March 28th, 2024

Massachusetts Department of Transportation

Road Safety Request for Information

massDOT
Massachusetts Department of Transportation

CAMBRIDGE
MOBILE TELEMATICS

Cover Letter

Cambridge Mobile Telematics (CMT) is excited to present our response to the Massachusetts Department of Transportation's (MassDOT) Request for Information (RFI) focused on Movement Telematics. As the global leader in mobile telematics, we are uniquely positioned to offer innovative solutions to the pressing challenges faced by Massachusetts roadways, particularly in addressing unsafe driving behaviors and enhancing roadway conditions through advanced telematics.

MassDOT has clearly identified the urgent need to improve roadway safety in the Commonwealth, with a focus on reducing speeding, and distraction-related serious injuries and fatalities. The COVID-19 pandemic has exacerbated these issues, making innovative solutions more critical than ever. The RFI underlines MassDOT's commitment to a Safe System approach, emphasizing the importance of leveraging technology and collaboration to address roadway safety challenges.

Who We Are

CMT is at the forefront of the telematics industry, dedicated to making the world's roads and drivers safer. Founded, and continuously headquartered right in the heart of Cambridge's Kendall Square, CMT's cutting-edge DriveWell platform and suite of mobile telematics solutions analyzes trillions of data points from millions of drivers worldwide to provide actionable insights into driving behavior. Our technology enables us to detect and address unsafe driving practices such as distracted driving, harsh acceleration, and speeding, contributing to a significant reduction in road risks and accidents.

Our work with government agencies, municipalities, and private sector partners across the globe has demonstrated our capacity to implement scalable, effective solutions that enhance road safety. Our technology has been pivotal in designing interventions that not only reduce unsafe driving behaviors but also provide critical data for infrastructure planning and targeted safety campaigns. Our partnership with many state and local municipalities showcases our capability to utilize telematics data to identify and mitigate road safety risks in real-time.

In the past, CMT has partnered with the City of Boston, and Mayor Marty Walsh, to present citizens with Boston's Safest Driver. This program, while different from the opportunity outlined in this RFP, shows the significant impact telematics data can have on driving behaviors, and the actionable insights provided to the City of Boston.

Boston's Safest Driver 2016 and 2019 competitions drew approximately 7,000 participants in total, and contestants were scored using five metrics: speed, acceleration, braking, cornering, and cell phone distraction. 2019 drivers saw dramatic reductions in risky behaviors, including a 48% drop in phone distraction and a 38% drop in speeding. The previous 2016 Safest Driver contest saw similar reductions in risky behaviors: the largest jump being that 57% of drivers

reduced their frequency of hard braking, compared to 37% in the previous season. These insights and meaningful levels of behavioral change resulted in the recognition of Boston's Safest Driver as an overwhelming success story for Vision Zero Initiatives.

CMT's unique blend of technological innovation, industry expertise, and commitment to safety aligns with MassDOT's objectives to employ telematics for improving roadway safety. Our ability to provide granular, actionable insights into driving behaviors and road conditions positions us as an ideal partner to support MassDOT's Safe System approach. Moreover, our success in collaborating with diverse stakeholders, from local governments to global insurers, underscores our capacity to bring valuable perspectives and solutions to the table.

We are enthusiastic about the opportunity to collaborate with MassDOT in addressing the challenge of roadway safety through advanced telematics. Our response to this RFI outlines a comprehensive approach to leveraging telematics data for safer roadways in Massachusetts, highlighting our commitment to innovation, safety, and public well-being.

We look forward to the possibility of working together to create safer roads for the residents of Massachusetts and beyond. Thank you for considering Cambridge Mobile Telematics as your partner in this vital endeavor.

The CMT Team

The Cambridge Mobile Telematics (CMT) team stands as a significant differentiator in the telematics industry, driven by a unique blend of expertise, innovation, and dedication to road safety.

Today, CMT has the largest team in telematics, with over 450 employees globally. Comprising over 40 data scientists, analysts, and road safety experts, our team brings together a wealth of knowledge. This diverse expertise enables CMT to not only process over 1 trillion data points per day but also to translate this data into actionable insights for improving road safety. Our team's commitment to pioneering research and development has resulted in the creation of cutting-edge telematics solutions, setting new standards in driver behavior analysis, risk assessment, and crash detection. Through this unparalleled expertise, CMT continues to lead the way in making roads safer for everyone, distinguishing itself as a key partner for public sector agencies, insurance companies, and automotive manufacturers worldwide.

Key Personnel

Dr. Hari Balakrishnan, Co-Founder and CTO: Hari led the MIT CarTel project with Sam Madden, developing the award-winning technology that led to CMT. He is also the Fujitsu Professor of Computer Science and Artificial Intelligence at MIT. Before CMT, he co-founded StreamBase (TIBCO) and was a founding advisor to Meraki (Cisco). For his impactful

contributions to networks, mobile systems, and telematics, he was inducted to the National Academy of Engineering and the American Academy of Arts and Sciences, and received the Infosys Prize and the IEEE Koji Kobayashi Award. Hari Balakrishnan was awarded the 2023 Marconi Prize for his pioneering contributions to communications technology, including foundational work in network efficiency and the co-founding of Cambridge Mobile Telematics, which significantly advances road safety and driving behavior analysis.

Dr. Sam Madden, Co-Founder, and Chief Scientist: In addition to co-leading the CarTel project with Hari Balakrishnan, Sam is the College of Computing Distinguished Professor at MIT and the Director of BigData@CSAIL. He is known for contributions to the field of database systems, including highly-cited papers on managing sensor data, column-oriented databases, and databases-as-a-service. He was a co-founder of Vertica (acquired by HP).

Lakshmi Shalini, VP of Risk and Analytics: Lakshmi is an experienced executive with multiple roles relating to understanding risk and analytics. Prior to joining CMT in 2020, Lakshmi held notable roles at companies such as Verisk, S&P, and Deloitte. Lakshmi's Risk and Analytics team has been a core part of CMT's ability to analyze big data to provide meaningful, and actionable insights to our public sector partners.

Lisa Pinals, Ph.D., Principal Data Science: After joining CMT's Data Science team in 2020, Lisa's expertise from Columbia University and Tufts have elevated her role at CMT to Principal Data Scientist II. Lisa recently authored a research paper titled, "The Importance of Engagement in Safe Driving Programs." The study offers a comprehensive look at the crucial role user engagement in telematics programs plays in reducing road risk. It found that the riskiest drivers with the highest engagement reduced their likelihood of a bodily injury claim by 5.5%

Alex Kerin, Ph.D., Director of Business Insights: Alex began his Data Science journey as a student at Massachusetts Institute of Technology, where he studied Bioengineering. He went back to MIT's Sloan School of Management in 2019 to further his education in Business Insights and Machine Learning. Alex joined CMT in 2020 as our Leader of Data Science. His vast experience and keen understanding of business solutions resulted in his role's expansion to Director of Business Insights.

Richard Sharp, Ph.D., Senior Principal Data Scientist: Richard's experience in Data Science began as an undergrad at Northwestern, where he studied Mathematics, and led to his Doctorate in Philosophy in Computational and Applied Mathematics. This experience brought Richard to companies like Microsoft and Starbucks where he was integral in their Data Science results. Richard joined the CMT team in 2019, where he has since been an integral part of our team, and pioneered the analytics delivered to our Public Sector partners

In addition, CMT created the Road Safety Advisory Board to help us realize the mission of making the world's roads and drivers safer. We do this by directly measuring driving risk, helping insurers and other mobility partners incentivize safe driving, and sending emergency help after a crash.

Our research reveals the behaviors that lead to crashes, giving road safety officials the data they need to implement new policies and plans. The board's primary goal is to advise the CMT team on how to grow the impact of our life-saving technology, preventing crashes and minimizing their impact on society.

CMT's Road Safety Advisory Board consists of the following individuals:

Steve Kiefer, Chairman, Founder of The Kiefer Foundation: Steve Kiefer brings 40 years of automotive industry experience to CMT's Road Safety Board, with leadership positions at General Motors, including President of General Motors International, VP of Global Purchasing and Supply Chain, and President of Delphi Powertrain. After the tragic loss of his son Mitchel Kiefer to a distracted driver in 2016, Steve established the Kiefer Foundation in his memory. Since then, he has been appointed to Michigan's Governor's Traffic Safety Advisory Commission and honored with the Distinguished Service Citation from the Automotive Hall of Fame for his tireless efforts in promoting safer roads.

Ryan McMahon, Executive Sponsor, CMT: Ryan McMahon is the Senior Vice President of Strategy & Corporate Development at Cambridge Mobile Telematics (CMT), the world's largest telematics provider. Ryan joined CMT from the insurance industry, where he held several leadership roles, introducing new products and insurance services to personal and commercial markets. Ryan is a member of CMT's executive team, with responsibilities overseeing corporate development, government, and public affairs. Ryan holds a BA in Psychology from SUNY Potsdam and an MBA from Worcester Polytechnic University

Tim Vogel, Executive Sponsor, CMT: Tim is a committed leader in technology with a focus on the cybersecurity industry, providing expertise around Cloud Security, Privacy, Regulatory Compliance, and Business Operations. Tim is also an entrepreneur and executive with more than 20 years of experience helping organizations design and deploy secure technology and processes to meet their business objectives. He develops innovative & effective solutions to increase efficiency in organizations, both big and small. Since 2016, Tim has served as the CISO of Cambridge Mobile Telematics (CMT). In 2022 Tim expanded his role with CMT as the CIO while continuing to lead CMT in all facets of security, governance, compliance, and privacy. Tim previously founded Xtium, an early cloud provider before it was called cloud, in 2003, where he successfully led the company being acquired by Evolve IP. Tim is dedicated to the pursuit of safer roads and drivers, especially those related to distracted drivers. Tragically, Tim's father was struck and killed by a distracted driver in 2007.

Jennifer Smith, Board Member, Founder of Stopdistractions.org: Jennifer Smith's mother was a victim of distracted driving in 2008. Since then, she has dedicated her life to raising awareness and educating the public about the dangers of distracted driving. Through her non-profit organization, StopDistractions.org, she has supported families who have lost loved ones to distracted driving. Working with the National Transportation Safety Board, Smith has helped pass hands-free laws in 14 states since 2018. Her work has also helped enforce "no texting" laws in 49 states and hands-free laws in 29 states. Jennifer's dedication has been recognized by the US Department of Transportation, naming her a Woman in Transportation History, and by the United Nations.

Ricardo Martinez, Board Member, MD, FACEP: Dr. Ricardo Martinez, MD, FACEP, is a former administrator of NHTSA and serves on the Executive Committee of the Transportation Research Board of the National Academies of Science, Engineering, and Medicine. During his time at NHTSA, Dr. Martinez played a pivotal role in reshaping the agency's approach to traffic safety. Under his leadership, NHTSA recognized traffic safety injuries as a national public health issue and implemented major regulations for vehicle safety. His efforts resulted in the lowest traffic fatality rate, the lowest percentage of alcohol-related fatal crashes, and the highest seat belt and child safety seat usage in American history from 1994 to 1999.

Todd Shurn, Board Member, Howard University: Dr. Todd Shurn is a Howard University Computer Science associate professor and researcher. With over 30 years of experience, Dr. Shurn has made significant contributions to academia and industry. He has collaborated on many projects with world-class institutions, including Carnegie Mellon University, Morehouse College, and the University of Southern California. Dr. Shurn has also served as a consultant to Microsoft, the Washington Post, and the U.S. Army. He is currently researching smart mobility, which has been funded by the National Science Foundation. Dr. Shurn recently produced the Howard University Computer Science Faculty - Howard University Transportation Research Center AI forum "Detecting Distracted Driving."

Kathy O'Toole, Board Member, Partner at 21CP Solutions: Kathleen O'Toole is a partner at 21CP Solutions. She is an attorney and career police officer who served as Chief of the Seattle Police Department, Commissioner of the Boston Police Department and Massachusetts Secretary of Public Safety. She also served as Chief Inspector of the Garda Síochána, the Irish national police service. O'Toole also sits on the bipartisan advisory board of States United Democracy Center.

Civic Research Questions on Telematics:

The Massachusetts Department of Transportation (MassDOT) Movement Telematics "challenge" is an innovative call to action, aimed at harnessing the power of telematics to address and mitigate unsafe driving behaviors, improve roadway conditions, and optimize traffic signal timing and phasing across the Commonwealth. Recognizing that Massachusetts is a hub for leading telematics companies and world-renowned research universities, MassDOT invites novel submissions that leverage telematics data to enhance road safety. The civic research questions proposed in the challenge encourage participants to explore a variety of safety-related issues, ranging from the impact of distracted driving on land use to the potential for telematics data to inform driver education and infrastructure improvements. This challenge underscores MassDOT's commitment to a collaborative, data-driven approach to improving roadway safety, inviting ideas from across the globe that can provide new insights and actionable solutions for making Massachusetts roads safer for all users.

Based on the "challenge," CMT believes our solution can answer the following civic research questions:

1. Is there a geographic correlation between different types of poor driving behavior (speeding, distraction, harsh braking, etc.)?
2. How might we use telematics to inform traffic signal timing and phasing to improve safety for Vulnerable Road Users?
3. How might we use telematics information, such as driver distraction or seatbelt use, to inform driver education activities and campaigns?
4. What sustainability metrics (like fuel consumption) are you able to provide insight into that could also correlate to safety improvements?
5. Show us something unique about your work that would provide new actionable insight for MassDOT in helping us prioritize resources.
6. How would your tool support insights in both heavily populated areas and more rural areas in Massachusetts?
7. How could your tool be leveraged to support the work of cities and towns in making their roadways safer through annual construction project planning?

Is there a geographic correlation between different types of poor driving behavior (speeding, distraction, harsh braking, etc.)?

In response to the Massachusetts Department of Transportation's (MassDOT) civic research question regarding the geographic correlation between different types of poor driving behavior, such as speeding, distraction, and harsh braking, CMT appreciates the opportunity to delve into the intricate relationship between driving behaviors and their geographical patterns. We understand that this question seeks to uncover whether specific areas within the Commonwealth are more prone to certain unsafe driving behaviors and, if so, the nature of these correlations. This knowledge is critical for targeting interventions and resources effectively to enhance road safety.

Our analysis leverages the extensive dataset obtained from millions of miles of driving data collected through our DriveWell platform. By employing advanced data analytics and machine learning algorithms, we have analyzed patterns of driving behavior across Massachusetts. Our preliminary findings indicate that there are indeed significant geographic correlations between certain types of poor driving behavior and specific areas. For instance, urban areas with high-density traffic are more likely to report instances of harsh braking and distraction, likely due to the complex driving environment and higher interaction with pedestrians and cyclists. Conversely, speeding tends to be more prevalent on rural and suburban highways, where roads are designed for higher speed limits and drivers may feel more comfortable exceeding them due to lower perceived risk of enforcement or accidents.

Our analysis also reveals that environmental factors, such as road layout, signage visibility, and the presence of speed cameras or enforcement, play a crucial role in influencing driving behaviors geographically. This suggests that interventions aimed at improving road safety need to be tailored to the specific characteristics and challenges of different areas to be most effective.

CMT is committed to collaborating with MassDOT to further refine this analysis, providing actionable insights, on MA specific streets, that can guide the deployment of safety measures and public awareness campaigns and enforcement targeted at reducing poor driving behaviors. By understanding the geographic nuances of driving behavior, we can work together to design more informed and effective road safety strategies that address the unique needs of communities across the Commonwealth.

How might we use telematics to inform traffic signal timing and phasing to improve safety for Vulnerable Road Users?

In addressing the MassDOT's civic research question on utilizing telematics to inform traffic signal timing and phasing for the improvement of safety for Vulnerable Road Users (VRUs), CMT recognizes the critical nature of this inquiry. The question seeks to explore how telematics data can be strategically used to enhance the safety of pedestrians, cyclists, and other non-motorized road users through the optimization of traffic control measures. We understand the importance of this endeavor in creating safer, more inclusive road environments for all users.

At CMT, our approach to this challenge involves leveraging high-resolution driving behavior data, collected across a wide array of urban, suburban, and rural settings, to identify patterns and potential conflicts between motorized vehicles and VRUs. By analyzing data points such as vehicle speed, acceleration, braking patterns, and proximity to crosswalks and cycling lanes, we can gain invaluable insights into how traffic signals and their phasing might be contributing to or mitigating risks faced by VRUs.

One promising application of our telematics data is the dynamic adjustment of traffic signal timing based on real-time traffic conditions and VRU presence. For instance, extending pedestrian crossing times at intersections during peak pedestrian traffic periods or when telematics data indicates frequent harsh braking by vehicles, suggesting potential conflict points. Similarly, implementing leading pedestrian intervals (LPIs) where data shows high turning volumes that could endanger crossing pedestrians or cyclists.

Furthermore, CMT's telematics data can aid in the development of predictive models to anticipate periods of increased VRU activity, allowing preemptive adjustment of traffic signal phases to enhance safety proactively. This could include adjusting green light phases to slow down traffic at key times or altering signal timings to reduce vehicle idling and encourage smoother traffic flow, thereby reducing the risk of accidents.

CMT is enthusiastic about partnering with MassDOT to harness the power of telematics in making informed decisions regarding traffic signal timing and phasing adjustments. Our goal is to contribute to a safer, more responsive road network that prioritizes the safety and mobility of all users, especially the most vulnerable. By integrating telematics insights into traffic management strategies, we can create a more harmonious and safe coexistence between motorized vehicles and vulnerable road users throughout Massachusetts.

How might we use telematics information, such as driver distraction or seatbelt use, to inform driver education activities and campaigns?

In response to the Massachusetts Department of Transportation's (MassDOT) civic research question on leveraging telematics data to combat distracted driving, Cambridge Mobile Telematics (CMT) proposes two comprehensive solutions designed to target and mitigate this pervasive issue.

1. Implementation of Road Safety Analytics:

Our first approach involves the utilization of Road Safety Analytics to meticulously analyze and understand the prevalence and patterns of distracted driving across different road segments. By aggregating and analyzing telematics data, we can pinpoint specific areas where distracted driving is most frequent, identifying potential hotspots that pose a higher risk to road users. This granular insight allows for the development of highly targeted educational campaigns, focusing on the areas identified as high-risk. Educational materials can be tailored to address the specific contexts and challenges of each road segment, making the campaigns more relevant and impactful for local drivers. Additionally, this data-driven approach enables us to measure the effectiveness of these campaigns over time, providing valuable feedback for continuous improvement.

2. Partnership with local agencies for Safest Driver Contests:

Drawing inspiration from the success of the Oklahoma Challenge, our second solution focuses on establishing partnerships with local agencies to run long-term Safest Driver Contests. These contests leverage telematics data to engage the community in friendly competition, incentivizing safer driving behaviors, including a reduction in distracted driving. Participants can track their progress and see how their driving habits improve over time, fostering a sense of accountability and motivation to drive more attentively. By making safety a community-wide goal, these contests not only promote individual behavior change but also contribute to a broader cultural shift towards safer driving practices. Additionally, the data collected through these contests provides further insights into the effectiveness of different strategies to reduce distracted driving, enriching our understanding and informing future initiatives.

Together, these solutions offer a multifaceted approach to tackling distracted driving, combining the power of data analytics with community engagement to create safer roads for everyone in Massachusetts. By understanding the specific risk factors associated with different road segments and fostering a competitive spirit of improvement among drivers, CMT and MassDOT can work together to significantly reduce instances of distracted driving and enhance overall road safety.

Show us something unique about your work that would provide new actionable insight for MassDOT in helping us prioritize resources.

Unique Insights for MassDOT: Prioritizing Resources with Telematics Data

CMT proposes a novel approach to utilize telematics data to offer MassDOT new, actionable insights that can significantly contribute to prioritizing resources effectively for road safety initiatives. Our telematics data, derived from millions of drivers across the country, including Massachusetts, allows for an in-depth analysis of driving behavior, road risk, and the impact of environmental factors on driving safety. By understanding these factors, the MassDOT can proactively make data-driven decisions on what to prioritize, and why to prioritize those items, to prevent potential serious injuries and fatalities.

Experience and Expertise of the CMT Team
The CMT team brings over a decade of experience in harnessing telematics data for road safety. Our work has included partnerships with public sector agencies, research institutions, and over 110 global programs aimed at reducing road risk and enhancing driver safety. CMT's data science and analysis capabilities are unmatched in the industry, providing insights into driver behavior, vehicle dynamics, and road conditions.

Data Validation by IIHS
Our approach to analyzing distracted driving and its correlation with crash risks has been validated by the IIHS. This independent analysis confirmed that CMT's distraction data offers deeper insights than traditional methods, providing a more accurate picture of driving behavior and its impact on road safety. This validation underscores the reliability and effectiveness of our telematics data in contributing to road safety research and initiatives.

Broad Range of Data Sources
CMT's partnerships with numerous insurance partners who provide us with access to a vast array of telematics data. This extensive dataset includes information on driving behaviors such as phone usage, hard braking, and speeding, among others. Our ability to aggregate and anonymize this data ensures privacy while still offering valuable insights into patterns that can inform MassDOT's road safety strategies.

How would your tool support insights in both heavily populated areas and more rural areas in Massachusetts?

Extensive Coverage and Representation
In the past six months alone, CMT has gathered data from 98,356 unique drivers in Massachusetts, with approximately 45,000 unique drivers actively contributing data each month. This substantial dataset underpins our analysis and insights, ensuring they are representative of the driving population across the Commonwealth, by capturing over 2% of all licensed driver's annually. Our app's ability to run on nearly all smartphones significantly expands our reach, allowing us to collect data from a wide array of socioeconomic and geographic cohorts. This inclusivity is essential for generating insights that are both comprehensive and nuanced, enabling targeted interventions that cater to the specific needs of different communities.

Insights in Heavily Populated Areas

In urban and heavily populated areas, the dense concentration of drivers presents unique challenges, such as congestion, aggressive driving behaviors, and frequent interactions with pedestrians and cyclists. Our tool leverages the high volume of data from these areas to analyze patterns and identify hotspots of risky behaviors or incidents. This analysis can inform targeted safety campaigns, infrastructure improvements, and policy changes designed to mitigate risk and enhance safety for all road users. Furthermore, the rich dataset allows us to examine the effectiveness of existing interventions and adjust strategies as needed to achieve the best outcomes.

Insights in Rural Areas

Rural areas, while less densely populated, face their own set of challenges, including higher speeds, longer emergency response times, and roads that may lack the safety features common in urban settings. CMT's tool is equally effective in these environments, where our widespread user base ensures that we capture a significant sample of driving behaviors even in less populated areas. This data can reveal trends such as seasonal variations in driving patterns, the impact of road conditions on safety, and areas where the introduction of safety features or public awareness campaigns could yield substantial benefits. By identifying specific risks associated with rural driving, MassDOT can allocate resources more effectively, prioritizing interventions where they are most needed.

How could your tool be leveraged to support the work of cities and towns in making their roadways safer through annual construction project planning?

Cambridge Mobile Telematics (CMT) presents a telematics-based solution uniquely designed to augment the efforts of cities and towns in Massachusetts in enhancing roadway safety through strategic annual construction project planning. Our tool's profound impact is illustrated through past successful partnerships, where CMT's data-driven insights have significantly contributed to the prioritization, design, and implementation of safety-centric infrastructure projects.

Facilitating Data-Driven Decision Making

CMT's platform provides detailed, actionable insights into driving behavior, identifying areas where interventions could significantly reduce road risks. Through the analysis of speed patterns, hard braking incidents, and phone usage while driving, our tool pinpoints high-risk areas that may benefit from infrastructure improvements. This data-driven approach enables cities and towns to allocate their resources more effectively, ensuring that construction projects are targeted towards areas with the most significant potential for safety enhancement.

Enhancing Project Planning and Prioritization

In partnership with various municipalities, CMT has demonstrated how telematics data can revolutionize annual construction project planning:

- Urban Congestion Mitigation: In a densely populated city, CMT's data revealed a correlation between high levels of congestion and increased instances of harsh braking and acceleration, suggesting a need for improved traffic flow designs. The city used these insights to prioritize the redesign of several key intersections, introducing roundabouts and traffic-calming measures that significantly reduced crash rates and improved pedestrian safety.

- Rural Road Safety Enhancements: For a rural town, our analysis identified roads where drivers frequently exceeded speed limits, particularly in areas with limited visibility or high wildlife crossing activity. The town utilized these insights to implement targeted speed reduction measures, including dynamic speed signs and enhanced roadway lighting, drastically reducing the incidence of wildlife-related collisions.

- Seasonal Safety Adjustments: Leveraging CMT's ability to provide real-time data, one municipality identified seasonal variations in driving behaviors that contributed to higher accident rates during winter months. This insight led to the strategic timing of road maintenance and snow removal operations, significantly reducing winter driving hazards.

Supporting Equitable Infrastructure Improvements

CMT's tool has also been instrumental in ensuring that safety improvements are equitably distributed across communities. By analyzing data from a wide range of socioeconomic cohorts, cities and towns can identify underserved areas where road safety measures are most needed, promoting equitable access to safe transportation for all residents.

Streamlining Communication and Community Engagement

Our platform facilitates better communication between municipal authorities and the public. By sharing data-driven insights and safety improvement plans with residents, cities and towns can foster a culture of safety and encourage community involvement in road safety initiatives.

Telematics Services Provider Questionnaire

Demonstrate that you can conflate your data insights to MassDOT's road inventory file (see MassDOT Assets below) and to Open Street Map or describe in some detail the process required to do this for roadway segments and the estimated time involved to do so.

In response to the request from the Massachusetts Department of Transportation (MassDOT) for the demonstration of data conflation with MassDOT's road inventory file and Open Street Map (OSM), Cambridge Mobile Telematics (CMT) outlines our approach to integrating disparate data sources to enhance road safety analytics. This process leverages our extensive experience in navigating the complexities of road segment data across different mapping databases, ensuring compatibility and maximizing the value of insights derived from our telematics data.

Addressing the Challenge

Conflating data insights with MassDOT's road inventory and OSM is a challenge we have encountered and managed successfully in various jurisdictions. The primary issue in conflation arises from the differences in road segment definitions between databases. These differences can include discrepancies in segment lengths, definitions of roadways, and updates to the map data. To address this, CMT has developed a methodology that emphasizes flexibility, accuracy, and scalability.

Our Methodology

1. Single Source Focus with Cross-Database Validation: Initially, CMT has prioritized using a single map database to maintain consistency and reliability in our data. This strategy simplifies the process of risk statistics computation by avoiding the discrepancies that arise from using multiple databases. However, recognizing the need for broader compatibility, we are exploring methodologies to integrate insights across different map databases, including OSM, by validating key attributes such as road segment lengths and directions.

2. Geospatial Analysis for Area-Based Conflation: For cases where segment-level precision is challenged by database discrepancies, CMT utilizes built-in geospatial functionalities, such as those provided by Amazon Redshift, to aggregate data at a larger scale (e.g., census tracts, zip codes). This approach allows us to align our data insights with broader geographical areas within MassDOT's road inventory, ensuring that the insights remain relevant and actionable.

3. Extended Road Stretches and Safety Corridors Analysis: CMT proposes analyzing extended stretches of roads and safety corridors by computing risk statistics over all segments within the defined areas. This method is particularly effective for long stretches of interstates or major roadways where segment-level specifics are less critical than the overall risk profile of the corridor.

CMT is committed to delivering actionable insights that support MassDOT's road safety objectives. Our approach to data conflation is designed to navigate the complexities of integrating multiple data sources, ensuring that our partners receive accurate, comprehensive, and timely insights. We believe that our methodology, backed by our extensive experience and innovative use of technology, positions us uniquely to support MassDOT in enhancing road safety across Massachusetts. We look forward to the opportunity to collaborate closely with MassDOT to refine these processes and deliver meaningful safety outcomes.

Please describe how you protect and preserve privacy with your product.

Cambridge Mobile Telematics (CMT) is deeply committed to protecting and preserving the privacy of all data collected and processed through our products. Our approach to privacy is comprehensive, incorporating advanced security measures, strict data handling protocols, and

transparent practices to ensure the confidentiality and integrity of personal data. Below, we detail our key strategies for privacy protection:

1. Opt-in Data from Insurance Partners: We prioritize user consent by implementing an opt-in model for data collection in partnership with insurance companies. This approach ensures that personal data is collected transparently and with the explicit consent of the users, adhering to privacy laws and regulations.

2. AWS Security: Leveraging Amazon Web Services (AWS), we employ industry-leading security measures to protect data at rest and in transit. AWS provides a secure and robust infrastructure with comprehensive compliance and assurance programs, ensuring the highest levels of data security.

3. Encryption: All personal data, whether at rest or in transit, is encrypted using strong encryption protocols. This ensures that data is safeguarded against unauthorized access and breaches, maintaining the confidentiality and integrity of personal information.

4. Security Advisory Board: Our commitment to privacy and security is further underscored by our Security Advisory Board, composed of experts in cybersecurity and data protection. The board advises on best practices, emerging threats, and strategic security initiatives to continuously enhance our privacy and security posture.

5. Aggregated and Anonymized Analytics: CMT employs data aggregation and anonymization techniques to ensure that analytics and insights derived from personal data are presented in a manner that cannot be linked back to any individual user. This practice not only complies with privacy laws but also respects the privacy preferences of our users, allowing for valuable insights without compromising personal data.

Our Privacy Policy outlines these practices in detail, providing transparency on how we collect, use, and protect personal data. By adopting a controller role, we decide the purpose and means of processing personal data, ensuring that our operations align with legal and ethical standards. Furthermore, our use of tracking technologies and cookies is clearly disclosed, offering users control over their data.

CMT does not sell personal data. We share data only as necessary, with strict controls and in compliance with our privacy policy. The rights of users regarding their personal data are fully supported, enabling access, rectification, and deletion upon request.

In summary, CMT's dedication to privacy is embedded in every aspect of our product design and service delivery. Through advanced security measures, strict adherence to privacy laws, and transparent practices, we ensure the protection and preservation of privacy for all users of our products.

Please explain your business model or models for working with government transportation authorities.

For government transportation authorities, CMT offers three types of products:

The first, Road Safety Analytics, is designed to provide road safety planners more analytics to assess risk, analyze effectiveness of road safety intervention and better prioritize infrastructure projects based on road safety. We provide tailored reports on specified road segments outlining things like distraction, speeding, and hard braking. We are able to break these behaviors down to day of the week, time of day, etc., to provide transportation authorities with the information they need to make informed and effective decisions for their roadways.

The second offering, Safest Driver, is designed as an intervention, public outreach/media campaign, and provides in-depth analytics on risk. Drivers download a customized white label app, are scored and compete based on their safety. This program has been highlighted as a success story on the road to zero fatalities by FHWA by analyzing and reducing risk.

Risk View is a real-time risk events platform that provides views of aggregated, anonymized location-based driving risk events to enable data-driven public policy decisions as well as road infrastructure designs and improvements for greater safety on US roadways.

Over the last 12+ years, CMT has built our business by developing long term, mutually beneficial partnerships. We pride ourselves in our ability to offer our customers customized pricing and commercial models depending on the scale, scope, and term for the solution for MassDOT. We are able to offer short or long term agreements, with either one-time, or recurring fees based on the scope and timing of the deliverables.

If relevant, please share how MassDOT would be involved in developing the product or if there are any opportunities for customization.

Cambridge Mobile Telematics (CMT) recognizes the transformative potential of collaborating closely with the Massachusetts Department of Transportation (MassDOT) to develop and customize telematics solutions that cater specifically to the needs and challenges of Massachusetts' roadways. Every state is different, and has different requirements and challenges in road safety. At CMT, we recognize that, and have integrated partnership and collaboration into our DNA to ensure we gain a deep understanding of your specific needs and requirements to save lives. CMT's foundation and evolution have been significantly shaped by highly collaborative, long-term partnerships with public sector agencies, insurance companies, and other stakeholders in the road safety ecosystem. These partnerships have been instrumental in tailoring our products to meet the unique requirements of each collaborator, ensuring that the solutions provided are not only effective but also seamlessly integrated into existing systems and processes.

In envisioning a partnership with MassDOT, CMT is committed to a deeply collaborative process to develop or customize our telematics solutions. This partnership could involve several key stages:

Needs Assessment and Goal Setting: Initially, our teams would work together to identify specific road safety challenges in Massachusetts, set clear objectives for what we aim to achieve through our collaboration, and establish key performance indicators (KPIs) to measure success.

Solution Requirements: Leveraging CMT's flexible platform, we would explore opportunities to configure our solutions to address the identified needs directly.

Please indicate the monthly volume of drivers/vehicles reflected in your data for Massachusetts roadways and the estimated percentage of drivers out of all of those on the roadway represented in your dataset.

Cambridge Mobile Telematics (CMT) distinguishes itself in the telematics industry through the breadth and scale of our data coverage, notably within Massachusetts and across the United States. In Massachusetts alone, our robust data collection efforts have recorded activities from approximately 100,000 unique drivers over the last six months, translating to around 45,000 unique drivers on a monthly basis.

This significant data capture in Massachusetts is reflective of our estimated 2-3% penetration rate among drivers nationally, showcasing a substantial and representative sample of the driving population. This level of penetration not only highlights CMT's comprehensive data collection capabilities but also our strong presence and the accuracy of our data in Massachusetts.

Our substantial market share in the US, working with 21 of the top 25 Insurance Carriers, further underscores our position as a leading provider of telematics solutions, offering unparalleled insights into driver behavior and road safety across the country. This extensive opt-in coverage and scale are key differentiators for CMT, enabling us to deliver highly accurate, actionable insights that can drive substantial improvements in road safety and driver behavior analytics.

Indicate if you have a demonstration with Massachusetts-based data that you would like to present in a workshop with MassDOT staff. Please include the topic you'd like to address and a few sentences on what you want to share.

Cambridge Mobile Telematics (CMT) is eager to demonstrate the application of Massachusetts-based data in a workshop with MassDOT staff. Our presentation, titled "Enhancing Road Safety in Massachusetts through Telematics Data," will showcase how telematics can identify and mitigate road risks by analyzing local driving behaviors such as speeding, hard braking, and phone distraction.

Highlights of Our Demonstration:

- Risk Mapping: We'll illustrate the use of telematics data to map high-risk areas in Massachusetts, pinpointing where safety interventions can make a significant impact.
- Effectiveness of Safety Interventions: Through Massachusetts case studies, we'll show the before-and-after effects of specific road safety campaigns and legislation.
- Predictive Analytics: We will discuss how predictive analytics can help MassDOT proactively enhance road safety.
- Partnership Success Stories: Brief examples of successful collaborations with public sector agencies will be shared, highlighting measurable improvements in road safety.

Objective: Our presentation aims to demonstrate the transformative potential of telematics data for road safety, offering MassDOT actionable insights for targeted, effective interventions.

Public Sector Experience

Cambridge Mobile Telematics (CMT) has a distinguished history of spearheading transformative road safety initiatives through our involvement in Safest Driver Contests, comprehensive Road Risk Analytics projects in California and Ohio, the Oklahoma Challenge, and road safety work in Missouri. CMT's technology and research has been highlighted by FHWA, and NHTSA in analysis on countermeasure effectiveness and underlying changes in behavior leading to increased fatal crash rates.

These endeavors highlight our ability to deploy innovative telematics and analytics solutions that engage communities, enhance driver behavior, and significantly mitigate road risks. Our Safest Driver Contests have successfully leveraged competitive spirit to encourage safer driving habits, demonstrating tangible reductions in risky driving behaviors. In California and Ohio, our Road Risk Analytics initiatives have provided state transportation agencies with actionable insights into driving risks, helping to prioritize interventions and allocate resources effectively. The Oklahoma Challenge showcased our capability to mobilize and engage drivers across the state in a concerted effort to improve road safety, achieving notable decreases in incidents of distracted driving and speeding. Collectively, these projects underscore CMT's expertise in harnessing data to foster safer driving environments and our commitment to reducing road fatalities and injuries.

Case Studies

Case Study: Boston's Safest Driver

CMT has partnered with the City of Boston, and Mayor Marty Walsh, to present citizens with Boston's Safest Driver. This program shows the significant impact telematics data can have on driving behaviors, and the actionable insights provided to the City of Boston.

Boston's Safest Driver 2016 and 2019 competitions drew approximately 7,000 participants in total, and contestants were scored using five metrics: speed, acceleration, braking, cornering,

and cell phone distraction. 2019 drivers saw dramatic reductions in risky behaviors, including a 48% drop in phone distraction and a 38% drop in speeding. The previous 2016 Safest Driver contest saw similar reductions in risky behaviors: the largest jump being that 57% of drivers reduced their harshness of breaking, compared to 37% in the previous season. These insights and meaningful levels of behavioral change resulted in the recognition of Boston's Safest Driver as an overwhelming success story for Vision Zero Initiatives.

As it relates to the Evaluation of Safety Strategies, one of the major learnings of this contest was the typical bicycle trip patterns on the roads in Boston. The below graphic represents a heat map of the bike trips taken around Boston and Cambridge Massachusetts. Through this data, The City of Boston discovered the need to better inform cyclists of alternative routes with clearly marked bike paths to reduce the risk of serious injuries and fatalities for VRU's.
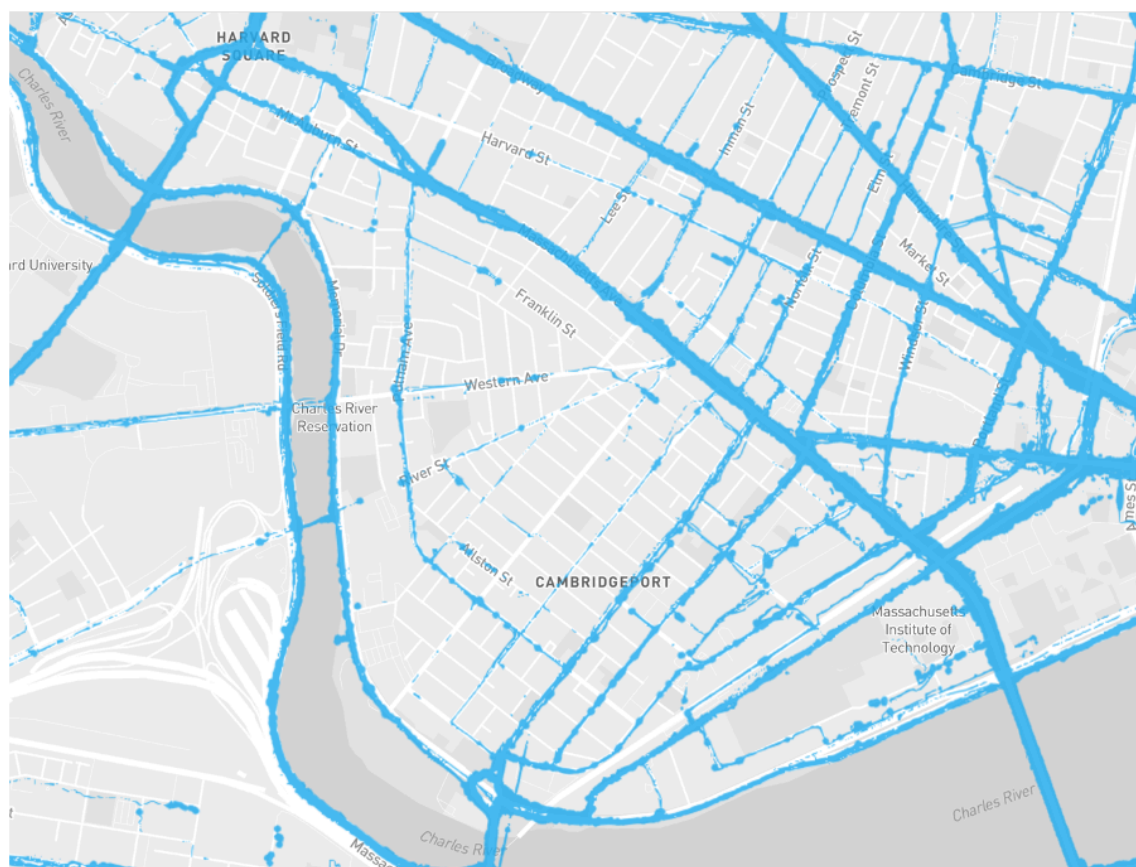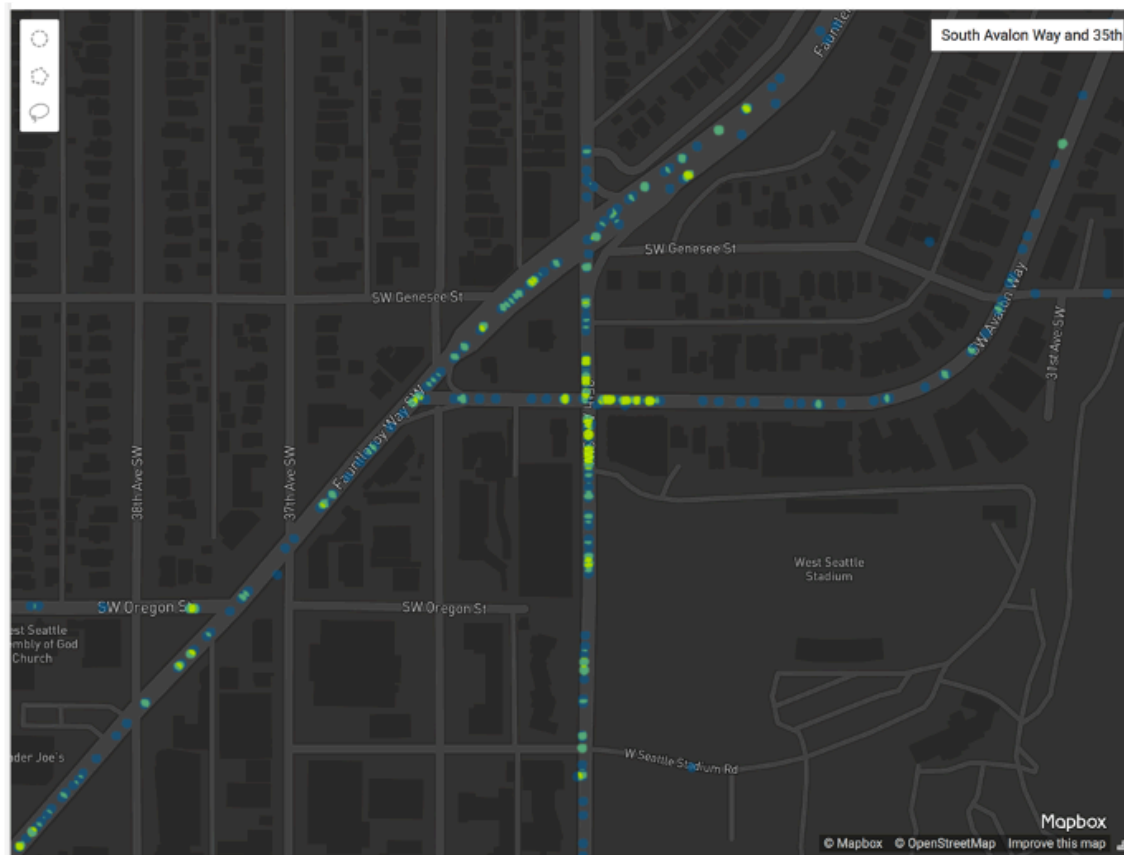

Separate from Boston's Safest Driver, CMT has run Safest Driver Contests in San Antonio, Los Angeles, and Seattle. Below are sample heat maps displaying CMT's ability to determine prevalence of dangerous road risks in a defined area.

Speeding Heat Map from Seattle's Safest Driver:
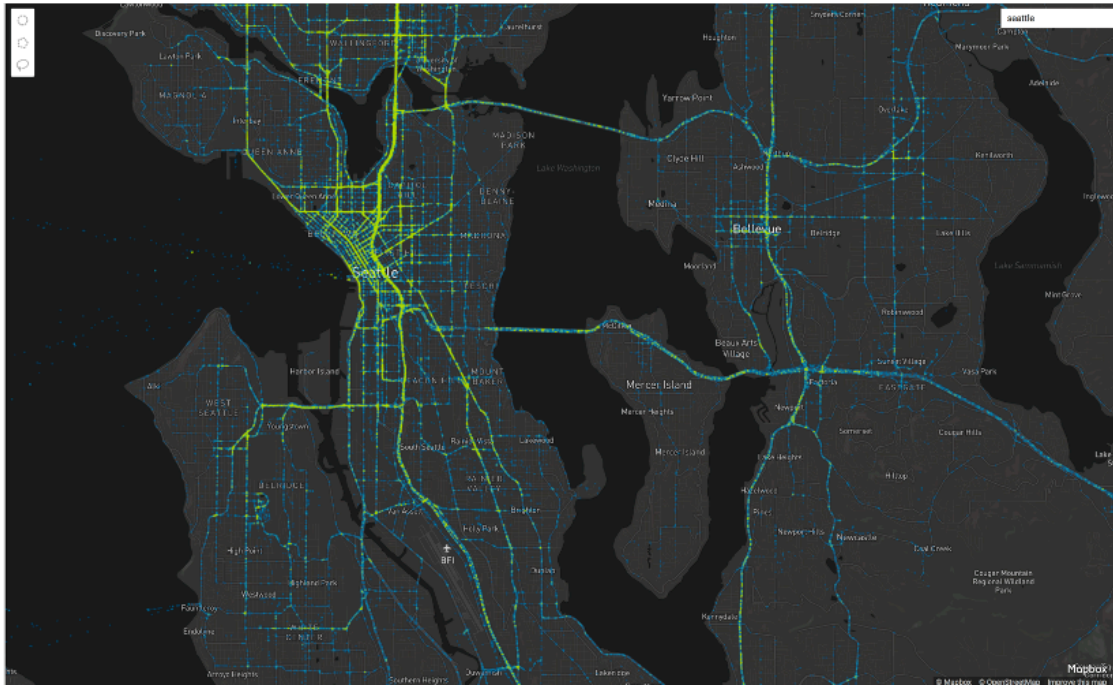
Distraction Heatmap from Seattle's Safest Driver:

Case Study: OH Road Risk Analytics

CMT has partnered with the State of Ohio on a project designed to understand the effectiveness of enforcement corridors. Our partners in Ohio identified areas of elevated speeding on numerous highway corridors. As a result, they put together a law enforcement campaign where there is an increased patrol presence within the identified corridors.

The hypothesis is that levels of speeding should decrease during, and after the times of elevated patrol presence. Utilizing CMT's Road Risk Analytics, The State of Ohio received an in depth analysis of the prevalence of speeding and other risky factors before the enforcement corridor and after. This report allowed the State of Ohio to understand the level of effectiveness of enforcement as a result of their safety campaign.

Case Study: CA Road Risk Analytics

Cambridge Mobile Telematics (CMT) has been instrumental in partnering with Los Angeles and Orange Counties, implementing our Road Risk Analytics solutions to analyze historical driving behavior trends, which has significantly contributed to targeted road safety initiatives and interventions in these regions. Our collaboration focuses on reducing distracted driving and improving overall road safety, leveraging our data analytics capabilities to provide actionable insights that guide local authorities in developing more effective traffic safety strategies and campaigns.
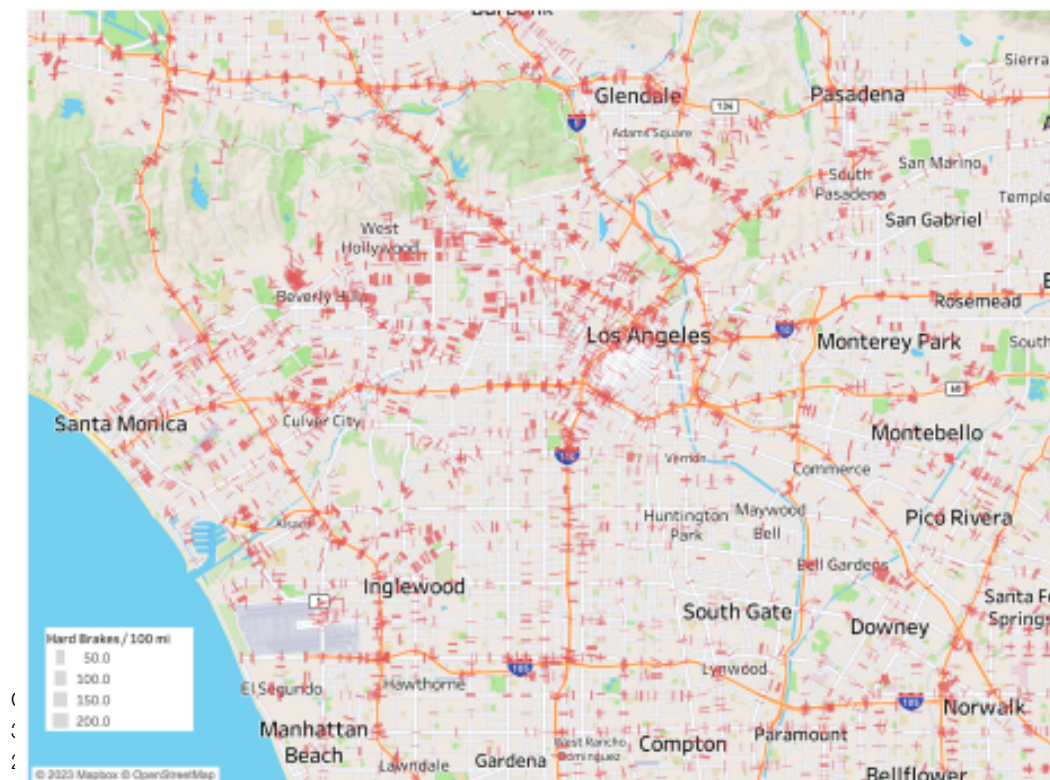
One hard braking hotspot the map above highlights is Rodeo Drive, south of its intersection with Sunset Boulevard. This is the time and place where driving risk behavior is at its peak, midweek, during the morning commute. While these locations already draw the attention of safety officials, CMT's high resolution, localized view of driving risk behavior helps to identify less well-known locations of concern.

For example, Suva Street, south of the intersection with Guatemala Street in Downey shows a high occurrence of hard braking. A street view image shows a stop sign placed unusually far from the intersection, obscured by a tree. In this example, Caltrans is able to identify the effectiveness of this infrastructure (stop sign), and determine a change needs to be made to avoid serious injuries and deaths in the future.

Case Study: WA TSC

The Washington State Traffic Safety Commission is evaluating telematics data as a replacement for roadside observational data in support of their mission to "reduce traffic fatalities and serious injuries to zero." To evaluate the effectiveness of telematics data for infrastructure and resource planning purposes, the WA TSC will compare telematics data to their existing data sources in order to confirm that telematics data is a valuable source of information, and to understand what telematics data can offer beyond the current approach. The expectation is that telematics data will be consistent with observational data, but also more comprehensive, and actionable

Additional CMT Experience

NHTSA Behavioral Safety Research - The National Highway Traffic Safety Administration (NHTSA) continues to study traffic safety during the COVID-19 pandemic, focusing on the first half of 2021. Their findings indicate persistently risky driving behaviors, including increased speeding, lower seat belt usage, and higher instances of driving under the influence of alcohol and drugs. Despite a slight recovery in travel patterns towards pre-pandemic levels, the severity of crashes and potentially pedestrian fatalities remain elevated. The analysis, in partnership with CMT, suggests that the challenges posed by the pandemic to traffic safety, such as higher ejection rates and continued high speeds on roads, are ongoing. These trends highlight the urgent need for effective countermeasures and interventions to address and mitigate these risks, ensuring safer roads for all users.

FHWA & UPenn, COMPARATIVE EFFECTIVENESS OF ALTERNATIVE SMARTPHONE-BASED NUDGES TO REDUCE CELLPHONE USE WHILE DRIVING -This details findings from two trials funded by the Federal Highway Administration and conducted by a collaboration between academic institutions and corporate entities, including Cambridge Mobile Telematics (CMT) and The Progressive Corporation. The research aimed to reduce distracted driving due to hand-held cellphone use, leveraging Progressive Insurance's Snapshot® program.

Trial 1 tested interventions such as social comparison feedback and financial incentives over 50 days. It found that a combination of weekly feedback and financial incentives, particularly when loss-framed, effectively reduced hand-held phone use.

Trial 2, spanning 70 days, aimed to build sustainable habits by adding tools like phone mounts, and strategies including goal commitments, gamification, and financial incentives. This trial showed significant reductions in hand-held use, especially with gamification and financial rewards.

The studies highlight the effectiveness of combining behavioral science insights with technology, such as CMT's telematics, to motivate safer driving practices. Implementing these approaches could notably decrease distracted driving incidents.

CMT Distracted Driving Reports - In addition to prior issues, CMT's The State of Distracted Driving in 2023 & the Future of Road Safety report is the most comprehensive research available on naturalistic distracted driving behaviors at scale. The report covers distraction behavior trends from 2020 through 2022 across the US, the progress of individual states, the impact of hands-free legislation, studies on how telematics reduces distraction, driver sentiment, how distraction influences crash rates, and more.

NYT Fatality Analysis - Since 2009, pedestrian fatalities in the U.S., particularly at night, have seen a concerning rise, diverging from trends in other wealthy nations. This increase, highlighted in 2021 with over 7,300 deaths, predominantly occurs after sunset. Factors unique

to the U.S., such as higher speed limits and designs favoring vehicle speed, contribute to this vulnerability. Emerging risks, including widespread smartphone use and larger vehicles, further exacerbate the problem. Data from Cambridge Mobile Telematics (CMT) indicates that American drivers are significantly more engaged with their phones while driving compared to British drivers, especially in the evening. This trend, coupled with the dominance of automatic transmissions that facilitate phone use, might be key to understanding the surge in nighttime pedestrian fatalities. Additionally, societal shifts such as increased suburban poverty and homelessness, alongside changes in vehicle size and driver behavior, are believed to play a significant role. This complex issue reflects a uniquely American challenge, intensified by nighttime conditions and evolving road-use behaviors.

[Stanford PNA Nexus Report](#) - The article presents a comprehensive study leveraging telematics data from Cambridge Mobile Telematics (CMT) to examine the disparities in speeding enforcement across various demographics and neighborhoods in 10 major U.S. cities. Despite finding that the occurrence of speeding is roughly equal across different neighborhoods, regardless of their demographic compositions, the enforcement of speeding violations is not. In several cities, enforcement is disproportionately targeted in non-White neighborhoods, while in others, it is more focused on predominantly White neighborhoods. On average, the study found a moderate inclination towards more enforcement in non-White neighborhoods after adjusting for actual speeding behavior.

Cambridge Mobile Telematics played a crucial role in this study by providing detailed telematics data, which includes second-by-second driving speeds of hundreds of thousands of individuals. This data allowed for an unprecedented level of insight into actual speeding behaviors across various neighborhoods, independent of demographic factors. CMT's data was integral in quantitatively assessing the true rates of speeding violations, thereby overcoming the benchmark problem that has challenged previous efforts to quantify racial and ethnic disparities in policing patterns related to traffic enforcement.

The significance of CMT's contribution lies in its ability to provide objective, behavior-based data on speeding, which serves as a critical benchmark for evaluating the fairness and equity of traffic enforcement practices. By analyzing approximately 25,000,000 trips taken by 270,000 drivers in 2019 and early 2020, CMT enabled a robust, data-driven analysis that sheds light on the complex dynamics of traffic enforcement and its impacts across different communities.

In summary, leveraging CMT's telematics data, the study highlights the potential for modern data collection methods to inform policy decisions and address long-standing issues of discrimination and disparate impact within traffic enforcement practices. This collaboration underscores the value of telematics data in enhancing our understanding of societal issues and guiding the development of more equitable enforcement strategies.

Conclusion

Cambridge Mobile Telematics (CMT) appreciates the opportunity to respond to the Massachusetts Department of Transportation's (MassDOT) Request for Information (RFI) for Movement Telematics. We are enthusiastic about the potential for our technology to significantly contribute to improving road safety in Massachusetts, leveraging our extensive experience in telematics to address the challenges outlined by MassDOT.

CMT is committed to advancing road safety through data-driven insights and innovative solutions. Our technology, which analyzes trillions of data points over billions of miles, offers a unique and comprehensive understanding of driving behaviors and road conditions. This enables us to identify and mitigate risks before they lead to accidents, thus supporting MassDOT's Safe System approach and contributing to the statewide effort to reduce speeding, distraction-related serious injuries, and fatalities.

Our response to this RFI, guided by MassDOT's civic research questions, demonstrates our capability to provide actionable insights into unsafe driving behaviors, roadway conditions, and the efficacy of traffic signal timing and phasing. Our analysis not only answers specific research questions but also presents a broader vision for enhancing road safety through telematics.

CMT's commitment to privacy and our collaborative approach with government transportation authorities ensure that our solutions are both effective and respectful of individual rights. Our business model, designed for flexibility, allows us to work closely with MassDOT to customize solutions that meet the unique needs of Massachusetts' roadways and its residents.

We look forward to the possibility of collaborating with MassDOT to implement telematics solutions that make Massachusetts roads safer for all. Our team is ready to engage in further discussions, provide demonstrations of our Massachusetts-based data, and explore customization options that align with MassDOT's safety priorities and infrastructure requirements.

Thank you for considering Cambridge Mobile Telematics as a partner in this critical endeavor to enhance road safety. Together, we can make a significant impact on reducing roadway injuries and fatalities, making Massachusetts a safer place for drivers, pedestrians, and all road users.

Sincerely,

The CMT Team