Design Challenge: UX Test

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Why a study?

To test the safety of an infotainment app (say, Navigation), I chose the form of a usability study over a survey or interview for two deliberate reasons:

- **When it comes to safety, what matters is what you <u>actually do</u>, not what you <u>think</u> you can or will do.**
- **Studies show that people drastically overestimate their capabilities when it comes to multitasking and driving.**

For these reasons, we need to have participants actually try to use the Navigation app while driving and measure how safely they can do it.

Methods

There are two ways to carry out this kind of test:

- Actual test driving of the EcoCar and using the app in the car
- Simulated test driving using virtual reality (VR) technology (e.g., a person playing a video game of driving using a steering wheel control, with another device in front of them simultaneously displaying the app)

There are advantages and disadvantages to each method, and both methods are complex:

- With actual test driving, we have higher realism and validity of what we are testing, because someone is actually driving while using the app. However, this method would be contingent on the operational state of the EcoCar prototype and would also require setting up a test driving course and introducing other cars, people, and obstacles to mimic real life. Plus, there is the risk that if it is indeed unsafe to us the app while driving, the participant and any others involved could potentially be put in a dangerous situation; such a risk would need to be minimized.
- With VR, we can introduce the participant to a variety of settings that they would encounter in real life with no risk (e.g., driving on freeways; city streets; suburbs; with pedestrians and

cyclists; in traffic). However, it is time and resource-intensive to set up a VR that reflects reality with a high degree of validity.

For the purpose of this Design Challenge, I leave the choice of method undefined (since it is largely conditional and logistics-based) and focus instead on the goals and metrics such a test would involve.

Goals/Metrics

Our overall goal is to measure safety. We can define safety as the combination of several components, each of which with its own metrics:

Component of safety	How to measure

Reduced distraction away from road	• Number of times driver looks away from the road
	    ○ *Inversely correlated with safety*
	
	• Total amount of time driver spends looking at app and not looking at road
	    ○ *Inversely correlated with safety*

Increased awareness of the road and what is going on	• Driver notices what is going on in the environment in real time and/or recalls it after the event (e.g., lane changes, pedestrians crossing, dangerous driving by others) ○ *Positively correlated with safety*

Safe driving behaviors	• Keeping a safe distance between own car and car in front (i.e., how close driver gets to coming in contact with another car)
	    ○ *Positively correlated with safety*
	
	• Obeying speed limit and other traffic laws (e.g., behavior at stop signs, lane changes, etc.)
	    ○ *Positively correlated with safety*

Thus, the usability test would involve having the participant drive (either in a real car or using VR) while using the Navigation app to accomplish a task (say, following directions to travel from Point A to Point B) and measuring the above variables. The more the driver's attention is distracted away from the road, the less aware they are of what's going on around them, etc., the less safe the app. Conversely, the

more they're able to respond safely to events in the environment, etc., the more safe the app. If it were under our control and could be done safely (more likely with a VR simulation), we could also introduce potential risks into the environment at points where the driver is focusing on the app, in order to test their response to outside stimuli.

Another interesting component would be to ask people *before* they participate in the test about how safely they think they would be able to use the Navigation app while driving (e.g., how objectively safe do they think they would drive and how subjectively safe they would feel while doing so). Then we could ask them the same question again at the end of the test, to see whether or not their responses changed and also to compare their responses to their actual performance during the task. If people did not feel safe while using the app and driving, for instance, this is something we would want to know. (Afterward, we could show them the results to increase their self-awareness of their driving behaviors, which could have the potential positive side-effect of helping them drive safely in the future out in the community.)

Further testing could be done as the app is iterated upon to refine it and improve its safety. As I noted in my feature sketches, a voice-dominant interface may present fewer distractions and be safer for drivers than visual displays. This hypothesis would be interesting to test with participants and introduces more areas for testing. For instance, what if there are technical issues with the voice recognition and drivers face obstacles in using it while driving? The app might be safe to use in perfect conditions, but what if a driver is having problems with it? Think of how distracting it is to try to troubleshoot and solve a problem while driving at the same time! We want to make sure the app is safe for driving in all conditions, environments, and settings that drivers might encounter.

Other considerations include selecting the sample. We would want a diverse group that is representative of drivers in the community, including ages, backgrounds, etc.. We could do research to see who is likely to drive hybrid and/or electric vehicles and start by recruiting from those segments of the population. Eventually, more interesting sub-testing could be done, such as: is this app safe for teens to use? For elderly?