Integrating Traffic Incident Management Interfaces

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PROBLEM AREA

Traffic in the US is becoming more and more costly, with a 2014 study showing that traffic cost US drivers a total of 7 billion hours and $160 billion in that year alone. One way to approach this problem is to improve traffic incident management systems, which are often outdated and lack coordination. We focused on the Iowa Department of Transportation's Traffic Management Center (TMC), where Traffic Incident Managers (TIMs) currently use over 15 different software applications.

INTRODUCTION

Traffic Incident Managers (TIMs) are responsible for detecting, responding to, and clearing traffic incidents. The TIMs in Iowa use three different monitors and multiple software packages which are not designed to work together. We designed a user interface (UI) for a unified software application that will handle all of their tasks. Our prototype will be evaluated and used to guide requirements for a final product that will incorporate machine learning.
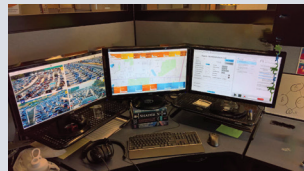
METHODS

Task Analysis → **Prototyping** → **Testing**
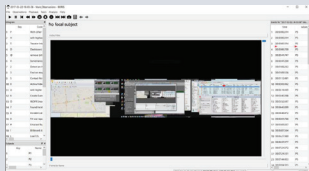
First, our project investigated the current usage of the 15+ user interfaces that TIMs use.

Next, we utilized rapid prototyping to create wireframes of the UI and 7 prototype iterations.
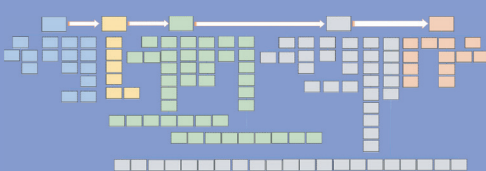
Finally, we conducted a test for our prototype with a Traffic Incident Manager.
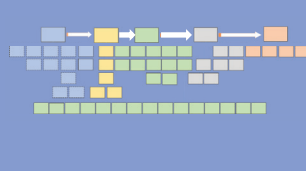
RESULTS

Between the old and the new prototype, the total number of possible steps needed to handle a typical incident has been **reduced by 55%**. Per incident, the time estimate has been reduced by nearly **9 minutes, a 52% reduction.**

Total number of steps needed to manage an incident

Current | Prototype

Detect Incident
Verify Incident
Respond to incident
Manage scene
Incident Clearance

CONCLUSION

The hierarchical task analysis of the new user interface shows a reduction of steps necessary for the traffic incident manager (TIM) to maintain and reinstitute steady traffic flow. The factors that contributed to the reduction of steps include minimizing cognitive overload and implementing machine learning. Machine learning was a key factor in reducing time by reducing the sources of incident alerts into one alert system.
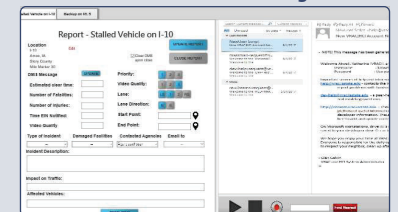
Final Prototype User Interface
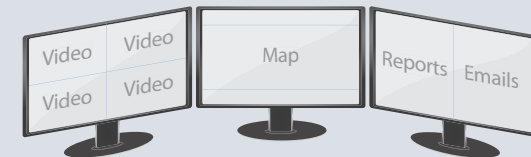
Center Screen
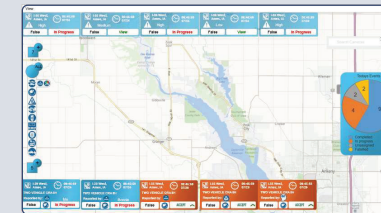
Left Screen

Right Screen

FUTURE DIRECTIONS

This prototype will continue to be modified and developed, and machine learning will advance with the software. A full-scale study will be conducted which evaluates the effectiveness of the new user interface. The next test will include measuring the number of clicks, screens, time taken for each state event, and overall time taken to manage an incident. The think-aloud method will also be used to further understand the thought process of traffic incident managers to better address their needs.

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