



**TRANSPORTATION AND VEHICLE
SAFETY RESEARCH PROGRAM**

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University of Iowa
**Automotive
Safety Research
& Education Campaign**



NARRATIVE REPORT YEAR 1

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EXECUTIVE SUMMARY

In January 2014, The University of Iowa (UI) and its partners began an automotive safety research program to develop and implement a national education campaign aimed at helping drivers understand safety systems and features in their vehicles. First year efforts were concentrated on conducting a first-ever National Survey to measure knowledge and understanding of advanced vehicle safety technologies and lay the foundation for a National Education Campaign targeted at 90% of the American driving public.

The three major components of the UI project are: (1) a National Survey; (2) a National Education Campaign; and (3) a series of automotive research studies. This report describes progress through the first year on all aspects of the project as outlined in the initial proposals. For ease of review, each component of the report follows the initial approved proposals.



NATIONAL SURVEY

The UI Iowa Social Science Research Center (ISRC) conducted the National Survey to examine drivers' knowledge of vehicle safety systems, as well as their understanding and use of defensive driving techniques.

Survey Research Objectives

In order to meet the goal of assessing drivers' attitudes, behaviors and levels of understanding, the UI developed the following research survey objectives:

- Identify critical gaps in public awareness of vehicle safety systems
- Gain knowledge regarding defensive driving skills currently used by drivers
- Pinpoint the most effective messages and techniques for encouraging safer driver behavior
- Improve awareness and use of active safety technologies in order to reduce unintended acceleration (UA)

The table below represents the tasks outlined for the survey, with their corresponding completion dates. In addition, the following sections provide a brief description of the progress and results achieved in each section during the first year.

TABLE 1. NATIONAL CONSUMER SURVEY OF DRIVING SAFETY TIMELINE

	Date Completed
Task 1: Define questions	February - June 2014
Work with national experts	March - May 2014
Sample selection and survey construction	May - July 2014
Conduct local pilot survey/revise	June 2014
Task 2: Conduct and Code Survey	Oct 2014
Data cleaning	Oct 2014
Task 3: Data analysis	Oct - Dec 2014
Task 4: Final Reporting	Nov - Dec 2014

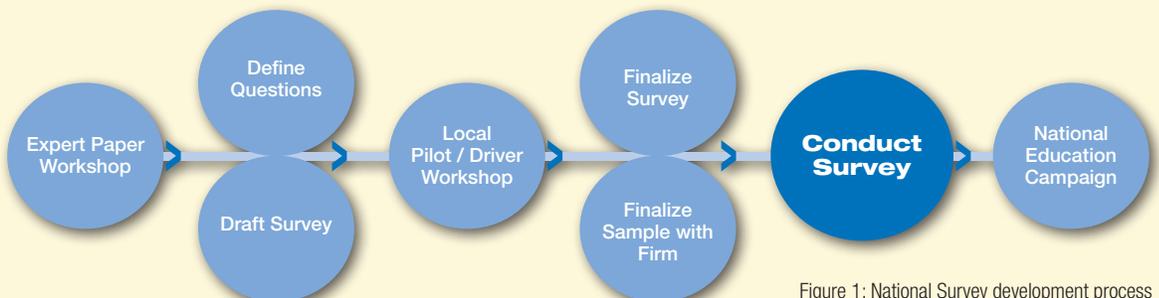


Figure 1: National Survey development process

Task 1. Define questions

(completed June 2014)

In order to develop a National Survey that could not only assess driver understanding and gaps in knowledge, but also provide information regarding defensive driving skills currently used, pinpoint effect messages for encouraging safer behavior, and improve awareness and use of safety technologies, the UI applied a multi-faceted approach to survey development. The question-development process included an in-depth literature review of existing and previous surveys in the vehicle technology and safety realm, an expert panel workshop, and a consumer panel.

Workshop of Automotive Safety Experts and Drivers

The UI team invited a panel of 15 industry and academic automotive safety experts (see side panel for a selected sample of panel members) in which the experts were tasked with two items. The first was to formulate two or three questions they would recommend for use in the National Survey and to justify them by explaining why they believed they were the most important questions.

The second task requested that experts write a two or three page overview of what they believe to be the key issues related to driver understanding of safety technology, particularly gaps in consumer understanding that might be addressed through an educational campaign.

This approach elicited very valuable information. The compilation of academic and professional responses can be found in Appendix A of this document.

Define Questions for the National Survey

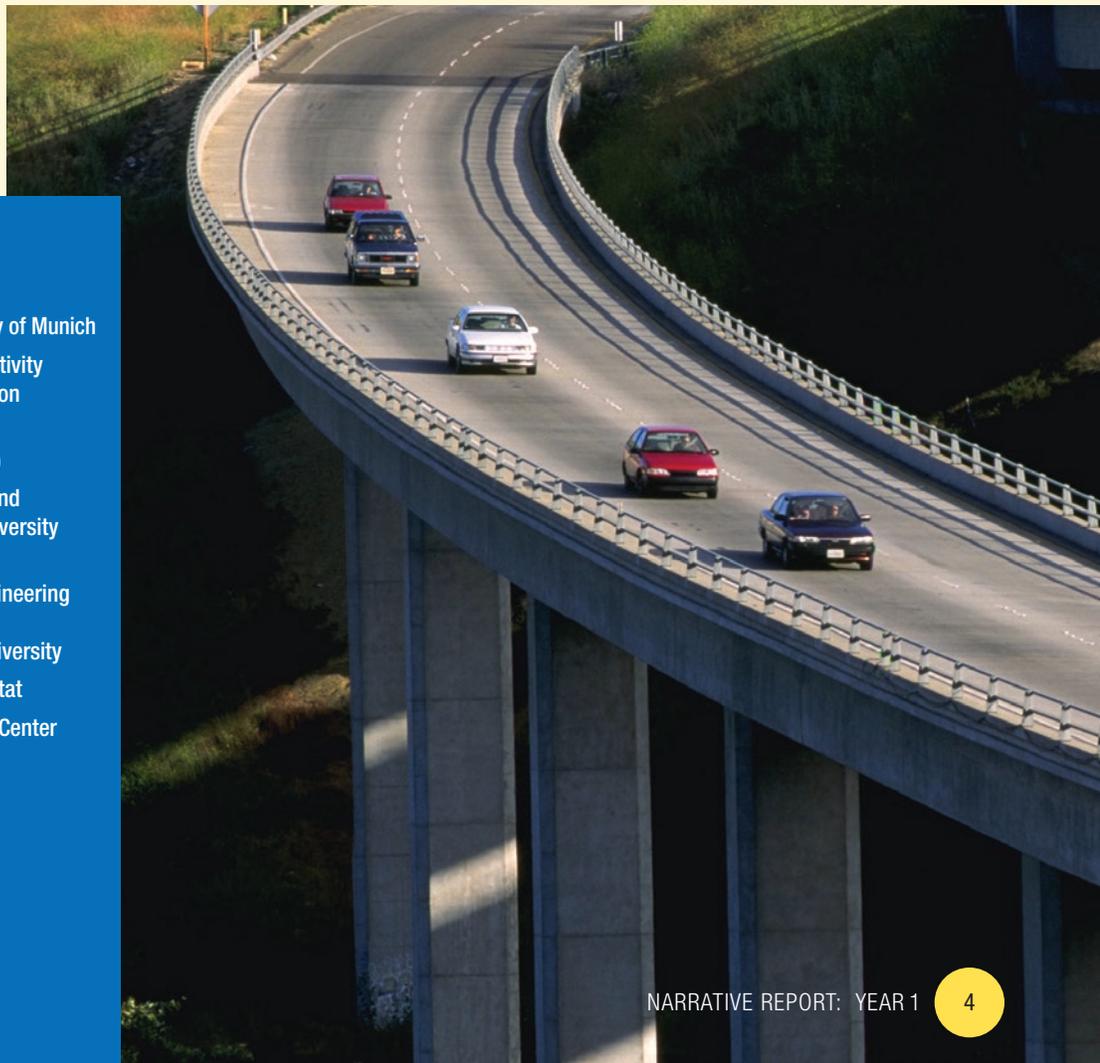
The UI ISRC took the survey inputs and formulated a draft for review by the internal UI team. Every question was reviewed for significance in terms of how it would measure the research objectives outlined by the proposal. The survey questions were broken into 6 basic subtopics:

- Basic driving habits/Your vehicle
- Comfort with vehicle technologies
- Understanding vehicle safety technologies
- Action in emergency situations
- Driving behaviors & beliefs
- Seeking Information

Conduct Pilot and Refine Instrument

A second group, consisting of a sample of 25 drivers selected from a UI database of previous driving studies to reflect a representative national sample, participated in a pilot test of the survey, as well as a brief conversational workshop. They gave input as to their own experiences with their vehicles and the safety systems in them.

The final survey instrument combined the opinions of national experts and consumers as to what are currently the most pressing safety issues.



EXPERT PANEL MEMBERS

Linda Angell, Touchstone Evaluations, Inc

Klaus Bengler, Professor, Technical University of Munich

John Lee, Emerson Electric Quality & Productivity
Professor, University of Wisconsin – Madison

Eddy Llaneras, Senior Research Scientist,
Virginia Tech Transportation Institute (VTI)

Bryan Reimer, Research Scientist, AgeLab and
Associate Director of the New England University
Transportation Center at MIT

Nicholas Ward, Mechanical & Industrial Engineering
Professor, Senior Researcher at Western
Transportation Institute, Montana State University

Neil Lerner, Human Factors Manager at Westat

John Campbell, Research Leader, Battelle's Center
for Human Performance and Safety

Mike Perel, Retired, Chief of Vehicle Safety
of National Highway Transportation
Safety Administration

Mike Regan, Professor, Australian National
University and Transport and Road Safety

Various OEMs



Task 2. Conduct and code survey

(completed October 2014)

The UI sought a reputable, nationally recognized leader in assembling Internet cohort panels to assist with the collection of a nationally representative sample. GfK Holdings, parent company of Knowledge Networks was the winning firm. The study was conducted on GfK's Knowledge Panel®, a probability-based web panel designed to be representative of the United States. The National Survey launched in mid-September 2014, and lasted approximately two weeks. **The final dataset included an ample response from 2,015 adult drivers across the United States.** The survey was fielded in two stages: a Pre-test survey and a Main survey. For each, GfK sampled random age-eligible adults. Selected panel members for each survey received an email invitation to complete the survey and were asked to do so at their earliest convenience.

The Pre-test survey was designed to test the functionality and length of the instrument with a small sample of 25 panel members. The median completion time of the Pre-test survey was 22 minutes. Upon review of the Pre-test results, the main survey was programmed and approved by the UI.

The field periods, completion and qualification rates for the Pre-test and Main surveys are presented below.

TABLE 2. FIELD PERIODS, COMPLETION AND QUALIFICATION RATES

	Pretest	Main
Field Start	9/5/2014	9/12/2014
Field End	9/10/2014	9/28/2014
N Fielded	79	4,278
N Completed	41	2,772
Completion Rate	51.8%	64.8%
N Qualified*	28*	2,015
Qualification Rate	68.2%	72.3%

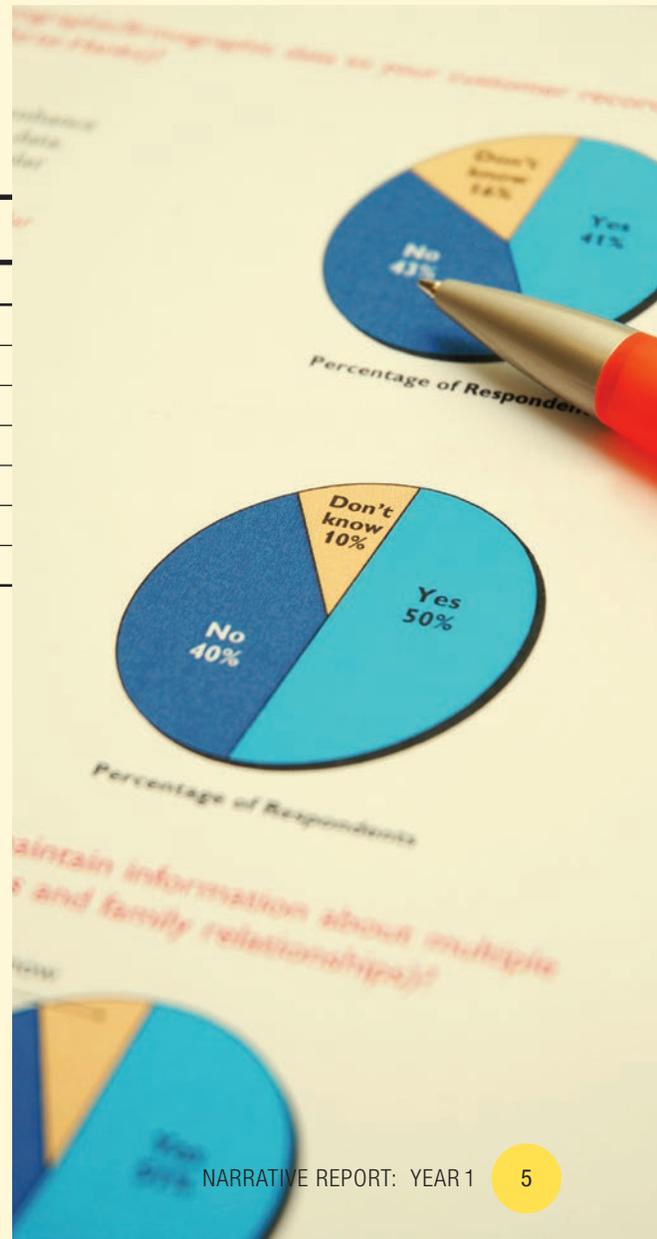
*27 qualified cases were delivered in the Pre-test dataset. The remaining case completed after this data delivery.

This dataset is the first of its kind to measure driver understanding of in-vehicle technologies, measure gaps in driver knowledge and awareness, and gather information regarding how consumers targeted for this campaign might consume information.

Task 3. Data analysis

(completed December 2014)

The UI received a completed, weighted and cleaned dataset from GfK Holdings on October 3, 2014. This dataset was accompanied by a complete methodology and preliminary analysis report. The UI then began work on analysis of the data. The Project Manager compiled a Preliminary Data Findings Report that included descriptive statistics, frequency distributions and cross-tabular analysis of variables throughout the dataset. These initial findings were presented to the internal UI team on October 16, and a general overview of the results was disseminated to the broader project team on October 20. The preliminary analysis (Appendix B) allowed the UI to assemble general descriptive reports on the knowledge and habits of the U.S. driving public, and to provide the necessary guidance for the campaign. The data presentation, National Survey instrument, GfK Project Report and Preliminary Findings may be found in Appendix B.





Task 4. Create final report

(completed December 2014)

In accordance with the settlement, the UI has prepared a final report detailing the survey methodology and complete process. Additionally, the UI received a final report from GfK that explicitly details their rigorous panel selection methodology process for probability-based sampling. The UI will be submitting journal articles and other research findings in the coming year at various conferences and small group industry-related meetings, and will continue to reference the data for the campaign. The results of the study reveal a comprehensive picture of the attitudes and behaviors of the American driving public when it comes to safety and vehicle safety technologies.

The project team has already presented the data results to the AAA Foundation and the National Highway Transportation Safety Administration.

The results of the survey provided data-driven guidance to the research team regarding current gaps in knowledge and understanding of vehicle safety technologies.

The National Survey project team was approved for a no-cost extension of the survey timeline to complete an additional survey with the unspent grant funds from the original survey. This survey will complement the efforts of the first survey, by collecting valuable insights from consumers that currently own vehicles with advanced safety technologies. The first survey served as a baseline knowledge of the **general consumer** understanding of the technologies. The second survey will specifically target consumers that have recently registered a vehicle that has the technologies and will measure the theory constructs that have been developed explicitly for this campaign (discussed in detail in the National Education Campaign section of this report). Additionally, the second survey will provide insight into this specific group of consumers' knowledge of the technologies.

This data will allow for comparison and analysis with the initial National Survey data. Additionally, both surveys have been designed with sustainability in mind to allow for longitudinal analysis by the UI and interested program partners in the future.

NATIONAL EDUCATION CAMPAIGN

The National Education Campaign (EC) is a comprehensive media package intended to reach 90% of adults in the U.S. Outcomes of the EC include: (1) to increase drivers' knowledge of safety technologies and inform them how to interact with such technology appropriately; and (2) to encourage drivers to be more engaged and to actively utilize defensive driving techniques when they are behind the wheel. This national campaign will involve traditional media (TV and radio), online and social media (website, Twitter), interactive games and apps, and instructional materials.

The EC is a data-driven campaign that is based on and guided by the results of the National Survey. The EC includes the overall broader project team, with efforts largely led by the UI, National Safety Council (NSC)¹ and Digital Artefacts (DA). Each partner has played a vital role in laying the foundation of the national campaign.

Tasks for the EC are listed in Table 3 below. Tasks 1 – 4 were completed in the First Year. The narrative following the table details the completion of each task.

TABLE 3. TASKS FOR THE EDUCATION CAMPAIGN

NATIONAL EDUCATION CAMPAIGN SCHEDULE	YEAR 1	YEAR 2	YEAR 3
1. Campaign theme and message development	✓	■	
2. Develop instructional materials	✓	■	
3. Develop interactive games and apps	✓	■	
4. Develop videos for website, course materials and TV	✓	■	
5. Deploy campaign on website		■	■
6. Deploy campaign using earned media		■	■
7. Deploy campaign using PSAs			■
8. Deploy campaign using paid media		■	■
9. Deploy campaign using social media		■	■
10. Deploy campaign using safety advocate networks		■	■
11. Outcomes assessment and final reporting			■

¹The National Safety Council (NSC) is a nonprofit organization whose mission is to save lives by preventing injuries and deaths at work, in homes and communities, and on road through leadership, research, education and advocacy. NSC has several program staff associated with the project. Key personnel from NSC include John Ulczycki (Vice President – Strategic Initiatives) and Alex Epstein (Manager) in addition to project managers, program managers, producers, graphic designers and writers.

Task 1. Campaign theme and message development (to be completed in December 2015)

The approach to the campaign theme and message development has been collaborative and multipronged. While we hoped initially that the National Survey could inform all aspects of the EC, the logistics involved in survey design and implementation, as well as the research and creative process entailed in theme development have made it imperative that the two proceed forward collaboratively and in tandem.

Campaign Theme and Message Development Key Activities

The UI identified several key activities that were to be completed under Task 1 in the first year. Table 4 below identifies those activities, along with their completion date.



TABLE 4. NATIONAL EDUCATION CAMPAIGN ACTIVITIES COMPLETED IN YEAR 1

Task	Activity	Date Completed
1.1	Literature review on audience for our campaign and media segmentation	7/1/14
1.2	Literature review on new technology/innovation	4/1/14
1.2.1	Share initial list of topics and messages	3/1/14
1.3	Explore behavior/educational models and theories	11/1/14
1.4	Explore message processing models and theories (especially related to reactance)	11/1/14
1.5	Develop rubric of knowledge, attitudes, behaviors with audience segments and key scientific messages	11/1/14
1.6	Develop brand strategy, names, media, develop style guide	12/10/14
1.7	Develop draft creative brief	9/8/14
1.8	Put together lay advisory group – cross-section of folks (adolescent, elderly, etc)	12/22/14
1.9	Put together 'expert' advisory group (driving instructors, dealership technical advisors, 911 dispatchers...)	7/15/14
1.10	Put together scientific advisory group (automotive technology experts, behavioral folks, instructional, social marketing)	7/15/14
1.11	Provide Input to survey items	5/12/14 - 7/31/14
1.12	Ongoing periodic meetings of advisory groups	Ongoing
1.13	Develop draft audience messages	8/1/14
1.14	Test messages with audience (survey and focus groups)	10/9/14
1.15	Refine messages	11/30/14
1.16	Finalize creative brief	11/14/14
1.17	Final messages	12/9/14
1.18	Message additions or clarifications	Ongoing

Theme development

(completed December 2014)

NSC was charged with the overall campaign theme development that would drive the campaign look and feel, including the campaign name, slogan and overall styling of messaging. All materials of the EC have unified branding elements so that audiences can easily identify the campaign.

The first key activity completed by the NSC, with the assistance of UI Dr. Natoshia Askelson, was a literature review of previous traffic safety mass media campaigns. The literature review had two primary objectives:

- Understand the most recent issues campaigned to consumers regarding vehicle safety technologies
- Identify how best to segment the population and determine behavioral targets (for more detail see 'Message Development,' below)

The NSC sought proposals from nationally recognized ad agencies with experience in working on public safety campaigns. GMMB was originally selected as the overall best fit for the campaign. GMMB created the initial branding names, taglines and mantras based on the project information and work completed to date.

There was then significant review by the UI, NSC and other program partners. After reiterations of various campaign name themes and types, the theme names, taglines and mantras were tested. The initial testing phase included focus groups in Baltimore and Tampa. Focus group participants included a variety of socioeconomic backgrounds, socioeconomic indicators, and types of vehicle ownership. The focus group (market testing) was used to initially select campaign themes that resonated with the general public. This research allowed the project team to determine which campaign themes were most likely to result in behavior change and improved driver behaviors.

At each point during the process, the UI and all program partners were part of the discussion and decision making for the next steps of the process.

Creatives tested

The concepts initially tested at the focus group setting are noted below:

1. driveyoursafety.org
2. driversmarter.org
3. MyCarDoesWhat.org
4. GetCarSmart.org
5. MindYourDrive.org
6. ReTakeTheWheel.org

Upon conclusion of the focus groups and dial testing, there were two clear frontrunners: **driversmarter.org** and **MyCarDoesWhat.org**. Both slogans were then tested in a national sample web survey for general preference, look and feel, and connection to the consumer.

MyCarDoesWhat.org emerged as the winning concept.



Figure 2: MyCarDoesWhat.org final logo design

In arriving at this decision the UI considered the quantitative and qualitative data presented throughout the creative process, in addition to the overarching campaign background, history and objectives. The team concluded that the primary goal of the campaign brand was to motivate consumers to seek information about their car. Driven by the data collected through the creative process, the project team believes that MyCarDoesWhat.org offers a unique branding opportunity that sparks interests among consumers through a distinctive name and has the potential to be a conversation starter.



Message development (partially completed – to be fully completed by December 2015)

All program partners are playing an integral part in the development of messages for the campaign. In order to achieve the goal of reaching 90% of U.S. adults, it is essential that the project team targets all markets in a highly effective and efficient manner.

Audience segmentation analysis

Prior to actually developing the content, the NSC completed a literature review that examined how best to segment the population and identify behavioral targets. In order for the campaign to be successful, to best target audience groups, it is imperative that the project team understands how consumers consume information and what their preferred method of consumption is. We divided *the US population broadly into four groups, labeled Gen Y, Gen X, Baby Boomers, and the Silent Generation*. Regardless of the ways the audience is eventually segmented, messages, message delivery and content will be designed in a user-appropriate format, so that, for example, the campaign may reach out to Gen Y segments of the population through Tweets and social media, while traditional TV ads may be developed to appeal to the Silent Generation.

Figure 3 below gives a sense of the complexity and breadth of the NSC review and scrutiny of sources for the campaign.



Figure 3. NSC Mind Map of Existing Media Campaigns

As demonstrated by the figure, the NSC and the UI have completed extensive research aimed at understanding existing campaigns, types of media, design and intervention, best practices and theory-based campaigns. This type of work and research will not stop. Throughout the development and life of the campaign, the project team will continue to stay on top of trends in campaigns and how consumers best prefer to consume their information.

Lay and expert panels

The NSC extended invitations to individuals that they and the UI identified as prime candidates for the lay, expert or scientific advisory panel. The primary objective of the panels was to provide input and guidance from various perspectives on how drivers can best understand and interact with the safety technologies in their autos. Each panel had a specific knowledge set and expertise that we hoped would provide guidance to the campaign. Participating members have been asked to occasionally (2-4 times per year) review and react to proposed campaign communication materials, assist in identifying gaps in messaging, and advise on the accuracy of messaging.

Content development

Once the team had a firm understanding of their audience and the key messages, it was ready to embark on message development (see Figure 4). As mentioned previously, campaign development began prior to the official results of the National Survey.

The responses from the expert panel were integrated with market research (including the literature review) and fleet penetration numbers to arrive at a starting point for message development. As a result, the UI team asked the NSC and DA to initially focus on anti-lock braking systems (ABS), adaptive cruise control (ACC), and rear-vision cameras as they rolled out information about safety technologies in stages. A significant portion of the first year focused on message development for these three technologies. Once the survey results were analyzed and digested by the UI, four additional technologies were announced to the broader team as the next areas of focus. These technologies were: blind spot warning systems, lane departure warning systems, tire pressure monitoring systems, and forward collision warning systems.



Figure 4. The message development process utilized by all program partners

Social media listening

In order to best identify the key messaging for the campaign, the UI and NSC conducted a Social Media Listening time trial. Given that a significant portion (56.7%) of users identified “Google or Internet search,” as their primary choice when searching for information, the team elected to conduct an analysis of real-world behaviors and trends in terms of how consumers were thinking, talking and otherwise expressing themselves about vehicle safety technologies. Social media listening entails a structured search of social media using goals and search parameters. The objective is to identify strategic opportunities to target materials and social media campaigns. The team was able to identify commonly searched technologies, as well as identify the variances between populations when it comes to social media as a means for gathering information.

Behavioral theory of change

A key component of the success of the EC is the ability to evaluate the program’s effectiveness. The NSC and Dr. Askelson developed a behavioral theory of change that will be applied to all campaign elements. The theoretical components are evidence based and incorporate the latest research in health communication (Figure 5).

The model is titled the Behavioral Theory of Change, and is an integration of the Theory of Motivated Information Management (TMIM) and the Precaution Adoption Process Model (PAPM). The TMIM is a behavioral model that attempts to increase a person’s motivation to seek information, while the PAPM theory attempts to change a person’s behavior. By combining these two theories, we can effectively motivate a person to seek information about safety technologies on the website (with the TMIM) and develop resources on the website to help people be safer drivers (with the PMIM).

The theory developed by the NSC and UI has four distinct stages: (1) Awareness and seek information; (2) Increase knowledge; (3) Change driving behavior; and (4) Support and advocate. Figure 6 is a visual representation of the EC theory. The diagram contains 3 columns. On the left are the four Stages the campaign will help people to move through. The middle column lists the specific strategies that encourage people to reach the next stage. Finally, the right column (Outcomes/Actions) details the outcomes or behavioral changes the audience will achieve at the end of each stage. Appendix C features a full version of the draft presentation and theory process developed by the NSC.

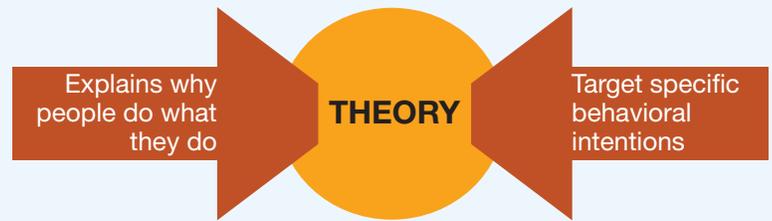


Figure 5. Theory of behavior change developed by the campaign

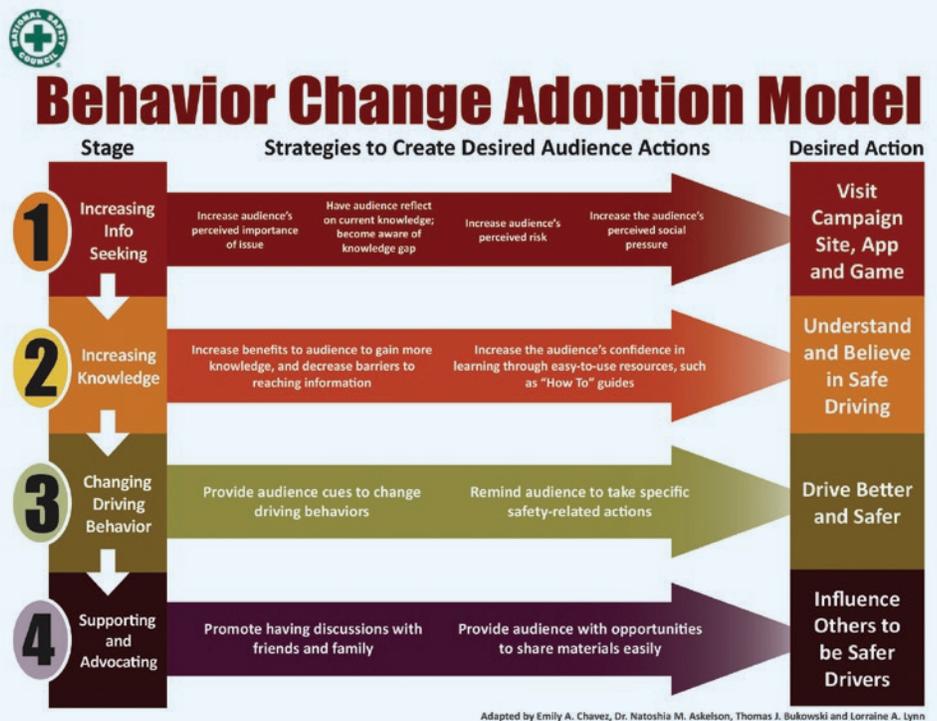


Figure 6. Behavior change adoption model developed by NSC and the UI. This model can be viewed in detail in Appendix C.



In Year 2, the campaign will be fully developed, themed, and ready for public consumption. The project team will work on unification of all elements of the campaign to prepare for brand cohesion. Additionally, the NSC will engage the advisory, lay and expert panels in the campaign production elements such as the overall campaign, campaign media material and the objectives of the campaign.

The project team will continue to evaluate the most effective key messages to ensure goal achievement of reaching 90% of the driving public a total of 12 times over the life of the campaign.

Task 2. Develop instructional materials

(ongoing – to be completed December 2015)

The UI is leading the effort to develop the instructional materials that will be integrated on the website, as well as marketed and distributed to younger, older and commercial fleet drivers through drivers' education, AARP, AAA, and various organizations.

Auto mechanics workshop at UI National Driving Simulator

To develop instructional materials, the team first began the effort by hosting an auto mechanic and customer service staff workshop. Local mechanics and customer service staff from dealerships were invited to the UI National Advanced Driving Simulator to tell the project team firsthand the issues they hear about from customers around safety technologies.

This workshop was intended to provide insight into *the types of problems consumers believe they have with their vehicles and how they communicate those problems*. The mechanics provided valuable information regarding what they see come through their businesses and how consumers talk about and deal with "problems" in their vehicles.

The UI team prepared and delivered a report to the project team on June 30, 2014 summarizing the findings from the mechanics workshop (Table 5).

TABLE 5. SUMMARY OF MECHANICS WORKSHOP

Number of respondents	24
Average years in auto industry	21 years
Job titles	Auto or tire shop owner Store manager Service and parts director Dealership owner
Setting	Auto and/or tire shop Body shop Dealership Specialty repairs

Two interesting and important findings from the workshop are noted below:

- Most people **do not possess detailed or in-depth knowledge about how a car works**, and are fine with that – as long as their car works as it is intended.
- The average consumer **does not really think about or understand how cars have changed** over the past couple decades.

The final report presented is included in Appendix D.

Instructional materials development by the UI College of Education

The UI team has partnered with researchers in the College of Education, Education Psychology² to develop instructional materials for the campaign. They have brought experience in developing design-based research for "instructional design," and extensive knowledge and experience with game-based learning environments and digital media to assist the project team in targeting audience segments (Figure 7 on next page).

The instructional materials will be designed with a focus on the mental model of system limitations of the various vehicle technologies.



²The Lead Investigators with the project include Ben Devane, Assistant Professor, and Joyce Moore, Associate Professor, with the College of Education, Educational Psychology Program. Drs. Devane and Moore have knowledge and expertise in instructional material design, scenario development and educational psychology.



Figure 7. Instructional material design process

In this first year, researchers completed and delivered the following:

- a) An **analysis** of instructional needs, content, potential user audiences, and potential instructional methods and materials
- b) The **design** of instructional materials, activities and scenarios (see Appendix E).

This process of analysis has examined:

- i. The **need** for instruction in terms of what is most necessary for users to learn
- ii. The **characteristics of user audiences** and their existing knowledge of the ACC systems
- iii. The **content of instruction**—the function of ACC systems and their parameters of use and operation
- iv. The **materials needed for instruction**—what platforms, materials and communicative form are best for a broadly defined audience.

The products resulting from this analysis are described below. In the upcoming year, the instructional materials will continue into the design phase.

The design activities that have been completed in the first year include:

- i. **Identifying potential problems** with learners' naive conceptions of how ACC systems function and how they should be used.
- ii. **Designing problem-based learning scenarios** that help users identify and self-correct their own misconceptions
- iii. **Designing measures to assess** how well users understand the function of ACC systems
- iv. **Developing experimental methods** that investigate the relationship between drivers' understanding of ACC systems and their safe driving behavior while using that system

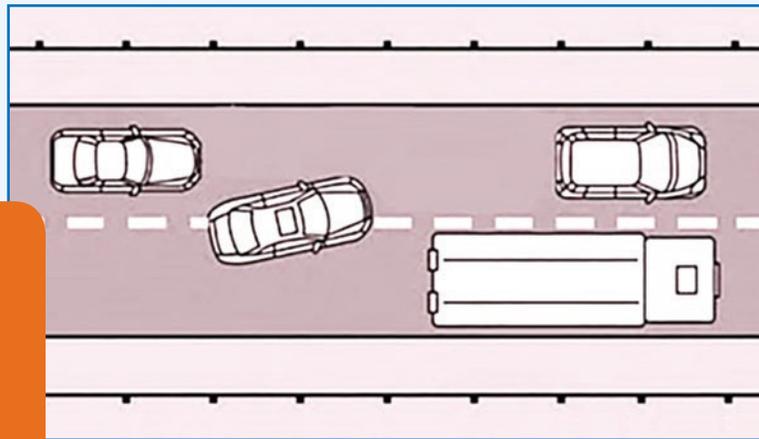


Figure 8. Example of instructional material scenario developed by the College of Education



The UI will fully realize the instructional materials plan laid out and developed by our Education Psychology colleagues. During the second year, these materials will be rigorously tested through the proposed research approach and methods, and will be prepared for distribution in the third year of the project. The research approach will test three instructional formats. These scenarios include a test-based instruction format, scenario-based instruction, and interactive game-like instruction. Participants will be tested with a post-instruction test, a simulator drive, and post-simulator test. This valuable research will provide the campaign team with evaluation metrics and data to help them understand the mental model development of drivers around the Adaptive Cruise Control technology.

Task 3. Develop interactive games & apps

(ongoing – to be completed December 2015)

Digital Artefacts (DA)³ has been charged with creating and managing the digital assets of the campaign. The first year concentrated efforts on laying the foundation for how to determine the best games to provide consumers with a *'real-world virtual experience' of interfacing with some of the latest safety technologies in normal, everyday circumstances.* The game design allows consumers to see how they might react to the unexpected in otherwise 'normal' driving situations, and to experience how the technologies are designed to help or intervene in such situations. The hope is that the consumer will begin to develop a mental model around these safety technologies while understanding that they (the driver) are the most important component of safe driving.

Website

DA has completed the basic framework for the website (Figure 9), including building a website prototype, and generating the first virtual game that will be available to consumers. The website will serve as the mainboard and epicenter of the entire campaign, where users can find general concepts and in-depth knowledge about vehicle safety technologies. The website layout incorporates design best practices to ensure ease of use, while providing a presentation that best leverages the content and interactive media of the campaign.

As demonstrated by the graphic below, the website features an easy-to-access, easy-to-navigate home page. The website is designed to have a 'Safety Technology,' page that will eventually include content and interactive media of every safety technology covered in this campaign. Other pages include: Games, Media, Educators, Resources and About. We include a brief description of each webpage below (please note: these are subject to change upon market and usability testing):

Games: Access to the Driving Simulation Game and other games developed for the campaign

Media: One stop shop where the user will find easy access to all media (videos, graphics, interactive components) produced by the campaign

Educators: Materials Driver's Education and AARP educators, as well as other social services and non-profits, can access for distribution

About: Introducing the campaign, who is involved, its purpose and any applicable contact information

The educational campaign portion of the website will be in sync with all elements of the campaign and will serve as a repository of information regarding vehicle safety technologies. The website will provide insights about common driving errors taken from the survey and tools/videos/tests/classroom materials to help educators instruct drivers about what to do in an emergency.

All website pages are expected to complete full buildout throughout early 2015, in preparation of the campaign launch.



Figure 9. Prototype of home page of MyCarDoesWhat.org

³Digital Artefacts is a multidisciplinary team of developers that produce and create interactive and educational media.

Key personnel from DA include: Allen Best (Operations Director), and several engineers, game designers and software developers.

Driving simulation game

In the first year, DA completed the framework for a preliminary environment that creates a real-world-like simulation of the vehicle safety technologies featured in the campaign. The Driving Simulation Game is designed to help build an understanding of consumer's vehicle safety technology through a fun, interactive and engaging capacity (Figure 10). The game encourages repeat use and in-depth learning by allowing website visitors to customize the game with their personal driving behaviors. The interactive, responsive and dynamic multimedia constructed by DA allows drivers to engage with the technologies in a structured, contextualized experience, while conveying the general overarching principals of each vehicle, as a driver would experience them in a real vehicle.

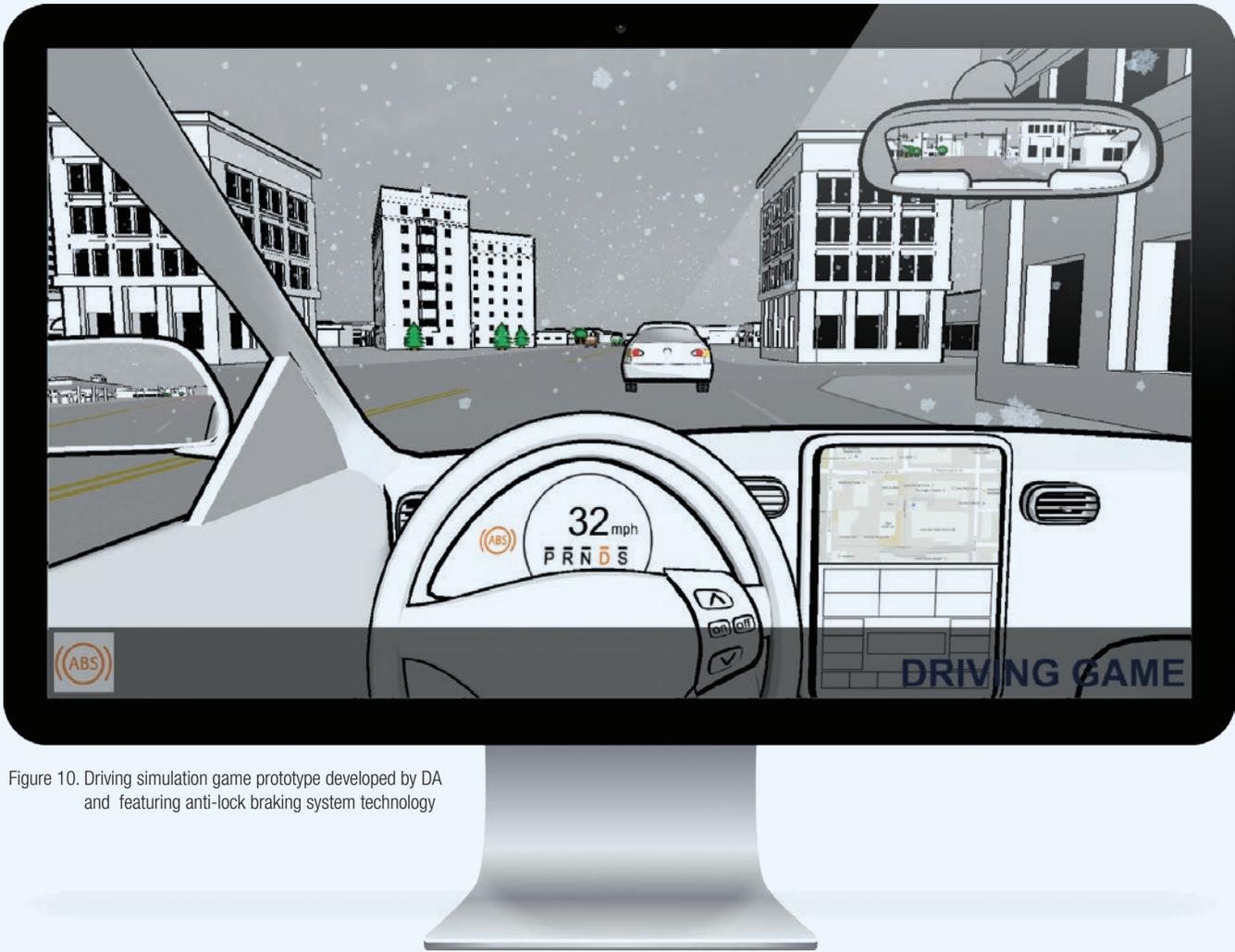


Figure 10. Driving simulation game prototype developed by DA and featuring anti-lock braking system technology

In the first year, DA has completed the necessary steps to build the overall environment in which the game will be featured (including an urban and rural type driving setting). Additionally, DA has focused efforts on developing the necessary conditions that are required by each technology. For example, the anti-lock braking technology is more likely to be experienced in wintery or slippery driving conditions.



In the second year, DA will focus on building the scenarios developed by the campaign team for each technology. Currently, DA is working on the "gaming" elements, the points structure and how the scenarios connect to the game environment. The second year will also feature usability testing prior to the campaign launch. Development of technology scenarios will continue in harmony with all other media interactive technology rollouts throughout the campaign.

Mobile application

DA is also well underway in the process of building a mobile application that can be used on any mobile device, PC or laptop (Figure 11). DA's work so far includes a multiplatform format that allows smooth and uniform presentation between the PC, laptop and mobile devices.

The mobile app features a driver safety quiz and general campaign information. The Driving Safety Quiz featured on the mobile app allows users to test their vehicle safety knowledge in the MyCarDoesWhat? community with other users. The quiz includes questions about the campaign vehicle technologies and allows users to play the quiz game by themselves or against other users in the community (Figure 12). Eventually, the Quiz Game will feature leading scorers in the community, as well as how users rank against fellow competitors. The quiz features commonly asked vehicle technology questions and some of the uncertainty around the technologies discovered through the National Survey data. The project team believes the mobile app and quiz offer a unique, fun and engaging way to provide educational material about the technologies to the general public.

Engagement is key. The more benefit consumers feel they gain with each visit, the more often they will return, the more data we will have to offer them with more targeted safety advice.



In the Years 2 & 3, the mobile application will see full campaign integration and will be marketed in all campaign launch materials. Additionally, for ease of information consumption, the mobile application will feature easy access through signup integration with the Facebook, Google+ and common e-mails APIs. It will be included in all usability testing and will be in harmony with all elements of the campaign.



Figure 11. Mobile application – MyCarDoesWhat.org front landing page of application (prototype)

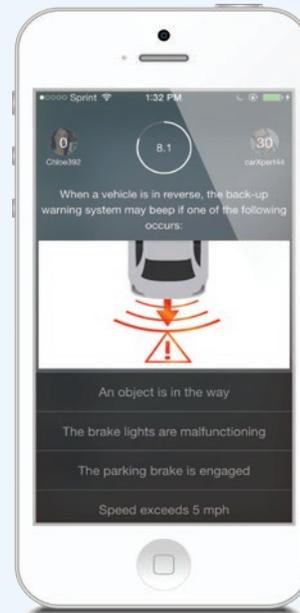


Figure 12. Mobile application – driving safety quiz game (prototype)

Task 4. Develop videos on website, course materials and TV
(ongoing – to be completed December 2015)

During year one, NSC developed and produced seven videos that are currently available on the prototype website. These include two videos each for adaptive cruise control, anti-lock braking system and back-up camera. Additionally, NSC created and produced a welcome video (Figure 13) to help website users orient themselves to Automobile Safety Systems. The National Safety Council production staff developed an extensive process to ensure that the scripts and videos resonated strongly with the public. Two distinct styles were developed – a Quick Guide Video (Figure 14) – close to 30 seconds in length and done entirely in simple animation that distills the key points of the safety system into quick, easy-to-understand messaging. The longer videos (Figure 15), about 2 and a half minutes in length, offer a hands-on, straight talking guide to the systems in an engaging format. Additionally, full-page static graphics were designed in an “explainer” style and an “infographic” style to supplement the text on the website.

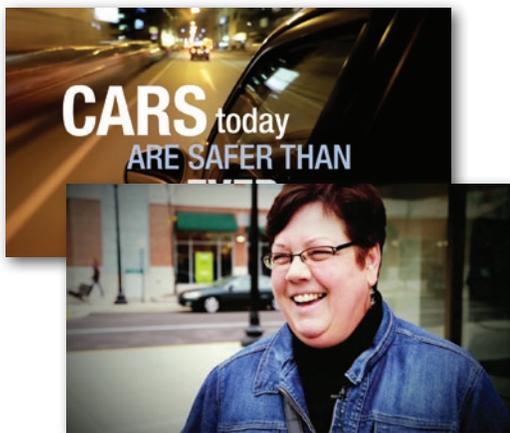


Figure 13. Screenshot of Welcome video



Figure 14. Screenshot of Quick Guide video

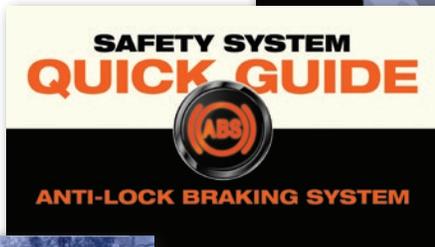


Figure 15. Screenshot of the engaging, hands-on, straight talking guide video

Upon developing the text for the graphics and the scripts for the videos and working with the University to ensure that all technical aspects of the Safety Systems were considered, NSC developed four distinct video styles for the longer video product in a “pilot” format to test their acceptance. The objectives for the market research were to understand attitudes, awareness and perceptions about the most effective style for engaging and educating the American driving public. The four video styles included: a single presenter, a presenter accompanied by his best friend (a dog), an animated story-driven video, and a highly realistic animation with narration. The market research was conducted in a focus group setting, that allowed for free and open discussion. The six groups were comprised of various socioeconomic demographics. Emphasis was placed on evaluating the video styles, not the content of the videos. The make-up of the groups was vetted by NSC market research and evaluation staff, with significant input from the University.

Based on in-person reactions to the focus group testing, NSC and University of Iowa chose to produce videos utilizing the host and his dog. This style successfully overcomes the “instructional” feel of the single host, allows the viewer to have a more emotional response to the video (because of the dog) and provided light entertainment value to counterbalance what might have otherwise been “dry” subject matter. It was very well received in focus group testing.

Additionally, the focus groups tested and provided feedback on the Infographic Style, as well as the Quick Guide Video – both of which were also well received. (Figure 16)



Figure 16. Infographic (each technology features its own)



The NSC will continue to build the messaging and content for the website. This includes not only the messages on technology webpages, but also the videos, interactive graphics and general media for the technologies that will be released throughout the campaign.

AUTOMOTIVE RESEARCH PROJECTS

The comprehensive Safety Research Design proposal examines the interaction between drivers, vehicles and roadways⁴. Each research study will assist the researchers in gaining an understanding of drivers' responses in emergency situations and situations involving the targeted vehicle safety technologies. The three studies bring together experts in human factors engineering, medicine, and neuroscience to examine driver behavior in emergency situations, evaluate the effectiveness of cognitive and physical training on drivers' pedal application behavior, and identify ways in which a vehicle might detect when an acceleration event is unintended.

Each research study has its own set of tasks to be accomplished during the three-year program. The narrative below details the Year 1 completions for each task, by research design project (Table 6).

Study 1 — Replicating emergency events in a controlled and safe environment

Study 1 is designed to examine driver reactions to emergency events re-created in a high-fidelity driver simulator. The objective of the study is to understand how drivers react in sudden emergencies, the order of their actions, and the speed of their reactions across scenarios.

Task 1. Identify driver, vehicle, traffic scenarios (completed December 2014)

The researchers have completed the development and foundation work necessary to collect driver performance data and data analysis in Years 2 and 3. In the first year, the researchers hired the necessary staff including an electronics/instrumentation engineer and research associate that will both assist with the support of the instrumentation of the vehicle cab and oversee the experimental plan and execution of the research study.

TABLE 6. AUTOMOTIVE RESEARCH STUDIES TIMELINE

University of Iowa Studies and Schedule

	YEAR 1	YEAR 2	YEAR 3			
STUDY 1: Emergency Events in Controlled Environments						
Task 1: Identify driver, vehicle, traffic scenario	✓	✓				
Task 2: Collect driver performance data						
Task 3: Analyze data and write report						
STUDY 2: Mitigating UA in Younger and Older Drivers						
Task 1: Baseline on-road study	✓	✓				
Task 2: Training regimen						
Task 3: Post-training evaluation						
STUDY 3: Using Context to Develop New UA Safety						
Task 1: Identify vehicle safety systems	✓	✓				
Task 2: Create future vehicle concepts						

⁴The three automotive research projects are housed at the National Advanced Driving Simulator (NADS). NADS is the world's most state-of-the-art driving simulator at a public university. Principal researchers include: Dan McGehee (Director of Human Factors and Vehicle Safety Research Division at the PPC), Nazan Aksan (Department of Neurology), Omar Ahmen (Director of Operations at NADS), Chris Schwarz (NADS, Electrical Engineering), and Kathleen Stewart (Department of Geography).

A significant portion of the first year efforts focused on the instrumentation and integration of a modern vehicle into the simulator at NADS (Figure 17). This process included identifying a suitable vehicle, procuring the vehicle, planning and designing the conversion process and testing/verifying that the vehicle worked as expected. Vehicle testing also ensured that the vehicle traffic scenarios could perform in a capacity that allowed for data collection. Table 7 lists some of the variables we expect to collect regarding drivers, vehicles, roadways and driving situations for analysis in this study.

TABLE 7. DATA TO BE COLLECTED IN NADS STUDY

Driver	Vehicle	Roadway	Situations
Driving experience	Seat design	Roadway speed	Parking
Height	Pedal design	Presence of other traffic	Backing
Weight	Idle speed	Roadway features	Cruise control
Foot size	Seat adjustment	Hills and curves	Merging onto freeways
Gender	Steering wheel angle	Weather events	Distracted drivers
Flexibility	Ignition type	Time of day	Interrupting habits
Vision and hearing	Transmission type		



Figure 17. NADS-1



Year 2 will feature data collection at NADS, based on the key factors identified in existing surprise crash situations and scenarios by the NADS researchers.

Study 2 — Measuring and mitigating unintended vehicle acceleration in younger and older drivers

Study 2 brings together a team of experts in cognitive neuroscience, medicine, human factors engineering, driving safety, simulation and biostatistics to conduct a two-phase research project to identify key mechanisms of risk at the interface between driver and pedal controls, as well as develop a novel approach to mitigating these risks through training targeting key human-vehicle interactions (Figure 18).



Figure 18. Study 2 variables identified in Year 1 for improving pedal control

Task 1. Baseline on-road study (ongoing — to be completed December 2015)

Researchers in the Department of Neurology completed the necessary foundational and development tasks in the first year to begin collecting data, developing the training regimen and conduct the evaluation for Years 2 and 3 of the study. In the first year, the researchers identified the multiple factors that affect the ability for drivers to decisively respond to sudden emergencies.

There was significant progress in the first year in identifying and testing the EEG system and sensors that would be used throughout the research studies to measure the cognitive load and brain and body factors that affect drivers' interactions with pedals. Additionally, the researchers have developed the framework of the study and the critical elements that are necessary for the scenario development and variable measurements.



In Years 2 and 3, the research team will collect data from both younger and older drivers with a range of cognitive impairments. Table 8 lists within-subject conditions for the randomization scheme. Participants will take two drives in the simulator on the same day: a distracted-driving condition and a drive with no-distraction.

TABLE 8. STUDY 2 SELF-REGULATORY DEMANDS TO BE CONDUCTED DURING TEST DRIVES

Drive-1		
No distraction	Low	3–4 minutes
	High	3–4 minutes
	Awareness interview, self-report of cognitive load	4–5 minutes
No distraction	Low	3–4 minutes
	High	3–4 minutes
	Awareness interview, self-report of cognitive load	4–5 minutes
Drive-2		
Listening distraction	Low	3–4 minutes
	High	3–4 minutes
	Comprehension test	3–4 minutes
	Awareness interview, self-report of cognitive load	4–5 minutes
Speaking distraction	Low	3–4 minutes
	High	3–4 minutes
	Awareness interview, self-report of cognitive load	4–5 minutes

At the end of the distraction segments, the drivers will be asked to pull to the side of the road and park. The research associate conducting the experiment with the subject will then conduct the mini-awareness interview and collect self-reports of the cognitive load during the drive. Following the end of the mini-awareness interview, they will be given instructions for the next segment. All responses will be audio recorded for later scoring and analysis.

The final year of the study will include the data analysis and development of a post-training evaluation associated with the individual demographic differences between awareness, personality and functioning by the driver.

Study 3 — Understanding the context of unintended accelerations: An engineering analysis

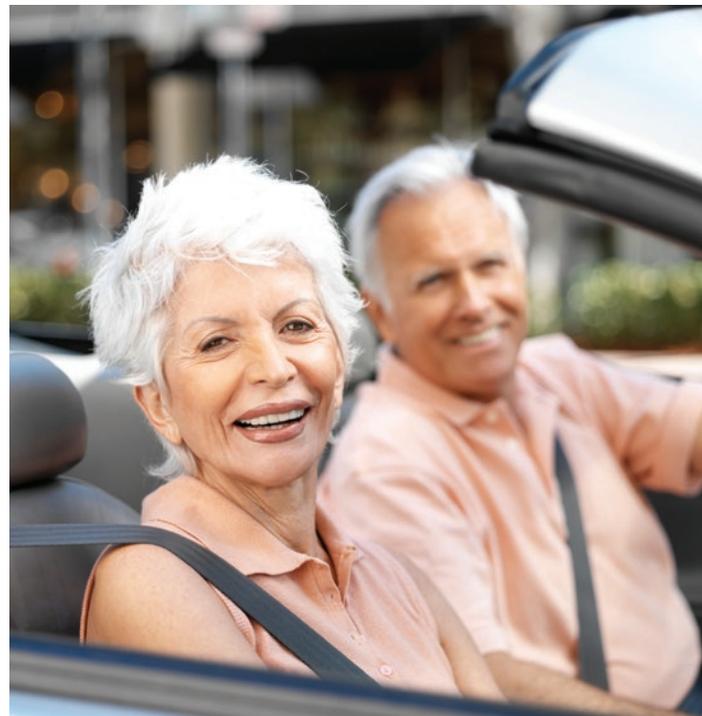
Study 3 is designed to conduct an in-depth engineering analysis and concept study that examines a vehicle's context relative to an unintended acceleration (UA) event. The goal of the study is to combine information from technologies (like micro-GPS, machine vision cameras and sensors), so that future vehicles could monitor for inappropriate accelerations, as well as prevent them if a discrepancy is detected.

The UI team is leading this study, together with Dr. Chris Schwartz at NADS and UI Geography Professor, Kathleen Stewart. The first year of the project heavily focused on planning and development activities and discussion among the project stakeholders.

Task 1. Identify vehicle safety systems (completed December 2014)

In the first year the research team on Study 3 completed the scope of the problem and laid the foundation for the in-depth analysis that is to be conducted. The scope was reviewed in existing literature and reports. The project team concluded it would be best to limit the scope to UA events that occur when the vehicle is stopped or traveling at low speeds.

This included identifying the inventory of types of systems that may be able to analyze the location and trajectory information from a vehicle sensors in which: (1) drivers are more likely to make pedal misapplications errors, and (2) it would be inappropriate for vehicles to take a certain action such as drive forward.



Task 2. Create future vehicle concepts (Partially complete and ongoing through August 2015)

Upon full analysis and understanding of both driver-based and vehicle-based causes of UA events, the researchers have begun designing the concepts for how technology may be able to override internal vehicle commands, even when caused by a system fault. The researchers on Study 3 have completed the following activities related to Task 2:

Designing a geospatial model for vehicle parking

Designing an ontology for vehicle parking

Researchers are continuing to investigate the factors that are likely to impact the parking process from a spatial perspective, including parking in different types of settings (residential garage, on street parking, parking lots, etc.).

The team has begun modeling the relationship between parking, parking settings, drivers' actions and the spatial trajectory representing the route a driver follows during the drive (Figure 19). They have identified the necessary variables that will be a part of the analysis that will help identify UA events.

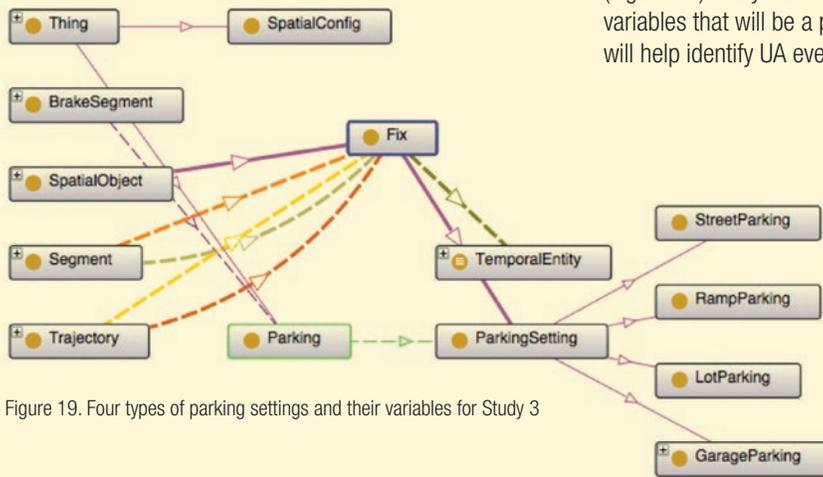


Figure 19. Four types of parking settings and their variables for Study 3

Naturalistic driving data

The researchers have begun analyzing naturalistic driving data collected by the PPC to provide insight on the driving behavior of drivers. The researchers are currently working on transforming the tabulated data into geographic feature classes that can be displayed in a spatial context (Figure 20). As a result, they will be able to generate a trajectory for each driving episode. With this transformed data, the researchers will investigate the speed changes during driving, especially with respect to parking, and consider the impact of the road elevations, as well as any significant turns on driving and parking behaviors.

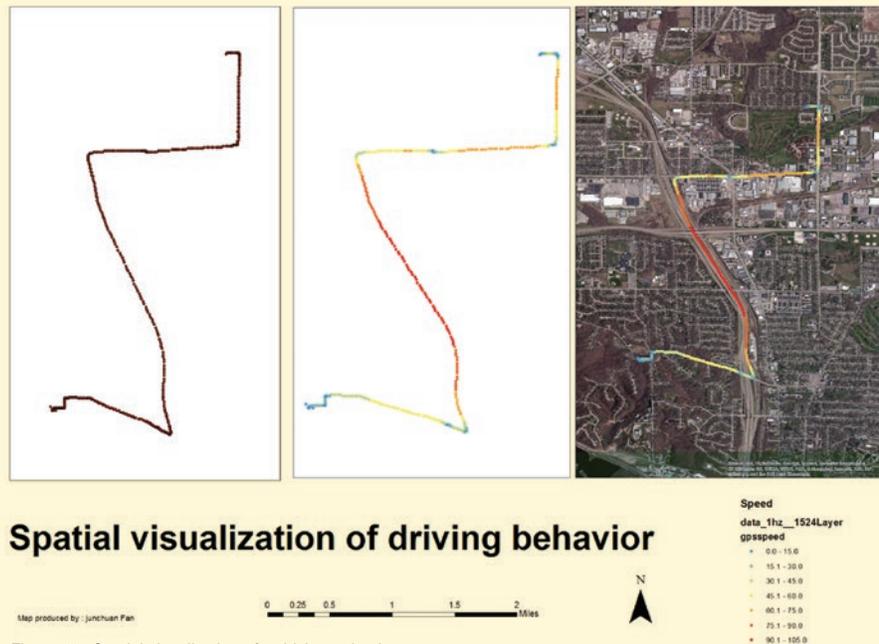


Figure 20. Spatial visualization of a driving episode



The researchers will continue the spatial visualization in GIS to develop the ontology of parking behaviors. The second year will focus on street parking and parking ramps. An instrumented vehicle owned by NADS will be utilized to collect additional data as needed to fill gaps in the naturalistic data. With the ontology complete, new data analysis and algorithm exploration with machine learning techniques will commence at NADS to make use of vehicle location and trajectory data and discovered parking classifications to develop elements of a system that could be used to detect UA events.



LOOKING FORWARD

The University of Iowa and program partners are anticipating an exciting year ahead. The team will complete development of videos and messaging, the online game, mobile application and website, and will then focus on the public launch of the campaign.

The National Survey will continue efforts on a targeted survey to consumers with the advanced vehicle safety technologies. The targeted survey focuses on developing an understanding of what motivates consumers with these technologies to seek information regarding their vehicle. Additionally, the data are expected to offer perspective into how consumers perceive the safety technologies in their new vehicle.

The National Education Campaign will continue to develop key messages, videos, and interactives that will be featured and available to the public during the campaign. The National Education Campaign will select a PR agency to assist with the media campaign launch. The program team anticipates an exciting year as the campaign begins to go public. The campaign is expected to reach the driving public with a total of 2.5 billion impressions in Years 2 and 3.

The research projects are now at the point where they will begin to collect data for the concepts they are exploring. From enhanced warning system concepts, to a better understanding how older drivers deal with technology, these projects will enhance our knowledge about automotive safety systems and driver performance/behavior.

Most importantly, the University of Iowa will continue to make connections with safety networks such as government agencies and non-profits to sustain the viability of the program and promote the overall campaign. The University of Iowa is excited to continue to build upon the great foundational work that has already been accomplished for this campaign and to make significant strides in the field of vehicle safety technologies.

University of Iowa Transportation and Vehicle Safety

The Transportation and Vehicle Safety Research (TVSR) program works to improve technology design through a better understanding of human behavior and safety system design. The challenge is to match user needs with the optimal solutions—technological or otherwise.



MyCarDoesWhat.org

Know More. Drive Safer.



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