

# Design for Safety: Decreasing First Responder Health Risks Through Real-Time Bio-Sensor Alerts

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## Introduction

The focus of this research project is using the Design Thinking process to create an informative dashboard for first responders. Design Thinking involves empathizing with the user, defining the problems to be solved, ideation, creating prototypes, and testing. This iterative process focuses on the user, resulting in the most effective product possible. The dashboard will display real-time biosensor data from sensors in the first responders' uniforms. This project is part of a larger project with the goal of vastly improving the safety of first responders during emergency hazardous material incidents. This project is funded by U.S. Department of Transportation.

## Design Thinking Process

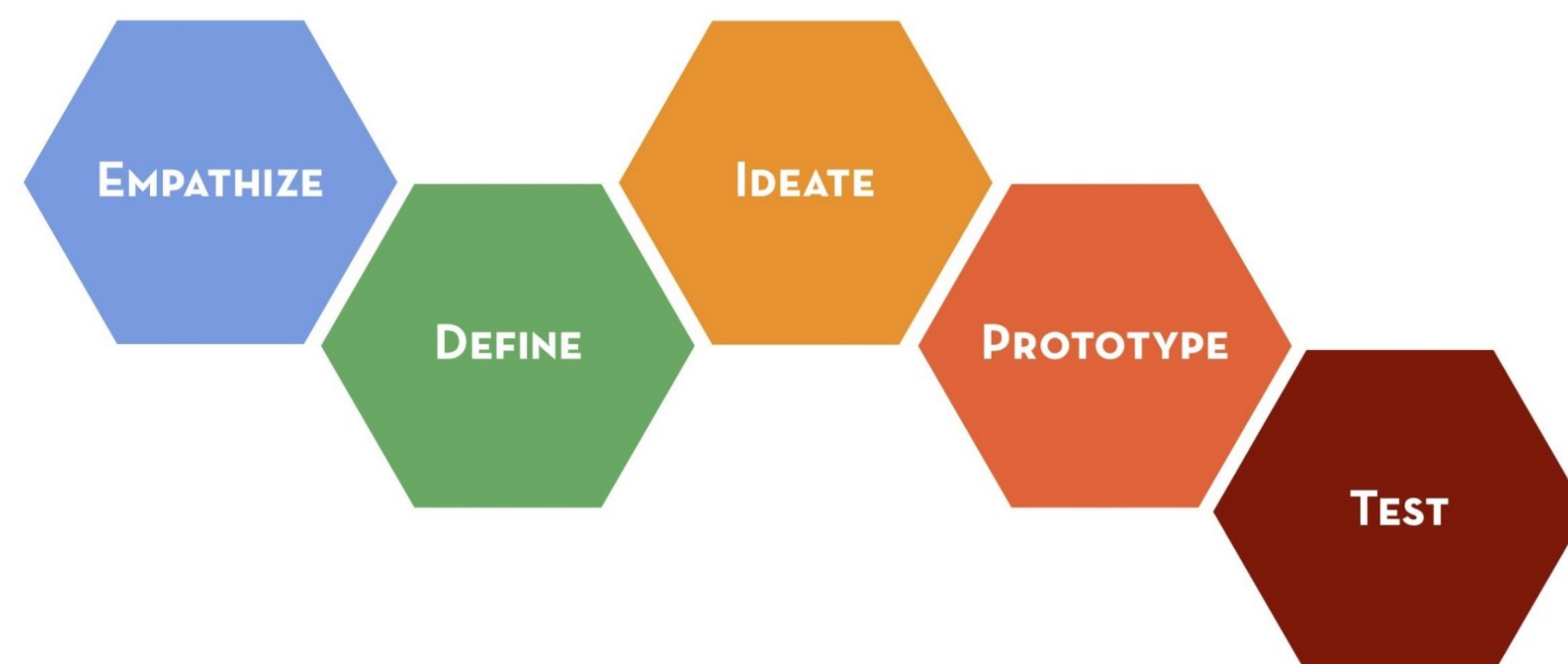


Figure 1

**The Design Thinking Process is an iterative process for creative problem solving, as displayed in Figure 1. (1,2)**

- **Empathize:** getting to know who the user is, learning and researching their needs.
- **Define:** begin analyzation of research and define a problem statement. The problem statement is written from the prospective of the user, not yourself or the company.
- **Ideate:** brainstorming, coming up with as many solutions to the problem as possible.
- **Prototype:** narrow down the best possible solution for the problem and defining how it will work.
- **Test:** see how the potential user will interact with the product created, identifies problems in the design, and what needs to be altered.

### Benefits of the Design Thinking Process

- Usability problems found early
- Takes less time, improvements are made early
- Saves money, improvements are made when work is cheap to produce

## Empathize and Define

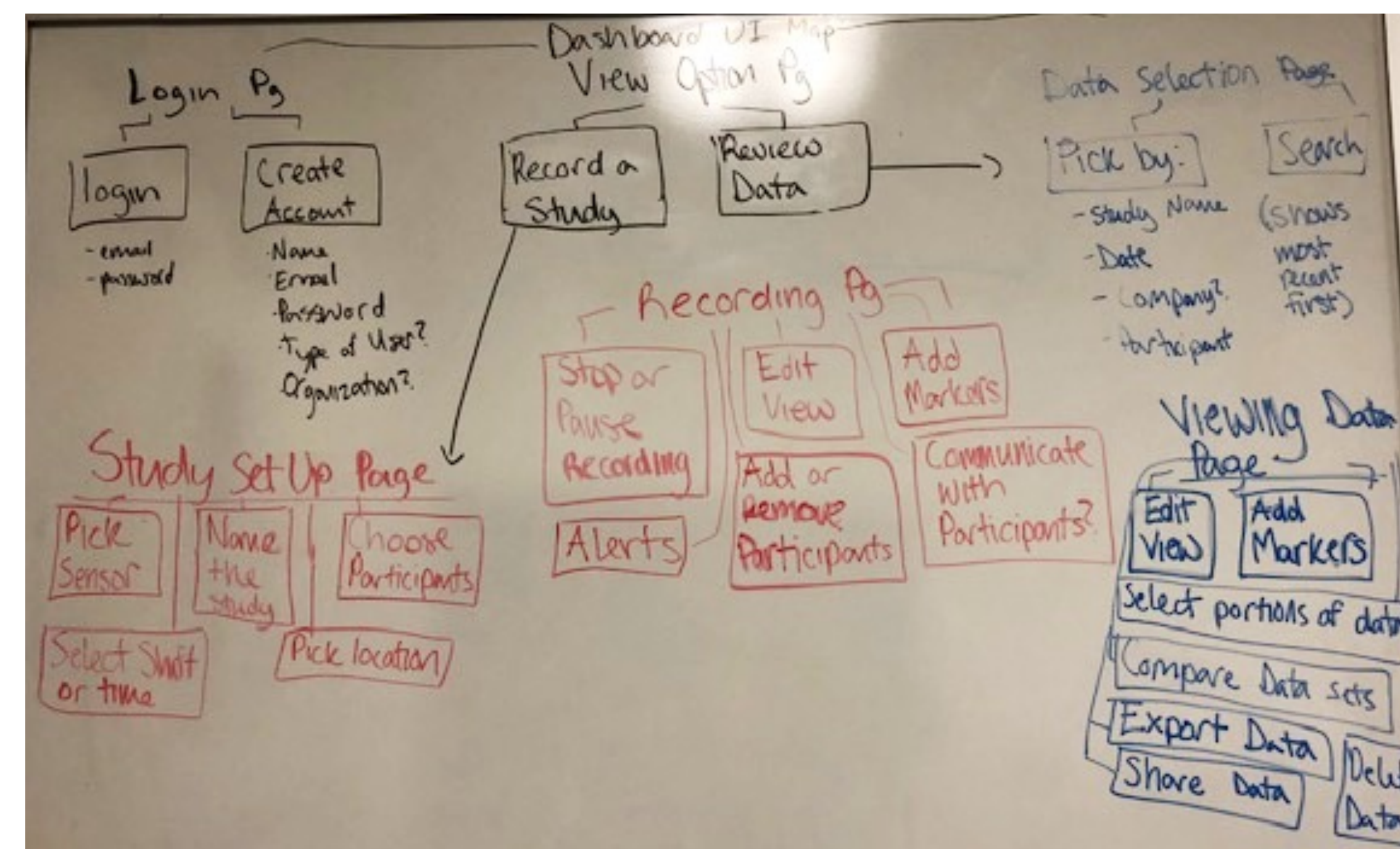


Figure 2

The first step of the process is **Empathize**. This involved researching current first responder technology, emergency response dashboards and iconography, and communication with local firefighters. After researching, the **Define** process began. Displayed here in Figure 2 is a map of all the potential web pages needed for the dashboard. The needs of the user need to be defined before designing.

## High-Fidelity Prototype

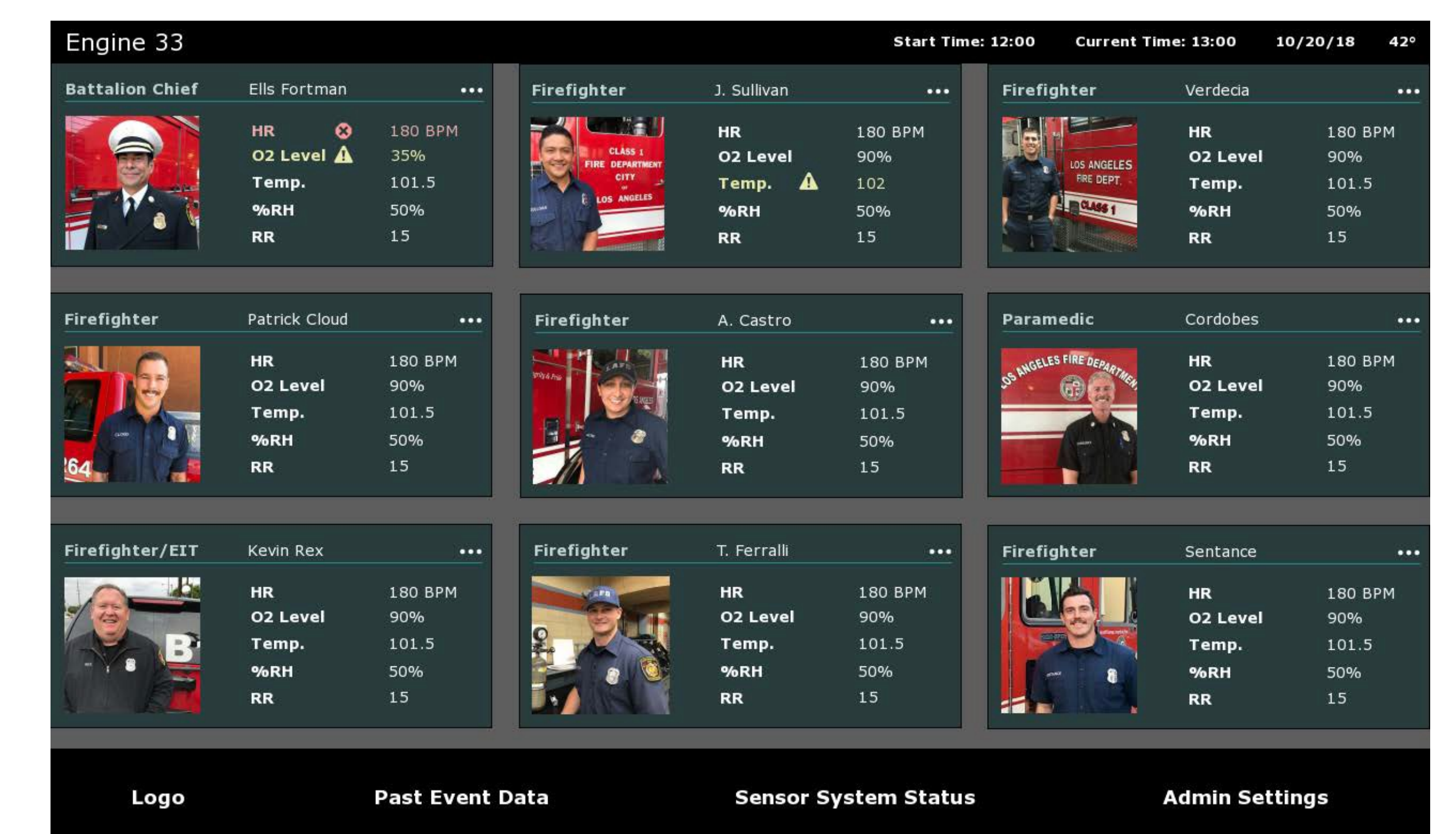


Figure 5

After creating low-fidelity paper prototypes, high fidelity prototypes were created, as seen in Figure 5. They were made on the computer to seem more real and are easier to test on the user. Preparation for the Test phase has begun. So far, these high fidelity mock-ups have been tested out in once with the firefighter leads.

## Ideate and Low-Fidelity Prototype

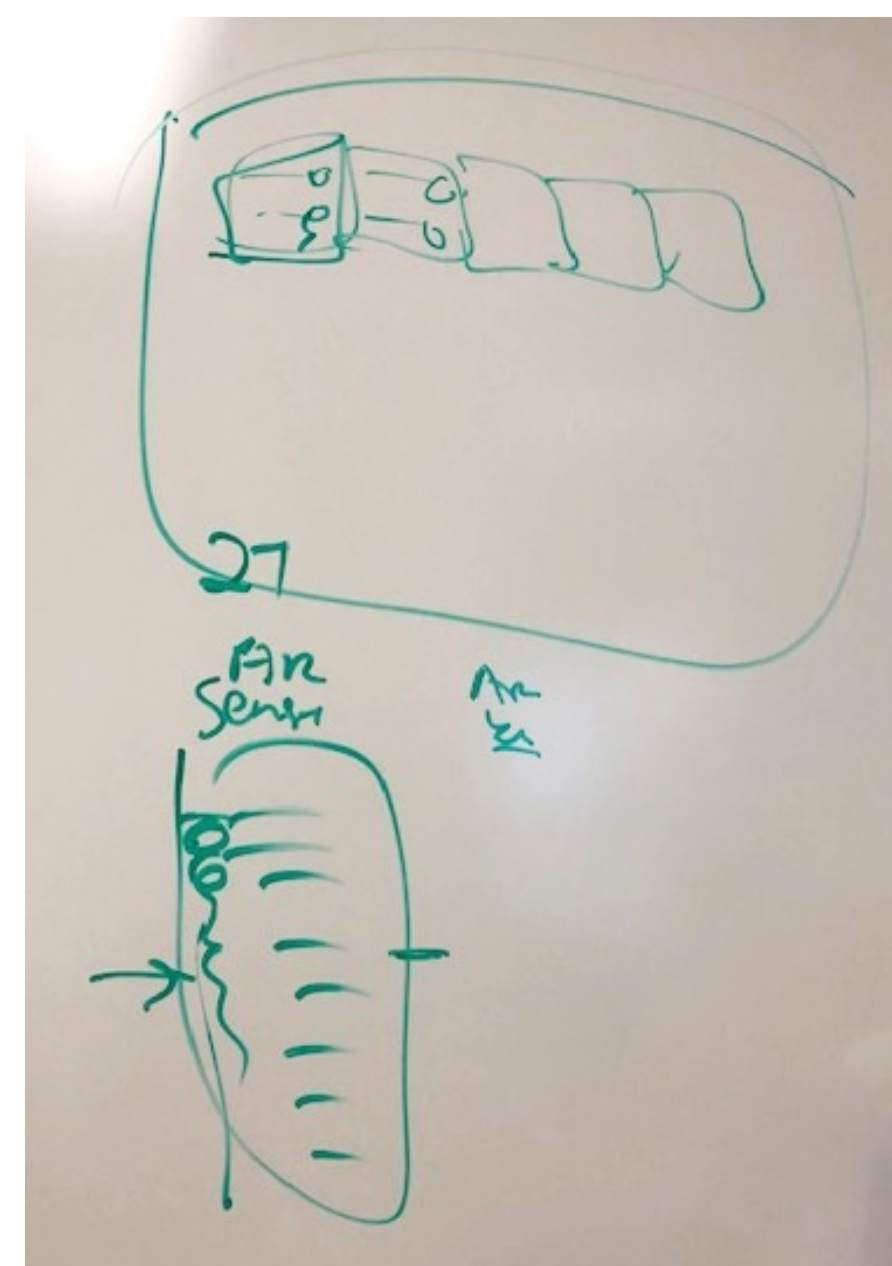


Figure 3

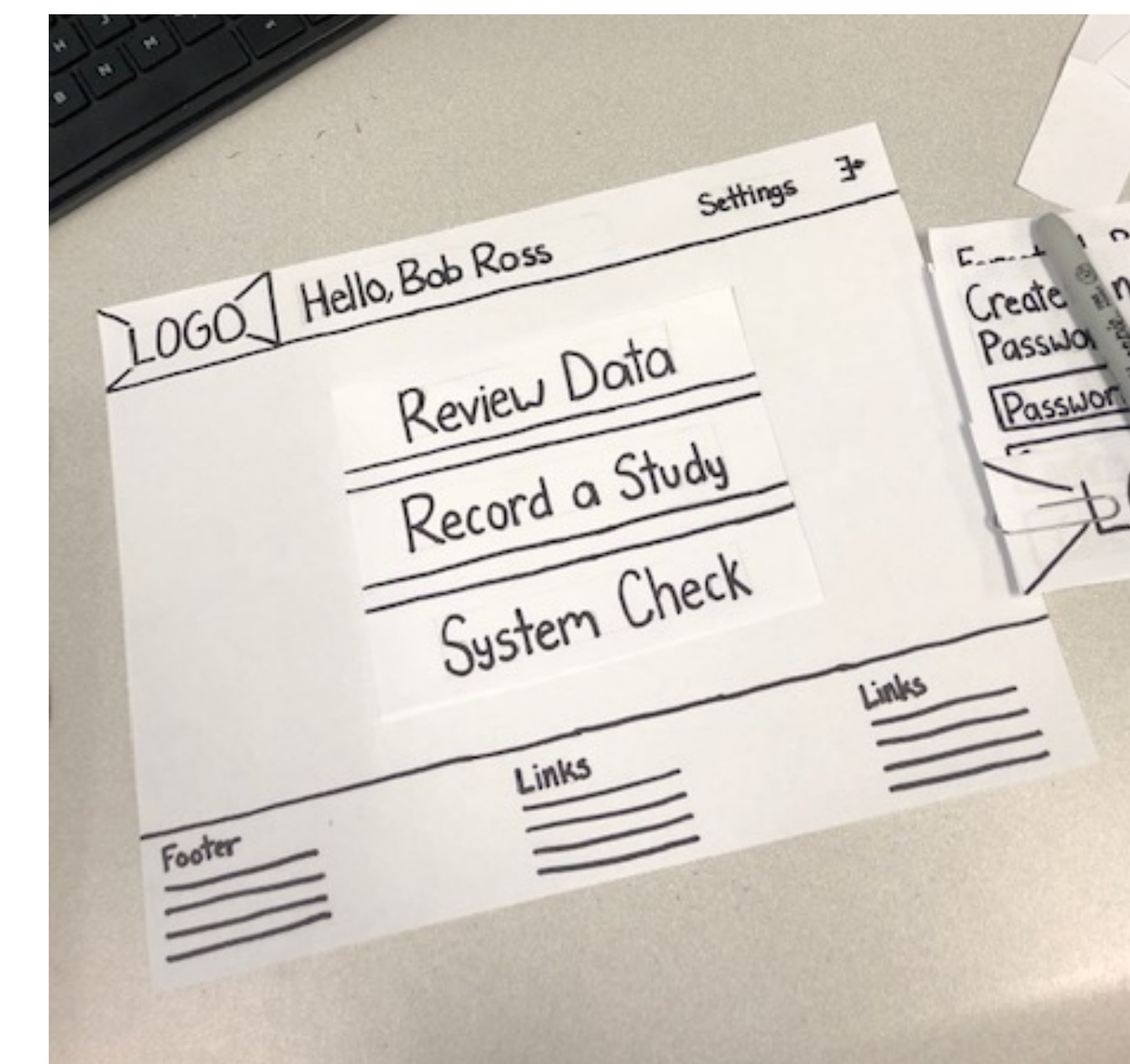


Figure 4

After defining the problem and the user's needs, the ideation process can begin. Ideate involved making simple designs on a whiteboard as displayed in Figure 3. Many ideas were sketched on the whiteboard before moving to **Prototype** phase displayed in Figure 4. These paper prototypes are low-fidelity and the first step in the prototyping process. They underwent critiques with the HazMat team to alter the design until it was solidified. After making paper prototypes, the next step was creating high-fidelity prototypes and prepare for testing.

## Next Steps and Assessment

The next steps in this research would be:

- Completing all design work and mockups
- Completing all development work of the actual website
- Testing all work with real users

An assessment of the effectiveness of the Design Thinking Process would be the conclusion of this project. This would validate if the system met the user's needs.

## References and Acknowledgements

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1. Design Thinking Process [Digital image]. (n.d.). Retrieved February 21, 2019, from <http://longevity3.stanford.edu/designchallenge/design-thinking-process/>
2. Dam, R., & Siang, T. (2019, February). 5 Stages in the Design Thinking Process. Retrieved February 21, 2019, from <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process>