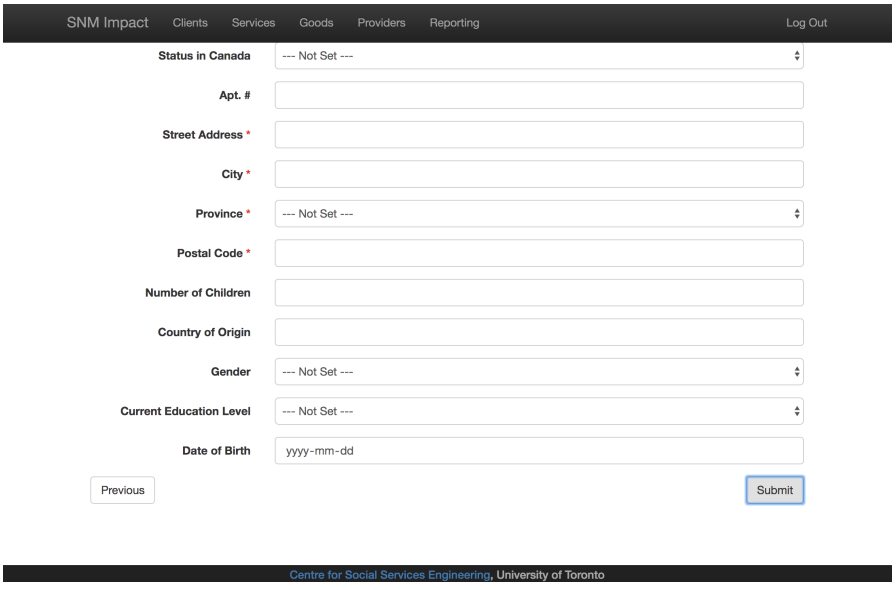


Step 2. Click the "Add new client profile" button.



Step 3. Enter data into all fields.

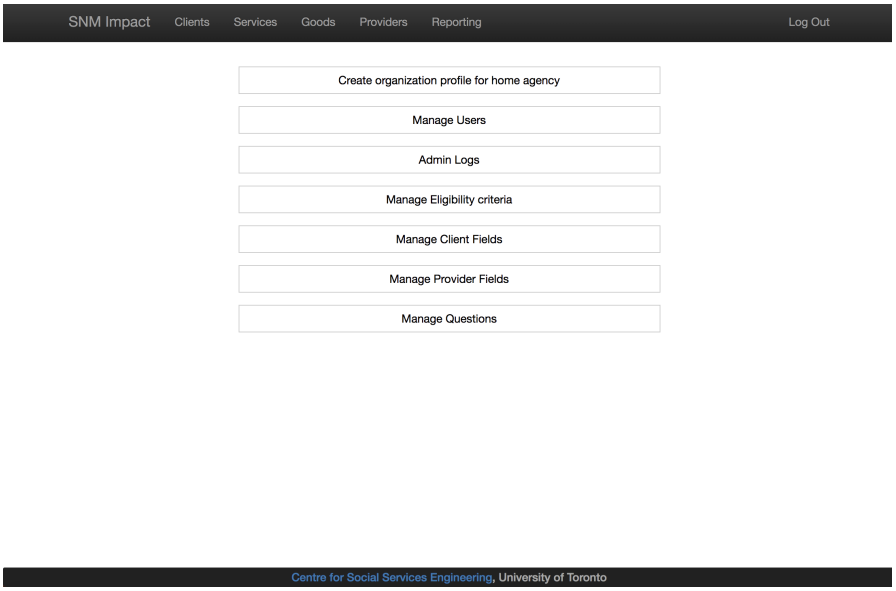
Step 4. Click the "Next" button.



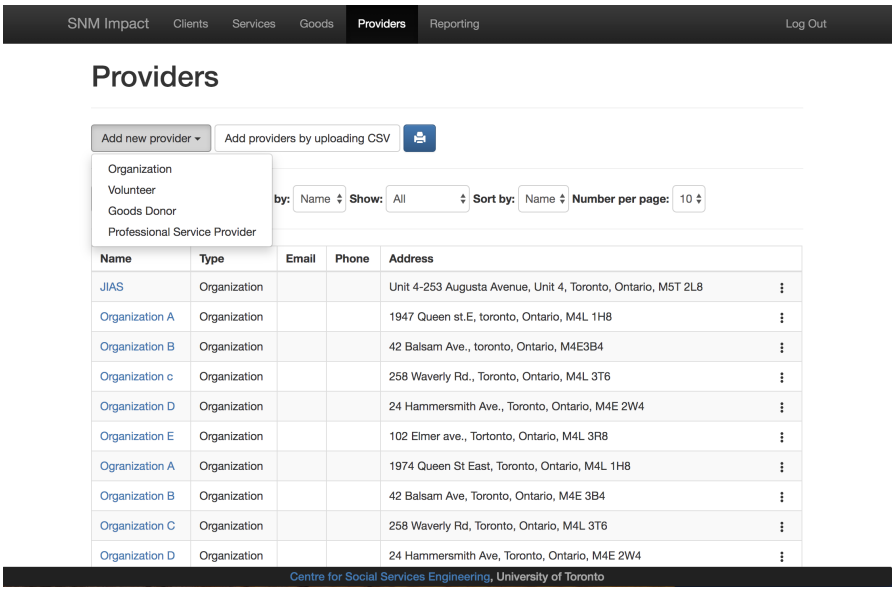
Step 5. On the new page, enter data into all fields.

Step 6. Click the "Submit" button.

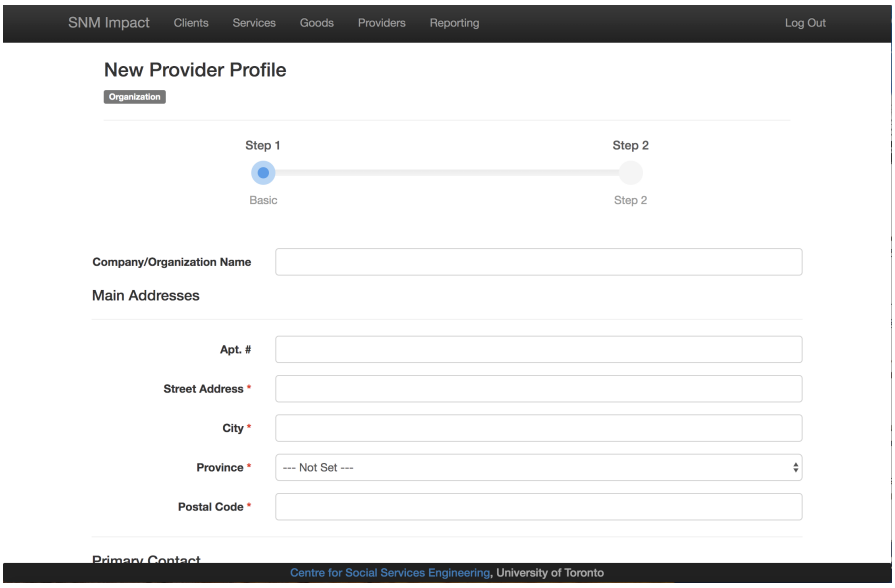
Workflow 2: Add a new provider



Step 1. Click "Providers" in the top navigation bar.

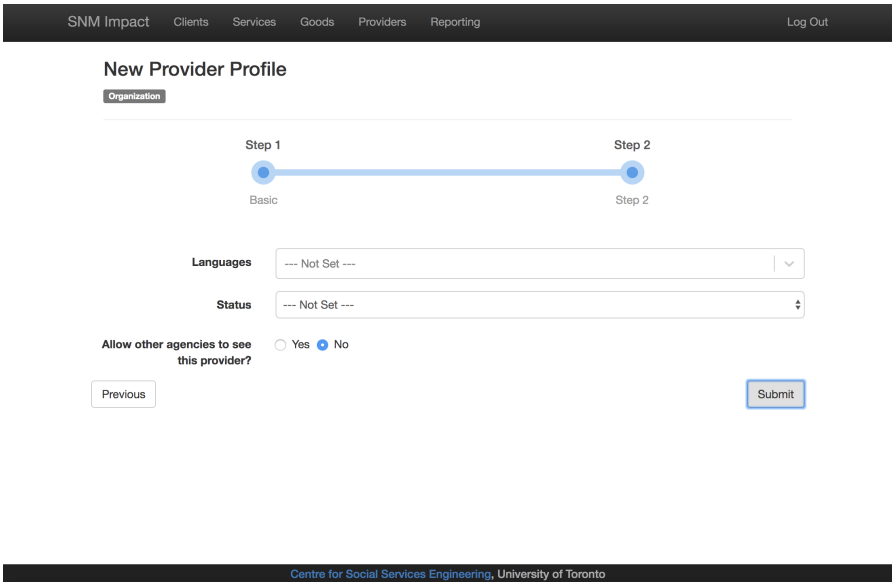


Step 2. Click the "Add new provider" button and select "Organization" from the dropdown menu.



Step 3. Enter data into all fields.

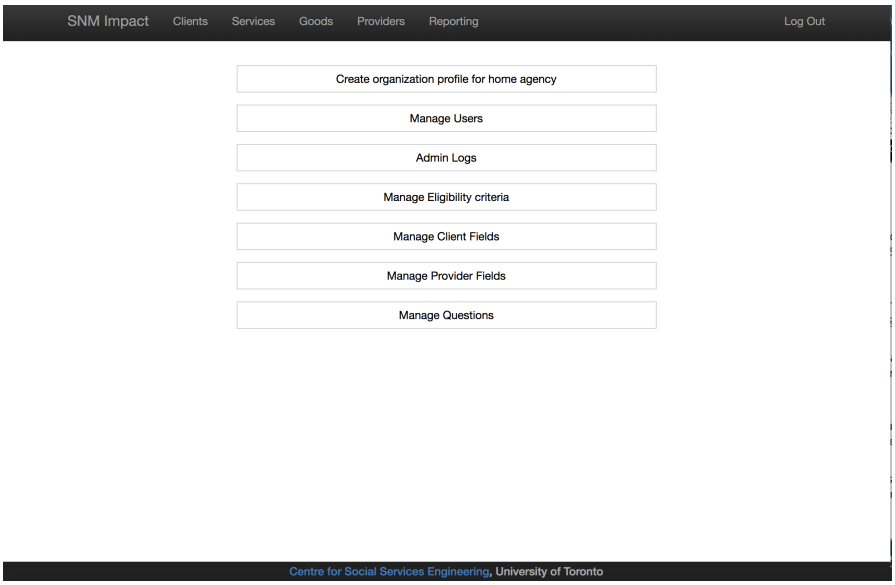
Step 4. Click the "Next" button.



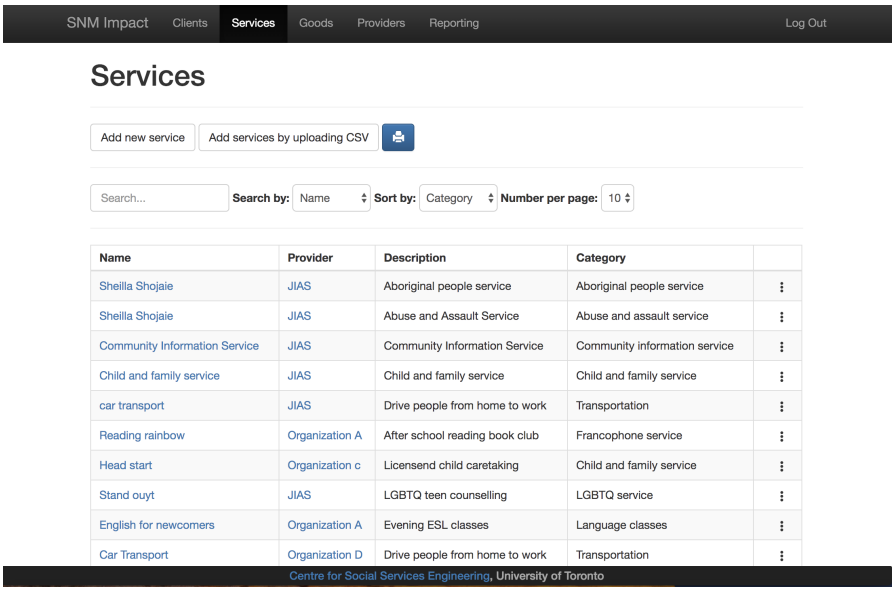
Step 5. On the new page, enter data into all fields.

Step 6. Click the "Submit" button.

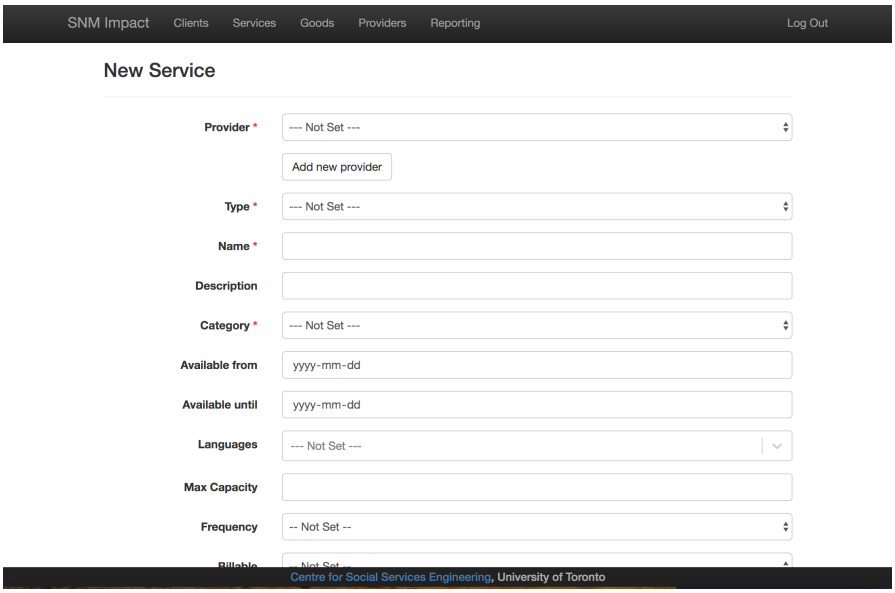
Workflow 3: Add a new service



Step 1. Click "Services" in the top navigation bar.



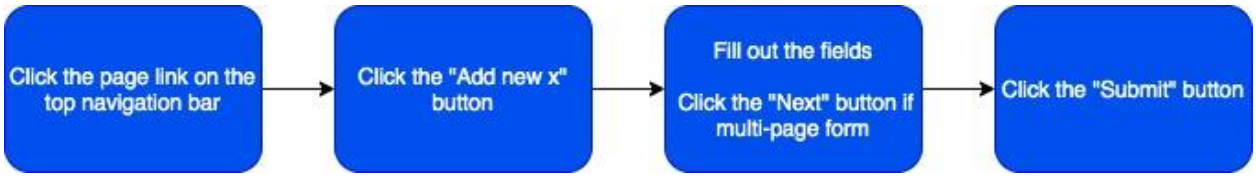
Step 2. Click the "Add new service" button.



Step 3. Enter data into all fields.

Step 4. Click the "Submit" button.

These three workflows can be summarized by the following user flow diagram.



1.5.2 User Personas

Alex is a Toronto-based social worker who works with newcomers from a variety of countries of origin, family structures, skills, needs, technological aptitudes, and language fluencies. Part of his job entails connecting his clients with the programs and services they need to the best of his ability. He is looking to advance his social work agency by moving from records that are largely paper-based to an online platform. He is relatively familiar working with computers, but perhaps not the most comfortable.

Anna is also a Toronto-based social worker who similarly serves a diverse client base. She oversees the programs at her social work agency and co-ordinates volunteers seeking to assist her clients. She is quite adept at working with computers and digital records. Flexibility and efficiency are important to her to adopt any new work technology because her time is very valuable.

2. Methodology

2.1 Participants

Participants in this study included two social workers from [redacted] and four information technology workers from [redacted]. All were recruited via email invitation. Participants were not compensated for their participation.

The social workers are the intended user of such a platform and their insight into the daily work of managing and assisting clients makes their contributions particularly valuable to the study. Both of these participants reported to use computers in their daily lives comfortably. The four information technology workers (aged 20-35) were chosen because they are well-versed in web forms and technology in general, so their insight into what makes for a good product of human-computer interaction would be valuable as well.

2.2 Procedure

This was a *within-group study* because each participant tested all conditions (blocks).

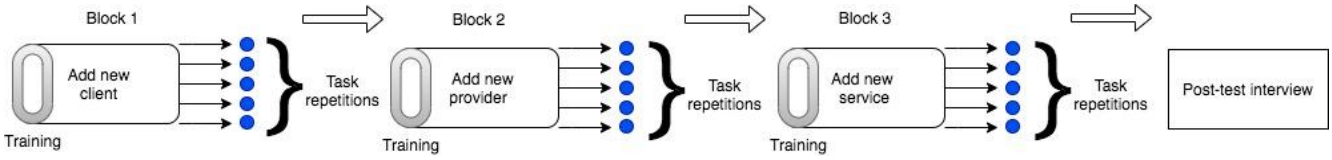
Participants reviewed the study protocol document (Appendix 1 [redacted]) and signed a consent form (Appendix 2 [redacted]). Then, they were informed about the methodology of the test. Sitting at a laptop, they were to do three blocks of five tasks each (one for each of the three workflows) using provided dummy data. Before each block, I provided brief training (which was timed) about how to perform the task. Then, the participant performed each task using the think aloud method. That is, they verbalized their thought process and mental models as they worked through the tasks. This was the chosen protocol to gather qualitative data because it allows for explicit transparency into the insights of the participant as they are carrying out the tasks in real time. I, the investigator, used the silent observer method so as to not influence their performance or thought process.

Participants were told that the forms are customizable to the needs of the social work agency, so the order of the fields and the structure of the web forms are not within the scope of the study.

I recorded the following data regarding their operation of the task:

- Seconds elapsed for the task
- Number and type Errors encountered
- Observed “pain points”
- Observed behaviour (frustration, delight, etc.)
- Task status, i.e., success/failure
- Other notes (for example, comments made by participants during execution of the tasks)

Following the tests, I conducted an interview with questions ranging from open-ended to numerical ratings regarding their satisfaction of the user interface, the training, comparisons to current personally-used workflows, their ratings of the platform using Nielsen’s heuristics [4] and more.



The study protocol document [redacted], completed consent forms [redacted], data collection forms [redacted], and post-test interviews [redacted] can be found in the Appendices.

3. Results and Analysis

3.1. User Experience Results and Analysis

From analysis of the qualitative and quantitative data of the study, the following key results emerged.

3.1.1. Form and input style

H1. *Forms that are divided into smaller sections on multiple pages are preferred by more than 50% (a majority) of users over a single long form.*

Data used to test this hypothesis were:

- Question 16 of the interview: "Did you prefer shorter sections on multiple pages or the single long form?" [quantitative and qualitative]
- Comments and observed behaviour of the participants during the trials [qualitative]

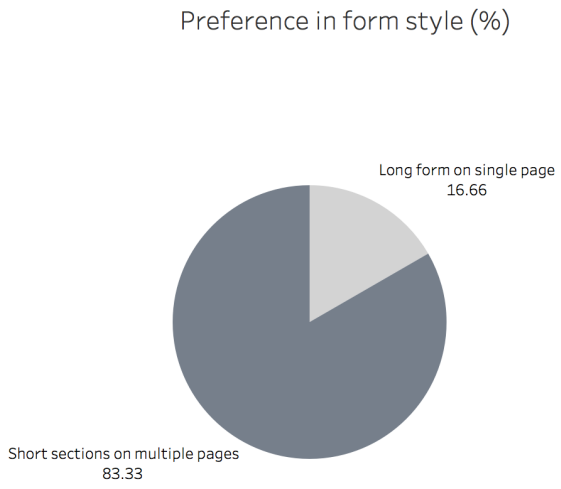


Figure 3.1

Figure 3.1 displays that 83.33% of participants preferred having short sections on multiple pages over a long form on a single page.

Comments made by participants in regards to form style were the following:

"There's too much data on one page. It's overwhelming." (during the "add new service" task-- single long form)

"Breaking it into shorter pages is better because you don't see this wall of fields which might turn you off."

"I would prefer everything on one page so there would be fewer clicks" (during the "add new provider" task-- shorter sections on multiple pages)

"I'd rather see everything I have to do at once."

In conclusion, the data supports the hypothesis. Forms that are divided into smaller sections on multiple pages are preferred by more than 50% (a majority) of users over a single long form and this may be due to the feeling that the form is less overwhelming when fewer fields are in sight.

H2. *There are no single long forms that should be replaced with shorter sections on multiple pages.*

Data used to test this hypothesis were:

- Comments and observed behaviour of the participants during the trials [qualitative]

Comments made by participants in regards to form style of specific forms were the following:

”This form is too long and should be more like the previous two.” (during the “add new service” task-- single long form)

”This page is so long. Should break it up like provider.” (during the “add new service” task-- single long form)

”The other style was better where you click through different pages to put in info instead of this.” (during the “add new service” task-- single long form)

In conclusion, the data does not support the hypothesis. Given that H3 holds and the above comments made regarding the long form on a single page style of the “add new service” form, having shorter sections on multiple pages would ostensibly improve user satisfaction.

H3. Fields that provide predictive functionality such as auto-complete or pre-populated answers lead to higher user satisfaction for more than 90% (a high majority) of users.

Data used to test this hypothesis were:

- Question 17 of the interview: “Were you more satisfied with fields that had predictive functionality such as auto-complete or pre-populated answers?” [quantitative and qualitative]

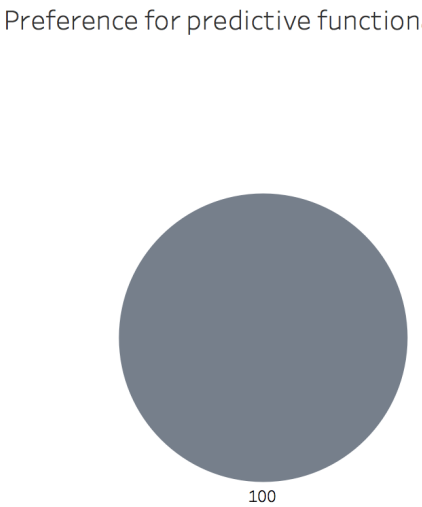


Figure 3.2 displays that 100% of participants preferred having predictive functionality.

Comments made by participants in regards to predictive functionality were the following:

“It makes it easier and faster.”

“Definitely more convenient and saves time.”

“Those should be used anywhere possible. It lowers the risk of human error.”

“It’s friendly, it’s easy. It helped that you have automatic completion.”

“Anything that is standardized should be standardized with fields.”

Figure 3.2

In conclusion, the data supports the hypothesis. Fields that provide predictive functionality are preferred by all participants. Reasons include convenience, a decrease in data input time, and a lower risk of human error.

H4. *There are no non-predictive fields that should be replaced with predictive fields.*

Data used to test this hypothesis were:

- Comments and observed behaviour of the participants during the trials [qualitative]
- Responses in the interview [qualitative]

Comments made by participants in regards to fields that lack but should have predictive functionality were the following:

"I'd like a list of countries rather than typing in whatever." ("County of Origin" field)

"Country should be a dropdown list. People spell things wrong like Kyrgyzstan." ("Country of Origin" field)

"...country should be a list." ("Country of Origin" field)

"...country should be a dropdown." ("Country of Origin" field)

"It should auto-complete city." ("City" field)

"I'd prefer a suggested postal code based on the address like other websites do." ("Postal Code" field)

"If it's possible, connect to Google maps to auto-complete address." (all address fields)

"Salesforce shows address on a map which makes errors apparent. So human error is the hardest part." (all address fields)

In conclusion, the data does not support the hypothesis. Given that H5 holds and the above comments, it seems that the non-predictive fields "Street address", "City", "Postal Code", and "Country of Origin" should be replaced with predictive fields.

H5. *Searchable inputs are preferred by at least 90% (a high majority) of users to unsearchable inputs.*

Data used to test this hypothesis were:

- Question 18 of the interview: "Did you prefer searchable inputs over non-searchable inputs where applicable?" [quantitative and qualitative]

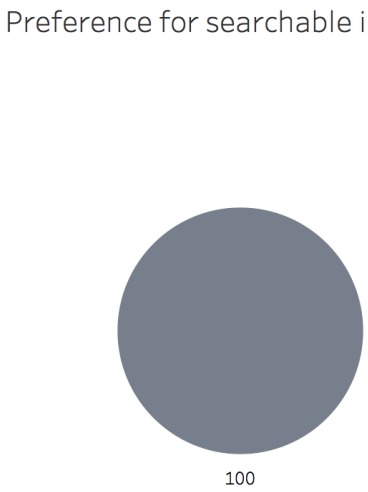
Figure 3.3 displays that 100% of participants preferred searchable inputs over non-searchable inputs where applicable.

Comments made by participants in regards to searchable inputs were the following:

"It speeds it up a lot."

"Made it faster for me."

"Makes it less of a hassle to find what you want."



"It's easier and faster."

"It's faster to use search."

In conclusion, the data supports the hypothesis. Searchable inputs are preferred by all participants. Reasons include convenience and a decrease in data input time.

Figure 3.3

H6. *There are no non-searchable fields that should be replaced with searchable fields.*

Data used to test this hypothesis were:

- Comments and observed behaviour of the participants during the trials [qualitative]
- Responses in the interview [qualitative]

Comments made by participants in regards to non-searchable fields that should be replaced with searchable fields are the following:

"Immigration status checkboxes really bothered me because I got in the rhythm of typing to search." ("Immigration Status" field)

"Choosing immigration status would be easier if I could type it in to search." ("Immigration Status" field)

"Immigration status should be a dropdown you can start typing to find." ("Immigration Status" field)

"The status in Canada-- I needed to look for it." ("Immigration Status" field)

"Immigration status has too many options (search type would have been better at preventing mistakes)." ("Immigration Status" field)

"Immigration status should be a searchable dropdown with divided sections by category." ("Immigration Status" field)

"I'd make eligibility searchable dropdowns." ("Immigration Status", "Current Education", "Complete Education Level" fields)

"I'd prefer dropdown menus for eligibility." ("Immigration Status", "Current Education", "Complete Education Level" fields)

"The eligibility was hard to choose from. Columns would have made it easier, but a dropdown you can look up with would be best." ("Immigration Status", "Current Education", "Complete Education Level" fields)

In conclusion, the data does not support the hypothesis. Given that H7 holds and the above comments, it seems that the non-searchable fields "Immigration Status", "Current Education", and "Complete Education Level" should be replaced with searchable fields.

3.1.2. Aesthetic

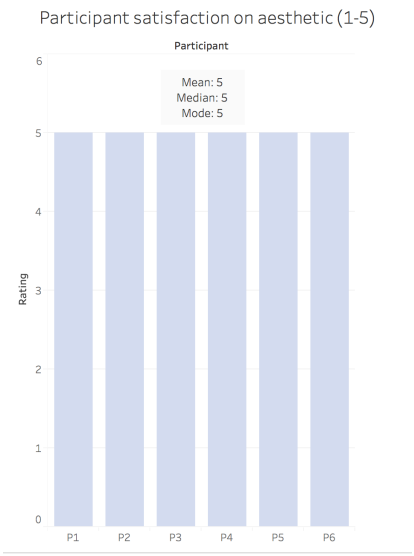


Figure 3.4

H7. *More than 50% (a majority) of users find that the layout of the interface is sufficient to operate the platform.*

Data used to test this hypothesis were:

- Question 24 of the interview on evaluating the Nielsen heuristic: "#8: Aesthetic and minimalist design" [quantitative and qualitative]
- Responses in the interview [qualitative]

Figure 3.4 presents the satisfaction ratings (1-5) that each participant reported regarding the aesthetic of the platform. All participants reported a rating of 5 indicating unanimity of satisfaction.

Comments made by participants in regards to the sufficiency of the layout of the interface to operate the platform were the following:

"The layout was good enough."

"Yeah, it's fine."

"It could be improved, but I'd say it's sufficient. I mean I got the job done."

"Did what I needed to do, so I'm satisfied with that."

"As it stands now, the interface looks sufficient."

In conclusion, the data supports the hypothesis. More than 50% (a majority) of users find that the layout of the interface is sufficient to operate the platform.

H8. *All users find the aesthetic of the interface appealing.*

Data used to test this hypothesis were:

- Responses in the interview [qualitative]

Comments made by participants in regards to whether the interface was appealing were the following:

"It's not pleasing and could look much better. More colours. Make it more visually attractive."

"It looks pretty boring though. I would add more icons and pictures maybe."

"It's not much better than Excel. It's not visually appealing. A bit boring."

"The interface is bland. Some colour would be better."

"Just make it look nicer. The homepage is very boring."

"The layout could be more pleasing."

In conclusion, the data does not support the hypothesis. Some participants reported that the aesthetic of the webpages was unappealing and described it as not pleasing, bland, or boring. Reasons include a lack of colours, icons, and images.

3.1.3. Navigation

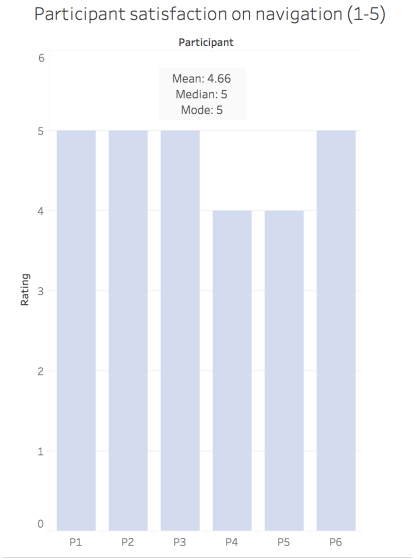


Figure 3.5

H9. *More than 50% (a majority) of users find that the platform is easy to navigate.*

Data used to test this hypothesis were:

- Question 3 of the interview: "How would you rate the ease of navigating the system from 1-5?" [quantitative and qualitative]
- Responses in the interview [qualitative]

Figure 3.5 presents the satisfaction ratings (1-5) that each participant reported regarding the ease of navigation on the platform. The mean was 4.66, the median was 5, and the mode was 5. If we take ratings of 3 or above to equate to satisfaction in the ease of navigation, then 100% of participants reported satisfaction.

Comments made by participants in regards to the navigation were the following:

"After I got used to it, it was very easy."

"Things are clearly labelled."

"Menus and buttons are easy to use."

"I could not go back to the service page when I clicked "add provider" by accident."

"Clicked "add provider" on service page and couldn't go back"

"But it's easy to accidentally click "add provider" button when you weren't supposed to."

"It could be more user-friendly by having separate buttons for types of providers rather than a dropdown."

"It was pretty straightforward, but I didn't like "add new provider" types in dropdown."

In conclusion, the data supports the hypothesis. More than 50% (a majority) of users find that the platform is easy to navigate. Reasons include the conspicuous labels in the navigation bar and on the forms.

3.1.4. Help and documentation

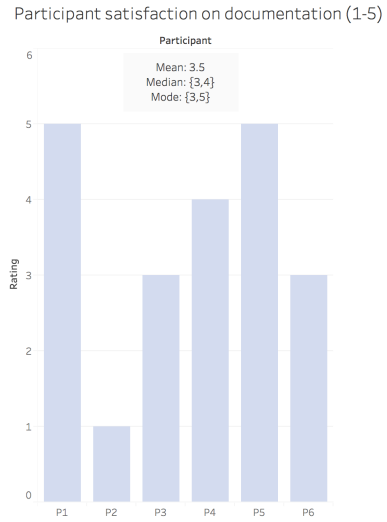


Figure 3.6

H10. *The design of the forms is sufficient to be used in lieu of help or documentation for more than 50% (a majority) of users.*

Data used to test this hypothesis were:

- Question 24 of the interview on evaluating the Nielsen heuristic: "#10: Help and documentation" [quantitative and qualitative]
- Responses in the interview [qualitative]

Figure 3.6 presents the satisfaction ratings (1-5) that each participant reported regarding the sufficiency of help and documentation available on the platform. The mean was 3.5, the median was {3,4}, and the mode was {3,5}. If we take ratings of 3 or above to equate to satisfaction in the amount of help and documentation, then 83.33% of participants reported that it was sufficient.

Comments made by participants in regards to the navigation were the following:

"I didn't feel I needed any help since the design of the websites was user-friendly."

"There's no need for documentation since it's straightforward."

"Some instructions about what the functions do would be helpful, but overall it was easy enough to use that I didn't really need any."

"Could have some minimal instructions to make it easier to use. The design made it not necessary for me though."

"No documentation encountered when there could have been some to help."

"As it gets more complex, there should be some help or documentation. For example, if you want to duplicate a program, how do you do that?"

In conclusion, the data supports the hypothesis. The design of the forms is sufficient to be used in lieu of help or documentation for more than 50% (a majority) of users. Reasons include that the platform is user-friendly and that the tasks are straightforward enough.

3.1.5. Error prevention

H11. *Allowing system errors to occur in place of client-side error prevention does not undermine the task success rate.*

Data used to test this hypothesis were:

- Task success rate of the trials [quantitative]
- The type and frequency of errors encountered [quantitative]

Figure 3.7 presents the task success vs. task failure rate. Of the ninety trials conducted overall, 8.88% of them failed.

Figure 3.8 displays the frequency of each error type encountered. Note that all errors encountered were system errors that were not caught by client-side checking of error-prone conditions.

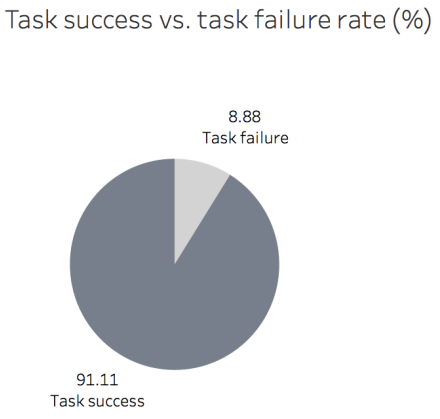


Figure 3.7

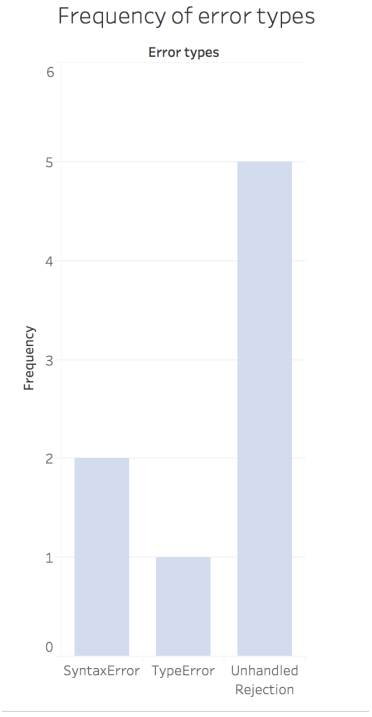


Figure 3.8

Finally, Figure 3.9 demonstrates that 100% of the task failures were due to encountering a system error.

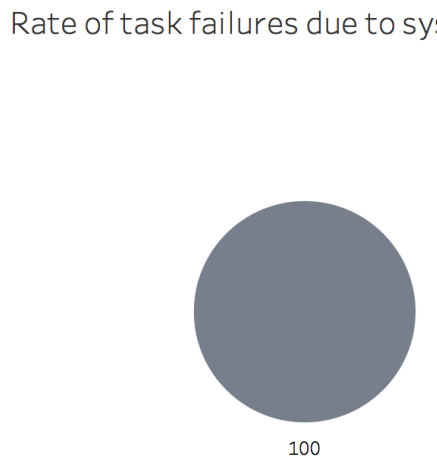


Figure 3.9

In conclusion, the data supports the hypothesis. Allowing system errors to occur in place of client-side checking of error-prone conditions undermines the task success rate because errors would not be caught before they are submitted.

3.1.6. Value

H12. *The capacity to share providers and services between agencies has value to social workers.*

Data used to test this hypothesis were:

- Question 9 of the interview: "How would having instant access to information on other providers' constraints such as eligibility, geography, cost and so on make a difference to how quickly or accurately you are able to satisfy client needs?" [qualitative]
- Question 10 of the interview: "This platform allows you to share the data that you input to other agencies. How would this affect service?" [qualitative]

In addressing question 9, the following comments were made by social workers:

"It would be helpful because if I had all the comprehensive information, I can exactly match the client to the service."

"I think that would speed things up. The challenge would be: every organization wants people to go through their own intake process. People don't want to put all their programs in the system for fear that all these people think they can come to the program. And max capacity current capacity would need constant updating on this external system. But the benefit would be reaching new clients and finding other resources for clients who need them."

In addressing question 10, the following comments were made by social workers:

"This would expand the number of services since there would be a wide range of services."

"It could mean an uptick in clients and an uptick in relationships with other agencies. It could mean a sudden influx of people who think they are eligible but are not because eligibility requirements are not read or not put in correctly."

The social workers noted that having instant access to other provider's constraints on services and being able to share data on services between agencies would widen the pool of resources available for assisting clients. This could help allocate resources not otherwise known about and improve the compatibility of a service to the client's need. This could also lead to improved relationships with other agencies.

One potential issue to address that was mentioned is that agencies have their own intake process and may defer putting their services on the platform for risk that clients will mistakenly think they are eligible because eligibility requirements are not read or not entered accurately. Also, the capacity count for a service would need to be constantly updated on this platform even when a client registers via another means. This may be an unrealistic assumption and could therefore lead to inaccurate capacity counts on the platform.

In conclusion, the data supports the hypothesis. The capacity to share providers and services between agencies has value to social workers.

3.2. Usability Results and Analysis

3.2.1. Training

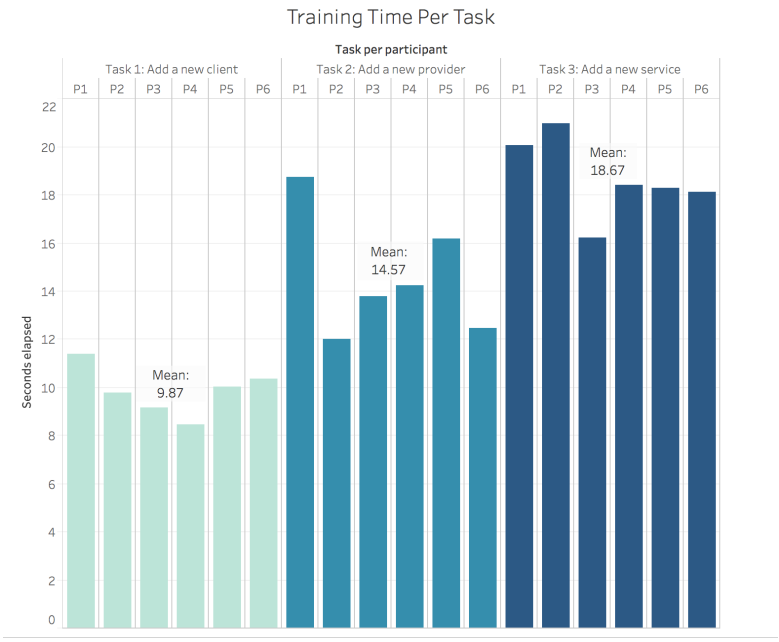


Figure 3.10

H13. *Thirty seconds of training in software use for each of the three functions ("Add a new client", "Add a new provider", and "Add a new service") is sufficient for the user's ability to proceed with the operations.*

Data used to test this hypothesis were:

- Seconds elapsed for training of each task [quantitative]
- Question 2 of the interview: "How effective was the training in using the software? Which aspects would you have liked more training on? How would you rate it from 1-5?" [quantitative and qualitative]

The training for each task involved a single demonstration of the workflow

using the platform. The investigator narrated the steps as they executed them ("I click this button in the navigation bar, and then...")

Figure 3.10 presents the seconds elapsed for training time of each task for each participant. These results are summarized in the following table.

Mean training time per task

Task 1: "Add a new client"	9.8 s
Task 2: "Add a new provider"	14.57 s
Task 3: "Add a new service"	18.67 s

Figure 3.11

Also, note that the maximum training time did not exceed 30 seconds.

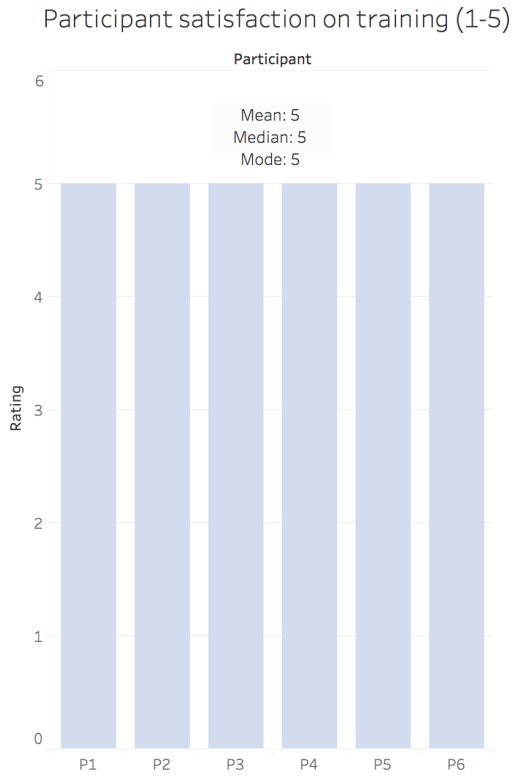


Figure 3.12

Next, we observe the satisfaction ratings (1-5) that each participant reported regarding the training in Figure 3.12. All participants reported a rating of 5 indicating unanimity of satisfaction.

Comments made in answer to question 2 in the interview were the following:

"It was pretty effective. The software is very user-friendly."

"The training was enough."

"Training was pretty simple. I didn't need anymore training on anything."

"It's pretty straightforward, so I don't think I needed any more training. "

"It was pretty effective."

"It was user-friendly."

Therefore, each training session took less than thirty seconds and the participants unanimously reported that it was sufficient to proceed with the operations. Given the comments made, it would seem that reasons for this include that the interface is user-friendly and the tasks are straightforward enough.

In conclusion, the data collected supports the hypothesis. Thirty seconds of training in software use for each of the three functions is sufficient for the user's ability to proceed with the operation because the interface is user-friendly and the tasks are straightforward enough.

3.2.2. Learnability

H14. *With each task, as the user becomes more familiarized with the interface and workflow, there is a minimum 5% overall average reduction of seconds elapsed per successive task within each block of tasks.*

Learnability is the capability of the platform to enable the user to learn how to use it. A learnable product is said to have intuitive design.

Data used to test this hypothesis were:

- Seconds elapsed to perform the task [quantitative]

Figures 3.13, 3.14, and 3.15 present the learning curves of the respective tasks. These plot the mean task time over the set number of trials. Note that they are all monotonically decreasing functions which does indicate overall reduction in task time between each successive trial within each task.

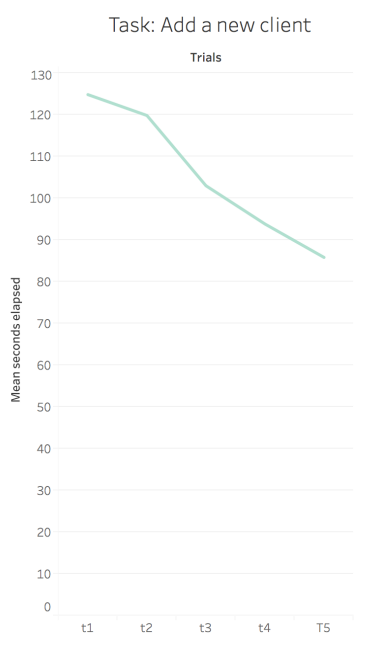


Figure 3.13

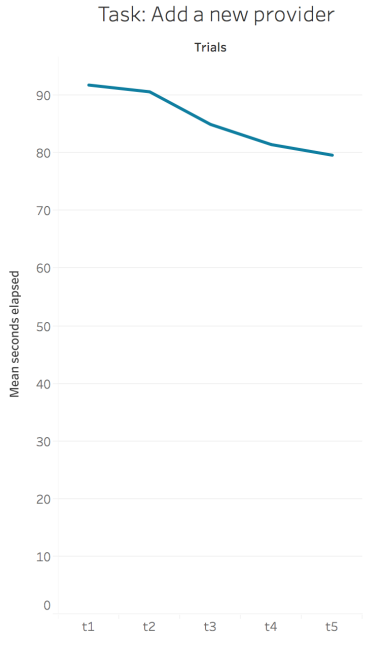


Figure 3.14

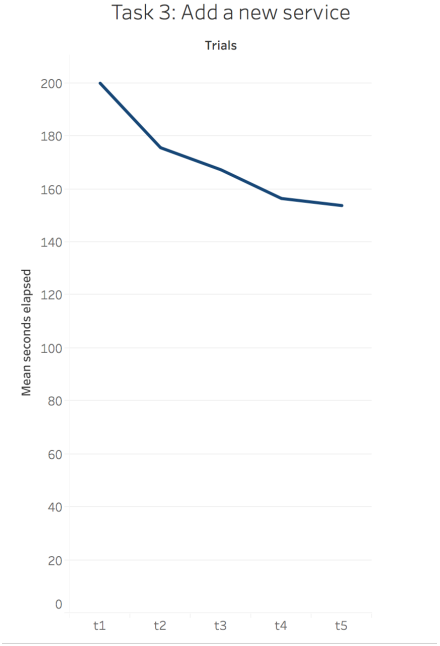


Figure 3.15

Figures 3.8, 3.9, and 3.10 plot the mean reduction (%) between mean task time between successive trials for each task. These results are summarized in the following table.

Mean reduction rate between successive trials

Task 1: “Add a new client”	8.87%
Task 2: “Add a new provider”	3.47%
Task 3: “Add a new service”	6.27%

Figure 3.16

Thus, the mean overall reduction rate between successive trials within a given task is 6.2%.

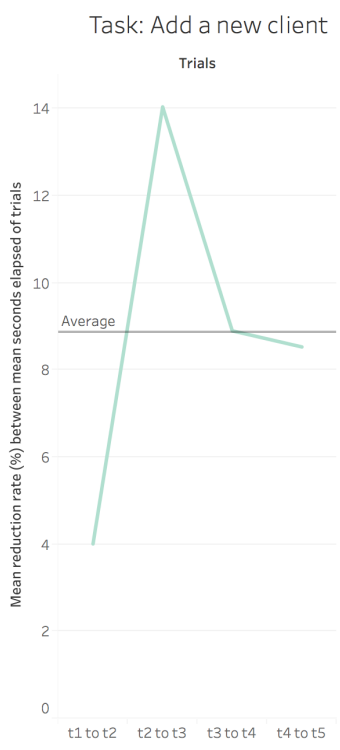


Figure 3.17

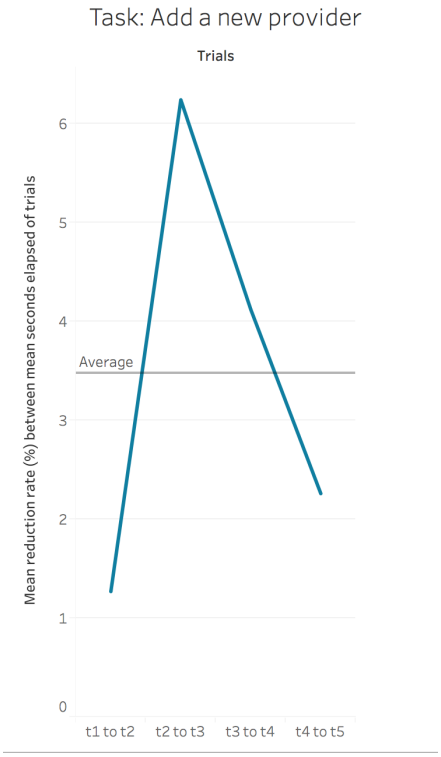


Figure 3.18

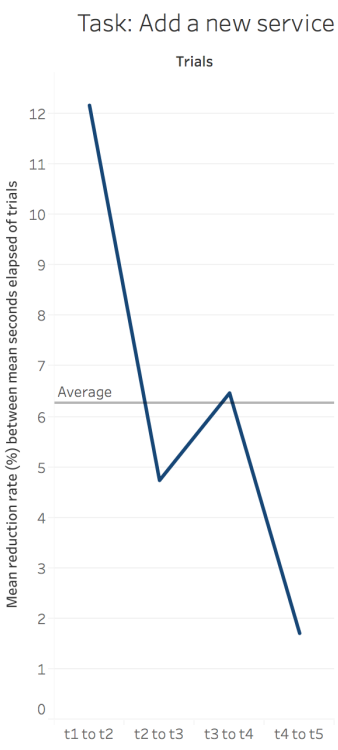


Figure 3.19

The learning curves in figures 3.17, 3.18, and 3.19 indicate that the platform has a degree of learnability over time. This consistent reduction in task time between successive trials is likely due to the user becoming familiarized with the interface and workflow.

In conclusion, the data collected supports the hypothesis. Seconds elapsed per successive task had an overall average minimum of 5% per block of tasks because the user becomes familiarized with the interface and workflow.

3.2.3. Nielsen's Heuristics

N1. Visibility of system status. *The system keeps users informed about what is going on through appropriate feedback within reasonable time.*

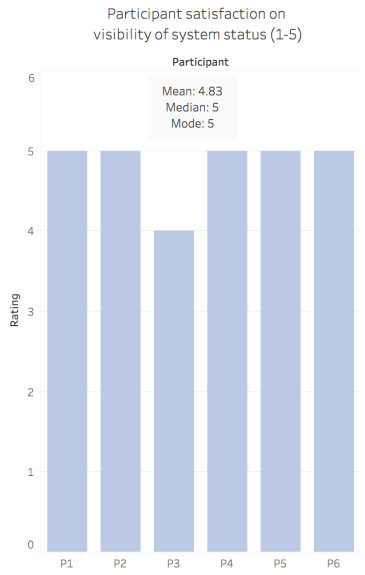


Figure 3.20

Figure 3.20 displays the rating each participant provided for their evaluation of the platform for this heuristic.

Comments made by participants regarding the system's adherence to this heuristic were the following:

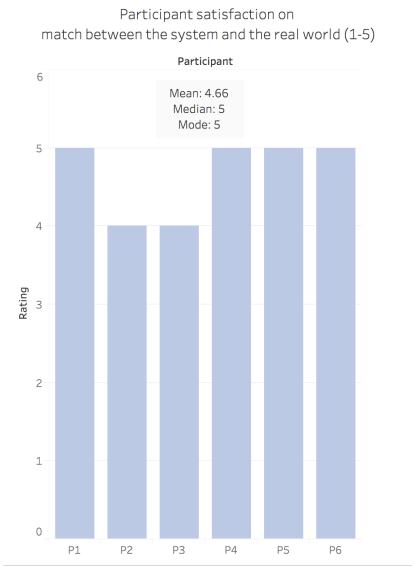
"I was always aware of which page I was on."

"It did a good job of keeping me informed about where I was I think."

"It didn't say successfully saved when I submit something."

"The only issue I saw was that the header didn't highlight the right page."

Overall, the satisfaction was high for visibility of system status (mean: 4.83) with a few issues raised.



N2. Match between system and the real world. *The system speaks the user's language, with words, phrases and concepts familiar to the user, rather than system-oriented terms, and follows real-world conventions, making information appear in a natural and logical order.*

Figure 3.21 displays the rating each participant provided for their evaluation of the platform for this heuristic.

Comments made by participants regarding the system's adherence to this heuristic were the following:

"The language was natural, but the levels of education should be listed in logical order."

"External or internal is a little vague."

Overall, the satisfaction was high for match between system

and the real world (mean: 4.66) with a few issues raised.

N3. User control and freedom. The system supports undo and redo. *Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue.*

Figure 3.22 displays the rating each participant provided for their evaluation of the platform for this heuristic.

Comments made by participants regarding the system's adherence to this heuristic were the following:

"I could not go back to the service page when I clicked "add provider" by accident."

"Clicked "add provider" on service page and couldn't go back."

Overall, the satisfaction was high for user control and freedom (mean: 4.16) with one issue raised.

Figure 3.21

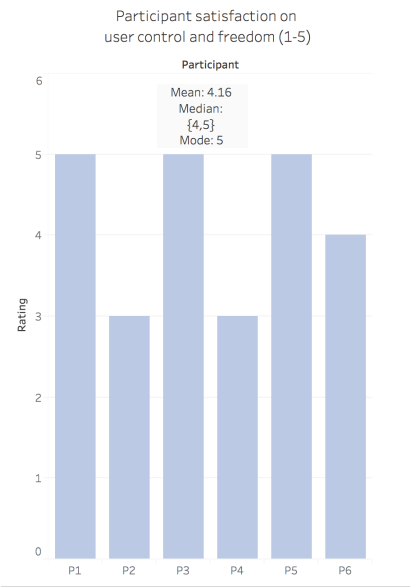


Figure 3.22

N4. Consistency and standards: *The system has a coherent platform convention for language and signage and uses it consistently* (Users should not have to wonder whether different words, situations, or actions mean the same thing.

Figure 3.23 displays the rating each participant provided for their evaluation of the platform for this heuristic.

Comments made by participants regarding the system's adherence to this heuristic were the following:

"The languages search was inconsistent with the other searches because it didn't search from the beginning of the languages."

"Language search was inconsistent."

Overall, the satisfaction was high for consistency and standards (mean: 4.5) with one issue raised.

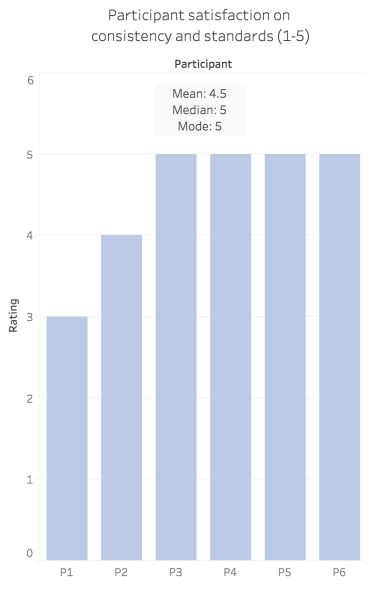


Figure 3.23

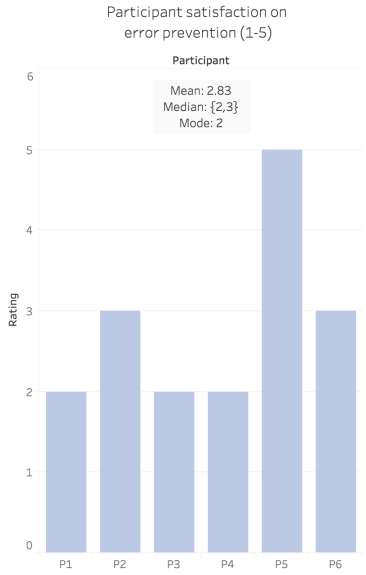


Figure 3.24

N5. Error prevention. *Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.*

Figure 3.24 displays the rating each participant provided for their evaluation of the platform for this heuristic.

Comments made by participants regarding the system's adherence to this heuristic were the following:

"Autofill by browser can cause mistakes. Phone number format error was not checked. Immigration status has too many options (search type would have been better at preventing mistakes)"

"Phone number format check needs to happen."

"Phone number format error"

"Dropdown of countries and form validation need to be put in. Duplicate checking should be done as well."

Overall, the satisfaction was moderate for error prevention (mean: 2.83) with several issues raised.

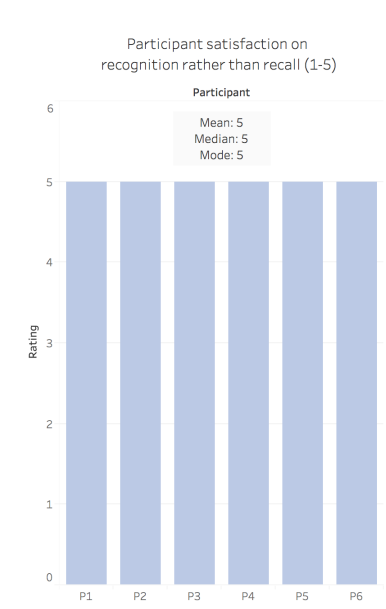


Figure 3.25

N6. Recognition rather than recall. *Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.*

Figure 3.25 displays the rating each participant provided for their evaluation of the platform for this heuristic.

No comments were made by participants regarding the system's adherence to this heuristic.

Overall, the satisfaction was very high for recognition rather than recall (mean: 5) with no issues raised.

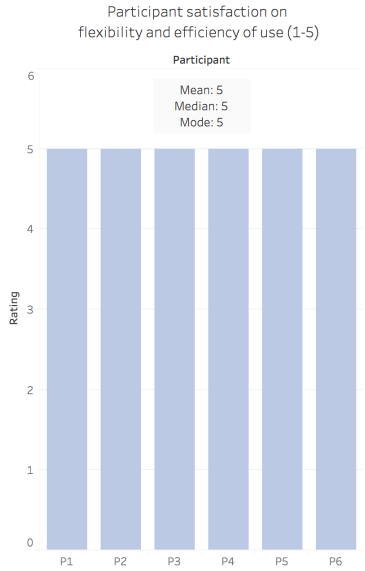


Figure 3.26

N7. Flexibility and efficiency of use. The system provides accelerators that allow users to tailor frequent actions. *Accelerators—unseen by the novice user—may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users.*

Figure 3.26 displays the rating each participant provided for their evaluation of the platform for this heuristic.

Comments made by participants regarding the system's adherence to this heuristic were the following:

"Tabbing between fields made it efficient."

"Autocomplete fields were good."

"Could start typing and tab between fields quickly."

"Use of search and tab."

"There were speed ups like tabbing and typing in the beginning of words."

Overall, the satisfaction was very high for flexibility and efficiency of use (mean: 5) with no issues Raised.

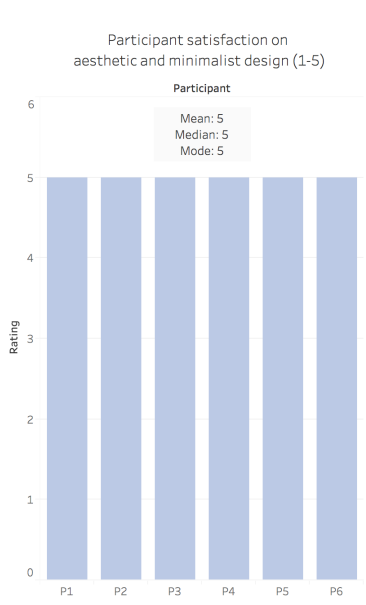


Figure 3.27

N8. Aesthetic and minimalist design. *Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.*

Figure 3.27 displays the rating each participant provided for their evaluation of the platform for this heuristic.

Comments made by participants regarding the system's adherence to this heuristic were the following:

"The layout was good enough."

"It could be improved, but I'd say it's sufficient. I mean I got the job done."

"Yeah, it's fine."

"Did what I needed to do, so I'm satisfied with that."

"With more fields, it would become more important to clean things up. As it stands now, the interface looks sufficient."

Overall, the satisfaction was very high for aesthetic and minimalist design (mean: 5) with no issues raised.

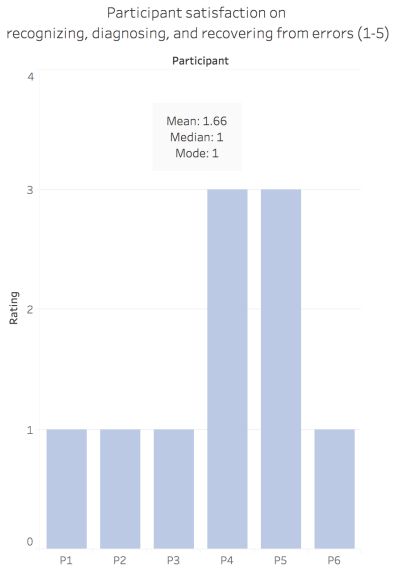


Figure 3.28

N9. Help users recognize, diagnose, and recover from errors. *Error messages are expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.*

Figure 3.28 displays the rating each participant provided for their evaluation of the platform for this heuristic.

Comments made by participants regarding the system's adherence to this heuristic were the following:

"Errors I didn't understand."

"No error messages encountered when there should have been."

"Got system error messages."

Overall, the satisfaction was low for recognizing, diagnosing, and recovering from errors (mean: 1.66) with a few issues raised.

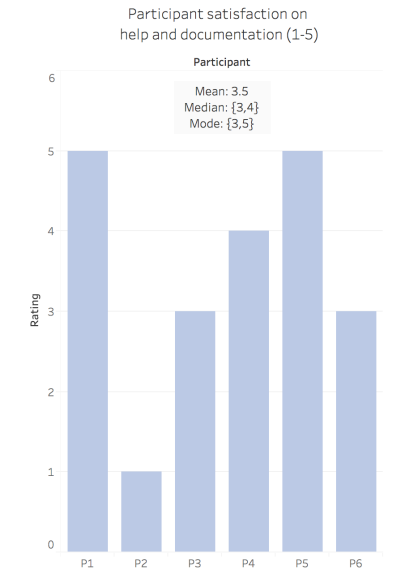


Figure 3.29

N10. Help and documentation. *The system provides help/documentation. Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.*

Figure 3.29 displays the rating each participant provided for their evaluation of the platform for this heuristic.

Comments made by participants regarding the system's adherence to this heuristic were the following:

"I didn't feel I needed any help since the design of the websites was user-friendly."

"No documentation encountered when there could have been some to help."

"Some instructions about what the functions do would be helpful, but overall it was easy enough to use that I didn't really need any."

"Could have some minimal instructions to make it easier to use. The design made it not necessary for me though."

"There's no need for documentation since it's straightforward."

"As it gets more complex, there should be some help or documentation. For example, if you want to duplicate a program, how do you do that?"

Overall, the satisfaction was moderate for help and documentation (mean: 3.5) with a few issues raised.

4. Discussion

4.1. Strengths of the SNM-I Platform

Ease of Learnability. The evaluation results show that the learning curve for adoption of the SNM-I platform for these three tasks exhibits a monotonic reduction in task time with each successive trial. Furthermore, the participants stated that the brief training provided before each task was sufficient as the user interface was user-friendly. When asked about whether they needed further help or documentation, most participants reported that they were satisfied with the lack thereof because, again, the user interface allowed the operation of the tasks to be straightforward. Thus, the user interface of the SNM-I platform is accessible for new adopters with limited training or documentation required.

Form Page Layout. The platform allows administrative users to customize their forms for adding a new client and provider and this includes assigning different sections of the form to different pages. Most participants found that this feature of these two forms made the associated task less overwhelming and easier to process.

Predictive Functionality. Many of the form fields provide predictive functionality such as "Category" and the "Eligibility" fields in the service form (list of pre-populated answers) and all participants reported that they preferred this type of input where applicable.

Search Functionality. Likewise, many of the form fields provide search functionality such as "Languages" in the service form and all participants reported that they preferred this type of input where applicable.

Interface Layout. All participants rated the sufficiency of the layout to operate the platform 5 out of 5.

Ease of Navigation. All participants were satisfied with the ease of navigation on the platform reporting that it was user-friendly and clearly-labelled.

Value. The social workers reported that being able to share providers and services between agencies would be a valuable asset to the platform they use to manage resources because it would allow them to draw from a wider pool of resources to better match a services to a client's needs.

Visibility of System Status. All participants reported a high overall satisfaction regarding the platform's ability to keep them informed about the status of the task.

Match Between System and the Real World. All participants reported a high overall satisfaction regarding the language used on the platform conforming to real-world conventions.

User Control and Freedom. All participants reported a high overall satisfaction regarding the platform's ability to support undo and redo.

Consistency and Standards. All participants reported a high overall satisfaction regarding the platform's ability to maintain consistency.

Recognition Rather Than Recall. All participants reported a very high overall satisfaction regarding the platform's ability to minimize the user's memory load by making options and information visible across different dialogues.

Flexibility and Efficiency of Use. All participants reported a very high overall satisfaction regarding the platform's ability to allow users to accelerate frequent actions such as tabbing between fields and using search.

Aesthetic and Minimalist Design. All participants reported a very high overall satisfaction regarding the sufficiency of the layout without any extraneous or irrelevant units of information.

4.2. Weaknesses of the SNM-I Platform

The Single-Page Layout of the "Add New Service" Form. Some participants reported that they would have preferred to have this form divided by section into separate pages similar to the "Add new provider" and "Add new client" forms.

The Lack of Predictive Functionality in the Location Fields. Some participants reported that they would have preferred pre-populated answers or auto-complete for "Street address", "City", "Postal Code", and "Country of Origin".

The Lack of Search Functionality in the Eligibility Fields. Some participants reported that they would have preferred search functionality for "Immigration Status", "Current Education", and "Complete Education Level".

The Bland Aesthetic. Some participants reported that the aesthetic of the webpages was unappealing because it was bland or boring.

Lack of Client-Side Error Prevention. 8.88% of trials failed and all of these failures resulted in the participant encountering a system error which some users reported not understanding or recognizing.

4.3. Suggestions for Improvement of the User Experience

1. Allow the customization of multi-page forms for "Add new service".
2. Implement predictive functionality for the location fields "Street address", "City", "Postal Code", and "Country of Origin".
3. Implement search functionality for the eligibility fields "Immigration Status", "Current Education", and "Complete Education Level".
4. Create a more engaging aesthetic for the platform by introducing more colours, call-to-action icons, and images.
5. Implement client-side form validation, error handling, and more comprehensive testing to catch error-prone conditions. In cases where input does not meet requirements, display the error using language that is easily recognizable and diagnosable to the user.
6. Ensure that the "back" functionality in browsers is properly implemented so users can undo mistakes or return to previous pages in their history.

7. Include short descriptions and instructions to prompt action from the user.
8. Display a success message when a form is successfully submitted.
9. Ensure that the current page in the navigation bar is highlighted.
10. Make the search functionality in the “Languages” field consistent with other search styles in the other fields (i.e. match from the beginning of the option’s label rather than anywhere in the label).
11. Omit the use of autofill by the browser to lessen the risk of error and the capacity of the browser to save inputs for privacy reasons.

5. Conclusion

During this project, we worked on user experience research to inform the excellent work done so far by the development team. The findings presented suggest that important shortcomings of the user experience were identified and should be addressed in future iterations of the SNM-I platform. Participants also highlighted several aspects of the platform that they found to be effective, valuable, and highly usable-- these pronouncements should also be considered in the continuation of this platform.

One limitation of this study was the relatively small sample size of six. In particular, the investigators were able to find no more than two participants employed in the field of social work. Although this was sufficient to obtain data about the user experience and make conclusions regarding the efficacy of various aspects, a larger sample size with more social workers would have provided more definitive results and insights into the workflow needs of social workers using this system designed specifically for them. Furthermore, the investigators would have ideally also tested the user experience for adding client needs and the matching module, but these units were being actively implemented at the time of this research study.

For future work, prospective researchers can utilize applicable qualitative and quantitative metrics from this study toward investigating the user experience of the “Add new need” form and the matching module when these functions are ready. A larger participant sample composed of more social workers would also be advisable for the reasons mentioned previously.

In conclusion, this was the first user-centric design research study of this current iteration of the SNM-I platform. It validated many of the hypotheses and the data challenged others. It also identified the strengths and weaknesses of the system for a user carrying out the “Add new client”, “Add new provider”, and “Add new service” tasks-- fundamental functions which should be optimized to provide a great and streamlined user experience. As such, concrete recommendations were made in the previous section to be carried on to the next group of engineers working on this essential project.

PART B.

Planning & Implementation of the Appointment Module

1. Introduction

The current implementation of the SNM-I platform lacks the functionality to schedule appointments for clients and service providers, an important feature that is interwoven with other functionality such as client intake, support plan, and matching. At a first glance, the motivation behind the appointment module is to allow the user to schedule an appointment for (potentially multiple) clients and service providers, have automated confirmation, cancellation, and notification, and have a feedback system in which participants can describe their experience of the appointment.

This part of the report begins with planning for the appointment module. This includes having an interview with a social worker regarding their workflow needs, creating use cases, and then deriving functional and non-functional requirements from them. Next, a process diagram and data model diagram are presented. Finally, the data models relevant to this feature are implemented in the server-side codebase.

2. Planning

2.1. Interview with a Social Worker

The interviewee has been working at [redacted] for [redacted] and works directly with [redacted] for client and donor management. They were asked verbally about their current workflow for appointment scheduling and what features they would like to see supported in SNM-I for appointment scheduling. Their response was the following, verbatim:

> [Redacted]

The following functional requirements were identified during the discussion with the [redacted] employee. The complete list of functional and non-functional requirements can be found in section 2.3.

1. The user should be able to create an appointment (must have).
2. The user should be able to confirm an appointment for a participant (must have).
3. If the service provider is internal, a notification that someone has registered would be nice (nice to have).
4. The user can view/create reports about service usage (nice to have).
5. All appointments created in SNM-I are entered into Outlook (nice to have).

2.2. Use Cases

The ten use cases defining interactions between actors and the system for the appointment module can be found in Appendix 6. The first use case is the following:

Use Case

ID:	1
Title:	Create appointment
Description:	User creates appointment with client(s), service provider(s), address, time, preferred method of contact for all participants, and can choose to confirm on behalf of a participant, send a confirmation request via their preferred method, or confirm later.
Primary Actor:	User
Preconditions:	User is logged in and selects new appointment
Postconditions:	An appointment has been created with details completed and confirmation requests have been sent out to participants about the appointment or the user has confirmed on their behalf (immediately or later).
Main Success Scenario:	User creates appointment with details completed and either sends out a confirmation request to participants, confirms on their behalf, or confirms later.
Extensions:	The preferred method of contact for confirmation request may be missing from client or service provider's profile (such as telephone number or email address). The user may not know the preferred method of contact for a participant. The client's preferred method of contact is by phone but the client's phone may not be able to receive text messages.
Frequency of Use:	High
Status:	In development
Owner:	Sheilla Shojaie
Priority:	High

2.3. Software Requirements Specification for the Appointments Module

Must-Have Functional Requirements

1. The user should be able to create an appointment.
2. Preferred method of contact for each participant should be pulled from the one specified on the profile of the participant.
3. The user should be able to change the preferred method of contact for individual participants for individual appointments.
4. The user should be able to edit the involved participants, location, and time at any time before the occurrence of the appointment.
5. The user should be able to confirm the appointment on behalf of a participant upon creation of the appointment, or have the system send a confirmation request to the participant, or confirm on behalf of a participant at a later time.
6. The system should send out a confirmation request with a link to a web form on the platform to any participants that the user indicates should receive one.
7. Participants should be able to confirm or reject the appointment by following the link to a web form (associated with the participant and the appointment). The system should notify all participants when a change to the appointment details occurs. The system should notify all participants when a cancellation to an appointment occurs . The system should notify all participants that the appointment is confirmed by everyone when the condition holds that the appointment is confirmed by everyone (either directly or by proxy of the user).
8. Participants and the user should be able to cancel a confirmed appointment.
9. The system should send feedback requests with a link to a web form on the platform to all participants.
10. Participants should be able to use and submit the feedback form. There should be a link to the feedback page of a participant on their profile which displays the aggregated feedback provided by others about that participant.
11. The user should be able to view the feedback associated with a participant on the feedback page of the participant.
12. The user should be able to view all past and pending appointments they have set up in an appointment dashboard.
13. The user should be able to view all past and pending appointments for any client on the client's profile.

Nice-To-Have Functional Requirements

14. Administrative users should be able to have the system generate a report of all appointments and the involved participants as well as the appointments created by any specific user.
15. If the service provider is internal, a notification that someone has registered would be nice.
16. All appointments created in SNM-I are entered into Outlook.

Must-Have Non-Functional Requirements

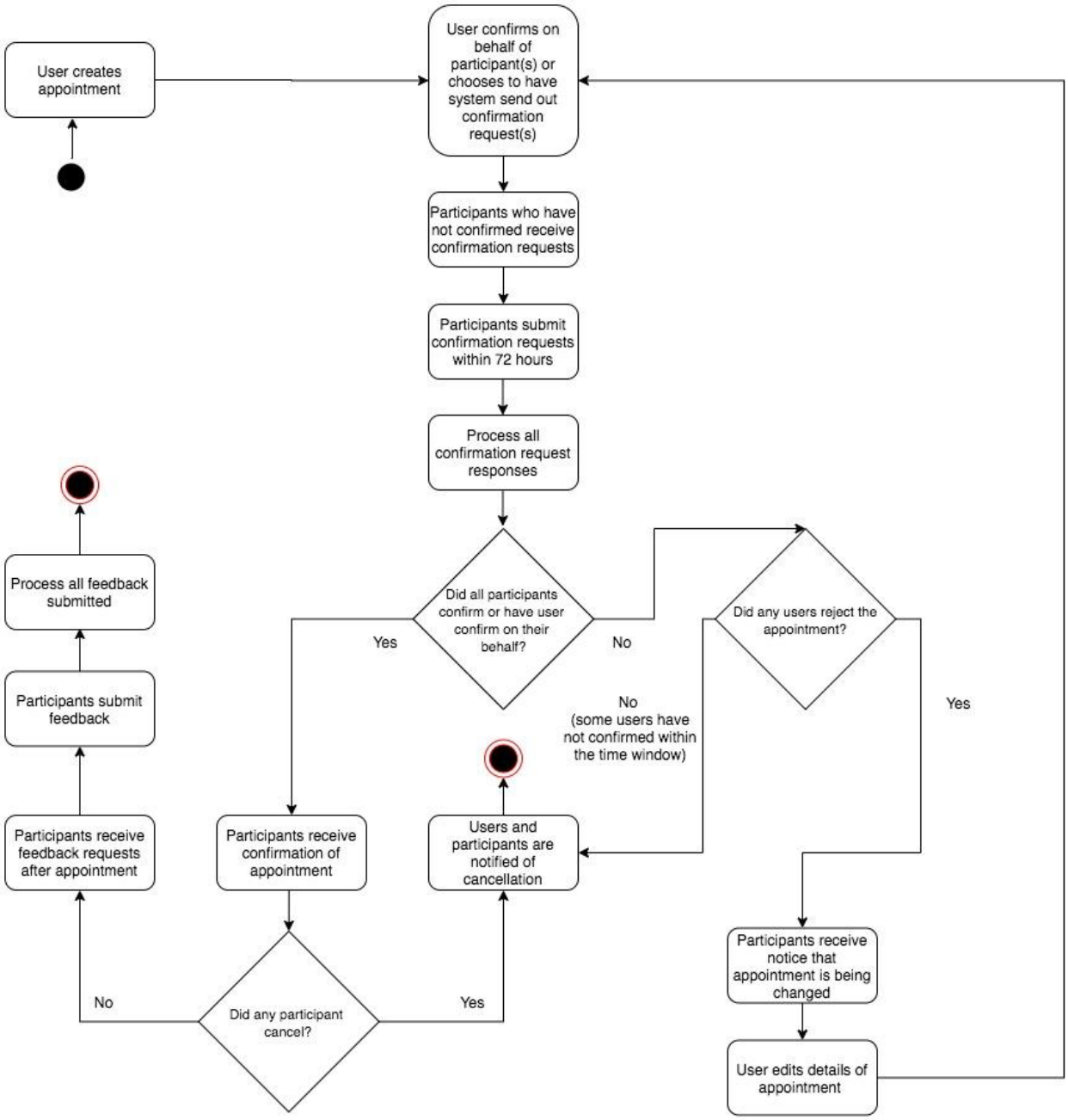
1. Feedback and confirmation webforms should be accessible and usable on both desktop and mobile devices.
2. For security purposes, once a feedback form is submitted, the participant should not be able to use the link to edit their feedback.
3. The system should log and store every change to an appointment as well as every notification sent, every confirmation or rejection, and all feedback submitted.
4. Participants should not be able to view the personal or contact details of other participants (besides names) .

5. The user is the only actor who can edit the details of an appointment.
6. The confirmation web forms should be disabled for participants once an appointment is cancelled.

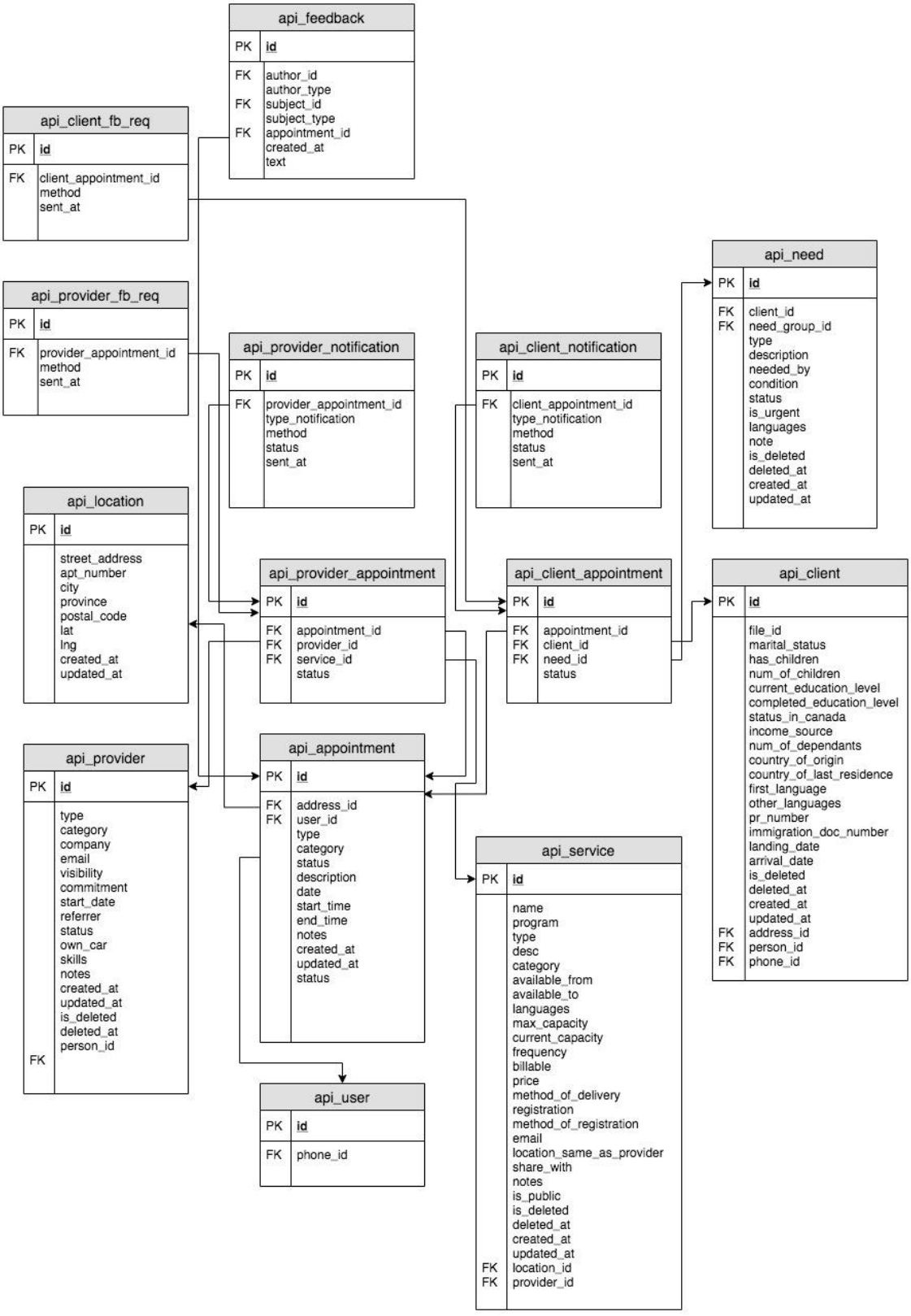
Nice-To-Have Non-Functional Requirements

7. All outgoing notifications to participants should be sent within five minutes of the state change that initiated it.

2.4. Process Diagram



2.5. Model Diagram



3. Implementation

3.1. Overview

In Django, each data model maps to a single database table. For this appointment module, seven additional data models have been defined alongside the existing set of data models in the directory /snm-server/api/models in the appointment branch. These can be found in Appendix 7.

For demonstration purposes, two models are presented below.

The class `Provider_Fb_Req` represents the database table storing feedback requests to providers. Here, the attribute `provider_appointment` is a foreign key referencing an entry in the database table `Provider_Appointment` which represents a provider's appointment which in turn has three foreign keys: `appointment` referencing a specific appointment in the `Appointment` table, `provider` referencing a specific provider in the `Provider` table, and `service` referencing a specific service in the `Service` table. Notice that the primary keys have the behaviour `on_delete=models.PROTECT`. This prevents the referenced object from being deleted if it already has an object referencing it in the database. So, for example, this would prevent the deletion of an entry in the `Appointment` table if there are other entries that reference it such as an entry in the `Provider_Appointment` table. This is important for auditing purposes (for instance, we want all records of feedback requests to be maintained and to know the appointments they reference).

The primary key is a unique identifier for each record in a table. In Django, when the primary key is not explicitly defined as is the case here, an IntegerField is automatically generated to hold the primary key.

provider_fb_req.py

```
---------------------------------------------------------------------------------------

from django.db import models

from django.contrib.contenttypes.models import Provider_Appointment


class Provider_Fb_Req(models.Model):


       provider_appointment = models.ForeignKey(Provider_Appointment, on_delete=models.PROTECT)

       method = models.CharField(max_length=1000, null=True)

       sent_at = models.DateTimeField(auto_now_add=True)
```

provider_appointment.py

```
---------------------------------------------------------------------------------------

from django.db import models
```

```
from django.contrib.contenttypes.models import Appointment, Provider, Service


class Provider_Appointment(models.Model):


        appointment = models.ForeignKey(Appointment, on_delete=models.PROTECT)

        provider = models.ForeignKey(Provider, on_delete=models.PROTECT)

        service = models.ForeignKey(Service, on_delete=models.PROTECT)

        status = models.CharField(max_length=30, null=True)
```

3.2. Module Dependencies

The appointment module has dependencies on other modules in the wider SNM-I system. These are client intake, client support plan, service eligibility, need matching, and user logging. The models that are referenced in the appointment module are: User, Client, Provider, Service, Need, Location, and Note.

The modules that will depend on the appointment module are the user's appointment dashboard as well as the client and provider feedback views.

4. Conclusion

This part of the report details the software requirements specification for the appointment module elicited via interviews with stakeholders as well as the resulting implementation.

The software requirements have been defined in terms of functional and non-functional requirements. The must-have functional requirements informed the creation of the internal data model that will support the functionality related to making and managing appointments.

These requirements were also used in the creation of a process diagram that illustrates the high-level processes involved in making an appointment. Finally, the data models for the must-have functionality have been implemented in Python in the server-side codebase.

One of the implementation challenges was supporting the involvement of multiple providers and clients in an appointment. I addressed this by using the models Provider_Appointment (which references an appointment, provider, and the service that the provider is serving) and Client_Appointment (which references an appointment, client, and the need that the client is having served). Thus, the system can find all the relevant Provider_Appointment and Client_Appointment entries and aggregate them in reference to a single appointment with the relevant services and needs mapped to each provider and client involved.

Another challenge was how to manage the case in which a client or provider does not confirm an appointment request. The solution, as illustrated in the process model, was to grant them a period of 72 hours to respond to the request or else cancel the appointment. This solution was chosen because it implements a simple mechanism

by which the participants of the appointment can confirm or reject the appointment that may otherwise lead to an endless loop of notification requests in the case of non-responsiveness.

Future work would involve integration testing of these data models to ensure cohesive interaction with the rest of the SNM-I functional module. Furthermore, the nice-to-have functionality has been outlined in section 2.3 and would be a beneficial addition for the user experience in future iterations of the module.

REFERENCES

References

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APPENDICES

Appendix 1. Study Protocol

[Redacted]

Appendix 2. Consent Forms

[Redacted]

Appendix 3. Participant Tasks

Project Title: “User Experience Study of Data Input”.

Investigators: Sheilla Shojaie | [Redacted],

Daniela Rosu | [Redacted]

Task 1: Inputting client demographic data

From the dashboard, go to the client management page. Then, create a new client profile using the pre-existing form. Input client demographic data and submit the form.

Task 2: Inputting a provider

From the dashboard, go to the provider management page. Then, create a new organization provider profile using the pre-existing form and submit.

Task 3: Inputting a service

From the dashboard, go to the service management page. Then, create a new service and submit.

Appendix 4. Data Collection Forms

[Redacted]

Appendix 5. Post-Test Interviews

[Redacted]

Appendix 6. Use Cases

Use Case

ID:	1
Title:	Create appointment
Description:	User creates appointment with client(s), service provider(s), address, time, preferred method of contact for all participants, and can choose to confirm on behalf of a participant, send a confirmation request via their preferred method, or confirm later.
Primary Actor:	User
Preconditions:	User is logged in and selects new appointment
Postconditions:	An appointment has been created with details completed and confirmation requests have been sent out to participants about the appointment or the user has confirmed on their behalf (immediately or later).
Main Success Scenario:	User creates appointment with details completed and either sends out a confirmation request to participants, confirms on their behalf, or confirms later.
Extensions:	The preferred method of contact for confirmation request may be missing from client or service provider's profile (such as telephone number or email address). The user may not know the preferred method of contact for a participant. The client's preferred method of contact is by phone but the client's phone may not be able to receive text messages.
Frequency of Use:	High

Status:	In development
Owner:	Sheilla Shojaie
Priority:	High

Use Case

ID:	2
Title:	Send confirmation request
Description:	Client or service provider receives a confirmation request via either text message or email depending on their designated preferred method of contact and confirms whether it works for them or not.
Primary Actor:	Client or service provider
Preconditions:	An appointment has been created and the option to send out a confirmation request to client or service provider was selected.
Postconditions:	The status of the appointment has been updated according to the response provided by the the client or service provider, i.e., “accept” or “reject”, via text message or email.
Main Success Scenario:	Client or service provider receives a confirmation request about an appointment via text message or email and indicates “accept” or “reject” and this updates the appointment status.
Extensions:	The client or service provider may not respond to the confirmation request. The client or service provider may respond to the same confirmation request multiple times.
Frequency of Use:	High
Status:	In development

Owner:	Sheilla Shojaie
Priority:	High

Use Case

ID:	3
Title:	Appointment update
Description:	The user checks on the pending appointment and sees that at least one client or service provider has indicated “reject” to a confirmation request. An internal trigger notifies all participants that the appointment will be changed. User edits the details of the appointment and chooses to either send out another confirmation request or confirm on behalf of a participant (immediately or later).
Primary Actor:	User
Preconditions:	At least one client or service provider involved in the appointment has rejected the confirmation request. Another possible precondition is that the client or provider requests modification to appointment details by contacting the user.
Postconditions:	(1) The appointment has been edited and (2) the user has confirmed on behalf of a participant following this change (immediately or later) or the participants are notified that the appointment will be changed, i.e., a new confirmation request has been sent out.
Main Success Scenario:	The user checks on the pending appointment and sees that at least one client or service provider has indicated “reject” to a confirmation request. User contacts that participant to discuss a better appointment time/address/etc. User edits the details of the appointment and chooses to either send out another confirmation request or confirm on behalf of a participant (immediately or later). Participants are notified that the appointment will be changed.
Extensions:	The user may not be able to reach the participant who rejected the appointment to discuss a better time/address/etc.
Frequency of Use:	High

Status:	In development
Owner:	Sheilla Shojaie
Priority:	High

Use Case

ID:	4
Title:	Appointment confirmation
Description:	A confirmation of an appointment was sent to all clients, service providers, and the user involved in the appointment. All clients and service providers participating in an appointment indicated “accept” to a confirmation request via their preferred method of contact or the user had already confirmed on their behalf. The status of the appointment is changed to “confirmed”. Appointment confirmation notifications are sent to all involved.
Primary Actor:	System
Preconditions:	All clients and service providers indicated “accept” to a confirmation request via their preferred method of contact or the user had already confirmed on their behalf. No participants have rejected the appointment.
Postconditions:	The status of the appointment has been changed to “confirmed” Confirmation notification for the appointment have been sent to all clients, service providers, and user involved in the appointment as well as shortly before the time of the appointment.
Main Success Scenario:	All clients and service providers indicate “accept” to a confirmation request via their preferred method of contact or the user had already confirmed on their behalf. The status of the appointment is changed to “confirmed” and confirmation notifications are sent to all clients, service providers, and user involved in the appointment upon this condition being met
Extensions:	
Frequency of Use:	High

Status:	In development
Owner:	Sheilla Shojaie
Priority:	High

Use Case

ID:	5
Title:	Appointment cancellation
Description:	A client, service provider, or user needs to cancel a confirmed appointment.
Primary Actor:	Client, service provider, or user
Preconditions:	There is a confirmed appointment.
Postconditions:	The appointment is marked as “cancelled”. Information about the reason for cancellation, if available, and the party who cancelled is logged by the system. All clients, service providers, and user involved in appointment are notified of cancellation.
Main Success Scenario:	A client, service provider, or user cancels a confirmed appointment via their preferred method of contact (text message or email) for client/service provider or via the platform for user. The appointment is then permanently cancelled. All clients, service providers, and user involved in appointment are notified of cancellation.
Extensions:	A client or service provider may have lost the notifications about appointment and therefore does not know how to cancel the appointment. A client, service provider, or user may accidentally cancel the appointment and need to undo the action (a grace period of 15 min for “Undo” cancellation is possible).
Frequency of Use:	Medium

Status:	In development
Owner:	Sheilla Shojaie
Priority:	High

Use Case

ID:	6
Title:	Appointment update
Description:	User changes the contact method for a client or service provider associated with an appointment
Primary Actor:	User
Preconditions:	There is a pending appointment.
Postconditions:	The contact method for a client or service provider has been changed.
Main Success Scenario:	User learns that a client or service provider wants to change their preferred method of contact associated with an appointment. They make this change. The affected participant is not notified.
Extensions:	The new preferred contact method may be missing from the participant's profile (such as telephone number or email address). The telephone number on the profile may not be able to receive text messages.
Frequency of Use:	Medium

Status:	In development
Owner:	Sheilla Shojaie
Priority:	High

Use Case

ID:	7
Title:	Feedback request
Description:	Shortly after an appointment has completed, an internal trigger sends out feedback requests to each participant.
Primary Actor:	System
Preconditions:	The time of a confirmed appointment has recently passed.
Postconditions:	Feedback requests have been sent to the participants of the appointment via their preferred contact method.
Main Success Scenario:	Shortly after time of an appointment has passed, an internal trigger sends out feedback requests to each participant via their preferred contact method.
Extensions:	The appointment did not take place because one or more participants did not show up. The preferred contact method is no longer valid.
Frequency of Use:	High

Status:	In development
Owner:	Sheilla Shojaie
Priority:	High

Use Case

ID:	8
Title:	Participants submit feedback
Description:	Participants submit feedback following an appointment using an online form.
Primary Actor:	Client, service provider
Preconditions:	Participants received a feedback request following an appointment via their preferred contact method
Postconditions:	Feedback may be submitted via an online form.
Main Success Scenario:	Shortly after an appointment has completed, clients and service providers associated with an appointment receive a feedback request and submit feedback via an online form.
Extensions:	Participants take a while to submit feedback. Participants do not submit feedback. The appointment did not take place.
Frequency of Use:	High

Status:	In development
Owner:	Sheilla Shojaie
Priority:	High

Use Case

ID:	9
Title:	View feedback
Description:	User views feedback associated with a particular client or service provider. They view the appropriate profile and see the past feedback made about them.
Primary Actor:	User
Preconditions:	The client or service provider selected by the user has received feedback and that feedback is recorded in the system.
Postconditions:	There are no explicit post conditions (the database does not change and no messages are sent or received by the system).
Main Success Scenario:	User views the profile of a client or service provider and see the past appointments they participated in. They click on them and view the feedback left by the other participants of the appointment.
Extensions:	Client or service provider has never participated in any appointments. Client or service provider has no feedback associated with their appointments.
Frequency of Use:	Medium
Status:	In development

Owner:	Sheilla Shojaie
Priority:	High

Use Case

ID:	10
Title:	View appointments
Description:	User views all the past and pending appointments they have set up in a dashboard view
Primary Actor:	User
Preconditions:	User has set up appointments.
Postconditions:	There are no explicit post conditions (the database does not change and no messages are sent or received by the system).
Main Success Scenario:	User sees all past and pending appointments they have set up in a dashboard view with the ability to select one and view its details.
Extensions:	User has never set up an appointment.
Frequency of Use:	Medium
Status:	In development

Owner:	Sheilla Shojaie
Priority:	High

Appendix 7. Data Models

provider_appointment.py

```
---------------------------------------------------------------------------------------

from django.db import models

from django.contrib.contenttypes.models import Appointment, Provider, Service


class Provider_Appointment(models.Model):


        appointment = models.ForeignKey(Appointment, on_delete=models.PROTECT)

        provider = models.ForeignKey(Provider, on_delete=models.PROTECT)

        service = models.ForeignKey(Service, on_delete=models.PROTECT)

        status = models.CharField(max_length=30, null=True)
```

client_appointment.py

```
---------------------------------------------------------------------------------------

from django.db import models

from django.contrib.contenttypes.models import Appointment, Client, Need


class Client_Appointment(models.Model):
```

```
appointment = models.ForeignKey(Appointment, on_delete=models.PROTECT)

client = models.ForeignKey(Client, on_delete=models.PROTECT)

need = models.ForeignKey(Need, on_delete=models.PROTECT)

status = models.CharField(max_length=30, null=True)
```

provider_notification.py

```
---------------------------------------------------------------------------------------
from django.db import models
from django.contrib.contenttypes.models import Provider_Appointment


class Provider_Notification(models.Model):


	provider_appointment = models.ForeignKey(Provider_Appointment, on_delete=models.PROTECT)
	type_notification = models.CharField(max_length=30, null=True)
	method = models.CharField(max_length=30, null=True)
	status = models.CharField(max_length=30, null=True)
	sent_at = models.DateTimeField(auto_now_add=True)
```

client_notification.py

```
---------------------------------------------------------------------------------------
from django.db import models
from django.contrib.contenttypes.models import Client_Appointment


class Client_Notification(models.Model):


	client_appointment = models.ForeignKey(Client_Appointment, on_delete=models.PROTECT)
	type_notification = models.CharField(max_length=30, null=True)
	method = models.CharField(max_length=30, null=True)
	status = models.CharField(max_length=30, null=True)
	sent_at = models.DateTimeField(auto_now_add=True)
```

feedback.py

```
--------------------------------------------------------------------------------

from django.db import models

from django.contrib.contenttypes.models import ContentType, Appointment


class Feedback(models.Model):


        author_id = models.PositiveIntegerField()

        author_type = models.ForeignKey(ContentType, on_delete=models.PROTECT)

        subject_id = models.PositiveIntegerField()

        subject_type = models.ForeignKey(ContentType, on_delete=models.PROTECT)

        appointment = models.ForeignKey(Appointment, on_delete=models.PROTECT)

        created_at = models.DateTimeField(auto_now_add=True)

        text = models.CharField(max_length=1000, null=True)
```

provider_fb_req.py

```
---------------------------------------------------------------------------------------
from django.db import models
from django.contrib.contenttypes.models import Provider_Appointment


class Provider_Fb_Req(models.Model):


       provider_appointment = models.ForeignKey(Provider_Appointment, on_delete=models.PROTECT)
       method = models.CharField(max_length=1000, null=True)
       sent_at = models.DateTimeField(auto_now_add=True)
```

client_fb_req.py

```
---------------------------------------------------------------------------------------
from django.db import models
from django.contrib.contenttypes.models import Client_Appointment


class Client_Fb_Req(models.Model):


       client_appointment = models.ForeignKey(Client_Appointment, on_delete=models.PROTECT)
       method = models.CharField(max_length=1000, null=True)
       sent_at = models.DateTimeField(auto_now_add=True)
```