# Chapter 78

# The Driving Machine:
## Combining Information Design/ Visualization with Persuasion Design to Change Behavior

**Aaron Marcus**
*Aaron Marcus and Associates, Inc. (AM+A), USA*

## ABSTRACT

*The Driving Machine seeks to provide an innovative vehicle dashboard that combines information design and persuasion design to change the driver's behavior, promoting safety, fuel efficiency, and sustainability.*

## INTRODUCTION

A 21st-century global vehicle dashboard-design challenge is to take advantage of technology to increase safety and conserve energy. The context is this: Advances in technology increase driving distractions, and global warming increases our desire to reduce our carbon footprint. In particular, the Green movement has helped to increase people's awareness of sustainability issues and propelled development of innovative products to help decrease our ecological footprint.

The Driving Machine seeks to increase safe driving-behavior and fuel-efficient driving by offering information, overviews, social networking, just-in-time knowledge, and incentives, including gamification, that can help to reduce, even prevent, vehicular accidents and promote more

fuel-efficient driving. The question then shifts to how best to motivate, persuade, educate, and lead people to adopt safe-driving behavior and reduce their energy consumption. For our conceptual design project we researched and analyzed powerful ways to improve safe and green behavior by persuading and motivating people to become more alert drivers and to reduce their energy consumption through a vehicle dashboard application we call the "Driving Machine."

Dashboards and automotive-related applications are available to increase people's awareness of safety and the environment, but such technologies often do not focus on innovative data visualization, and they may lack persuasive effectiveness to encourage drivers to continue good driving behavior. Communicating one's carbon footprint, driving skills, and alertness, helps build awareness

and identity, but does not result automatically in effecting behavioral changes. The question then becomes: How can we better motivate, persuade, educate, and lead people to become safer and more efficient drivers? Aaron Marcus and Associates, Inc. (AM+A) has embarked on the conceptual design of a mobile-phone/tablet-based product, the Driving Machine, intended to address this situation.

The author's firm previously designed and tested similar concept prototypes that seek to change people's behavior: the Green Machine application in 2009, oriented to persuading home consumers to make energy-conservation behavior-changes; the Health Machine application in 2010, oriented to avoiding obesity and diabetes through behavior changes regarding nutrition and exercise; and the Money Machine in 2011, targeted to baby boomers and oriented to assisting them to manage their wealth more effectively (Marcus & Jean, 2010; Marcus, 2011; Marcus, 2012; Marcus, 2013). The Driving Machine uses similar principles of combining information design/visualization with persuasion design.

A Driving Machine key objective is to combine information design and visualization with persuasion design to help users achieve their goals of driving more safely and efficiently by persuading users to adapt their driving behavior, for example to follow traffic laws better and adopt carpooling behavior.

AM+A intends to apply user-centered design along with persuasive techniques to make the Driving Machine highly usable and to increase the likelihood of success in adopting new driving behavior. This chapter explains the development of the Driving Machine's user interface.

## BACKGROUND

As the amount of computing technology continues to increase in our cars and trucks, careful consideration must be given to dashboard design to ensure the safety and reliability of drivers, passengers, and vehicles. Increasingly states are passing laws that limit drivers' abilities to operate mobile phones or to read/send text messages while driving. Recent research illustrates that even such laws may not go far enough, as cited by Paul Green (Green, 2003). Paul Green (2003) describes how driving and using a cell phone, regardless of having hands free or not, places drivers at greater risk of causing accidents than drivers who only talk to passengers inside their vehicles. The reason talking on the phone is a greater danger than talking to passengers is because passengers are more aware of current driving situations than people being communicated with on the phone. One study by Redelmeier and Tibshirani (1999), as stated by Green (2003), that using a cell phone increases the likelihood of a crash by up to 4.3 times versus those not using a cell phone while driving. Estimates for distraction-related crashes in the United States typically come from a sample of about 5,000 police-reported crashes called the Crashworthiness Data System (CDS) (Green, 2003). To overcome future problems that new technologies might have on driving, the National Highway Traffic Administration (NHTASA) proposed a set of guidelines to test the impact of a specific task on driving performance and safety. If a task is deemed too distracting to a driver's focus based on the Visual-Manual NHTSA Driver Distraction Guidelines for In-Vehicle Electronic Devices, NHTASA encourages automobile manufactures to prevent a driver's from being able to perform the interfering task (National Highway Traffic Safety Administration, 2012).

AM+A previously has done research for BMW (Marcus, Chen, Brown, & Ball, 2002) in a report titled "Future HMI Directions," in which AM+A thoroughly researched a driver-centered approach to HMI (Human-Machine Interaction). Although the report is over ten years old, the human factor issues are still highly relevant today as evidenced in Green's research and the NHTASA report.

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