Solar Size: User Testing

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Version	Date
1	March 26, 2022
2	April 6, 2022

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User Testing	
Project Name	SolarSize
Date Produced	March 26, 2022
Date Revised	April 6, 2022
Goal (Qualitative)	The main goal of qualitative user testing is to test the usability and utility of the application through user observations.
Plan (Qualitative)	The plan is to have users complete a series of tasks and explore the application.
Proposed Outline (Qualitative)	1. To begin, we will provide a brief explanation about the purpose of the application. 2. The user will explore the interface freely. We will have the user: a. Provide any comments or initial thoughts they may have b. Explain what they were trying to do or expecting the application to do c. Comment on anything they think could be done to improve the usability 3. If the user has not yet attempted to perform an optimization analysis, guide them to try it out. The consumption data file will be provided to the user. As the user is completing the analysis, we will note any difficulties they experienced. 4. At the end, we will go over the experience with the user and allow them to ask any questions they still have. We will prompt the user to give a review of their overall experience and struggles.
Goal (Quantitative)	The main goal of quantitative user testing is to determine the usability of the application by measuring the performance (time-taken) of specific tasks.
Plan (Quantitative)	The plan is to have users (technical and non-technical) complete a series of tasks and record the time taken to complete each task.
Proposed Outline (Quantitative)	1. Navigate the About page a. What is the cost of the interconnection fee? b. What is Module Area? 2. Fill out the Input page form a. Location: Carlyle b. Upload Consumption Data file

	c. Add new panel type (don't need to fill it out) and then delete that panel d. Roof area: 400 e. Loan interest: 4 f. Grants: 6500 g. Price of Power: 0.1485 h. Roof direction: 349 degrees (north) i. Start date: Jan 1, 2021 j. End Date: Nov 30, 2021 k. Calculate 3. Look at results on Summary Page a. What is the total return on investment? b. How many kWh were generated annually? c. What was the capital cost? d. How many panels are suggested? e. What year will your savings be in the positive? 4. Export the Consumption vs estimated solar graph

Qualitative Testing Conclusion:

Users found the application visually appealing and felt the visuals on the summary page helped with understanding the information provided. The user interface was well-accepted with the exception of a few minor suggestions regarding cosmetic things. The users did not experience any major struggles while navigating the site and were able to explore and use the application with relative ease. Any struggles or questions they had about specific information or functionalities were usually alleviated through further exploration of the application or reading the information on the about page. In general, the users indicated that the information, statistics, and suggestions provided were very useful and they could envision the application being implemented and used by many people.

Qualitative Testing Results:

USER 1: Adam Tilson on Project Bazaar Day #2

Page	Comments
About Page	N/A
Input Page	● Focus on speed of entry ○ Form is tab-able

Summary Page	N/A
General Feedback	• Model seems to need some tuning

USER 2: Non-technical user

Page	Comments
About Page	• Helpful for understanding how ROI calculation works • Very informative • Provides useful information
Input Page	• Center roof direction dial • The end date input could probably be beside the start date input
Summary Page	• The cash flow estimation graph is a lot of information in one graph. It might be nice to have one clear graph where the yearly savings are shown
General Feedback	• Looks good • It is a cool application

Changes Made:

- Added a graph that shows the overall yearly savings amounts
- Centered the roof direction dial
- Moved the end date input beside the start date input instead of below it

USER 3: Greenwave user

Page	Comments
About Page	• Assuming the buttons on the side take you to different sections of information • Would be nice to have more information on the solar model • The break down of the ROI calculations is helpful
Input Page	• Being able to enter an address into the map is nice • The roof direction dial is a nice feature for inputting the angle and direction like a compass • Having preset panels makes it easier to use for non-technical customers if we decide to do that • Does the .csv file input accept any file?

	○ Determined file format matches Greenwave's consumption file formatting
Summary Page	● Is there a way to see the individual flows for the values in the cash flow estimation graph? ○ It is nice to be able to isolate the individual flows by hovering or using the bottom legend ● Assuming the hamburger menu allows you to zoom or print the graphs ○ The ability to export the graphs to provide to users is a very helpful feature
General Feedback	● It is visually appealing ● It will be a useful tool for estimating value of a project

Changes Made:

- Added additional information about solar model to About page

USER 4: Semi-technical user

Page	**Comments**
About Page	● Page and information will be useful for non-technical users if they have access and are trying to use the application
Input Page	● Does the map work for anywhere in the world? ○ Tried Sydney, Australia and it found it on the map ○ The map is really nice because it shows you where you are and verifies that the location is being detected correctly ● The file upload is friendly to use ● The roof direction dial is neat and it is nice that you can drag the dial or type in the angle ● The reset button is nice
Summary Page	● It is really useful to be able to download the graphs ● The squares to represent the panels is a neat visual feature ● All the visuals are a nice breakdown of the information
General Feedback	● It looks nice ● The application is an interesting concept and could be very useful

Quantitative Testing Conclusion:

When comparing the times for the completion of specified tasks, there is a clear difference between the average time taken by a non-technical user versus a technical user. The average time taken by technical users was shorter than non-technical users for the completion of every individual task as well as the overall completion time. The average total completion time for the specified tasks by non-technical users was 3 times longer than the technical users' average time. While observing the technical and non-technical users complete the tasks, the technical users had advantages over the non-technical users due to their experience with applications, form functionalities, and solar-related knowledge. For example, the advantage was noticeable in tasks 1.a and 1.b where technical users either knew the answer to the question or had a better understanding of what section the answer would be found under on the About page. It was also noticeable in 3.c when the technical users knew to look at the first year in the cash flow diagram and use the legend to isolate the value whereas the non-technical users had to look around before finding the value. In general, the times for both technical and non-technical users were reasonable, indicating the application's overall usability. The increased usability for the technical users was expected as the application's target customers are technical users.

Quantitative Testing Results:

Non-Technical Users

Times taken to complete tasks outlined in the quantitative testing plan

Task	User 1	User 2	User 3	User 4	User 5	Average
1	2.84 s	6.93 s	18.88 s	4.61 s	5.07 s	7.67 s
1.a	1 min 16.89 s	9.19 s	1 min 12.72 s	20.89 s	45.91 s	45.12 s
1.b	1 min 1.25 s	1 min 17.45 s	46.65 s	40.92 s	26.66 s	50.59 s
2.a	48.82 s	41.91 s	46.20 s	29.96 s	25.45 s	38.47 s
2.b	23.05 s	10.34 s	19.36 s	9.54 s	9.49 s	14.36 s
2.c	20.39 s	37.43 s	42.53 s	25.43 s	25.58 s	30.27 s
2.d, e, f, g	46.37 s	54.36 s	1 min 17.90 s	18.96 s	33.07 s	46.13 s
2.h	17.40 s	14.59 s	29.15 s	28.64 s	20.20 s	22.00 s
2.i, j	27.68 s	21.22 s	32.11 s	14.11 s	41.72 s	27.37 s
2.k	8.24 s	3.82 s	4.91 s	2.64 s	3.33 s	4.59 s
3.a	38.47 s	7.29 s	33.13 s	4.92 s	23.57 s	21.48 s

3.b	11.31 s	6.10 s	6.21 s	5.29 s	20.31 s	9.84 s
3.c	21.94 s	13.54 s	24.05 s	55.84 s	44.09 s	31.89 s
3.d	14.45 s	5.21 s	13.87 s	9.61 s	11.88 s	11.00 s
3.e	14.52 s	34.52 s	10.60 s	41.19 s	15.66 s	23.30 s
4	41.93 s	28.46 s	45.34 s	12.13 s	29.24 s	31.42 s
Total Time	7 mins 55.55 s	6 mins 12.36 s	8 mins 43.61 s	5 mins 24.68 s	6 mins 21.23 s	6 mins 55.49 s

Technical Users

Times taken to complete tasks outlined in the quantitative testing plan

Task	User 1	User 2	User 3	User 4	User 5	Average
1	3.54 s	4.07 s	2.69 s	2.86 s	2.38 s	3.12 s
1.a	10.22 s	10.40 s	7.93 s	20.89 s	13.74 s	12.64 s
1.b	8.16 s	16.70 s	5.24 s	10.39 s	9.84 s	10.07 s
2.a	6.74 s	4.01 s	10.54 s	8.23 s	5.85 s	7.07 s
2.b	10.80 s	9.78 s	5.66 s	9.38 s	7.23 s	8.57 s
2.c	5.85 s	5.27 s	4.69 s	4.45 s	4.97 s	5.05 s
2.d, e, f, g	34.57 s	27.16 s	12.22 s	36.78 s	20.78 s	26.30 s
2.h	8.69 s	8.57 s	5.51 s	4.67 s	7.30 s	6.95 s
2.i, j	10.66 s	11.04 s	11.80 s	7.84 s	8.27 s	9.92 s
2.k	1.56 s	1.50 s	1.44 s	1.54 s	1.34 s	1.48 s
3.a	6.34 s	10.51 s	3.80 s	7.83 s	5.86 s	6.87 s
3.b	3.88 s	6.28 s	6.33 s	5.94 s	4.49 s	5.38 s
3.c	8.12 s	11.19 s	9.07 s	8.36 s	9.87 s	9.32 s
3.d	2.54 s	4.15 s	3.65 s	3.72 s	4.70 s	3.75 s
3.e	5.88 s	9.40 s	4.53 s	4.86 s	6.62 s	6.26 s

4	8.26 s	14.41 s	8.28 s	7.34 s	9.73 s	9.60 s
Total Time	2 mins 15.81 s	2 mins 34.44 s	1 min 43.38 s	2 mins 25.08 s	2 mins 2.97 s	2 mins 12.34 s