Automating Lab Product Stability Tracking: Reducing Task Time by 70% in One Week

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Built a JavaScript-based app that automated the manual calculation of lab product stability, reducing a 20-minute task to 6 minutes and freeing MLS staff to focus more on patient sample analysis.

Outcome Statement

Developed an app that automatically calculates remaining stability hours for lab products, cutting a 20-minute manual task down to 6 minutes — a 70% faster process. Staff gained time back immediately after launch, boosting overall productivity.

Context

Medical Laboratory Scientists (MLS) are required to quickly analyze and report results for a high volume of patient specimens.

They are responsible for instrument maintenance and quality control tests. These duties are time consuming and tools are needed to make them more efficient.

For example, we discussed the current manual workflow for calculating remaining stability of lab products, taking 20 minutes on average. A way to automate the process would help free up time to focus on patient samples.

My role in the project

Collaborating closely with MLS to understand the features they would find most useful, I applied my HTML, CSS, and JavaScript skills to design and code the calculation app from scratch to automate the calculation of remaining product stability. Upon completion, I collaborated with the lab team to test the app’s accuracy and ease of use.

The mandate: 50%+ reduction in task time in 1 week

MLS staff were tasked with maintaining stability of reagents (lab products) on two specimen analyzers, with each analyzer used on alternating days for testing. MLS manually calculates remaining reagent stability hours to prepare for the next day. We needed a solution to reduce the 20-minute manual process, improving efficiency and freeing up time for patient sample analysis.

Note:

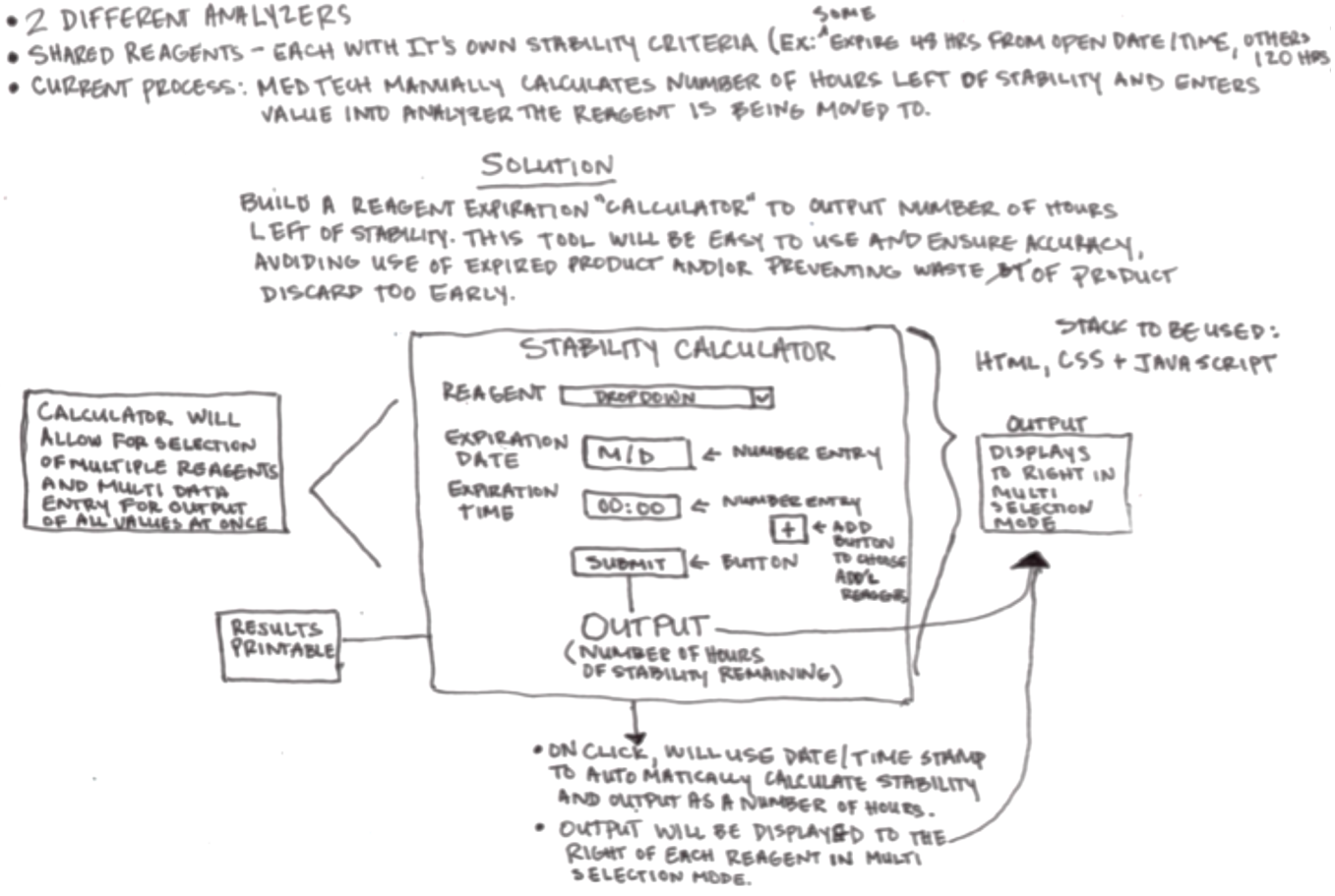
AI tools were used to assist with research, debugging, and code explanation. All design decisions, implementation, and final testing were completed by me.

Day 1-2*:*

I spoke with Anny, an MLS, to understand what features and functions the app would require. We discussed the importance of it being easy to use and 100% accurate.

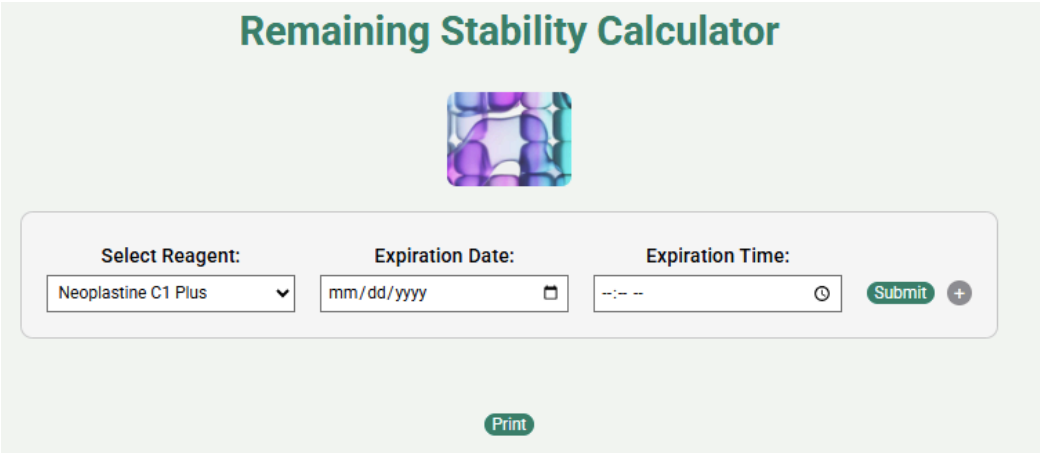
We collaborated on a wireframe to visualize the design and plan the UX/UI components. This included multiple value inputs to calculate and display the remaining stability hours, with an option to print the results.

<u>Project wireframe:</u> used to complete initial HTML coding and CSS styling.



Day 1-2 Continued:

Initial prototype:

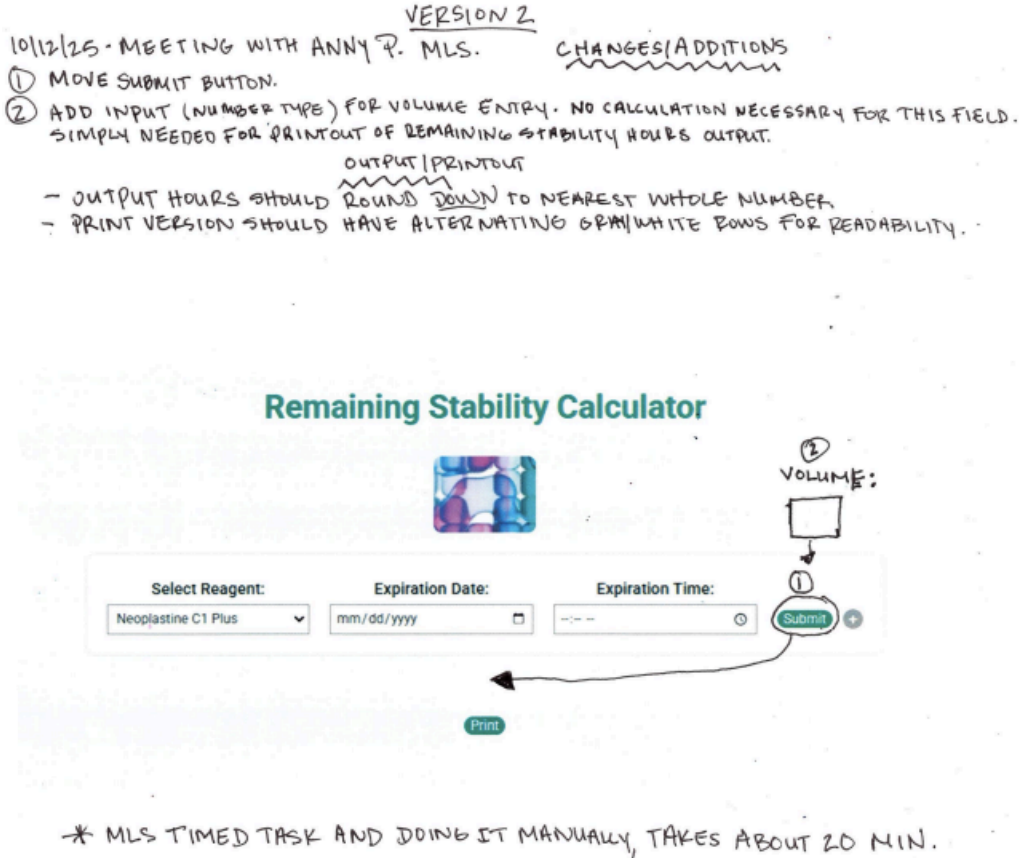


Day 3-4:

I shared the app prototype with Anny and we discussed the following updates:

- Submit button to be moved below the inputs.
- A new input for reagent volume.
- A "-" button to delete unintentional entries.
- A "reset" button to clear entries was needed.
- Output rounded down to the nearest whole hour.

Version 2 wireframe:

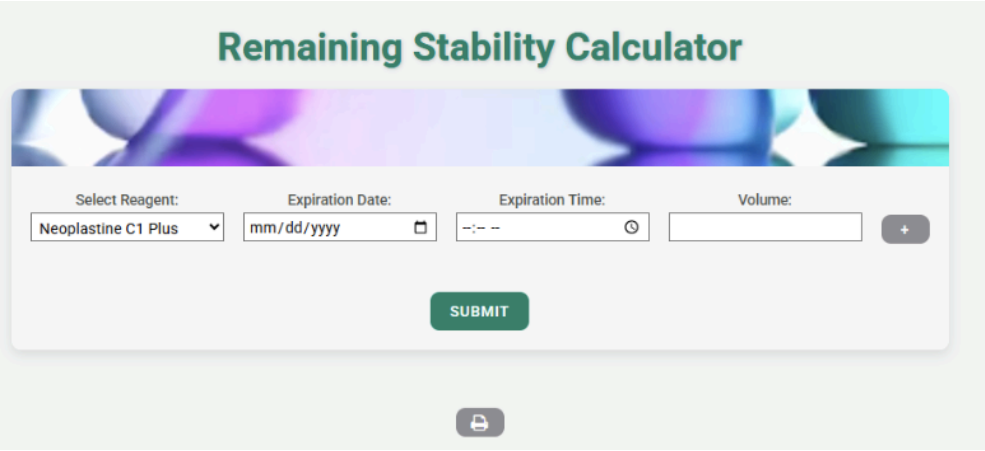


Day 3-4 continued:

HTML and CSS were updated to accommodate the layout changes and button additions.

JavaScript code was written using reagent, expiration date and expiration time inputs and comparing the values to a timestamp from the user's computer in ISO 8601 format / UTC time.This calculated the difference in hours and output the remaining stability rounded down to the nearest whole hour.

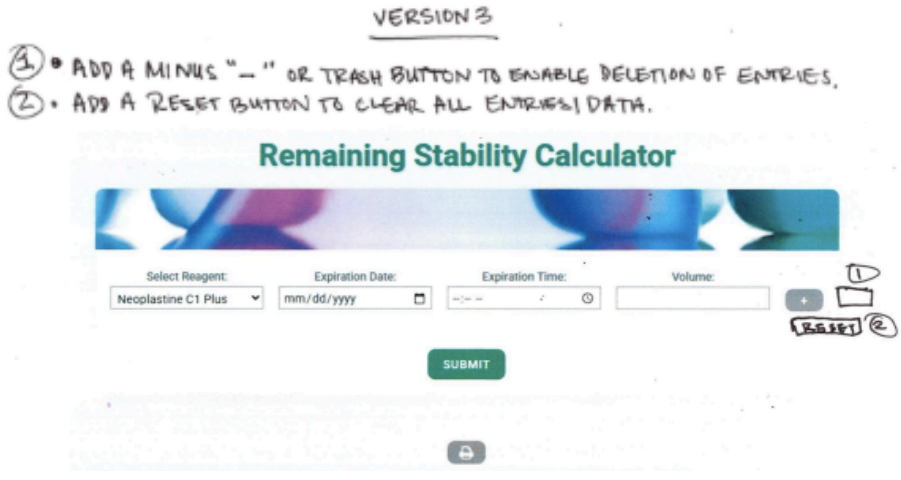
<u>Version 2 completed:</u> Revised prototype with new buttons and improved usability.



Day 5:

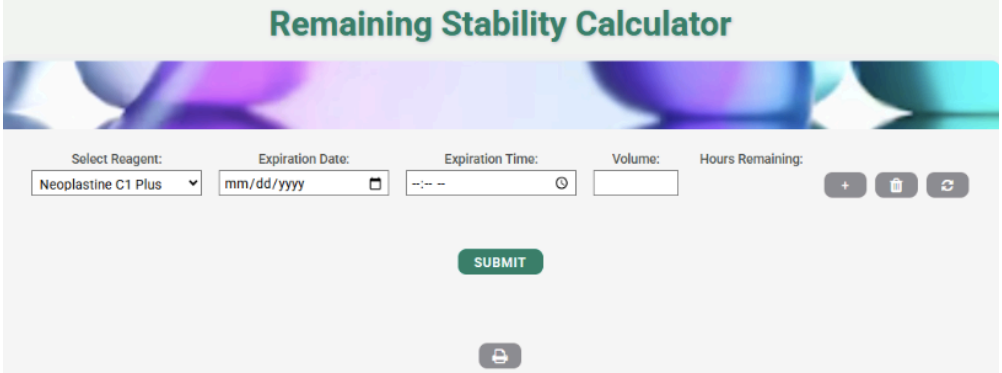
I added CSS and JavaScript event listeners for the Add, Minus, and Reset buttons. The Add button appends a new row of input fields, the Minus button removes the selected row, and the Reset button clears all input fields in all rows. Clicking the Submit button calculates and displays all outputs.

<u>Version 3 wireframe:</u>



Day 5 Continued:

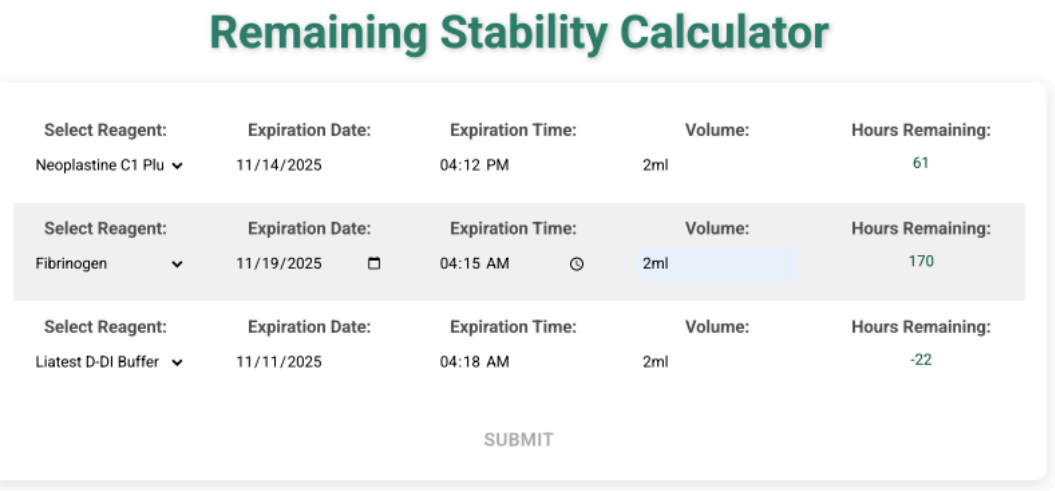
<u>Version 3 completed:</u> Refined design supporting multiple input rows and streamlined workflow.



Day 6:

After further consideration and confirming with Anny, I changed the JavaScript functionality by making the Reset button clear only the input fields and output for the row in which it is clicked. This prevents MLS from having to start over when only one row needs to be deleted. I added an event listener to the Print button to open the printer dialog. I also implemented a print-specific CSS media query to format the report for readability, which included zebra striping on alternate rows and hiding buttons and images to ensure a clean, professional layout when printing.

<u>Report with CSS formatting:</u> Final print layout showing zebra striping and clean formatting.



Day 7:

Finalized the HTML, CSS, and JavaScript files in Visual Studio Code and pushed all project files to a GitHub repository, including a detailed README documenting the project.

Automated Testing

To further verify the calculator's reliability, I implemented automated tests using Cypress. While the MLS team and I had already tested the application manually, automated testing allowed the calculator's functionality to be validated repeatedly and consistently.

The Cypress test suite simulates real user interaction with the interface by entering reagent data, selecting expiration dates and times, and triggering the calculation.

Test Scenarios

The automated tests verify several core behaviors of the application:

• Confirming the calculator page loads successfully.
• Verifying that reagent inputs and expiration values produce the correct remaining stability calculation.
• Testing how the application behaves when required inputs such as expiration date or time are missing.
• Checking edge cases including past expiration dates and expiration dates far in the future.

Ensuring Consistent Time-Based Calculations

Because the calculator compares expiration values to the user's system time, the tests use Cypress's clock control feature to freeze time during execution. This ensures that the calculation results remain consistent each time the tests are run.

Testing Workflow

1. Cypress loads the deployed calculator application.

2. The test simulates a user entering reagent and expiration data.

3. The calculation is triggered by clicking the submit button.

Day 7 Continued:

4. Cypress verifies that the resulting output appears and matches the expected result.

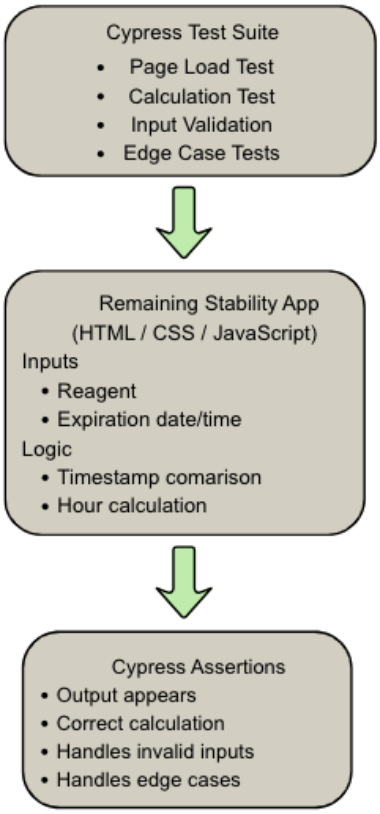


Figure: Automated testing workflow using Cypress.

Cypress tests simulate user interaction with the calculator by entering reagent data, triggering the calculation, and verifying that the resulting output behaves as expected.

Outcome

The addition of automated tests improved confidence in the calculator's accuracy and stability. The Cypress test suite now provides a repeatable way to confirm the application behaves correctly if updates are made in the future.

Final Verification

After completing the automated testing, MLS staff and I performed a final review of the calculator to confirm that the interface was easy to use and that all outputs were accurate. The application successfully met the project goal of reducing the manual calculation process by more than 50%.

Project Reflection:

This project deepened my understanding of JavaScript and front-end development while highlighting the impact of close collaboration with end users. Working alongside MLS staff showed me how thoughtful design and automation can significantly improve efficiency. Seeing the tool reduce task time by over 70% reinforced my motivation to build solutions that make everyday work easier and more effective.