

W209-1: VIDS Final Project Presentation

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Vital Information Display System

Goal: Build an intuitive visualization for end-of-life care givers to make a better informed decision regarding their loved one.

1. **Display summarized views of patient vital information**
2. **Show caregivers how far a vital sign is from normal range**
3. **Allows users to stay informed and make decisions**





Development Workflow

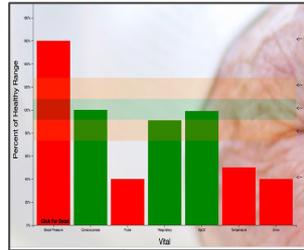
The workflow process progressed from paper mockups to an interactive website powered by D3 visualizations.



Static Mock Up
(PowerPoint)



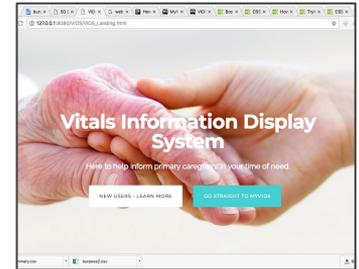
Static Build
(D3)



Semi-Interactive Build
(D3, HTML, JS)



Test Design
(lookback.io)



Interactive App
(CSS, D3, HTML,
JS, Python)

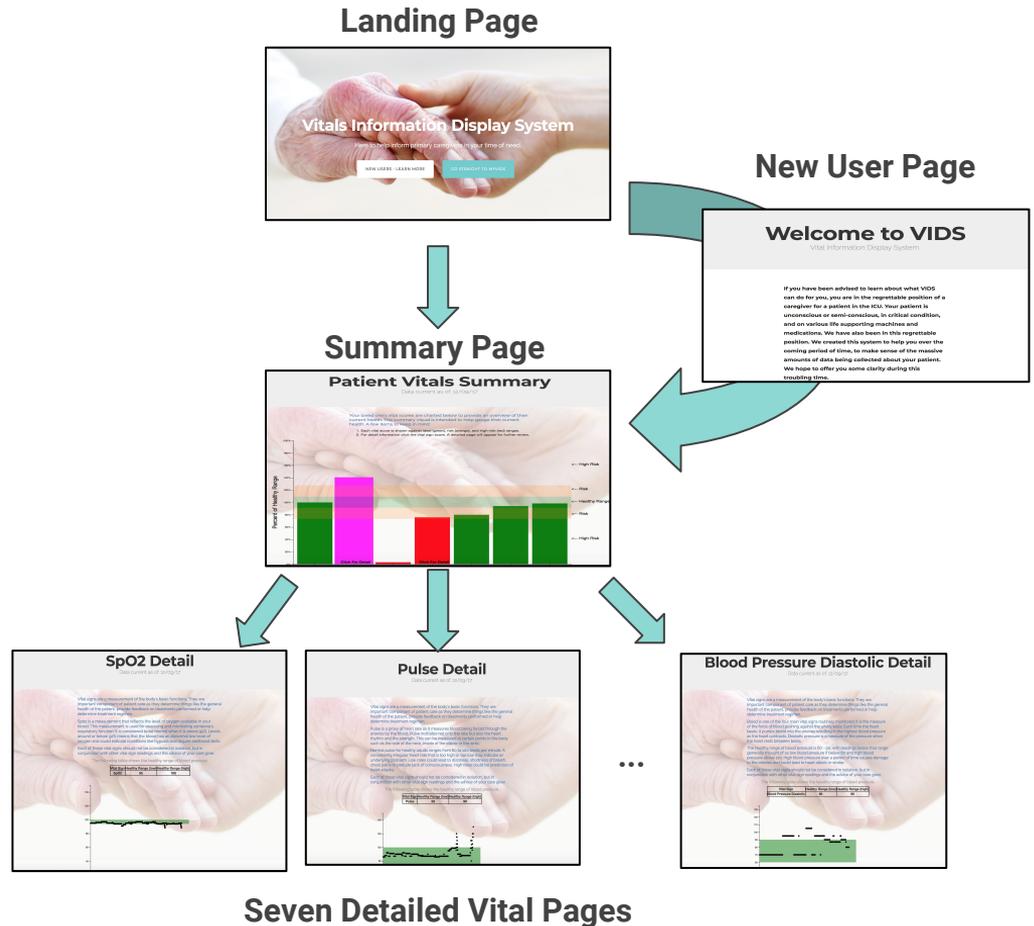


System Architecture

Website driven by HTML, CSS, JS, bootstrap

Visuals drawn using D3

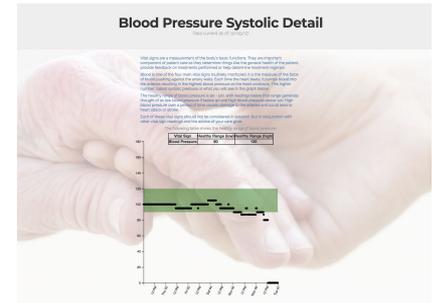
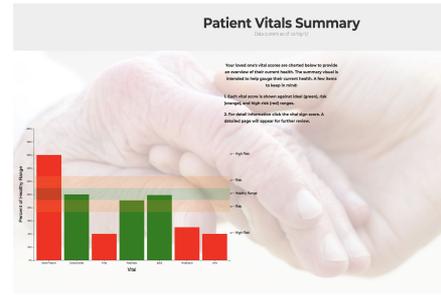
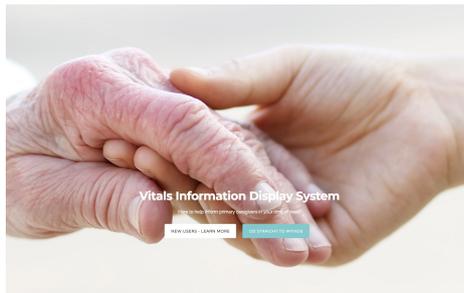
Data stored in CSV files and loaded through Python scripts





Demo

- The tool has several screens, we will go through them in sequence
- The progression of the screens were designed so that they could be self-explored by a patient's loved ones themselves, or they can be guided through it by the caregiver
- Just a reminder that none of us are medical experts, even though John does look like a surgeon. Also, ironically a hitman.



VIDS Demonstration





User Testing Overview

Hypothesis' To Test:

1. The purpose of VIDS is easily understood by the user.
2. The hierarchy of the tool is easy to navigate.
3. The summary visual allows the user to make their own assessment of the patient's current health.
4. The summary visual provides an accurate view of patient's health
5. The detailed visuals allow the user to make their own assessment of the patient's health.
6. The detailed visuals provide an accurate view of patient's health.



**Four Users With
Relevant Experience**



20 Tasks/Questions



Critical Items to Change Post UT

Improvement

User Feedback

<p>1. Build a new user page:</p> <ul style="list-style-type: none">- Include a stand alone new user page (M)- Clarify the role of the user vs. medical professional (M)	<ol style="list-style-type: none">1. During the 'getting familiar' phase, it was clear that more information establishes the context,2. Users appeared to find the information text accompanying the tool sparse and not deep enough.3. 64% of failures tied to not understanding purpose
<p>2. Add chart context (summary/detail):</p> <ul style="list-style-type: none">- Text box on summary page to brief the user (M)- Key to show healthy and unhealthy ranges (M)- Time stamp to show how recent data is (M)- Show length in unhealthy zones tied to a warning notification (S)	<ol style="list-style-type: none">1. "The summary page needs to be easier to use and explained clearer"2. Users were able to understand healthy range, but unhealthy was unclear3. "It was clear that it showed performance, but not knowing what the vitals were was confusing for a user."
<p>3. Include visual navigation queues:</p> <ul style="list-style-type: none">- "Click here" box on summary page (S)- Revise landing page buttons (S)	<ol style="list-style-type: none">1. Clicking the rectangle led to the detail screen with no direction2. "The MYVIDS button is foreign to a new user"

M = Must, S = Should, W = Want

Detailed List of User Test Prioritization Included in Appendix

Critical Item #1: Build a New User Page

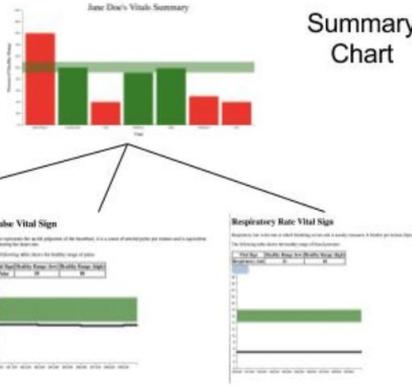
Pre-Test:



Landing page



Summary Chart



Post-Test:



If you have been advised to learn about what VIDS can do for you, you are in the regrettable position of a caregiver for a patient in the ICU. Your patient is unconscious or semi-conscious, in critical condition, and on various life supporting machines and medications. We have also been in this regrettable position. We created this system to help you over the coming period of time, to make sense of the massive amounts of data being collected about your patient. We hope to offer you some clarity during this troubling time.

You will likely have questions now and in the near future about how your patient is progressing. Are they getting better? Worse? Staying the same? It is very difficult to estimate the patient's overall progress through all the beeps and buzzers going off around the bed, all the faces coming in and out of the room, and burdened with the additional anxiety you and other caregivers may be experiencing.

Although there are many complexities and uncertainties in the health of your patient, VIDS can offer two kinds of important insight into your patient's health.

VIDS will show how average this sign reading is for normal ranges, is your patient experiencing a rapid heart rate? How low is it? And how fast is it? VIDS

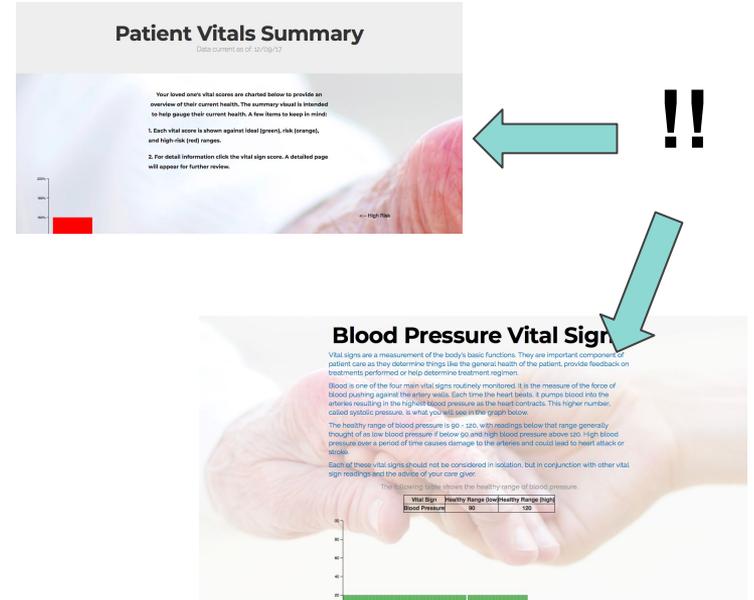
VIDS will show how average this sign reading is for normal ranges, is your patient experiencing a rapid heart rate? How low is it? And how fast is it? VIDS

Critical Item #2: Add Chart Context

Pre-Test:

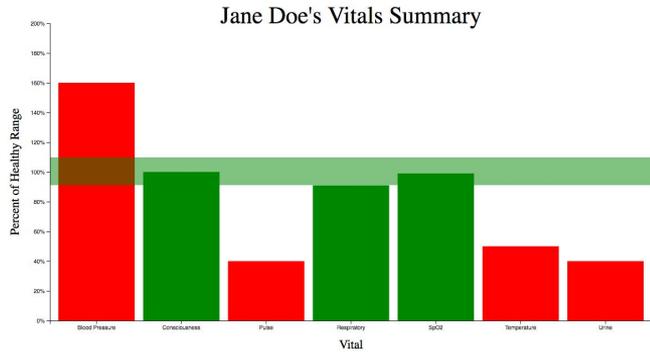
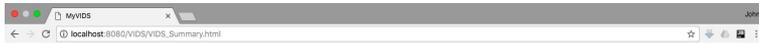


Post-Test:

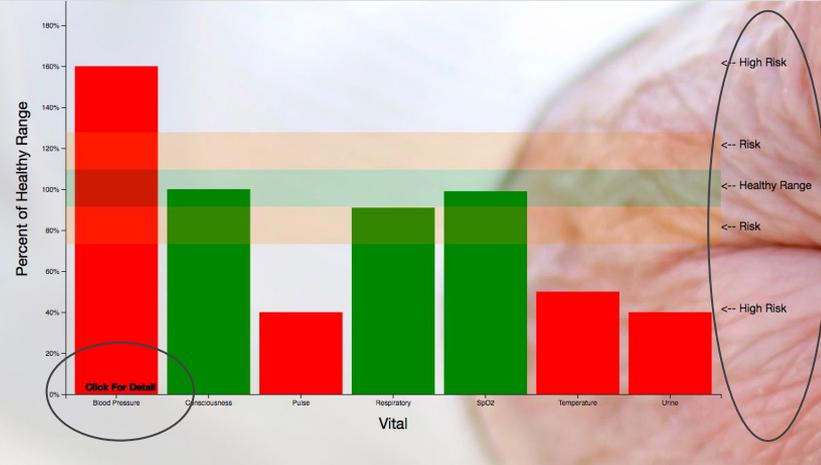


Critical Item #3: Include Visual Queues

Pre-Test:



Post-Test:





Future Iteration Steps

Short Term

1. Continue iterating aesthetics of website tool
2. Add trending information to visualizations
3. Run user testing round 3

Long Term

1. Partner with existing data providers to expand functionality
2. Build data pipeline to update VIDS real time
3. Re-design application for mobile device use

Appendix





Detailed List of Improvements

(M) New user page establishes a lot of the key information around the tool and around the use of the information (including the vitals). It is vital we have a good page and content here and should be top of our list. This is demonstrated by the fact that about 65% of all errors were designated as having a root cause of 'No New User Page'. New user page should have clear navigation to summary info. The new user page should include the following changes.

- a. Clarification on the role of the user of VIDS vs. the medical professional
- b. A warning statement that the information is not prescriptive and does not support recommendations of next course of action
- c. Introductions to the vitals included in the visuals

(M) The addition of more information and context in both the summary and detailed pages, especially to help absorb the information being displayed. This information should be accompanied by aesthetic tweaks to the pages to make it more pleasing and decrease the contrast with the landing page. Changes include:

- d. A text box on the summary page explaining what the chart is showing
- e. A key to show what is a healthy range and what is the user's level
- f. A time stamp to show how recent the data is

(M) Clearer cues on the summary page to ensure users know that detailed data is available. Changes include:

- g. Replace the pink transition color on the bars.
- h. A "click here" queue to show if functionality is accessible by clicking



Detailed List of Improvements Cont'd

Better design on healthy range representation on the charts, including better readability on the values. This should be in sync with the contextual text provided for each vital sign. Specifically:

- a. (M) Including a scaled healthy would help (healthy, unhealthy, severely unhealthy).
- b. (S) Showing extended length in unhealthy zones tied to a warning notification

(M) Detailed visuals could be enhanced with comments on historical levels to make comparisons easier and highlight salient changes.

(S) Establish a unifying visual theme that connects each graphic and page. The screens appear disjointed. This can be accomplished by:

- c. (S) Having a set background or layout between both the summary and detailed pages
- d. (S) Aligning fonts, text sizes, and text layouts (aligned centered vs. left)
- e. (S) Matching hover (tooltip) capability between summary and detailed screen

7. (W) Per subject 3 recommendation, include real-time updates and ability to monitor patient remotely via app/website.