Report to Congress:
"Operations of the Council for Vehicle Electronics, Vehicle Software, and Emerging Technologies"

Prepared by the

U.S. Department of Transportation
National Highway Traffic Safety Administration

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This report is submitted in response to the request by Congress under the new five-year transportation reauthorization bill, the Fixing America's Surface Transportation Act (FAST Act). The FAST Act authorizes funds for Federal-aid highways, highway-safety programs, transit programs, and other purposes over fiscal years 2016 through 2020.

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ACRONYMS

DHS	Department of Homeland Security
FAST Act	Fixing America's Surface Transportation Act
GAO	Government Accountability Office
ISO	International Standards Organization
MAP-21	Moving Ahead for Progress in the 21st Century Act
NCMS	National Center for Manufacturing Sciences
NHTSA	National Highway Traffic Safety Administration
NIST	National Institute of Standards and Technology
USDOT	United States Department of Transportation

I. INTRODUCTION

On December 4, 2015, the President signed into law a new five-year transportation bill, the Fixing America's Surface Transportation Act (FAST Act). Section 24201 "Report on the Operations of the Council for Vehicle Electronics, Vehicle Software, and Emerging Technologies" states that:

> "Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Energy and Commerce of the House of Representatives a report regarding the operations of the Council for Vehicle Electronics, Vehicle Software, and Emerging Technologies established under section 31401 of the Moving Ahead for Progress in the 21st Century Act (49 U.S.C. 105 note). The report shall include information about the accomplishments of the Council, the role of the Council in integrating and aggregating electronic and emerging technologies expertise across the National Highway Traffic Safety Administration, the role of the Council in coordinating with other Federal agencies, and the priorities of the Council over the next 5 years."

This report responds to the FAST Act requirement that the Secretary submit a report to Congress on the Council's accomplishments, its roles in integrating and aggregating expertise across the National Highway Traffic Safety Administration (NHTSA) and coordinating with other Federal agencies, and its priorities over the next five years.

II. BACKGROUND

Vehicle Electronic Control Systems Complexity Trends

Automobiles have become vastly more complex over the last several decades in terms of the extent of their reliance upon electronic systems. Electronic systems in a typical passenger car now control dozens of features, from entertainment and navigation to active safety applications like anti-lock brakes, electronic stability control, automatic emergency braking, and lane keeping assist. Recent developments in the automotive industry suggest that the complexity and pervasiveness of such electronic systems in vehicles will continue to increase.[1] Research and development into automating safety-critical functions like braking, steering, and throttle – including systems that automate all three functions to enable full self-driving – continues to accelerate. Many of these emerging automotive electronic systems show potential to improve vehicle safety significantly by preventing or mitigating the severity of crashes. However,

[1] For a more in-depth assessment of vehicle electronic systems, see "Report to Congress: 'Electronic Systems Performance in Passenger Motor Vehicles'", National Highway Traffic Safety Administration, December 2015, http://www.nhtsa.gov/staticfiles/laws_regs/pdf/Electronic-Systems-Performance-in-Motor%20Vehicles.pdf

precautions must be taken to ensure that they do not also introduce new hazards. Safety-critical electronic control systems must demonstrate robust reliability in their operation as well as resilience in the face of cyber-attack attempts, especially as wireless communications are increasingly integrated into automotive systems. Alongside advances in automotive electronic systems, the pursuit of improved automobile fuel economy has driven an interest in automobile weight reduction strategies, which could include increased integration of lightweight plastic and composite materials into vehicle components.

MAP-21 Requirement to Establish a Council for Vehicle Electronics, Vehicle Software, and Emerging Technologies

On July 6, 2012 the President signed into law a two-year transportation reauthorization bill, the Moving Ahead for Progress in the 21st Century Act (MAP-21). This bill authorized Federal-Aid highway funds for highway safety programs, transit programs, and for other purposes. Section 31401 of MAP-21, "National Highway Traffic Safety Administration Electronics, Software, and Engineering Expertise" states that:

> "(a) COUNCIL FOR VEHICLE ELECTRONICS, VEHICLE SOFTWARE, AND EMERGING TECHNOLOGIES.—
>
> (1) IN GENERAL.—The Secretary shall establish, within the National Highway Traffic Safety Administration, a Council for Vehicle Electronics, Vehicle Software, and Emerging Technologies (referred to in this section as the ''Council'') to build, integrate, and aggregate the Administration's expertise in passenger motor vehicle electronics and other new and emerging technologies.
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> (2) IMPLEMENTATION OF ROADMAP.—The Council shall research the inclusion of emerging lightweight plastic and composite technologies in motor vehicles to increase fuel efficiency, lower emissions, meet fuel economy standards, and enhance passenger motor vehicle safety through continued utilization of the Administration's Plastic and Composite Intensive Vehicle Safety Roadmap (Report No. DOT HS 810 863).
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> (3) INTRA-AGENCY COORDINATION.—The Council shall coordinate with all components of the Administration responsible for vehicle safety, including research and development, rulemaking, and defects investigation.
>
> (b) HONORS RECRUITMENT PROGRAM.—
>
> (1) ESTABLISHMENT.—The Secretary shall establish, within the National Highway Traffic Safety Administration, an honors program for engineering students, computer science students,

and other students interested in vehicle safety that will enable such students to train with engineers and other safety officials for careers in vehicle safety.

(2) STIPEND.—The Secretary is authorized to provide a stipend to any student during the student's participation in the program established under paragraph (1).

(c) ASSESSMENT.—The Council, in consultation with affected stakeholders, shall periodically assess the implications of emerging safety technologies in passenger motor vehicles, including the effect of such technologies on consumers, product availability, and cost."

Establishment of NHTSA's Electronics Council

In recognition of increasing levels of complexity in vehicle electronic control systems that offer potential safety and efficiency benefits, but also introduce a range of new challenges, and also responding to the MAP-21 requirement, NHTSA established the Council for Vehicle Electronics, Vehicle Software, and Emerging Technologies (herein referred to as "the Council") in 2012 and developed the governing scope and operational principles for this group, which was captured in the Council's first charter.

The Council had its first meeting in December 2012 and has been guided by the following goals outlined in its original charter:

- Assess new and emerging technologies focusing on electronic control systems to identify and examine safety issues and the need for safety standards.
- Stay abreast of current developments in vehicle electronics and lightweight plastic and composite technologies through meetings with vehicle manufacturer/suppliers, outside researchers, and other stakeholders.
- Review and identify priority agency activities in the areas of vehicle electronics, vehicle software, and emerging technologies, including reviewing progress in addressing recommendations made by the National Academy of Sciences.[2]
- Facilitate recruitment opportunities for students interested in vehicle safety, focusing on vehicle electronics, vehicle software, and emerging technologies.

[2] "The Safety Promise and Challenge of Automotive Electronics: Insights from Unintended Acceleration (Transportation Research Board Special Report 308)," prepared by the Committee on Electronic Vehicle Controls and Unintended Acceleration, the Transportation Research Board, the Board on Energy and Environmental Systems, the Computer Science and Telecommunications Board, and the National Research Council of the National Academies, for the National Highway Traffic Safety Administration, 2012, http://onlinepubs.trb.org/onlinepubs/sr/sr308.pdf.

- Coordinate, communicate, and disseminate information on emerging technologies throughout the Agency.

The Council meets five to six times per year and its membership includes NHTSA's Chief Counsel, Director of Governmental Affairs, Policy & Strategic Planning and representation from key career leadership positions within NHTSA's Vehicle Safety offices. The list below represents the latest composition of the Council, which has been updated over the years in response to organizational changes:

- Executive Director
- Chief Safety Scientist
- Associate Administrator for Rulemaking
- Associate Administrator for Vehicle Safety Research
- Associate Administrator for Enforcement
- Associate Administrator, National Center for Statistics and Analysis
- Chief Counsel
- Director, Governmental Affairs, Policy & Strategic Planning
- Director, Office of Defects Investigation
- Director, Office of Crash Avoidance Standards
- Director, Office of Data Acquisition
- Director, Office of Vehicle Crash Avoidance and Electronic Controls Research
- Director, Office of Crashworthiness Research
- Director, Vehicle Research and Test Center
- Director, Office of Vehicle Safety Compliance
- Director, Office of Odometer Fraud Investigation

The Council typically meets for 90-120 minutes, during which time it reviews the status of action items from previous meetings, receives briefings from NHTSA staff on priority activities related to the Council's role, and conducts open discussion followed by suggestions from Council members on topics for future meetings.

Primary roles of the Council

The Council's mission statement, as documented in its charter is:

> *Broaden, leverage, and expand agency expertise in motor vehicle electronics to continue ensuring that technologies enhance vehicle safety.*

The Council's charter emphasizes the nature of the group as a coordination, facilitation, and advisory body, not a research or implementation entity. Within its mission, the Council has served as a resource within the agency by providing input, recommendations, and cross-cutting expertise to agency activities related to emerging technologies and vehicle electronics.

The remainder of this report will highlight the Council's activities, accomplishments, and priorities over the next five years for broadening, leveraging, and expanding NHTSA's expertise in motor vehicle electronics to continue ensuring that technologies enhance vehicle safety.

III. ACCOMPLISHMENTS OF THE COUNCIL

The following sections highlight key accomplishments of the Council:

Developed and updated the Council charter

Upon its establishment in 2012, the Council drafted a charter to establish expectations for the duties and responsibilities of its members as well as clearly articulate the group's mission and goals. The Council has reviewed and updated this charter to reflect the group's evolving membership and responsibilities.

The Council established duties and responsibilities in alignment with the direction provided by Congress in MAP-21.[3] These duties and responsibilities include the following:

- Review and provide recommendations on key agency activities focused on broadening the agency's expertise in motor vehicle electronics, vehicle software, and other new and emerging technologies.
- Facilitate intra-agency coordination by holding regular meetings to discuss relevant agency work and emergent issues in the areas of vehicle electronics data, research, rulemaking, and enforcement.
- Facilitate external stakeholder coordination through information exchange meetings.
- Coordinate with the NHTSA Honors Recruitment Program as well as other programs (e.g., Science, Technology, Engineering, and Math education) to facilitate training and internship opportunities for students interested in vehicle safety.
- Review activities related to emerging lightweight plastic and composite technologies in motor vehicles to increase fuel efficiency, lower emissions, and meet fuel economy standards with a

[3] MAP-21, Division C, Title I, Subtitle D, Section 31401

specific focus on the Administration's "Safety Roadmap for Future Plastics and Composites Intensive Vehicles."[4]

- Periodically assess the implications of emerging safety technologies (e.g., risk assessments) in motor vehicles, including effects on consumers, product availability, and cost.
- Develop an annual list of priorities for the Council in alignment with NHTSA's "Priority Plan for Vehicle Safety and Fuel Economy."[5]

Oversaw and guided the development of report to Congress: "Electronic Systems Performance in Passenger Motor Vehicles"

MAP-21 established a requirement that the Secretary of Transportation (a) examine the need for safety standards with regard to electronic systems in passenger motor vehicles and (b) subsequently submit a report to Congress on the highest priority areas for safety with regard to electronic systems. The Council played a vital role in guiding the processes that led to the development of this report. The Council received periodic updates and provided input and feedback on an ongoing basis.

For example, the Council provided feedback on the development of the report's outline as well as guidance on the best approach to seeking public comments and incorporating public feedback into the report. NHTSA's process included the agency soliciting public input via a request for comments published in a Federal Register notice soliciting public input.[6] The public comment period for this RFC was open between October 7, 2014 and December 8, 2014. After incorporating feedback collected in response to the RFC, NHTSA submitted this report to Congress in January 2016.[7]

Provided input on the development and implementation of Honors Engineering Recruitment program

MAP-21 established a requirement that the Secretary of Transportation create within NHTSA an honors program for students pursuing degrees in engineering, computer science, or other vehicle safety-related fields.

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[4] "A Safety Roadmap for Future Plastics and Composites Intensive Vehicles," National Highway Traffic Safety Administration, Report No. DOT HS 810 863, November 2007, http://www.nhtsa.gov/DOT/NHTSA/NVS/Crashworthiness/Vehicle%20Aggressivity%20and%20Fleet%20Compatibility%20Research/810863.pdf

[5] Current version: "Overview of NHTSA Priority Plan for Vehicle Safety and Fuel Economy, 2015 to 2017," National Highway Traffic Safety Administration, June 2015, http://www.nhtsa.gov/staticfiles/nvs/pdf/NVS_priority-plan-June2015_final.pdf.

[6] Available at: https://federalregister.gov/a/2014-23805

[7] "Report to Congress: 'Electronic Systems Performance in Passenger Motor Vehicles'", National Highway Traffic Safety Administration, December 2015, http://www.nhtsa.gov/staticfiles/laws_regs/pdf/Electronic-Systems-Performance-in-Motor%20Vehicles.pdf

The Council directed NHTSA staff to work with the Office of Human Resources to develop a program to meet this MAP-21 requirement. The staff tasked with this effort frequently briefed the Council on its progress and solicited input at key decision points. The Council provided input on significant provisions of the program (eligibility, program administration, training and development, and after-program completion), provided guidance on targeting students, and informed human resources decisions that would help assign candidates within the program.

Student interns hired under this program have since worked in rotations in offices represented on the Council. The Council made it a priority for each office to host interns, assign them challenging tasks, and dedicate staff time to mentor and guide the students. The program has been greatly successful for the participating students based on their feedback; they received challenging rotational assignments, made meaningful contributions to agency priority areas, and understood and embraced the agency's safety mission. The program has also been successful for NHTSA because these engineering students brought in diversity of knowledge and mindset to the agency.

However, the program did uncover the difficulty of converting the honors interns into NHTSA employees in part due to salary offerings that are not competitive with industry. None of the honors interns converted to full time employees. Due to this fact, the Council is in the process of reevaluating the agency's approach to the Honors Engineering program. The original intent was to enhance agency's ability to attract, leverage, and retain a younger generation of engineering candidates with expertise in new and emerging fields such as cybersecurity. However, limitations on maximum compensation that could be offered to new graduates, combined with high private sector demand for qualified engineering graduates makes the retention objective difficult to achieve.

On the other hand, the agency believes that retention may not be the only success metric. We see the importance of expanding our reach to the newer generation, exposing them to our public service commitment and safety mission, positioning them to consider these values while they work in the private sector, and acquiring quality work from these individuals during their time with the agency are all successes. Given these objectives, the Council is assessing whether adjustments might be necessary and what the alternatives might be.

Identified and prioritized training topics to offer to NHTSA employees

Part of the Council's role, as directed by Congress in MAP-21, has been to integrate and aggregate electronic and emerging technologies expertise across the agency. In pursuit of this role, the Council has devoted time to identify and prioritize topics relevant to electronic systems and other emerging technologies for internal staff training. Members of the Council have identified more than a dozen

training seminar topics along with appropriate delivery methods and potential speakers. For example, the Council hosted training seminars in September 2014, with two sessions focused on the International Standards Organization (ISO) 26262 standard for functional safety of road vehicles, targeted at NHTSA's general vehicle safety staff. The Council also directed staff to identify and host a training session on advanced steering systems in 2016, which was completed in May 2016. Other topics identified through the Council's activities and under consideration for future sessions include technical briefings on automotive electronic systems, seminars on cybersecurity topics and the activities of external cybersecurity groups, tutorials on electronic systems safety evaluation methods, and briefings on other United States Department of Transportation (USDOT) programs relevant to emerging technologies and vehicle electronic systems.

Provided guidance to design, develop and test a carbon fiber B Pillar[8]

With guidance from the Council, in 2014 NHTSA awarded a $1.1 million contract to the National Center for Manufacturing Sciences (NCMS) to design, develop and test a carbon fiber B Pillar for a passenger vehicle. NCMS partnered with BMW and the University of Delaware Center for Composite Materials for this project. BMW has provided performance requirements for existing steel B Pillars. The University of Delaware provided material testing and prototype manufacturing expertise. To date this project has done extensive material characterization, crash simulation, design optimization, and is currently conducting part fabrication. This effort is an example of the Council's role in furthering research on emerging lightweight plastic and composite technologies in motor vehicles, and which is coordinated with all components of the Administration responsible for vehicle safety, including research and development, rulemaking, and defects investigations per MAP-21 Section 31401(a)(3).

IV. INTEGRATION AND AGGREGATION OF ELECTRONIC AND EMERGING TECHNOLOGIES EXPERTISE ACROSS NHTSA

A key role of the Council since its inception has been to integrate and aggregate expertise in automotive electronic systems and emerging technologies across NHTSA. The Council has fulfilled this role through two key groups of activities, discussed below.

[8] B-pillar is typically the second vertical post from the front of the car that supports the roof of the vehicle. The B-pillar plays a critical role to prevent roof crush during a vehicle rollover event.

Identified and prioritized topics for training, seminars, and briefings for NHTSA staff

As discussed in the previous section, the Council has identified and continuously refined a list of potential topics for training sessions, seminars, and briefings focused on building expertise within the agency in automotive electronic systems and emerging technologies. Members of the Council have organized sessions on the ISO 26262 standard for functional safety of road vehicles and advanced steering systems.

Provided guidance and feedback on agency projects, actions, and initiatives

Throughout the Council's existence, it has invited agency subject matter experts to brief the group on emerging areas of agency activity, major initiatives focused on automotive electronic systems and emerging technologies, and high-profile actions and issues. These briefings have served as opportunities both for Council input on the relevant efforts as well as building education and awareness among Council members on cross-cutting electronics and emerging technologies issues.

Topics of briefings to the Council have included recall data analysis pertaining to electronic systems and advanced emerging technologies, target crash populations for automated vehicles, vehicle cybersecurity, the keyless ignition rulemaking, and automated vehicle policy issues.

V. COORDINATION WITH OTHER FEDERAL AGENCIES

As part of its role in coordinating with other Federal agencies, the Council provided guidance on several NHTSA initiatives performed in conjunction with other agencies. The following sections provide brief summaries of these efforts and the Council's involvement:

Vehicle Cybersecurity Roundtable

On January 19, 2016, NTHSA hosted a vehicle cybersecurity roundtable event to solicit feedback from industry, the research community, and other Federal government agencies on needs for NTHSA support and guidance in securing vehicles against and mitigating the impacts of cyber-attacks. Staff responsible for organizing the roundtable briefed the Council several times on its approach and progress, offering opportunities for the Council to provide input on the meeting focus, desired outcomes, panelists, and invitees. Following the roundtable, staff briefed the Council on the details and outcomes of the event, which attracted over 300 participants from over 200 unique organizations, including 25 Federal organizations, 17 automotive manufacturers, and 13 professional associations. Many of the Council members attended this event in person. This was followed by a meeting with government cybersecurity experts such as from the National Institute of Standards and Technology (NIST) and the Department of

Homeland Security (DHS). NHTSA developed industry best practice guidance[9] for vehicle cybersecurity with input from its Federal partners.

Joint Release Public Service Announcement with the FBI

Council members provided review and feedback on a proposed public service announcement released by the Federal Bureau of Investigation (FBI) in March 2016.[10] The public service announcement focuses on the potential vulnerabilities of vehicle electronic systems to remote exploits and includes explanations of recently demonstrated intrusions. The announcement also presents resources to help consumers to stay informed about vehicle system cyber-vulnerabilities and provide information about the actions NHTSA is taking to improve the cybersecurity posture of vehicles in the United States.

VI. PRIORITIES OF THE COUNCIL OVER THE NEXT FIVE YEARS

The Council has identified the following six priorities to undertake over the next five years (calendar years 2016-2020). These are consistent with the agency's strategic objectives, and research and rulemaking priority plans. They are established based on their alignment with Council's core mission of focusing on emerging electronics and safety issues and the needs for intra-agency coordination. The Council periodically reviews its priorities and makes adjustments annually based on the topics brought to its attention.

Continue to broadly carry out Electronics Council activities

The Council will continue to meet on a bi-monthly basis and focus its discussions on the priority areas it will identify annually consistent with the Agency's published Priority Plan; namely, integrating and aggregating expertise in automotive electronic systems and other emerging technologies across NHTSA, and coordinating with other agencies. As part of administering its internal processes, the Council plans to assist in the development and maintenance of annual priority areas, periodically review and revise the Council charter, and document meeting discussions through meeting minutes.

Guide and oversee the implementation plans for relevant GAO recommendations

Several ongoing Government Accountability Office (GAO) investigations pertain to the Council's core focus areas. The Council expects to monitor recommendations made through GAO investigations that are aligned with the core mission of the Council. For example, the Council is guiding the implementation

[9] Cybersecurity Best Practices for Modern Vehicles, NHTSA, October 2016. Available at: http://www.nhtsa.gov/staticfiles/nvs/pdf/812333_CybersecurityForModernVehicles.pdf

[10] "Motor Vehicles Increasingly Vulnerable to Remote Exploits," National Highway Traffic Safety Administration and Federal Bureau of Investigation, 17 March 2016, http://www.ic3.gov/media/2016/160317.aspx.

plan for the sole recommendation made in the GAO investigation 542245 (Vehicle Cybersecurity)[11]. The Council will continue to assess recommendations from other investigations, identify those where it can facilitate intra-agency coordination in emerging technical safety areas, and oversee their expeditious implementation.

Review agency research priorities and upcoming policy decisions

NHTSA has explored potential actions in several areas related to automotive electronic systems and emerging technologies. The Council plans to be involved in reviewing and guiding a subset of potential agency research priorities and decisions particularly in the areas of automated vehicles, automotive cybersecurity, electronics reliability, lightweight materials.

Coordinate the implementation of the USDOT's vehicle cybersecurity program initiatives

The Council plans to coordinate the implementation of Department's vehicle cybersecurity program initiatives. As part of this effort, the Council will review and coordinate follow-up actions and recommendations identified through the 2016 Vehicle Cybersecurity Roundtable event. Event follow-up may include additional coordination with Federal partners, including other USDOT modes, NIST, the National Telecommunications and Information Administration, the Federal Trade Commission (FTC), and the DHS among others. The Council also plans to coordinate the development of a risk-assessment plan for automotive cybersecurity threats.

Provide guidance to safely integrate automated vehicle technology

The Council provided guidance to the development of the Federal Automated Vehicles Policy[12] guidance for highly-automated systems and expects to provide continued guidance on the implementation of next steps, and assist in addressing associated coordination needs across various stakeholders.

Focus on improved data collection mechanisms from real-world crashes

The Council recognizes data collection as a very important area to understand emerging technologies, their associated challenges, and to formulate informed actions to mitigate underlying issues. NHTSA recently developed new sample design and data collection elements as part of its Data Modernization Project. The new sample scheme was designed to include new model year vehicles which are more likely

[11] "Vehicle Cybersecurity: DOT and Industry Have Efforts Under Way, but DOT Needs to Define Its Role in Responding to Real-world Attack," United States Government Accountability Office, GAO-16-350, March 2016 http://www.gao.gov/assets/680/676064.pdf

[12] Federal Automated Vehicles Policy: Accelerating the Next Revolution in Roadway Safety, September 2016. Available at: http://www.nhtsa.gov/nhtsa/av/index.html

to be equipped with advanced crashworthiness and crash avoidance technologies. In addition, the investigation-based data collection program added data collection variables identifying crash avoidance equipment type, availability and activation. The Council expects the work on data collection mechanisms to be an area of continued priority over the next five years taking into account rapidly developing new automated safety technologies.

Continue to review and prioritize staff-level training and seminars

The Council plans to continue its work in identifying, prioritizing, and delivering training sessions and seminars for NHTSA staff on high-priority topics related to vehicle electronic systems and emerging technologies.

Continue plastics and composites research and outreach

In 2016, a carbon fiber B pillar was constructed and successfully demonstrated to manage the energy for a side impact crash. The final report on the material testing, modeling, design, and evaluation of the prototype B pillar has been provided to NHTSA, which is being evaluated by the agency. The Council will consider these findings and continue to guide the agency's future decisions over researching the use of lightweight materials in the construction of modern vehicles.

Identify hiring needs with respect to new technical skills

As a follow-on to the Honors program, the Council will continue to coordinate with both Budget and Human Resources to identify hiring needs and methods to attract and retain technically skilled employees in emerging areas such as electronics, software, cybersecurity, etc. The Council will also continue to provide guidance for the Honors Engineering Recruitment program.

VII. CONCLUSIONS

The Council has served as a valuable resource within NHTSA for the past four years, providing guidance and feedback on high-priority agency actions and initiatives. It also facilitates a venue for sharing agency expertise across offices and disciplines. Furthermore, the Council has cultivated expertise within the agency on automotive electronics and emerging technologies through its input on the establishment of an honors recruitment program in engineering and computer science as well as the development and initial implementation of a training agenda for agency staff on relevant and high-priority topics.

Over the next five years, the Council plans to build upon these initial efforts to further strengthen the agency's capacity to address safety challenges and opportunities presented by automotive electronic systems, advanced materials, and other emerging technologies.

VIII. SUMMARY

This report fulfills the requirement of the FAST Act, Division C, Title XXXIV, Subtitle C, Section 24201, which required NHTSA to report to Congress on the roles, accomplishments, and upcoming priorities of its Council for Vehicle Electronics, Vehicle Software, and Emerging Technologies. The Council was established under MAP-21 as a group charged with building, integrating, and aggregating NHTSA's expertise in passenger motor vehicle electronics and other new and emerging technologies; researching the inclusion of emerging lightweight plastic and composite technologies in motor vehicles; coordinating with groups throughout NHTSA; establishing an honors recruitment program for engineering and computer science students; and assessing, in consultation with internal and external stakeholders, the implications of emerging safety technologies in passenger motor vehicles.

This report on the Council for Vehicle Electronics, Vehicle Software, and Emerging Technologies documented its key accomplishments, discussed its role in both inter- and intra-agency coordination and skills aggregation, and defined the Council's priorities for the next five years. The Council plans to continue its coordination, facilitation, and guidance efforts towards ensuring the safety of automotive electronic systems and emerging technologies.