

**Department of Transportation
National Highway Traffic Safety Administration
Information Collection Request Supporting Statements: Part A
Distraction: Modern Voice Command Interfaces
OMB Control No. 2127- (New or assigned number)**

Abstract:¹

The National Highway Traffic Safety Administration (NHTSA) is proposing new research involving the collection of information from the public to understand the effects of voice command interfaces (VCIs) on driver performance, distraction, and cognitive workload via a driving simulator study. VCIs allow drivers to verbally request actions (e.g., send a text) or information (e.g., what is the weather forecast for today), which can be initiated with either a spoken phrase (e.g., “Hey Google”) or button presses. This study will compare VCI use to visual-manual interface use, particularly during safety-critical driving situations. A visual-manual interface refers to any system where a user interacts by looking at something (visual) and manipulating it with their hands (manual). Driver performance, distraction, and cognitive workload will be assessed using data collected from a driving simulator, eye tracker, electrocardiogram (ECG), and tactile detection response task (TDRT). The overall objective of this information collection request is to advance the state of knowledge regarding the use of VCIs in vehicles by comparing common tasks executed across different VCI systems, and across different input methods (VCI vs. visual-manual input).

Westat is the contractor leading this effort, and they will be working with a partner, Dynamic Research Inc. (DRI). All procedures will be approved by the Institutional Review Board (IRB) at DRI. Data collection will involve human subjects operating DRI’s driving simulator and will begin upon receipt of PRA clearance and final approval from DRI’s IRB. DRI’s driving simulator provides a safe and controlled environment for testing production vehicles. Its modular design allows for easy swapping between different vehicle makes and models, facilitating comprehensive evaluations. The research involves a single study session, during which participants from the general population will complete a series of drives in a driving simulator. Drivers’ interactions with six VCI systems will be evaluated (e.g., Apple CarPlay, Android Auto, Google Built-In, and three OEM systems) across four vehicles. Participants will be recruited based on which vehicle and system they use when they drive (e.g., Android Auto in a Honda Accord) and will complete their session using that same vehicle (or very similar vehicle) and system. Participation is voluntary with a monetary honorarium provided to participants.

Vehicles and their available systems, as well as the VCI capabilities, may change year to year. Therefore, the specific vehicles and OEM systems will be selected after PRA approval and will be based on an annual technology scan assessing changes in VCI capabilities in production vehicles. None of the elements of the study affecting participant burden (e.g., number of drives or tasks performed) will be changed.

Participants will complete a series of nine drives (in one vehicle), consisting of a familiarization drive, seven drives where they will complete secondary tasks, and one drive involving a safety

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critical event (SCE). The familiarization drive will occur first, serving as practice for participants to drive the simulator. The order of the seven task drives will be counterbalanced to control for order effects. The SCE drive will occur last due to potential behavior changes after drivers experience a possible crash due to the SCE.

The familiarization drive is designed to help participants get accustomed to driving in the simulator. Although participants will be assigned to the system/vehicle that matches their own vehicle, the control of the vehicle may feel different from real-world driving, so it will take participants some time to acclimate. Therefore, before any data is collected, participants will complete a drive to gain familiarity and reduce any potential practice or learning effects.

The seven task drives will be comprised of six standardized task drives. The six standardized task drives will consist of three common task drives, where participants will perform common in-vehicle secondary tasks (e.g., navigation, music streaming, phone calls) while driving. Each common task will be performed once using VCI technology and once using traditional visual-manual interaction. The unique task drive will assess advanced vehicle-to-infrastructure features specific to that particular vehicle or system.

The final drive will be a Safety-Critical Event (SCE) drive, involving a simulated dangerous driving situation. During this drive, participants will be engaged in a navigation task to induce distraction. The task will be interrupted by a sudden, covered-to-revealed road obstruction that requires an immediate response.

A. Justification

1. Explain the circumstances that make the collection of information necessary. Identify any legal and administrative requirements that necessitate the collection.

Subchapter V of Chapter 301 of Title 49 of the United States Code (U.S.C.) authorizes the Secretary of Transportation to conduct “motor vehicle safety research, development, and testing programs and activities, including activities related to new and emerging technologies that impact or may impact motor vehicle safety.” 49 U.S.C. 30182. Pursuant to Section 1.95 of Title 49 of the Code of Federal Regulations (CFR), the Secretary has delegated this authority to the National Highway Traffic Safety Administration (NHTSA).

NHTSA was established by the Highway Safety Act of 1970 (Pub. L. No. 91-605, §202(a), 84 Stat. 1713, 1739-40). NHTSA’s mission is to save lives, prevent injuries, and reduce the economic costs of road traffic crashes through education, research, safety standards, and enforcement activity. To further this mission, NHTSA conducts research as a foundation for the development of traffic safety programs. Specifically, NHTSA is authorized at 49 U.S.C. 30182 to (1) conduct motor vehicle safety research, development, and testing programs and activities, including activities related to new and emerging technologies that impact or may impact motor vehicle safety and (2) collect and analyze all types of motor vehicle and highway safety data and related information to determine the relationship between motor vehicle or motor vehicle equipment performance and accidents involving motor vehicles and deaths or personal injuries resulting from those accidents.

As vehicle technologies advance, they have the potential to dramatically reduce the loss of life each day in roadway crashes. Alternatively, systems such as VCIs may not reach this potential or could potentially decrease safety by increasing driver distraction and cognitive workload while also decreasing driver performance. While some published research exists on VCI systems, much of it is based on older technology. Consequently, the impact of recent advancements in modern VCI systems, particularly those introduced in model year 2020 and beyond, remains largely unexplored. Additionally, findings from a literature review preceding this empirical effort indicate there is a gap between the VCI capabilities (i.e., tasks that can be performed) studied in research and those implemented in commercially available vehicles. VCIs allow drivers to verbally request actions or information, which can be initiated with either a spoken phrase (e.g., “Hey Google”) or a button press. To this end, the overall objective of this information collection request is to advance the state of knowledge regarding research differences in driver distraction, performance, and cognitive workload across VCI systems as well as across various task types. NHTSA is authorized to undertake collaborative research and development projects with nonfederal entities. This information collection supports the department’s strategic goal of safety.

2. Indicate how, by whom, and for what purpose the information is to be used. Except for a new collection, indicate the actual use the agency has made of the information received from the current collection.

This new information collection request seeks OMB approval for a study designed to investigate the impact of modern VCI systems on driver performance, distraction, and cognitive workload by drivers completing various tasks while driving a simulator. Previous research has not focused on the impact of VCIs on crash risk or response to a SCE. Knowing that driver distraction can cause motor vehicle crashes that result in both injury and death, the goal of the data collection is to contribute to the understanding of the potential impacts of using VCIs while driving. Westat, a prime contractor under NHTSA's Indefinite Delivery Indefinite Quantity (IDIQ) contract, will be responsible for the overall study design and oversight of execution. Westat will work in collaboration with their partner, DRI, to conduct the data collection and data validation effort, utilizing DRI's drive-in simulator.

Any information requested as part of this information collection request will be used by DRI and Westat researchers on behalf of NHTSA's mission and to aid in efforts to address research gaps related to the benefits or consequences of VCI use and the impact on safety. All study materials and procedures will be approved by the DRI Institutional Review Board (IRB). All participation is voluntary.

This study will be conducted within a fixed-base driving simulator located at the DRI facility. For this research, four vehicles will be instrumented and integrated into the simulator. Due to the potential technological advancement during the PRA approval process, the final four vehicles will be determined after approval, based on findings from an annual technology scan which will examine recent trends in VCI capabilities in production vehicles. For the data collection effort, we will assess six systems (e.g., Android Auto, Apple CarPlay, Google Built-In, and three OEM-specific systems). As noted previously, the systems will be selected after PRA approval so that they reflect the most current technology. The final sample will include 144 valid data sets: 24 participants per VCI system. Eligible participants will be limited to those who regularly use one of the selected VCI systems.

Based on recent studies, we anticipate some participant attrition before reaching our final dataset of 144.

- Eligibility Questionnaire Completion: We expect approximately 1330 individuals will complete the eligibility screener.
- Eligibility and Contacting Participants: From those eligible and meeting demographic criteria, we anticipate contacting approximately 198 individuals. This accounts for an expected 10 percent attrition rate between screener completion and session attendance.

- Simulator Sickness: We anticipate that approximately 10 percent of participants may experience simulator sickness and be unable to complete the session. To account for this, we plan to schedule 178 participants (for 160 to complete the session).
- Data Invalidity: We anticipate that an additional 10 percent of data may be invalid due to equipment malfunctions or participant noncompliance. Therefore, we plan to recruit 160 participants to achieve a final dataset of 144, allowing for the potential exclusion of invalid data.

We propose a two-fold approach to recruitment: (1) DRI's participant database and (2) social media posts. We anticipate 330 potential participants from DRI's participant database will complete the eligibility questionnaire, while approximately 1000 potential participants will complete the eligibility questionnaire from social media. All communication and forms will be approved by the DRI IRB.

Eligibility screening will be completed through an online questionnaire (NHTSA Form 2071: Eligibility Questionnaire) hosted by Voxco, a secure online survey administration platform. Form display and branching logic will ensure respondents see the minimal number of questions required to determine eligibility by ending the questionnaire early if criteria are not met at different points in time. The components include (1) a PRA statement informing participants about the rules governing federally funded research; (2) a privacy notice of data collected and used per California state laws; (3) consent for eligibility questionnaire and study introduction and description to inform participants about the study and specific data to be collected; (4) eligibility questionnaire to identify participants based on eligibility criteria; (5) general health questionnaire to identify potential health concerns that prevent participation; and (6) contact information for scheduling purposes.

The landing page of the questionnaire will contain a forced response question asking if the respondent is above 18 years old, then (if yes) branching logic will display the privacy notice, consent letter that contains the elements necessary for eligibility consent. Participants will provide consent to the online questionnaire when they answer "yes" to both the eligibility consent and study interest questions. These questions will be set to force response. Respondents who are not between the ages of 18 and 70 years old, who do not give consent to provide responses to the online eligibility questionnaire, or who are not interested in the study will be directed to a message thanking them for their time. Everyone else will be directed to complete the questionnaire. The questionnaire will ask potential participants about their ability to adhere to study requirements, driving qualifications, general health history, and information about their vehicle(s), as well as VCI systems used.

If criteria are not met, participants will be directed to a message thanking them for their time and telling them they are not eligible. If criteria are met, participants will be asked to provide their contact information and general availability for a study visit. They will be informed this would link their questionnaire responses to their name. If a participant

meets study criteria, a researcher will schedule the study session using NHTSA Form 2072: Scheduling Form. Participants will also be provided a link to NHTSA Form 2073: Pre-Study Materials to be completed before their study session, as well as a link to the specific vehicle manufacturer's privacy policy that will be relevant for their study session. Note that reading the privacy statement is optional per NHTSA's guidelines and was therefore not included in the burden calculations. The Pre-Study Materials packet includes a series of documents for participants to review and certain forms for them to complete prior to their study session, including (1) a privacy notice for describing types and purposes of data collection per California state law (read), (2) a confidentiality agreement to protect proprietary DRI information and technology (read and sign), (3) a copy of the informed consent for participant records (signatures will be obtained at the scheduled session), (4) a indemnification form to hold DRI harmless and allow participation in the study (read and sign), and (5) a general information questionnaire to collect participant information (i.e., mailing address, demographic information, health condition). All of these items will be completed in Voxco. Participants will receive a copy of the informed consent along with this survey link for their records.

Participants will be assigned to a study group based on responses to the vehicle information and VCI system block of questions in the online eligibility questionnaire. The information collected in the online eligibility questionnaire largely will not be used as data. An exception is the demographic and vehicle information blocks of questions. For participants who sign NHTSA Form 2075: Informed Consent Document at the study session, responses will be aggregated so we have information on the vehicles and driving history with those vehicles for participants who completed the study. Responses will not be tied to an individual and will not be kept for individuals who do not complete the study.

Approximately 48 hours before the study visit, participants will be sent a reminder email with information and reminders for their visit (NHTSA Form 2074: Appointment Confirmation Form), as well as links to NHTSA Form 2073: Pre-Study Materials and the specific vehicle manufacturer's privacy notice. Participants must refrain from alcohol and illicit or recreational drugs (e.g., cannabis) for the 12 hours preceding their study visit. The email also requests that participants verify they have no current illness symptoms or feel unwell and that they have experienced no changes to their health or mobility since completion of the Eligibility Questionnaire. Participants will also be reminded to complete NHTSA Form 2073: Pre-Study Materials, if they have not already, with a link to the survey.

A dedicated preparation room at DRI will serve as the starting point for data collection during scheduled sessions, providing the necessary equipment and a private setting for administering consent. Following the informed consent component, participants transition to the driving simulator. Throughout the in-person data collection event, all questionnaires and forms will be hosted on Voxco (an online survey administration platform) and administered on a tablet equipped with a keyboard cover that permits touch or traditional response entry, except for NHTSA Form 2075: Informed Consent

Document, which will be printed for participants to read and sign the day of their session. Study sessions will last approximately 2.5 hours.

The study visit will begin with participants completing NHTSA Form 2075: Informed Consent Document. A researcher will provide participants time to read the informed consent, will verbally review it, and will answer any questions before obtaining written consent. The researcher will then verify the form for accuracy (i.e., name is spelled correctly, form is dated appropriately) and then sign and date the consent. Participants will be provided a printed copy of the informed consent for their records.

Following consent, participants will be asked a series of yes/no questions to verify their answers from the online eligibility questionnaire and verify that their health criteria (e.g., no new, unexpected back or neck pain) has not changed and that they have not used any alcoholic recreational, or illegal substances in the last 12 hours (NHTSA Form 2076: Daily Health Survey). A researcher will then review the participant's driver's license. This includes confirming date of expiration (to ensure it is currently valid), date of birth (to ensure age eligibility), sex (to assist with balancing the sample), and restrictions (to confirm ability to drive research vehicles in the simulator). Participants whose driver's licenses have been expired for more than sixty days will not be permitted to continue and will be dismissed. They may be rescheduled if they renew their license while the study is still enrolling; otherwise, they will be deemed ineligible. If age criteria aren't met, or the license has an exclusionary restriction, participants will be sent home and will not be eligible to continue.

Participants will be escorted to the research vehicle and instructed on how to adjust the seat for optimal comfort. They will be instrumented with an electrocardiogram (ECG) to measure heart rate variability (HRV), eye-tracking glasses to record gaze and pupil data, and tactile detection response task (TDRT) sensors to measure cognitive workload. Next, participants will begin the training and driving component of the protocol. Training begins with information about the study, the vehicle, and system operation, as well as the TDRT training (e.g., how to respond to the TDRT), and details specific to the research vehicle the participant will drive (e.g., how to initialize the infotainment and VCI systems). After the training, a researcher will address any concerns and answer questions.

Participants will be given the opportunity to walk through the steps to activate the VCI and manual interface while in the DRI simulator. After this training, a researcher will address concerns and answer questions. Next, participants will complete a 4-minute familiarization drive. This period allows them to:

- Become accustomed to the research vehicle.
- Acclimate to wearing the ECG sensors and eye-tracking glasses.
- Practice responding to the TDRT system.
- Experience scenario elements similar to the study drive, such as driving within a simulated traffic environment.

After the familiarization drive, a researcher will address any concerns and answer questions.

Participants will complete a series of eight study drives. Seven study drives, called task drives, will consist of participants executing a secondary task while driving. Three secondary tasks, called common tasks, will be repeated twice, once with the VCI and once with the manual interface (summing to six of seven task drives). The seventh task drive will be a VCI task that is unique to the current system the participant is testing. Participants will undergo task training before each task drive, consisting of a brief explanation, followed by task practice. Participants must successfully complete each task three times before beginning the study drive. All task drives will be counterbalanced to control for order effects. The eighth and final drive is a safety-critical event (SCE) drive. During this drive, the participants will engage in a secondary task (navigation task). Half of the participants will complete this task using visual-manual controls, while the other half will utilize the VCI. While engaged in the secondary task, participants will encounter an unexpected SCE: a hidden reveal of a stopped vehicle. They must then respond appropriately to this critical event.

After each drive, participants will complete NHTSA Form 2077: Simulator Sickness Questionnaire to ensure they are well enough to continue driving. After participants have completed all the drives, they will undergo a debrief, receive their honorarium, and complete NHTSA Form 2079: Debrief to confirm payment for their participation.

Like the vehicles and VCI systems, we anticipate task availability and functionality to change throughout the PRA approval process. Therefore, the individual tasks will be finalized after the PRA approval process in conjunction with the annual technology review.

3. Describe whether, and to what extent, the collection of information involves the use of automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, e.g., permitting electronic submission of responses, and the basis for the decision for adopting this means of collection. Also, describe any consideration of using information technology to reduce burden.

The DRI registry, an electronic database of approximately 2,000 individuals who have expressed interest in participating in driving safety research or who have participated in previous studies at DRI, will be used to recruit participants. Participants will also be recruited by website/social media postings. Recruitment advertisements will direct interested individuals to an online eligibility questionnaire. For those who prefer assistance, the option to have a researcher administer the eligibility questionnaire over the phone will be available.

For those who complete the online eligibility questionnaire, data will be collected electronically via Voxco. The eligibility questionnaire will be accessible via a link and can be completed at the respondent's convenience; in addition, the respondent can leave and come back to the questionnaire if desired should something interrupt them.

Branching and display logic used in the questionnaire will reduce the need for respondents to skip questions on their own if they don't apply. Online eligibility screening was adopted to allow for flexibility for respondents and has been very well received in previous studies conducted at Westat and DRI.

Video, physiological, and driving performance data from the research vehicles and sensors are recorded and transferred to a DRI computer. Computer programs (e.g., MatLab and R) are used to reduce data to summary measures and to perform statistical analyses and generate results and figures.

4. Describe efforts to identify duplication. Show specifically why any similar information already available cannot be used or modified for use for the purposes described in Item 2 above.

As part of the earlier technology scan and literature review, VCI research studies within the last five years were systematically rated and catalogued. Many studies focused on the cognitive effects of driving with and without VCIs, with other studies adding secondary tasks such as radio tuning, or cognitive tasks such as the n-back, as well as comparisons between VCI tasks with the manual-input equivalent. One research gap is a lack of vehicles newer than the 2017 model year, meaning that little research exists about current VCI systems. Another pertinent research gap is the role of cognitive workload, which lacked precise operational definitions and theoretical frameworks, meaning that much of the work is unclear as to which underlying cognitive processes are being modeled. In addition, the literature review revealed that none of the research evaluated the impact of VCIs on crash risk or response to a safety critical event, and there was little consensus on which tasks were the most affected by VCI system use. These existing gaps in our understanding of VCIs underscore the critical need for this research effort.

The Privacy Notice is displayed to respondents twice, once for potential participants during eligibility screening, and once for participants who intend to participate in the study and schedule a session, per the California Consumer Privacy Act of 2018. Other critical questions pertinent to participant inclusion criteria (e.g., vehicle and VCI system type) or the state of participant health (e.g., new back/neck pain) are collected multiple times to ensure the participants can safely participate in the planned study.

5. If the collection of information impacts small businesses or other small entities, describe any methods used to minimize burden.

This collection of information will not affect small businesses or other small entities. Respondents are individuals who meet certain criteria and who volunteer for the study.

6. Describe the consequence to Federal program or policy activities if the collection is not conducted or is conducted less frequently, as well as any technical or legal obstacles to reducing burden.

The information collection covered herein will be collected once only.

As the agency responsible for prescribing and maintaining the standards for vehicle safety in the United States, NHTSA is constantly seeking objective data for use in basing decisions about how to best protect the road-traveling public and minimize deaths and injuries associated with motor vehicle crashes. Timely, accurate information on driver behavior and performance considering modern-day vehicle equipment and driver habits is essential to NHTSA's determining of the most appropriate recommendations and requirements for vehicle equipment and driving safety.

- 7. Explain any special circumstances that would cause an information collection to be conducted in a manner:**
- a. requiring respondents to report information to the agency more often than quarterly;**
 - b. requiring respondents to prepare a written response to a collection of information in fewer than 30 days after receipt of it;**
 - c. requiring respondents to submit more than an original and two copies of any document;**
 - d. requiring respondents to retain records, other than health, medical, government contract, grant-in-aid, or tax records, for more than three years;**
 - e. in connection with a statistical survey, that is not designed to produce valid and reliable results that can be generalized to the universe of study;**
 - f. requiring the use of a statistical data classification that has not been reviewed and approved by OMB;**
 - g. that includes a pledge of confidentiality that is not supported by authority established in statute or regulation, that is not supported by disclosure and data security policies that are consistent with the pledge, or which unnecessarily impedes sharing of data with other agencies for compatible confidential use; or**
 - h. requiring respondents to submit proprietary trade secrets, or other confidential information unless the agency can demonstrate that it has instituted procedures to protect the information's confidentiality to the extent permitted by law.**

NHTSA is requesting an exemption to the requirement at 5 CFR 1320.5(d)(2)(vi) to allow NHTSA to use a statistical data classification that has not been reviewed and approved by OMB. Specifically, NHTSA seeks to use the seven minimum categories for race and ethnicity in lieu of collecting more detailed information as specified in Statistical Policy Directive No. 15: Standards for Maintaining, Collecting, and Presenting Federal Data on Race and Ethnicity (SPD 15). Since NHTSA estimates that, at most, 160 individuals will participate in the research study, we do not anticipate having sufficient numbers of respondents in the detailed race/ethnicity categories to permit analysis with them. Additionally, because of the small sample size, we anticipate that much of the detailed race/ethnicity data would need to be suppressed in the final de-identified dataset in order to protect respondents' privacy. Therefore, we are requesting to use the seven minimum categories for race/ethnicity.

The collection does not require respondents to provide information more frequently than quarterly, nor does it involve written responses within fewer than 30 days of receipt. Additionally, respondents are not required to submit more than an original and two copies of any document, nor retain records beyond three years. All statistical surveys are designed to produce valid and reliable results that are generalizable to the study population. The study includes no pledges of confidentiality that are unsupported by statutory or regulatory authority, and no proprietary trade secrets or confidential information will be collected.

- 8. If applicable, provide a copy and identify the date and page number of publication in the Federal Register of the agency's notice, required by 5 CFR 1320.8(d), soliciting comments on the information collection prior to submission to OMB. Summarize public comments received in response to that notice and describe actions taken by the agency in response to the comments. Specifically address comments received on cost and hour burden. Describe efforts to consult with persons outside the agency to obtain their views on the availability of data, frequency of collection, the clarity of instructions and recordkeeping, disclosure, or reporting format, and on the data elements to be recorded, disclosed, or reported.**

A Federal Register notice with a 60-day comment period soliciting public comments on the following information collection was published on February 10, 2026 (91 FR 5984). NHTSA received a total of four comments from: Automotive Safety Council, CPAC Foundation Center for Regulatory Freedom, Consumer Reports, and Alliance for Automotive Innovation. The following excerpts summarize the key points submitted by commenters for NHTSA's consideration; all cited references have been removed for brevity. When applicable, to facilitate a clear mapping of the agency's response to the specific issues raised, the points are numbered to correspond with the numbered responses below.

The Automotive Safety Council (ASC) commented with support for NHTSA's planned research to determine the current state-of-the-art capabilities that Voice Command Interfaces (VCI) provide to vehicle drivers and passengers. ASC offered specific suggestions and questions for consideration in the research study.

Regarding the subject recruitment and sample size (1), ASC asked for the technical reason to exclude pregnant participants (a), if there are constraints concerning physical conditions which may affect subjects' voices (b), and if additional recruitment would be necessary to achieve the target sample size and maintain counter-balancing (c). The second point raised by ASC was in reference to the OEM vehicles included in the simulator, and how they would be presented (2).

A third question was related to the Safety Critical Event (SCE), whether a within-subject manipulation of the task modality (VCI vs. visual-manual) could be considered for that event (3).

They also questioned, since the hardware/software and audible path may be different for each system, how these differences will be accounted for in the study protocol and/or analysis (4).

The ASC suggested inclusion of driver reaction time and time-to-collision be measured and analyzed (5).

They also asked how the eyetracking visual areas of interest (AOIs) will be defined, and suggested NHTSA consider alignment with Euro-NCAP's driver engagement protocols (6).

Regarding assessment of cognitive workload (7), ASC asked two questions regarding TDRT: if there a potential concern about the added workload required (a) and if passive measures could also be used (b).

They also had a suggestion regarding task training, asking the potential benefit of block training of all tasks in one sequence (8).

Regarding study drives (9), ASC asked two questions: if the task used for the SCE will be selected randomly from the set of all trained tasks, or if the same task will be used for all subjects (a), and whether SCE task selection should be selected based on a general workload expectation (b).

Regarding drive duration (10), ASC asked whether (approximately) four minutes per trial is sufficient duration to allow subject immersion, leading to a naturalistic response, and whether multiple tasks be included in longer drives (b).

Finally, ASC also provided some suggestions regarding considerations for future research phases (11). They suggested that cases where the VCI fails to execute the intended task and/or executes the wrong task be considered (a), and to consider ambient and/or cabin noise factors in VCI performance (b).

Response:

NHTSA appreciates ASC's feedback on this topic. Many of the suggestions will be integrated into the full research and analysis plan. Regarding ASC's specific points:

1.
 - a. There will be a provision to exclude those who are pregnant due to the increased risk of simulator sickness.
 - b. There will be no constraints planned regarding health or physical conditions that affect the subject's voice, since these individuals are part of the general driving population.
 - c. Recruitment will continue until the target sample size and counterbalancing is achieved.

2. The full OEM vehicles will be included in the simulator environment with fully functional cabins.
3. To ensure data integrity, the safety critical event is designed as a between-subjects factor. Given the risk of a crash or significant event during the event, NHTSA are concerned about 'carryover effects.' If a participant experiences a strong emotional or behavioral reaction in the first session, particularly if a crash occurs, it will likely bias their performance in any subsequent sessions. Utilizing a between-subjects design allows us to obtain clean, unbiased data by preventing the adverse behavior and heightened awareness that follows a safety critical event. To ASC's point, NHTSA will ensure sufficient statistical power is achieved to make this comparison robustly as a between-subjects factor.
4. To account for hardware and software variations across tested systems—such as microphone orientation and voice amplitude, our analysis will include vehicle/system type as a predictor variable. Furthermore, the simulator provides a controlled environmental baseline, effectively isolating these system-specific differences by eliminating external variables like ambient background noise and engine interference.
5. NHTSA will incorporate this into the study design. The researchers will be collecting and analyzing metrics of driver performance including driver reaction time and time-to-collision.
6. The study defines Areas of Interest (AOIs) to include the instrument cluster, infotainment screen and controls, on road (including mirrors), and off-road locations. Eye-tracking data collected from this study will have sufficient quality to calculate long distraction and short distraction (VATS) as defined in the Euro-NCAP protocols, and NHTSA will consider the use of these variables in the analysis.
7.
 - a. The researchers do not anticipate that the TDRT will impose a significant secondary workload. The task is designed for minimal cognitive burden and will be applied consistently across all study conditions. This allows the TDRT to serve as a reliable baseline for comparison when no other secondary tasks are being performed.
 - b. While the researchers acknowledge the value of passive or subjective measures, the researchers have opted not to include additional one-item workload scales to minimize participant burden. Because the TDRT provides continuous, objective workload data, the researchers believe further repeated measures are unnecessary for the scope of this analysis.
8. The researchers have opted for individual task training over a blocked sequence to ensure mastery of the unique procedural steps required for each system. While block training may offer a more realistic 'mixed' scenario, it risks degrading task-specific proficiency. By requiring three successful trials per task, the researchers ensure that performance

results reflect a high level of competency with each individual interface before data collection begins.

9.

- a. The task selected for the safety critical event will be the same task across all participants and will be a repeated task from the earlier study drives.
- b. The task selected for the safety critical event is anticipated to be higher workload and has the longest task completion time, which also ensures the participant will be performing the task during the safety critical event.

10.

- a. The researchers have found that four minutes provides sufficient time for subject immersion. Research indicates that driving performance typically stabilizes within 30 seconds; by initiating tasks 1.5 to two minutes into the drive, the researchers ensure the participant has reached a steady state of naturalistic driving before the evaluation begins.
- b. The researchers have opted against combining multiple tasks into longer drives to preserve the integrity of the training protocol. Because each task requires specific, individualized training to ensure proficiency, keeping the trials separate prevents procedural confusion and ensures that the data reflects a clean interaction with each unique system.

11.

- a. The researchers share ASC's recognition of importance of tracking VCI reliability. For instances where the system fails to execute the intended task or executes an incorrect command, the researchers will formally document the occurrence. This data will be used to identify potential patterns or commonalities among specific tasks, command structures, or system types where failures are most prevalent.
- b. Regarding environmental factors, the current study is conducted in a controlled simulator environment without passengers. Consequently, ambient and cabin noise are not variables within the present scope. This controlled design effectively evaluates the VCI systems under near optimal conditions, which should reflect best on their intended use and design. Additionally, noise cancellation capability is anticipated to improve as these technologies develop, lowering the cost/benefit ratio of including ambient and cabin noise as additional variables in this study. Manipulating ambient and cabin noise as additional variables in this study would exponentially increase the study duration, burden on participants, and cost. However, these factors may provide valuable context for future real-world or high-fidelity environmental research. Researchers will note this issue raised by ASC in the final report.

The CPAC Center for Regulatory Freedom supported NHTSA's effort to better understand the safety implications of modern voice command interfaces, and also recommended careful attention to analytical discipline, real-world applicability, and the limits of inference.

CRF offered specific suggestions for consideration in the Research Study:

1. Interpret proxy measures of distraction and cognitive workload with caution.
2. Align all metrics with clearly defined, decision-relevant safety questions and avoiding unnecessary or low-value data accumulation.
3. Recognize the limitations of simulator-based research and avoid overgeneralizing findings.

In addition, CRF suggested that NHTSA interpret research appropriately when considering future rulemaking and guidance, and recommended some points; in summary:

4. Ensure that research findings are not used to justify prescriptive design mandates, technology-specific requirements, or de facto performance thresholds. Take a technology-neutral approach to future guidance. Ensure that early-stage research does not lead to premature regulatory hardening. Maintain flexibility in future policymaking by recognizing the evolving nature of both technology and the empirical evidence base.

Response:

NHTSA appreciates the Center for Regulatory Freedom's (CRF) specific suggestions for the research study, and has taken each into thoughtful consideration. Regarding some of the specific points:

1. NHTSA agrees that the relationship between proxy measures and safety outcomes is complex, and the researchers will highlight these limitations in the final report.
2. To ensure burden-to-utility discipline, the scope of this study is intentionally focused on a controlled comparison between voice-command and visual-manual task completion. This specific design allows for high internal validity and the isolation of driver performance variables, avoiding unnecessary data accumulation while directly addressing decision-relevant safety questions.
3. The researchers recognize that simulator environments have inherent limitations regarding real-world generalizability, environmental noise, and system latency. These factors will be clearly delineated in the final report to ensure findings are interpreted within the appropriate context. To prevent premature generalization, results will be situated within a broader evidentiary framework. NHTSA remains committed to a performance-based, technology-neutral approach that preserves flexibility for future innovation while contributing to the evolving body of empirical knowledge.
4. NHTSA appreciates CRF's comments. NHTSA maintains a technology-agnostic approach to rulemaking and guidance and considers robust research literature when doing so.

NHTSA also received suggestions from Consumer Reports regarding the Research Study. They stated, in summary, that the study will compare three common tasks performed through the VCI with the same tasks performed manually, along with one additional voice-only task, and that the notice also describes a simulator familiarization drive, but does not explicitly identify a baseline. They suggested that comparable baseline condition here could make the study more useful by providing a clearer benchmark for the voice and manual task comparisons.

They also suggested that the study should include a way to measure how demanding participants found each task, suggesting that a more subjective post-task workload assessment could provide useful additional context for interpreting such measures, and would allow NHTSA to evaluate whether participants' perceptions align with the observed effects.

Consumer Reports also explained that, while participants will use a voice command interface with which they are already familiar in a vehicle they drive regularly, and the study will document errors made during training before the task drives begin, the extra effort required to address and respond to a failed voice interaction may increase distraction and should be reflected in the protocol.

Response: NHTSA appreciates Consumer Reports' review and suggestions for the study. NHTSA acknowledges the importance of comparing secondary task performance against a baseline driving condition. To address this without increasing participant drive time, each individual trial includes a dedicated baseline period where no secondary task is being performed. These periods will be integrated into the final analysis, allowing for a direct, within-participant assessment of the magnitude of distraction relative to ordinary driving.

NHTSA recognizes the value of understanding participant perceptions of task demand. However, the current study is designed to prioritize objective, physiological, and performance-based indicators of workload. To maintain a strict burden-to-utility discipline and prevent participant fatigue, subjective questionnaires were deemed outside the immediate scope of our primary research questions. However, to incorporate Consumer Reports' suggestion, ad hoc, overt comments made by participants regarding workload will be noted but not solicited.

NHTSA acknowledges the importance of capturing driver errors and the challenges associated with VCI use. The current study is designed to capture frequent users of the system and includes training to ensure participants are proficient using the system, similar to owning the vehicle and using the vehicle for 3 months. This allows for an understanding of the impacts of using the VCI as intended to make more controlled comparisons to visual-manual tasks. While errors related to speech recognition and interaction failures are recognized as an important aspect of real-world use, the variability and inconsistency of such errors was considered out of scope for the present study. However, these concerns were addressed in a previous phase of this project, where

research staff novice to using VCI's completed an in-vehicle task analysis and documented the errors they experience when performing a much broader list of tasks. Findings from that effort will be documented and summarized in the final report.

Finally, Alliance for Automotive Innovation also offered several suggestions for consideration in the Research Study, these are summarized below:

1. They suggested that NHTSA provide more precise definitions of the study's objectives, as it is currently unclear whether the intent is to assess the overall effects of VCIs on driver inattention, compare how different system designs influence driver performance, or both.
2. Alliance for Automotive Innovation also encouraged NHTSA to offer more comprehensive details regarding the specific tasks selected within the study, including how it will account for differences in how study participants interpret task instructions during testing, accounting for variation in terms of familiarity with the test vehicle and their general use of VCIs, and the nature of the email subtask.

They also recommended that NHTSA consider including a post-test questionnaire as part of this study to capture drivers' self-reported assessment of both driving and secondary task performance, stating that this may also provide additional insights to help inform future research. In addition, the Alliance for Automotive Innovation requested more information on the safety-critical event (SCE) task and whether this will be consistent among all participants. In other words, while participants will be randomized to complete either a VCI task or visual-manual task during the SCE, the agency should specify whether these tasks will be standardized across all participants.

3. Alliance for Automotive Innovation encouraged NHTSA to provide additional details on the documentation and treatment of user and system errors throughout the study's driving scenarios.
4. "NHTSA should provide more information on the purpose of the driver performance data that it plans to collect during task drives and how this will be compared against "normal" baseline driving behavior." The Alliance also seeks clarification on the relevance of pupil diameter (PD) and heart rate variability (HRV) as cognitive workload assessment values.
5. Alliance for Automotive Innovation suggested NHTSA should perform further assessments to detect and mitigate any issues regarding the adequacy of the study's sample size.
6. Finally, Alliance for Automotive Innovation recommended that NHTSA maintain its collaboration with industry stakeholders.

Response: NHTSA appreciates the questions and suggestions offered by the Alliance for Automotive Innovation. While the 60-day notice provides a high-level summary of

research, many of the requested details will be specified in the full research and analysis plan, and we will fully take into account the provided input:

1. NHTSA has defined the primary objective of this research as understanding the impacts of VCIs on driver attention and other safety-relevant performance metrics. The study is specifically designed to evaluate the interaction between the driver and the interface rather than to serve as a comparative ranking of specific automotive brands. NHTSA acknowledges the inherent differences in hardware, software, and logic across various VCIs. To account for this variability and prevent system effects from confounding the results, vehicle type will be utilized as a predictor variable in our statistical models. This approach allows us to isolate the general effects of voice interaction while statistically controlling for the unique characteristics of each tested system.
2. The specific tasks included in the study will be finalized nearing PRA approval as the technology scan and task analysis components of this effort are updated annually to ensure the most recent vehicles and systems will be included in the final selection. For the study, there will be three common tasks that can be performed through voice commands and visual-manual input (e.g., navigation, text-messaging). All participants will complete task training prior to the task drives. The training will be specific to the system that is being tested. The task training will provide the participant with the pathway or voice commands required to complete the task, which will be specified in the final report. To account for differences in VCI use while driving, task training will require the participant to successfully complete the task three times before the drive to ensure proficiency. The selected tasks encompass varying levels of complexity, anticipated workloads, and completion times to demonstrate the full range of functions achievable via voice commands. While NHTSA recognizes the potential value of capturing participant perspectives on driving and secondary task performance, such subjective data collection is outside the current project scope. This exclusion is a deliberate measure to minimize participant burden and maintain focus on objective performance metrics. To ensure experimental consistency, the safety-critical event will remain identical for all participants. The study design balances participants across two conditions: completing the task via voice commands or through visual-manual input. Furthermore, the specific task associated with the safety-critical event will be uniform across all subjects and will consist of a task repeated from earlier drives. To incorporate Alliance for Automotive Innovation's suggestion, as mentioned above, ad hoc, overt comments made by participants regarding workload will be noted but not solicited.
3. NHTSA acknowledges the importance of understanding errors associated with voice commands. To incorporate this suggestion, errors and recovery tactics made during task training will be catalogued and summarized using descriptive statistics. Though, given that we are recruiting people who are familiar with these systems, it is possible there may not be enough errors to analyze in a robust manner. In addition, in an earlier phase of the project, the research team conducted a separate in-vehicle task analysis, where novice users performed the candidate tasks to identify and document potential errors. Findings from that effort will be documented and summarized in the final report.

4. NHTSA acknowledges the importance of specifying the driving performance metrics, and responsive to the recommendation, will be included in the final report. The measures collected in this study include standard deviation of lane position (SDLP), standard deviation of speed (SDS), speed differential (SDf), mean glance duration (MGD), total glance time (TGT), and the proportion of long glances (PLG) more than two seconds. Pupil diameter was included because it is a reliable indicator of cognitive workload (Zhang & Cui, 2022). Additionally, HRV was included as it has been shown to increase with perceived cognitive workload (Solhjoo et al., 2019).
5. The sample size was selected based on the 2013 Visual-Manual NHTSA Driver Distraction Guidelines for Electronic Devices, which provides task acceptance testing methods and participant sample size and demographics. In addition, to incorporate this suggestion to the research plan, a power analysis for the within-subject design and statistical model to be used will be conducted, raising confidence that the recruited sample size is sufficient. Detailed methods regarding the analysis will be included in the final report.
6. NHTSA thanks the Alliance for its recommendation to maintain collaboration with industry stakeholders. As part of an earlier phase of this project, the research team conducted interviews with industry representatives (OEMs and tier-one suppliers) to gather information regarding advancements in VCIs, design elements and feedback, error recovery, smartphone interface applications, and customer feedback. The summarized, anonymized findings from these interviews will be included in the final report. Based on Alliance's input, NHTSA will identify additional mechanisms of routine engagement with industry stakeholders throughout the study.

After thoughtful consideration of all the above comments, NHTSA will ensure that summaries of findings from task analysis and (anonymized) industry outreach phases of this research are included in the final report. These modifications do not yield material changes in the participant burden estimate from that which was published in the 60-day notice.

NHTSA published a notice in the *Federal Register* on XXXX (Volume XX, Number XX, pages XXXX-XXXX) with a 30-day public comment period to announce that NHTSA intended to forward the request for the proposed information collection to OMB.

Reference Comments if any provided.

9. Explain any decision to provide any payment or gift to respondents, other than remuneration of contractors or grantees.

The compensation rate for completion of the study was reviewed and approved by an independent Institutional Review Board. Respondents will receive no payment or gift for completion of the online eligibility questionnaire. NHTSA plans to provide monetary payment at a rate of \$60 per hour for study participation. Such compensation is consistent with normal experimental practice to compensate participants for their time and

encourage participation in research studies. According to the Midwest Information Office of the Bureau of Labor Statistics (https://www.bls.gov/regions/west/news-release/occupationalemploymentandwages_losangeles.htm), the local average hourly rate across occupations is roughly \$35, and the highest hourly rate is roughly \$83. We determined that \$60 per hour (resulting in a total payment of \$150 for 2.5 hours) is appropriate to recruit participants who meet specific recruitment criteria.

10. Describe any assurance of confidentiality provided to respondents and the basis for the assurance in statute, regulation, or agency policy. If the collection requires a systems of records notice (SORN) or privacy impact assessment (PIA), those should be cited and described here.

All data will be treated with sensitivity and security considerations commensurate with its level of confidential content. The DRI IRB will review all instruments, eligibility questionnaire, informed consent materials, and procedures to ensure that the rights of individuals participating in the study are safeguarded before recruitment can begin. The IRB is a specially constituted review body established to protect the welfare of human subjects recruited to participate in research.

As stated in NHTSA Form 2075: Informed Consent Document, no individual results or personal information will be published. Published documents will provide only summary statistics that cannot be used to identify an individual. Links between individual names and study numbers will be securely stored according to the provisions of the DRI IRB. Identifying information will not be transmitted to NHTSA. De-identified data may be placed in a central public repository to adhere to data sharing requirements.

11. Provide additional justification for any questions of a sensitive nature, such as sexual behavior and attitudes, religious beliefs, and other matters that are commonly considered private. This justification should include the reasons why the agency considers the questions necessary, the specific uses to be made of the information, the explanation to be given to persons from whom the information is requested, and any steps to be taken to obtain their consent.

No questions of a sensitive nature are involved in this information collection; therefore, no justification statements are necessary. Some screening questions address topics that are commonly considered private, such as health information. These questions are necessary to ensure respondents meet criteria for the study and as a safety precaution to screen for conditions that could prove dangerous to the respondent with respect to driving in the simulated environment (e.g., motion sickness). Health-related questions are posed in the respective eligibility questionnaires to ensure that the respondents could be considered of average driving ability, are healthy enough to safely participate in an experimental protocol, are not impaired in any way, and have no episodic health conditions that could manifest during their participation (e.g., seizure). Health information will be collected with yes/no questions.

The eligibility questions used for respondent screening are prefaced with a statement clarifying that responding is voluntary and that information will only be used for the purposes of study recruitment. The responses to these health history questions are not recorded or reported on in the final dataset but are used as a screening tool. The information for all respondents will be kept through recruitment until data collection is complete. The information is deleted once data collection is confirmed as complete. An exception is the responses to the demographic and vehicle information set of questions contained within the eligibility questionnaires, which will be kept for respondents who enroll into a study visit. These responses will be aggregated in any reporting. These questions are necessary to quantify the driving experience of participants who enroll and to assign them to the appropriate study group. For individuals who did not meet criteria, name and contact information is not collected, so sensitive information is not tied to an individual. Data is collected via Voxco and securely stored on servers hosted by DRI.

12. Provide estimates of the hour burden of the collection of information on the respondents and estimates of the annualized labor cost to respondents associated with that hour burden.

This collection of information is time for an individual rather than costs to a company paying labor costs, so cost calculation is for an unloaded wage opportunity cost. To calculate the opportunity cost associated with the forms and other relevant activities necessary for this collection of new information, NHTSA looked at average hourly earnings for employees on private nonfarm payrolls (civilian workers). NHTSA estimated the total opportunity costs associated with these burden hours by looking at the average wages and salaries for total private employees on private nonfarm payrolls. The Bureau of Labor Statistics (BLS) estimates that the average hourly wage for this group is \$35.69.² Therefore, NHTSA estimates the total opportunity cost associated with the 637 burden hours to be \$22,741. As all data collection will take place in one year, the annualized cost is the same as the total cost. Standard rounding rules were applied at each step of the calculations.

The following estimates of burden are calculated by summing the time to complete survey questions and the time to read associated forms. The time to complete survey questions is based on our recent survey experience, finding that participants complete an average of 7 questions per minute, and therefore dividing the number of questions by 7 returns an estimate of the time needed to answer survey questions. The time to read forms is calculated by taking the number of words in a form and dividing by the average

² See Table B-3 Average hourly and weekly earnings of all employees on private nonfarm payrolls by industry sector, seasonally adjusted, for December 2024, available at <https://www.bls.gov/news.release/empst19.htm> (accessed January 15, 2025).

reading speed (238 words per minute³). Table 1 provides a summary of the total estimated burden hours and labor costs associated with those submissions.

The information collection components for this research and the information desired are listed below. Attrition rates of 10 percent were estimated at various steps of the recruitment and study procedure and can be seen below in Table 1.

Attrition rates for this study are based on prior researcher experience and recent DRI (Driving Research Institute) studies. These studies, which utilized similar recruitment methods and eligibility criteria, indicate that approximately 10 percent of scheduled participants do not show up for their appointments. Participants may experience simulator sickness due to various factors related to the driving simulator (e.g., visual fidelity, cockpit motion) and the driving environment (e.g., vehicle speed, rapid movements). Based on researcher experience with the chosen driving simulator and environment, it's anticipated that 10% (n=18) of participants will be unable to complete the experiment due to simulator sickness.

- **NHTSA Form 2071: Eligibility Questionnaire**—This questionnaire establishes whether participants are eligible to participate. The components include (1) a PRA statement informing participants about the rules governing federally funded research; (2) a privacy notice of data collected and used per California state laws; (3) consent for eligibility questionnaire and study introduction and description to inform participants about the study specific data to be collected; (4) eligibility questionnaire to identify participants based on eligibility criteria; (5) general health questionnaire to identify potential health concerns that prevent participation; and (6) contact information for scheduling purposes. To participate in the study, individuals must have experience with the system/vehicle, have normal or corrected-to-normal hearing, be 18-70 years old, meet specific vision requirements (e.g., wear contacts while driving), be fluent in English, possess a valid driver's license, drive a predefined number of miles per year, have the ability to participate in the study for 2.5 hours, abstain from alcoholic, recreational, and illicit substances for 12 hours before the session, have no medical conditions that limit or restrict driving and lack of motion sickness, require no special driving equipment, have no history of seizures within 6 months, not be taking sedatives or psychotropic medications, have a valid social security number or tax identification number, and are not pregnant. Among those deemed eligible, we will ensure a balanced representation of ages and sex. We anticipate 330 responses from DRI's driver database and 1000 responses from external sources (e.g., social media), with an average completion time of 10 minutes.
- **NHTSA Form 2072: Scheduling Form**—This form is required as it serves to establish potential participant interest in participating and scheduling a session. The data collected consists of the participant's name, study date and time. This is an email sent to eligible participants to confirm their interest in participating in the study. We anticipate contacting 198 potential participants to schedule a session, of which 178 (10 percent

³ Brysbaert, M. (2019). How many words do we read per minute? A review and meta-analysis of reading rate. *Journal of Memory and Language*, 109, 104047. <https://doi.org/10.1016/j.jml.2019.104047>

attrition based on recent research experience) are expected to follow through to form completion and session scheduling. We anticipate 6 minutes to complete scheduling. This includes 1 minute to read the email and an average of 5 minutes to review their schedule and select timeslots. A link to the vehicle's manufacturer privacy policy per NHTSA's connected vehicles recommendation is provided. Participants are not required to review it, so it was not calculated into the burden estimate.

- **NHTSA Form 2073: Pre-Study Materials**—This form is required as it provides participants with (1) a privacy notice for describing types and purposes of data collection per California state law (read), (2) a confidentiality agreement to protect proprietary DRI information and technology (read and sign), (3) a copy of the informed consent for participant records (signatures will be obtained at the scheduled session), (4) an indemnification form to hold DRI harmless and allow participation in the study (read and sign), (5) a general information questionnaire to collect participant information (i.e., mailing address, demographic information, health condition). Participants will also receive a copy of the informed consent for their record. We anticipate that it will take 9 minutes to read and complete the pre-study materials that will be administered to all 178 participants.
- **NHTSA Form 2074: Appointment Confirmation Form** —This form is required to remind participants of their scheduled study session, which will be emailed 48 hours before the appointment. The email is anticipated to take 1 minute to read and will be sent to all 178 participants. Participants will be asked to respond to the email confirming their attendance, and a researcher will collect their response and store it for reference before the study session. This information will consist of the participant's name, whether they affirmed attendance, and an alternative study session date and time if necessary. This email contains the link to the pre-study materials (see above) and a reminder that they must be completed before the study. A link to the vehicle's manufacturer privacy policy per NHTSA's connected vehicles recommendation is provided. Participants are not required to review the manufacturer privacy policy, so it was not calculated into the burden estimate.
- **NHTSA Form 2075: Informed Consent Document**—This form is required as it provides the participants with the description of the study, informs the participants of their rights during the study, and obtains written informed consent. The informed consent document will be printed on paper for participants to physically sign at the beginning of their session. We expect the informed consent process to last 17 minutes.
- **Intake Procedures** — The intake process is required to ensure participant information for compensation, as well as review the driver's license to confirm validity, confirm the driver's age, review eligibility status, and confirm demographic information to aid in balancing demographics across conditions per NHTSA's guidelines. Furthermore, a daily health survey is collected to ensure the participant is feeling well enough to participate. Finally, participants will complete the simulator familiarization drive to familiarize themselves with driving the simulator, ensure they can adequately control the vehicle, and do not experience simulator sickness. The subcomponents of burden can be seen below. The entire procedure (as seen in Table 12 below) is anticipated to take approximately 21 minutes.
 - **Eligibility Confirmation** —A subcomponent of this process, which is required, is to verify the participant's demographic information (i.e., age and sex) via their

license to ensure proper balancing of experimental conditions. This subcomponent is expected to take approximately 2 minutes.

- o **NHTSA Form 2076: Daily Health Survey** - A subcomponent of this process will contain a daily health survey that will be administered to ensure participants are feeling well enough to participate. We anticipate this subcomponent will take 3 minutes to complete.
- o **Simulator Familiarization Drive**—This subcomponent is necessary for preparing participants for driving in the simulator. Simulator driving may feel different from regular driving and requires an adjustment period to successfully control the vehicle. Additionally, participants who experience simulator sickness can withdraw from the study. Before entering the vehicle, participants will receive training on the operation of the vehicle, VCI and manual interface systems, as well as the Tactile Detection Response Task (TDRT), which is expected to last approximately 10 minutes. Participants will then enter the vehicle and receive additional training lasting about 2 minutes. Next, participants will complete a 3-5-minute (4-minute average) familiarization drive to practice driving and responding to the TDRT. Training on the operation of the vehicle and the familiarization drive will take approximately 16 minutes to complete.
- **NHTSA Form 2077: Simulator Sickness Questionnaire**—This form is required to ascertain whether participants feel well enough to continue after the simulator familiarization drive and subsequent study drives (administered 9 times). We anticipate that 18 participants will experience simulator sickness and will withdraw from the study, returning a sample size of 160 participants who complete the study session. The SSQ is important to administer after the last drive because some participants may feel motion sickness due the SCE and would require monitoring from study staff until the symptoms pass. The SSQ is anticipated to take 2 minutes to complete (16 questions).
- **Data Collection Activities** – This process is required because it contains the information necessary to answer NHTSA’s research questions. It is composed of three subcomponents: task training, study drives, and a task novelty assessment form. Each subcomponent is discussed in greater detail below. The subcomponents of burden can be seen below. The entire procedure (as seen in Table 12) is completed 8 times as is anticipated to take approximately 9 minutes per trial, resulting in overall completion time of 72 minutes.
 - o **Task Training**—Before each task drive, participants will receive verbal training on how to complete the task from the research staff. This is necessary because participants may not initially comprehend the task, inhibiting task completion and therefore estimates of distraction and cognitive workload. Participants will complete practice trials in the vehicle. Three trials must be completed successfully before participants complete the associated task drive. This subcomponent is anticipated to take 4 minutes to complete per trial, for a total completion time of 32 minutes.
 - o **NHTSA Form 2078: Task Novelty Assessment** – After training, but before the drive, a single item form entitled Task Novelty Assessment will be administered to assess the frequency of task completion in the participant’s daily drive. This subcomponent is anticipated to take 1 minute to complete per trial, for a total completion time of 8 minutes.

- o **Study Drives**—This set of procedures will be where the primary information collection takes place. Specifically, measures of driver performance, distraction, and cognitive workload will be collected via the driving simulator, TDRT, and physiological sensors (eye tracking and HRV). The study drives include eight drives that are made up of three common VCI task drives, three common visual-manual interface task drives, one unique VCI task drive, and one safety-critical event (SCE) drive. The task drives will be counterbalanced to control for order effects. Due to the potential behavior change post SCE, the SCE drive will occur last, with a covered-to-revealed road obstruction. The common tasks shared by VCI and visual-manual input will be tasks that are regularly completed in vehicles, as identified by the technology scan. The unique task drive will assess a task that many other systems cannot perform (e.g., sending an email in Apple CarPlay). Each drive is estimated to average 4 minutes per trial (with a range between 3 and 5 minutes), for a total completion time of 32 minutes.
- **NHTSA Form 2079: Debrief**—The debrief is necessary to explain the study purpose and procedures, as well as provide the participant an opportunity to ask questions. Participants will complete an honorarium form after the completion of the debrief. The debrief and honorarium confirmation is expected to last 5 minutes.

Table 1: Burden Estimates

NHTSA Form Number	Information Collection	Number of Respondents	Frequency of Response	Time per Response (Minutes)	Cost per Response	Burden Hours	Opportunity Cost
2071	Eligibility Questionnaire	1330	1	10	\$5.95	222	\$7,914
2072	Scheduling Form	198	1	6	\$3.57	20	\$707
2073	Pre-Study Materials	178	1	9	\$5.35	27	\$953
2074	Appointment Confirmation Form	178	1	1	\$0.59	3	\$106
2075	Informed Consent	178	1	17	\$10.11	50	\$1,800
2076	Intake Procedures (Eligibility Confirmation, Daily Health Survey, Simulator Familiarization Drive)	178	1	21	\$12.49	62	\$2,223
2077	SSQ	160	9	2	\$1.19	48	\$1,713
2078	Data Collection Activities (Task	160	8	9	\$5.35	192	\$6,848

	Training, Task Novelty Assessment, Study Drives)						
2079	Debrief (Honorarium Form)	160	1	5	\$2.97	13	\$475
Total						637	\$22,738

13. Provide an estimate of the total annual cost burden to respondents or record keepers resulting from the collection of information. Do not include the cost of any hour burden already reflected in the response provided in question 12.

There will be no start-up or record-keeping costs to respondents to obtain these data. Participation is voluntary, and no one will be required to participate. Respondents will be compensated for their time and effort for participating in the study procedures. The only cost burdens respondents will incur are costs related to travel to and from the research location. The costs are minimal and are expected to be offset by the honorarium that will be provided to the research participants. NHTSA estimates that each of the focus group participants will travel less than 30 miles one-way to the research location (60 miles round trip). Using the IRS standard mileage rate⁴ of \$0.70 per mile, each respondent is expected to incur no more than \$42.00 (\$0.70 x 60 miles) in transportation costs. Therefore, estimated burden costs are no more than \$7,476 (\$42.00 x 178 respondents).

14. Provide estimates of annualized costs to the Federal government. Provide a description of the method used to estimate cost, which should include quantification of hours, operational expenses (such as equipment, overhead, printing, and support staff), and any other expense that would not have been incurred without this collection of information.

The total estimated contract cost to the government for collection is \$946,668 (the total awarded contract value) and the annual estimated cost to the government for collection is \$236,667 (using a period of performance of 4 years).⁵

The estimated annual cost in terms of the Federal government's research study contract management time is approximately 40 hours for the Contracting Officer's Representative (COR) for the relevant contract task order and 8 hours for the supervisor. Using as an example a COR GS pay scale level of GS-14 Step 1, and a Supervisor GS pay scale rate

⁴ <https://www.irs.gov/tax-professionals/standard-mileage-rates> (accessed November 12, 2025)

⁵ This information collection request is the culmination of the previously completed and ongoing tasks, including: (a) literature and online scan; (b) structured interviews with fewer than nine individuals; (c) in-vehicle evaluations; (d) annual technology scans. All these tasks informed the design of the empirical research and therefore included in the total cost to the government.

of GS-15 Step 1, NHTSA estimates that the cost associated with those hours to be \$3,373.20 ($\$68.27 \times 40 \text{ hours} = \$2,730.80$; $\$80.30 \times 8 \text{ hours} = \642.40 ; $\$2,730.80 + \$642.40 = \$3,373.20$; GS locality Washington-Baltimore-Arlington, DC-MD-VA-WV-PA, and pay rates for year 2025). The estimated costs incurred by the Federal government relating to the administration and technical support for this information collection are based on the number of minutes needed to for the contractor to administer and process each question set and the number of respondents.

The total annual estimated cost to the Federal government (contract cost + GS hourly wage) is \$240,040.20 ($\$236,667 + 3,373.20$).

- 15. Explain the reasons for any program changes or adjustments reported on the burden worksheet. If this is a new collection, the program change will be the number of burden hours reported in response to question 12 and the entire burden cost reported in response to question 13. If this is a renewal or reinstatement, the change is the difference between the new burden estimates and the burden estimates from the last OMB approval.**

The collection of this information is associated with a new project. Therefore, there is no program change from an existing collection. As stated in Question 12, the annual burden time for this new collection is 637 hours, and the total opportunity cost for the collection is \$22,738.

- 16. For collections of information whose results will be published, outline plans for tabulation and publication. Address any complex analytical techniques that will be used. Provide the time schedule for the entire project, including beginning and ending dates of the collection of information, completion of report, publication dates, and other actions as applicable.**

Findings from the data collection effort will be compiled in a final report that will undergo agency review at NHTSA and will include an Executive Summary, Background, Introduction, Methodology, Results, and Conclusions sections.

The current plan is for a draft final report in early 2027 with publication of a final report and final briefing in late 2027. The final report will provide summary statistics and tables as well as the results of statistical analysis of the information, but it will not include any personal identifiable information.

- 17. If seeking approval to not display the expiration date for OMB approval of the information collection, explain the reasons that display would be inappropriate.**

NHTSA will display the expiration date for OMB approval on all recruitment and data collection materials.

18. Explain each exception to the topics of the certification statement identified in "Certification for Paperwork Reduction Act Submissions." The required certifications can be found at 5 CFR 1320.9.⁶

No exceptions to the certification are made.

In accordance with the requirement at 5 CFR 1320.9(g), the following statement will be provided to respondents. The specific burden amount in the statement will vary by form. Paperwork Reduction Act Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a current valid OMB Control number. The OMB Control Number for this information collection is 2127-XXXX (expiration date: MM/DD/YYYY). We estimate that it will take approximately 10 minutes to complete this form/questionnaire. All responses to this collection of information are voluntary. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to: Information Collection Clearance Officer, National Highway Traffic Safety Administration, 1200 New Jersey Ave, S.E., Washington, DC, 20590.