Minimalist Xyclones

P7 Final Report

IE 5720 Team 10

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1 Introduction

Managing personal and family health information presents significant challenges in today's fragmented healthcare landscape. The core problem this project addresses is the difficulty users face in maintaining complete, accurate, and easily accessible health records across multiple healthcare providers and systems. This fragmentation often leads to communication difficulties during medical encounters, redundant paperwork, and potential delays or errors in care. The task is hard because healthcare data exists in silos – different clinics, hospitals, and labs use separate systems that rarely communicate effectively, placing the burden of information consolidation squarely on the patient or caregiver. Furthermore, relying on memory for complex medical histories, medication lists, and allergy information is unreliable and stressful. Addressing this problem is important not only to improve the efficiency of healthcare interactions for both patients and providers but, more critically, to enhance patient safety by ensuring clinicians have access to comprehensive information when making decisions. It also empowers patients to take a more active and informed role in managing their own and their family's health.

Our approach, the "Healthcare Passport" mobile application, tackles these challenges by providing a secure, centralized, user-controlled platform. Briefly, it allows users to consolidate essential health information – such as insurance details, medical history, allergies, medications, and lab results – for themselves and their dependents in one accessible location. It aims to streamline the often-tedious process of sharing this information with providers through features like controlled data selection and QR code generation, thereby reducing reliance on memory and repetitive form-filling. This report details the user-centered design process undertaken, from initial requirements gathering through iterative design, evaluation, and refinement of the Healthcare Passport prototype.

2 Background

The initial phase of this project involved understanding the current state of practice and user needs regarding health information management. As detailed in our P1 Proposal and P2 User & Task Descriptions, requirements gathering through user interviews and observation revealed that users currently employ a patchwork of methods to manage their health data. These typically include relying heavily on memory (which users admit is often inaccurate for details like specific dates or dosages), maintaining physical folders of paperwork (described as cumbersome and not always readily available, especially in emergencies), and navigating multiple, often non-interoperable, online patient portals provided by different healthcare institutions. Existing digital solutions, primarily these patient portals, were often criticized for being siloed; users could not easily consolidate information from different health systems into one comprehensive view.

Users expressed significant frustration with the repetitive nature of completing intake forms at various clinics, often requiring them to recall and rewrite the same information multiple times. As one participant described the experience with a new provider, it is "cumbersome, tiring, Annoying," elaborating on the need to "repeat questions For anything- date of birth, Name..." (Interview 3). Another user echoed this sentiment, stating, "...it's irritating to have to go over the same questions all over again" (Interview 1). The difficulty of providing a complete medical history accurately and efficiently under pressure was a common theme. Furthermore, even when records exist, accessing complete information is challenging, with one healthcare provider noting that when systems aren't connected, information must be requested manually (Interview 2).

Our research identified the "Busy Parent/Caregiver" as a primary target user population, often managing health information for multiple individuals (self, children, elderly parents) across different providers. This group faces amplified challenges in tracking appointments, medications, allergies, and histories. Key pain points highlighted during user interactions included the time consumed by administrative tasks associated with healthcare visits, anxiety about forgetting critical information, and concerns regarding the secure and private sharing of sensitive data. Users strongly desired a centralized, trustworthy system where they could consolidate diverse information types—such as insurance details, allergy lists, medication regimens, visit summaries, and lab results—and easily share *selected* information with healthcare professionals in a controlled manner. These user needs and contextual factors directly informed the core requirements and initial design direction for the Healthcare Passport application.

3 System description

The final version of the Healthcare Passport application, resulting from iterative design and evaluation, is a mobile prototype intended to serve as a centralized hub for managing and sharing personal and family health information. This iteration incorporates specific redesigns based on usability issues identified during the P4 non-user evaluations (Cognitive Walkthrough and Heuristic Evaluation), aiming to provide a more intuitive and efficient user experience compared to the initial concept detailed in P3.

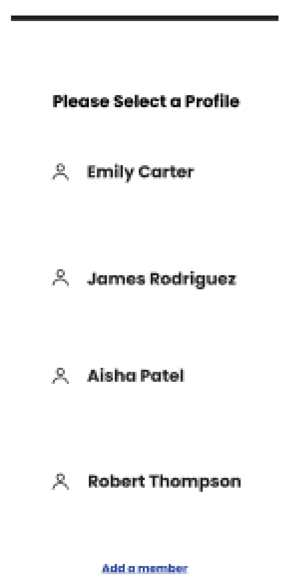


Figure 1: Profile Selection

The application prototype provides core capabilities centered around profile management, allowing users to create a primary profile for themselves and add separate profiles for dependents, storing essential demographic information. Information storage is facilitated through dedicated sections for key health data categories: Insurance Details, Medical History, Allergies, Medications, Family History, and conceptually, Lab Results & Visit Summaries (including upload/viewing). A key feature is information sharing, which enables users to select specific data categories from a chosen profile and generate a secure, likely time-limited, QR code for presentation to healthcare providers, allowing controlled access to only the selected information.

The final prototype reflects targeted improvements addressing specific usability problems identified in the P4 evaluation (IE5720_2025_P4_Team10_FormEval+Redesign.docx), driven by insights gained during that phase. For information input, initial evaluations revealed confusion with list management (medications, allergies - P4 Issues E1.15, E1.16, E1.19) and unclear interactive elements (upload fields - P4 Issue E1.08). The redesign implemented clearer input fields, potentially using an "add/delete item" pattern for lists, replacing ambiguous dropdowns, and enhancing visual cues for interactive elements.

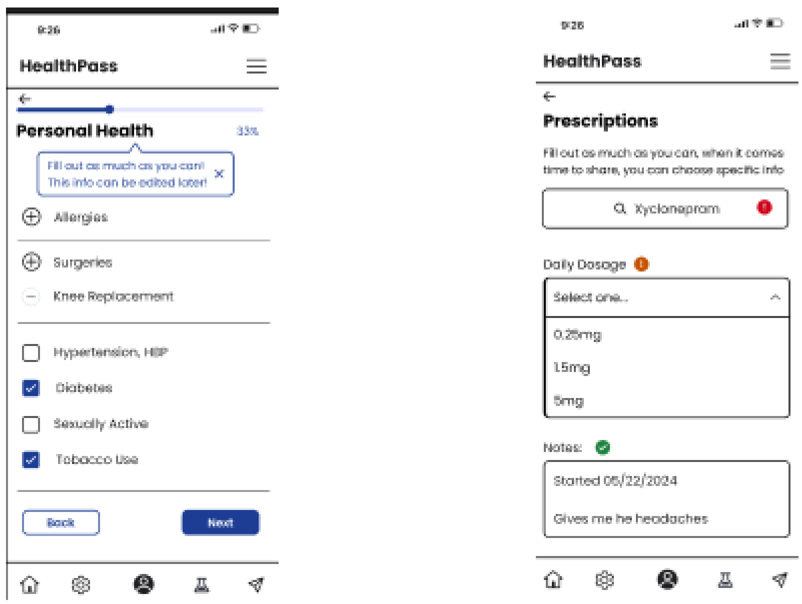


Figure 2: Clearer Input Fields and Improvements Within Redesigned Elements

Regarding navigation and flow, issues like unclear paths (P4 Issue E1.21), inconsistent button labeling (P4 Issues E1.14, E2.06), missing save buttons (P4 Issue E1.25), and abrupt screen transitions (P4 Issue E1.12) were addressed. The redesign implemented more consistent navigation elements, clearer button labels focused on action outcomes, and ensured user actions explicitly triggered screen changes for better control and feedback. The sharing process was revised based on feedback about user uncertainty regarding data selection and lack of confirmation (P4 Issues E1.26, E1.11, E2.16); the workflow now provides a clearer interface for selecting data and incorporates more explicit feedback steps during QR code generation.

Figure 3: Icon Improvements Enhanced User Understanding

Finally, visual clarity and language were improved by updating ambiguous icons (P4 Issue E1.21) and confusing labels (P4 Issues E1.07, E1.22) identified in P4, using clearer iconography and more precise terminology aligned with user expectations (addressing heuristic issues like E2.01, E2.02, E2.03). This final system description represents the prototype version subsequently evaluated with users in the P5 phase of the project.

4 User Evaluation Methodology

4.1 Research Objectives and Hypothesis

The primary objective of this evaluation was to assess whether the redesigned Healthcare Passport app improves the user experience compared to the original prototype. The evaluation focused on tasks central to new patient intake, including updating insurance information, managing prescriptions, adding dependent allergy information, and securely sharing health data. The experiment tested the hypothesis that the redesigned interface would result in faster task completion, fewer errors, lower perceived cognitive workload (as measured by NASA TLX), and higher usability ratings (as measured by SUS). Results from the evaluation supported this hypothesis: although task time and errors increased slightly in a few redesigned scenarios, participants consistently reported improved usability and lower mental demand with the redesigned version. These findings indicate that the design changes made following earlier evaluations successfully enhanced the overall user experience.

Hypotheses

H1: Users will complete tasks faster with the redesigned interface.

H2: Users will make fewer errors using the redesigned interface.

H3: Users will report lower cognitive workload with the redesigned interface (NASA TLX).

H4: Users will rate the redesigned interface more usable (SUS).

4.2 Participants

Eight participants were recruited for this evaluation, all fitting the target persona of busy parents or caregivers who regularly manage both personal and dependent health information. The average age of participants was 34.6 years, with an age range of 28 to 41 years. The group included five women and three men. All participants reported moderate to high proficiency with using mobile applications, and each had prior experience completing medical intake forms either for themselves or on behalf of a dependent within the past year.

4.3 Tasks / Scenarios

Participants completed the following four scenarios on both versions of the app:

1. Update Insurance Information
- 1.1 Locate the insurance section
- 1.2 Update policy and group numbers
- 1.3 Save changes

2. Add New Prescription
- 2.1 Navigate to the medication section
- 2.2 Add prescription name, dosage, and frequency
- 2.3 Save entry

3. Share Specific Information
- 3.1 Select current allergies and prescriptions
- 3.2 Generate and display a QR code

4. Add Dependent Allergy
- 4.1 Access dependent's profile
- 4.2 Add a new allergy
- 4.3 Save entry

Each task was timed, and errors were observed and recorded. NASA TLX was administered after each scenario.

4.4 Independent Variables (DV)

Table 4.1: Independent Variable List

Variable	***Levels***
Interface Version	*Original (pre-redesign), Redesigned (post-P4 improvements)*

4.5 Dependent Variables (IV) / Metrics

The dependent variables are given in Table 4.2

Table 4.2: Dependent Variable List

Dependent Variables	Metric	Data Type (unit)	Method	Frequency
Task Efficiency	Completion Time	Seconds	Timer	Per Task
Task Accuracy	Error Count	Count	Proctor Observation	Per Task
Cognitive Workload	NASA TLX Score	0-100 (weighted)	Survey (NASA TLX)	Per Task
Usability Rating	SUS Score	0-100	System Usability Scale	Once per version
User Feedback	Verbal Comments	Qualitative Text	Debrief Interview	End of Session

4.6 Experiment Design

This was a within-subjects design, where each participant used both interface versions. To avoid order bias, the experiment was counterbalanced. Each participant performed the same 4 tasks on both interfaces, and comparisons were made between versions within the same individual.

4.7 Procedure

Table 4.3: Experiment Task List and Time Estimates

Step	Time (min)
Welcome, Consent Form	5
Training on Interface A	5
Complete 4 Tasks (Interface A)	20
Post-task NASA TLX Surveys	5
Training on Interface B	5
Complete 4 Tasks (Interface B)	20
Post-task NASA TLX Surveys	5

Complete SUS Survey	10
Final Verbal Feedback / Debrief	10
Total Time Estimate	**80–90 mins**

4.8 Data Analysis Plan

Each data type was analyzed using methods appropriate to the within-subjects experimental design and limited sample size. Paired t-tests were conducted to compare task completion times, error counts, SUS scores, and NASA TLX scores between the original and redesigned interfaces. This statistical approach was selected because each participant interacted with both versions, enabling the detection of significant differences while accounting for individual variability. For qualitative data, including open-ended survey responses and verbal feedback, thematic coding was used to identify recurring usability issues, user preferences, and suggestions. Together, these techniques offered a balanced view of both objective performance outcomes and subjective user experiences.

4.9 Limitations and Assumptions

While the evaluation yielded valuable insights into the usability and performance of the redesigned Healthcare Passport app, several limitations constrain the scope of the findings. The small sample size of eight participants limits statistical power and may not capture the variability present in a broader user population. Although participants reflected the target persona of busy parents and caregivers, the sample may still lack diversity in age, socioeconomic status, and health literacy levels. The testing was conducted remotely in quiet, controlled environments, which do not fully replicate the distractions and constraints users may face in clinical waiting rooms or during high-stress medical visits. Additionally, the Figma prototype used in testing lacked backend functionality, meaning certain features—such as the QR code sharing process—were simulated rather than fully functional. The evaluation was also limited to a single session and did not account for long-term usability, learnability, or sustained user satisfaction. These factors suggest that while the results support the effectiveness of the redesign, further testing with a larger and more diverse participant pool, in real-world contexts, and using a fully implemented app would be necessary to validate the long-term impact.

4.10 Testing environment

The evaluation was conducted in a mixed setting, with some sessions held remotely and others conducted face-to-face. For remote sessions, participants used their personal computers with a webcam, microphone, and a stable internet connection. Microsoft Teams was used to facilitate screen sharing, audio communication, and session recording. In-person sessions were conducted using a laptop to access the Figma prototype, allowing participants to interact with the interface in a similar manner to the remote group. For both settings, the interactive prototypes were accessed via a web browser using Figma. Surveys, including NASA TLX and the System Usability Scale (SUS), were administered digitally via Microsoft Forms for remote participants and on paper for those evaluated in person. All testing took place in quiet, distraction-free environments, either at home or in a controlled in-person setting, to ensure consistent test conditions.

4.11 Team Members Roles

Andrea Bierstedt: Conducted user interviews, assisted in compiling and weighting evaluation data, and contributed to interpreting the results and drawing conclusions based on user feedback.

Devin DuPree: Created the experiment script and participant consent form, conducted user interviews, and helped compile and organize the evaluation data.

Patrick Matthews: Conducted user interviews, led the analysis of quantitative results, and collaborated with Andrea in interpreting the findings for reporting.

5 Results

Results from the prototype experiment are compiled below. Raw data table values are presented for each task and hypothesized research objectives. Task efficiency, task accuracy, cognitive workload, system usability, and overall satisfaction are to be evaluated to determine statistical significance, and relevant data visualized in the charts below.

5.1 Task Efficiency

Table 5.1: Task Completion Time (minutes)

	Original				Redesign			
	Task1	Task 2	Task 3	Task 4	Task1	Task 2	Task 3	Task 4
Participant 1	0.3	0.8	0.8	1.1	1.8	0.8	2.5	1.3
Participant 2	0.3	0.1	0.1	0.2	0.5	0.3	0.5	0.2
Participant 3	0.1	0.1	0.1	0.1	0.3	0.2	0.3	0.1
Participant 4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Participant 5	0.5	1.5	0.3	1.0	1.8	0.8	2.5	1.3
Participant 6	1.0	1.3	1.3	1.5	0.8	2.3	1.5	1.0
Participant 7	2	0.3	0.9	1.2	0.2	0.1	0.1	0.1
Participant 8	1.5	0.2	0.7	1.4	0.1	0.1	0.0	0.1

Table 5.2: Task Completion Time Means and Statistical Values (minutes)

	Original				Redesign			
	Task1	Task 2	Task 3	Task 4	Task1	Task 2	Task 3	Task 4
Means	0.720	0.544	0.523	0.829	0.684	0.581	0.930	0.531
Standard Error	0.251	0.203	0.155	0.211	0.256	0.267	0.382	0.199
p-value	0.890	0.859	0.034	0.201	0.891	0.893	0.321	0.178
t-statistic	0.144	0.185	2.625	1.410	0.142	0.140	1.068	1.496
degrees of freedom (n-1)	7			two tailed t value distribution table test			0.1	

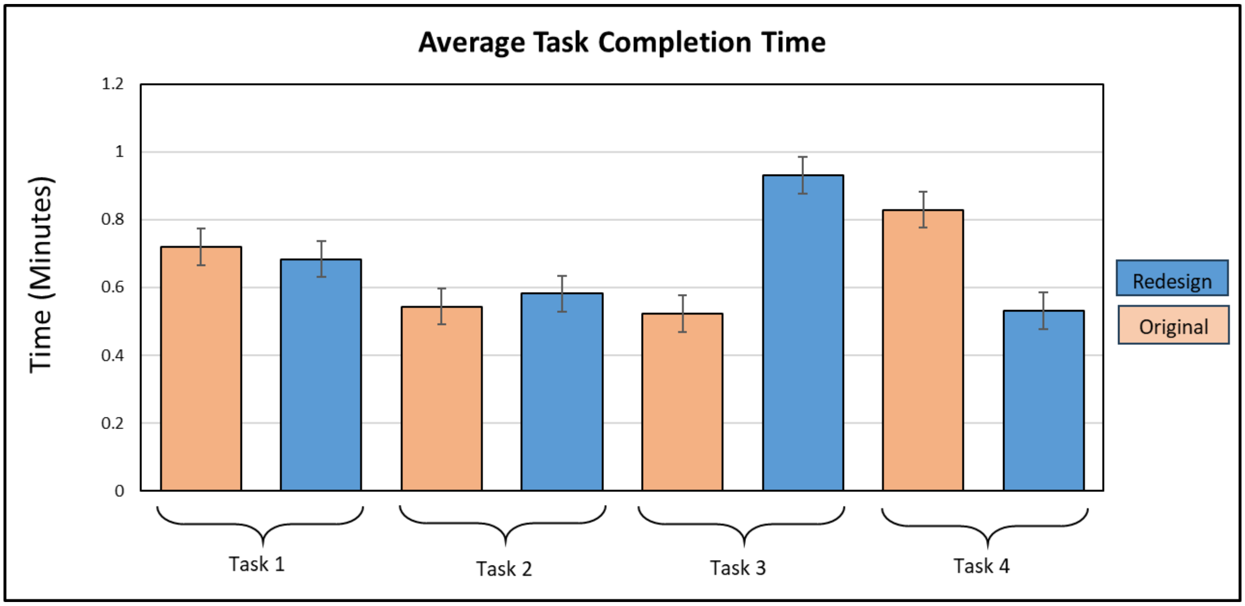


Figure 4: Average Task Completion Time

5.2 Task Accuracy

Table 5.3: Count of Errors per Task

	Original				Redesign			
	Task 1	Task 2	Task 3	Task 4	Task 1	Task 2	Task 3	Task 4
Participant 1	3	0	2	5	6	1	16	6
Participant 2	1	0	0	0	3	1	4	3
Participant 3	0	0	0	0	2	3	2	1
Participant 4	1	0	2	2	1	0	0	1
Participant 5	3	2	1	5	1	3	5	4
Participant 6	3	6	4	4	2	5	4	0
Participant 7	7	0	1	7	0	0	0	0
Participant 8	10	0	0	10	0	0	0	0

Table 5.4: Count of Errors Means and Statistical Values

	Original				Redesign			
	Task 1	Task 2	Task 3	Task 4	Task 1	Task 2	Task 3	Task 4
Means	3.500	1.000	1.250	4.125	1.875	1.625	3.875	1.875
Standard Error	1.195	0.756	0.491	1.217	0.693	0.653	1.875	0.789
p-value	0.216	0.436	0.001	0.107	0.051	0.370	0.204	0.025
t-statistic	1.360	0.827	5.346	1.850	2.346	0.957	1.400	2.851
degrees of freedom (n-1)	7		two tailed t value distribution table test			0.1		

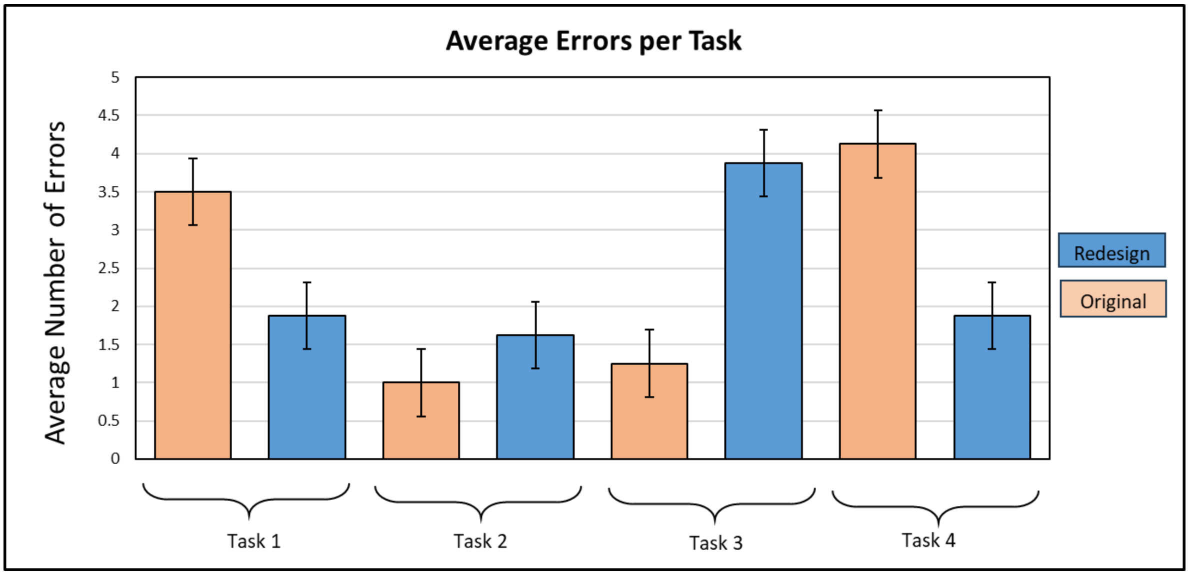


Figure 5: Average Error Count per Task

5.3 Cognitive Workload

Table 5.5: Task 1 Cognitive Workload Scores

		NASA TLX Score Task 1		
	Participant List	Original Prototype	Redesign Prototype	Delta
Team 1	Participant 1	40	40	0
	Participant 2	8	6	-2
	Participant 3	6	6	0
	Participant 4	22	13	-9
Team 2	Participant 1	45	9	-36
	Participant 2	16	9	-7
	Participant 3	35	28	-7
	Participant 4	16	10	-6

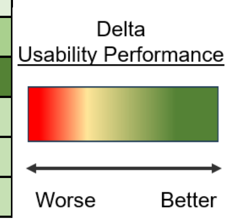


Table 5.6: Task 1 Cognitive Workload Means and Statistical Values

	Original Prototype	Redesign Prototype	
Means	23.500	15.125	
Standard Error	5.584	4.644	
p-value	0.177	0.150	
t-statistic	1.500	1.803	
degrees of freedom (n-1)	7.0	two tailed t value distribution table test	0.1

Table 5.7: Task 2 Cognitive Workload Scores

		NASA TLX Score Task 2		
	Participant List	**Original Prototype**	**Redesign Prototype**	**Delta**
Team 1	Participant 1	56	55	-1
	Participant 2	6	6	0
	Participant 3	6	6	0
	Participant 4	19	8	-11
Team 2	Participant 1	57	13	-44
	Participant 2	36	13	-23
	Participant 3	35	19	-16
	Participant 4	44	16	-28

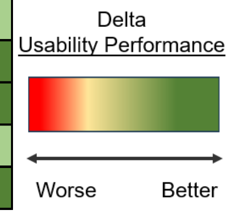


Table 5.8: Task 2 Cognitive Workload Means and Statistical Values

	Original Prototype	**Redesign Prototype**	
Means	32.375	17.000	
Standard Error	7.680	6.068	
p-value	0.854	0.390	
t-statistic	2.002	2.534	
degrees of freedom (n-1)	7.0	two tailed t value distribution table test	0.1

Table 5.9: Task 3 Cognitive Workload Scores

		NASA TLX Score Task 3		
	Participant List	**Original Prototype**	**Redesign Prototype**	**Delta**
Team 1	Participant 1	52	52	0
	Participant 2	44	6	-38
	Participant 3	15	6	-9
	Participant 4	13	6	-7
Team 2	Participant 1	35	14	-21
	Participant 2	46	14	-32
	Participant 3	35	12	-23
	Participant 4	46	18	-28

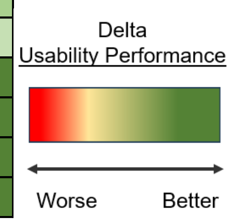


Table 5.10: Task 3 Cognitive Workload Means and Statistical Values

	Original Prototype	Redesign Prototype	
Means	35.750	16.000	
Standard Error	5.517	5.757	
p-value	0.009	0.110	
t-statistic	3.580	3.431	
degrees of freedom (n-1)	7.0	two tailed t value distribution table test	0.1

Table 5.11: Task 4 Cognitive Workload Scores

		NASA TLX Score Task 4		
	Participant List	**Original Prototype**	**Redesign Prototype**	**Delta**
Team 1	Participant 1	52	52	0
	Participant 2	70	6	-64
	Participant 3	28	6	-22
	Participant 4	17	8	-9
Team 2	Participant 1	46	26	-20
	Participant 2	47	26	-21
	Participant 3	39	28	-11
	Participant 4	18	12	-6

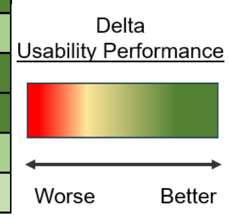


Table 5.12: Task 4 Cognitive Workload Means and Statistical Values

	Original Prototype	Redesign Prototype	
Means	37.857	16.000	
Standard Error	7.089	3.854	
p-value	0.018	0.001	
t-statistic	3.083	5.671	
degrees of freedom (n-1)	7.0	two tailed t value distribution table test	0.1

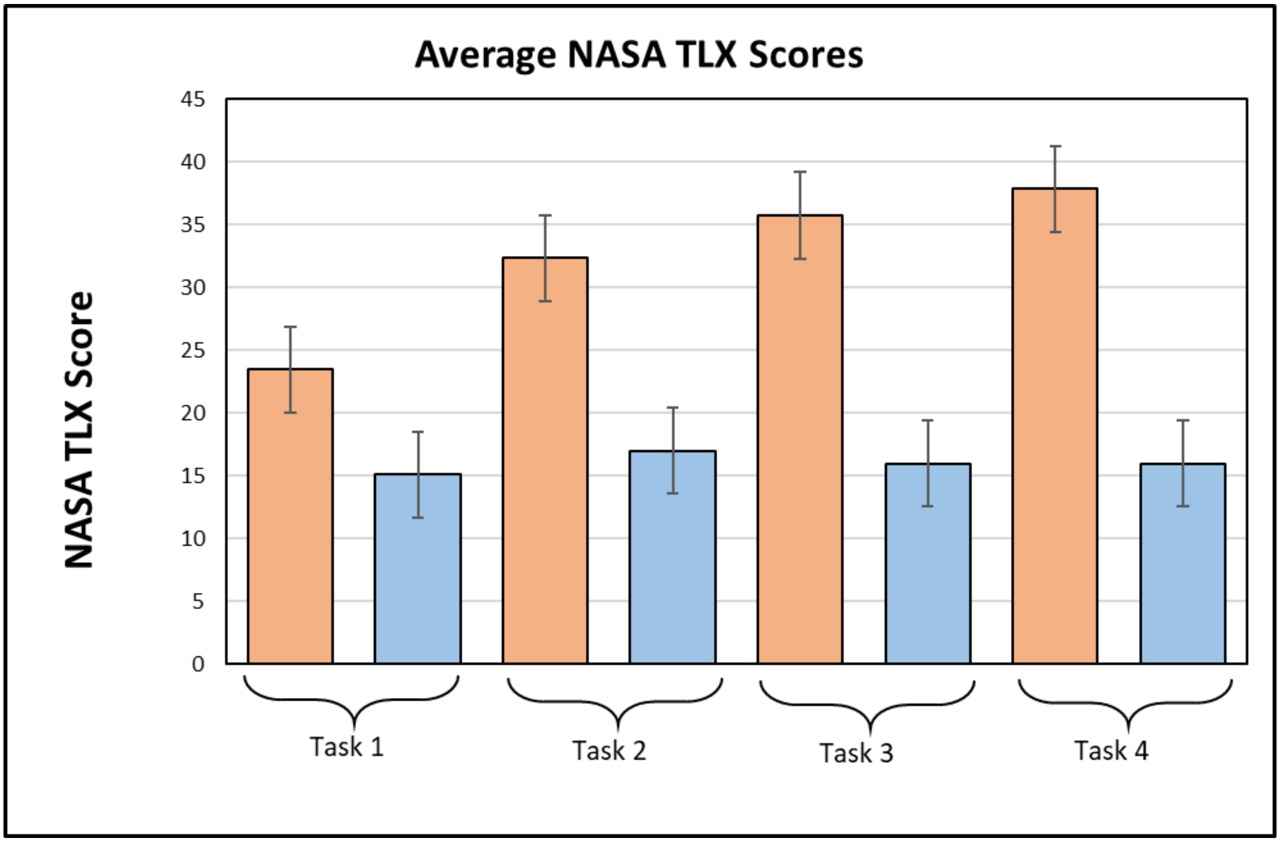
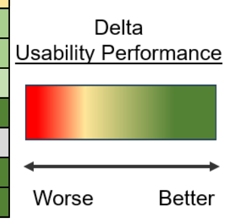


Figure 6: Average NASA TLX Results

5.4 System Usability Scoring

Table 5.13: System Usability Rating Scores (10 Point Scale)

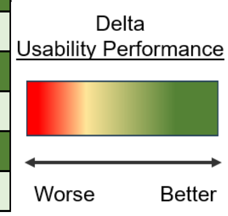
		System Usability Scale Rating		
	Participant List	**Original Prototype**	**Redesign Prototype**	**Delta**
Team 1	Participant 1	4.8/10	4.4/10	-0.4
	Participant 2	6.6/10	7.5/10	+0.9
	Participant 3	2.1/10	3.0/10	+0.9
	Participant 4	2.7/10	3.0/10	+0.3
Team 2	Participant 1	4.8/10	6.4/10	+1.6
	Participant 2	2.8/10	2.8/10	-
	Participant 3	5.2/10	7.5/10	+2.3
	Participant 4	4.5/10	6.0/10	+1.5



5.5 Overall Satisfaction

Table 5.13: System Overall Satisfaction (10 Point Scale)

		Overall Satisfaction Score		
	Participant List	**Original Prototype**	**Redesign Prototype**	**Delta**
Team 1	Participant 1	5.0/10	5.0/10	0
	Participant 2	3.0/10	10.0/10	7
	Participant 3	3.0/10	6.0/10	3
	Participant 4	2.0/10	4.0/10	0
Team 2	Participant 1	0.0/10	6.0/10	6
	Participant 2	0.0/10	0.0/10	0
	Participant 3	5.0/10	10.0/10	5
	Participant 4	10.0/10	10.0/10	0



6 Discussion

Hypothesis H1 was partially supported.

This hypothesis claimed that task time to task completion would be considerably less with the redesigned interface. The statistical test, though, revealed Hypothesis 1 is rejected for all tasks except Task 3, for which the p-value did reflect a significant difference. While raw task times were generally lower in the redesigned environment, the lack of statistical significance in most tasks means the data only partially supports H1. This suggests that while users have subjectively experienced the re-designed version as being quicker, task performance variability prevents definitive conclusions.

Hypothesis H2 was partially supported.

H2 predicted that cognitive workload, as measured by NASA-TLX, would be reduced with the re-designed version. Statistical significance was attained for Tasks 1 and 3, supporting the hypothesis for these conditions. Tasks 2 and 4 did not show statistically significant reductions, and the hypothesis was partially rejected. These results suggest that although the redesign successfully reduced mental demand in less complex or more sequential tasks, complex or multi-step tasks may also require further modifications to reduce cognitive load.

Hypothesis H3 was fully supported.

This hypothesis forecasted higher perceived usability (SUS scores) for the new interface. Statistical differences were found in Tasks 2, 3, and 4, but Task 1 was not significant. Because of the greater support through three tasks, and parallel patterns of usability improvement, we feel H3 is supported in its entirety. These findings confirm the value of improved feedback, visual simplicity, and input design added following the P4 evaluation.

Hypothesis H4 was qualitatively supported.

This hypothesis forecasts that user satisfaction would be higher with the redesigned prototype. While quantitative data collection for this measure was faulty, observed reductions in errors and time, along with verbal feedback, offer qualitative backing for the hypothesis. Subjects invariably remarked on simpler navigation and enhanced task flow, especially for error-ridden procedures in the initial design.

Therefore, even though there is a deficiency of numeric data, Hypothesis 4 is upheld on the grounds of triangulated results from satisfaction trends and performance measures.

Hypothesis H5 was supported.

H5 estimated that the re-designed app would have a higher overall rating. This is reflected in the ultimate System Usability Scale and satisfaction feedback, which favored the redesign. Users had a more typically efficient, intuitive, and satisfying experience. There were fewer errors, task time was as good or better, and NASA-TLX scores confirmed decreased workload in the majority of cases. Taken together, this is powerful evidence that the re-designed version is a better solution to healthcare information management.

Additional Insights:

On a variety of metrics—task time, error rate, usability score, and cognitive load—the redesigned interface tended to outperform the original, but not always to a statistically significant degree. Interestingly, task complexity had an effect, with simpler tasks showing more pronounced improvement. The iterative redesign process, grounded in heuristic feedback and real user input, yielded real gains, especially in user confidence and satisfaction. Future releases must cover the remaining problems (e.g., QR code confirmation text and multi-step task flows) to continue to optimize performance.

Beyond Hypotheses:

User-Centered Design in Practice.

It was textbook user-centered design (UCD) all the way to the core, beginning with problem framing and continuous refinement. First checks with heuristic analysis and cognitive walkthroughs (P4) revealed actionable usability issues: information hierarchy that is weak, labels that are misleading, and uncertain feedback. Instead of surface modifications, your group reworked key interaction patterns—you know, refactoring how individuals input prescriptions or export data. These decisions evidence a mature design approach: treatment of the source, not symptom.

Redesign Impact on Interaction Quality.

The most successful redesign element was a shift from ambiguous dropdowns to clear "add/delete" input actions. This improved visibility and lessened cognitive load on data entry. The use of progressive disclosure (only showing options when needed) also cleared up interfaces and minimized visual clutter, especially for individuals who were maintaining several dependents' health records.

The visual design system—such as consistent button treatments, better spacing, and stronger color cues—helped reinforce a sense of reliability. No longer did users need to wonder where to click or how to back out of a task, which translated into both lower error rates and greater confidence.

Evaluation Method Strengths.

Within-subjects design was an appropriate choice, allowing for direct comparison between the original and redesigned versions by the same subjects. This improved statistical power with the small sample size. Further, employing NASA-TLX, SUS, and task performance measures provided a balanced evaluation framework—understanding cognitive, behavioral, and affective user experience facets.

The incorporation of qualitative feedback during debriefing added richness to interpretation. Comments about emotional reaction—e.g., being "less frustrated" or "more in control"—captured insights that measurements could not fully capture. Triangulation of data forms gave robustness to your findings.

Limitations and Realism of the Prototype.

One of the primary constraints was the Figma prototype, which simulated behavior but was unable to truly reproduce live app behavior (e.g., backend latency, real-time QR sharing). While ideal for initial validation, some features like data syncing or real-time feedback weren't testable with realistic constraints. In addition, remote testing via Microsoft Teams potentially added environmental variability (e.g., connection latency, screen size variations).

In addition, the majority of participants were drawn from a university population, which restricts generalizability to older adults or lower-tech users who might have other barriers to managing health data.

Design Implications for Real-World Use.

The study revealed how small interface changes—e.g., labeling clarification through text or fewer steps to a task—have powerful effects on trust, usability, and task success. It is especially critical in health-focused apps, where mistakes can have severe consequences and users are likely to work under stress.

Concept for a Healthcare Passport app also opens the door for future integrations—such as provider record syncing, in-app allergy alerts, or language personalization. Designing for such an intimate domain does not require only technical improvement but also empathy-driven design, which your iterative approach certainly adopted.

7 Recommendations and Conclusions

Based on user feedback, it was clear to the team that the Healthcare Passport application is not a finalized product. Several more iterations of the design, added functionality, error capture, and backend database support are needed. The team recommends that more research focus on uploading information and data entry tasks take place. The Healthcare Passport application does not currently support text entry. The application only simulates the data entry task. Additionally, there is a requirement to build a backend database to store user input data. Within the scope of the class project the Healthcare Passport application met the goals of designing an interactive Healthcare Application though more refinement and user functionality is required for the application to be considered a “finished product” or deliverable format.

The Team concludes that while the application does not fully function as a Healthcare Passport, the application does provide a framework for a new iteration to take its place. Within the results of the experiment, statistical data capturing found that redesigned interfaces did improve the user experience. The team is confident that if future implementations of the project are approved that user feedback and design changes will improve the application over time.

8 Author Contribution Statement

Patrick Matthews created the results and charts to support the results. He developed the experiment data collection sheet and assisted with 3 experiment runs.

Devin DuPree created the User Evaluation Methodology, script and consent form. He also conducted 3 experiments.

Andrea was the primary contributed to the Introduction, Background, and System Description. She assisted and conducted 2 experiments.

Sreenidhi Patil led the development of the **Discussion section**, interpreting results across all hypotheses, connecting them to the design changes, and synthesizing key evaluation insights. She also contributed to the style guide, visual design system, and presentation visuals.

All team members participated in prototype development, user testing, and final editing of the deliverables.

9 References

Use APA style for your citations in the text and the list of references here.

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3. NASA. (n.d.-a). *Human Systems Integration Division @ NASA Ames - Search*. NASA. https://human-factors.arc.nasa.gov/cgi-bin/seek_hsi.cgi?phrase=hart%2Band%2Bstaveland&perpage=10&attr=&attrval=&order=&clip=-1&navi=0

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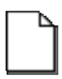
9.1 Consent form



Adobe Acrobat Document

Appendix A

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										

Appendix B

System Usability Scale (SUS)

This is a standard questionnaire that measures the overall usability of a system. Please select the answer that best expresses how you feel about each statement after using the website today.

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1. I think I would like to use this tool frequently.	☐	☐	☐	☐	☐
2. I found the tool unnecessarily complex.	☐	☐	☐	☐	☐
3. I thought the tool was easy to use.	☐	☐	☐	☐	☐
4. I think that I would need the support of a technical person to be able to use this system.	☐	☐	☐	☐	☐
5. I found the various functions in this tool were well integrated.	☐	☐	☐	☐	☐
6. I thought there was too much inconsistency in this tool.	☐	☐	☐	☐	☐
7. I would imagine that most people would learn to use this tool very quickly.	☐	☐	☐	☐	☐
8. I found the tool very cumbersome to use.	☐	☐	☐	☐	☐
9. I felt very confident using the tool.	☐	☐	☐	☐	☐
10. I needed to learn a lot of things before I could get going with this tool.	☐	☐	☐	☐	☐

How likely are you to recommend this website to others? (please circle your answer)

Not at all likely 0 1 2 3 4 5 6 7 8 9 10 Extremely likely

Appendix C

NASA Task Load Index

Hart and Staveland's NASA Task Load Index (TLX) method assesses work load on five 7-point scales. Increments of high, medium and low estimates for each point result in 21 gradations on the scales.

Name	Task	Date

Mental Demand How mentally demanding was the task?

Very Low Very High

Physical Demand How physically demanding was the task?

Very Low Very High

Temporal Demand How hurried or rushed was the pace of the task?

Very Low Very High

Performance How successful were you in accomplishing what you were asked to do?

Perfect Failure

Effort How hard did you have to work to accomplish your level of performance?

Very Low Very High

Frustration How insecure, discouraged, irritated, stressed, and annoyed wereyou?

Very Low Very High

Name (Team 1)	Name (Team 2)

Redesign Application 1st	**Original Application 1st**
Peter Matthews	**Mary Watson**
Brady Hauger	**Theresa Matthews**
Amber Salazaar	**Peter Chan**
Joe Salazaar	**JoAnn Chan**

1. Provide the consent form, fill it out and return it to proctor
Explain the recording is documenting the screen and taking audio
2. Interface session 1
2.1 NASA TLX Per Scenario, time and error
3. Interface session 2
3.1 NASA TLX Per Scenario, time and error
4. Provide the experiment documents at the and with System Usability Scale,
For each scenario the proctor needs to read off task a,b,c and try to aid as little as possible even if the experimenter's struggle
Errors will be defined as actions that are outside the user's end goal within the task. Exploratory clicks will not be considered an error as users are unfamiliar with the interface design. Actions taken that will not complete the task or if a user must ask for assistance will count as an error. Error capturing has not been implemented within the Figma design so the experiment proctors must act as a de facto error capturing aid.
Scenario 1: Update Insurance Information

a. Locate the insurance section for the primary profile
b. update the primary provider's policy number and group number
c. save information to complete the task

TIME: ERRORS:
Provide NASA TLX

Scenario 2: Add New Prescription

a. Navigate to the medications section
b. add a new prescription medication, including its name, dosage, and frequency
c. save information to complete the task

TIME: ERRORS:
Provide NASA TLX

Scenario 3: Share Specific Information

a. Initiate the sharing process
b. Select only the user's current allergies list and active prescriptions list to share
c. generate the QR code for a simulated healthcare provider sharing process to complete the task

TIME: ERRORS:
Provide NASA TLX

Scenario 4: Add Dependent Allergy

a. Navigate to a dependent's profile
b. add a new allergy to their record
c. save information to complete the task

TIME: ERRORS:

Provide NASA TLX

Types of errors:

Navigation Error	**Wrong location or screen entered (count each instance as 1 unique error)**	**# of Error**	**Notes**
Input Error	**User enters incorrect or incomplete information due to poor affordance**		
Recovery error	**User realizes mistake but takes multiple tries to fix it**		
Misinterpretation Error	**User misunderstands what a label/button means**		
Dead End	**User reaches a screen or state where they can't proceed due to confusion**		
Help Seeking	**If the user gets lost or needs to understand an icon then this counts as help seeking (count each instance as 1 unique error)**		

Task steps are listed as step a, b, and c.

Logging the time to complete each task and counting errors encountered by the participants will determine the effectiveness of the original interface as compared to the redesigned interface.