

Health in Transportation
Corridor Planning Framework

It's Complicated:
Transportation's Relationship
with Public Health

Identifying Transportation Solutions
That Promote Healthy Aging

TEXAS TRANSPORTATION Researcher

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The Intersection of Health and Transportation

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ON THE COVER: Health and transportation intersect on multiple levels — from the impact of the transportation system itself on system users (e.g., the correlation between pulmonary health and traffic emissions) to how we're sometimes our own worst enemy on the roadway (e.g., driving under the influence). Texas A&M Transportation Institute researchers examine this often dangerous intersection to find the best research solutions that promote the safest, most productive transportation system for all users.



3

The Intersection of Health and Transportation

4

What We're Thinking: As Cars Get Better, Driving Gets Worse

6

Transportation Technology Conference Highlights Opportunities and Challenges with Connected and Automated Vehicles

8

TTI, Texas A&M Explore Incentivizing Active Travel with Bus Rapid Transit Lines

10

Zero Deaths Directive Applauded by Experts at 2019 Traffic Safety Conference

12

It's Complicated: Transportation's Relationship with Public Health

14

Health in Transportation Corridor Planning Framework

16

Identifying Transportation Solutions That Promote Healthy Aging

18

Driven to Improve Safety: TTI, Texas A&M Partners Collaborate to Reduce Agricultural Crashes

20

TTI News

23

What Goes Around Comes Around: Convenience Culture? How About Compassion Culture?

Editor's Note: On the cover of the last issue, we showed a child in a car seat aboard a transit bus. Above the child's head was a folded blanket, raising safety concerns. When placing a child in a safety seat, it is considered dangerous to place anything near or on top of the child's head that is not a part of the car seat or was not sold separately to be used with that specific car seat. We regret the error.

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The Intersection of Health and Transportation

AT A GLANCE

35% INCREASE in
pedestrian fatalities
between 2008 and 2017



100/day
THE NUMBER OF people
dying in U.S. traffic crashes



142,000/year
THE NUMBER OF cases
of U.S. childhood
asthma caused by
nitrogen dioxide
(NO₂) resulting from
traffic

3.2M
THE NUMBER OF
annual global
deaths attributable
to insufficient
physical activity



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41% Teens who say
they browse social media
while driving
(doubled between 2009 and 2014)

what we're
THINKING

Russell Henk

AS CARS GET BETTER, **Driving Gets WORSE**

THIS ARTICLE WAS
ORIGINALLY PUBLISHED IN
DALLAS NEWS APRIL 11, 2019.

Our cars keep getting better, but our driving seems to be getting worse.

Auto design has evolved from safety belts and airbags that help us survive crashes to features like lane-departure warnings and automatic emergency braking that help us avoid them. Still, the rate of distracted driving deaths rose twice as fast as overall crash deaths in the first half of this decade, according to the Centers for Disease Control and Prevention. You could argue that human intelligence isn't keeping pace with artificial intelligence.

Developing driver IQ, of course, begins at a very young age. And so does smartphone ownership. A Nielsen study in 2017 found that nearly half of kids got their first smartphones when they were 10 to 12 years old. They will have had five or six years to perfect their wireless skills, creating what amounts to a functional addiction, by the time they reach legal driving age. Scary.

Fortunately, teenagers no longer flock to driver license offices to secure permits right away. In fact, a growing number of those eligible to drive at age 16 are instead waiting until they turn 18, deterred mostly by a lack of interest in driving and an aversion to its cost. This means two more years of maturing and brain development (handy in making critical judgments about driving risks), but the newest drivers aren't gaining the benefit of learning to drive under safer conditions afforded by graduated driver licensing laws.

We know that new drivers benefit from at least 12 months of supervised on-road experience to establish basic driving abilities. That doesn't change simply because they wait two years to start driving. Recent data indicate that longer-term crash rates are actually higher for those who wait until age 18 than for those who start driving when they're 16 or 17.

And, two years waiting to venture out as a new driver is also two years spent growing more comfortable with — and addicted to — a smartphone. In recent years, texting while driving among 18- to 29-year-old drivers actually declined modestly from 71 percent to 58 percent. But at the same time, those who browsed social media websites while driving nearly doubled, jumping from 21 percent to 41 percent. Those who posted on those sites while driving grew from 20 percent to 30 percent. Smartphone task management is becoming more complex for younger and less-experienced drivers, requiring more of their attention and effort.

Considering all of that, it's easy to assume that distracted driving is a youth-only problem. But it's not. Even though adults (example-setting parents in many cases) may have mastered vehicular operation, they may botch even the most basic smartphone functions. When that fumbling happens behind the wheel, safe driving experience means little. If we're expending more time and attention on distractions, we're investing less in the driving task. It's a zero-sum proposition.

To stop this, we've long relied on traditional strategies of laws and associated penalties, parental restrictions, and, more recently, peer influence. But new research suggests we may have a new motivator: hamburgers and pizza.

The Teens in the Driver Seat® Program, developed by the Texas A&M Transportation Institute, launched a smartphone app in 2016 that awarded prizes for distraction-free driving. We found significant reductions in distracted driving when teen drivers focused on those rewards (including food) rather than their smartphones.

Distracted driving is an issue for everybody but more so for teenagers as they form lifelong driving patterns. We can only hope that those habits don't lead them to fail the driver IQ test. ■



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SMARTPHONE TASK MANAGEMENT is becoming
more complex for younger and less-experienced drivers,
requiring more of their attention and effort.

In recent years, **texting while driving** among 18- to 29-year-old drivers actually **declined modestly** from **71 percent** to **58 percent**.



But at the same time, those who **browsed social media websites while driving** **nearly doubled**, jumping from **21 percent** to **41 percent**.



The number who **posted on those sites while driving** **grew** from **20 percent** to **30 percent**.



Transportation Technology Conference Highlights Opportunities and Challenges with Connected and Automated Vehicles



Nearly 200 participants at the Fourth Annual Texas A&M Transportation Technology Conference learned the latest on connected and automated vehicle (CAV) research and deployment activities in Texas and the nation. The April 29–May 1 conference was organized by the Texas A&M Transportation Institute (TTI), in partnership with The Texas A&M University System, Texas A&M University, Texas A&M Engineering, and the Texas A&M Engineering Experiment Station. Conference sponsors included 3M, Cisco, and HNTB at the maroon level, and Econolite, HDR, and Neology at the gold level.

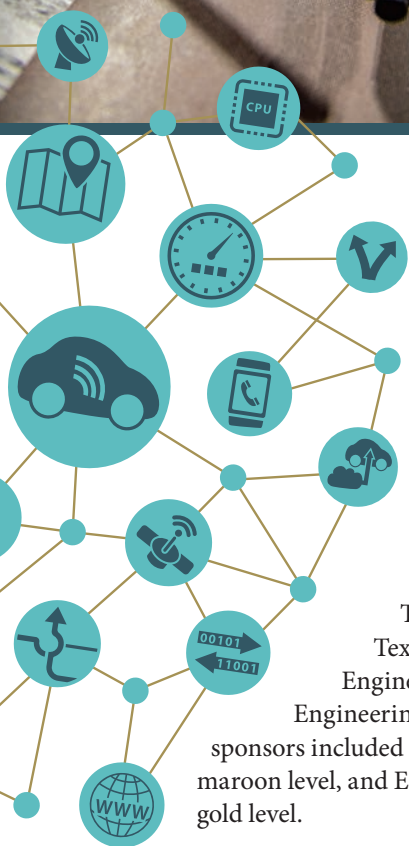
“The annual Texas A&M Transportation Technology Conferences focus on highlighting current CAV and technology research under way throughout The Texas A&M University System and pilots, demonstrations and deployments in Texas and other states,” said Katie Turnbull,

TTI executive associate director and conference planning chair, during the opening session. “Texas continues to be a leader in CAV research, policy development, testing and deployment.”

The conference began with two workshops, providing participants with deeper dives into low-speed autonomous shuttles and the use of blockchain technology in transportation. Speakers in the first workshop highlighted low-speed autonomous shuttle pilots in Frisco, Bryan-College Station and Houston, as well as Columbus, Ohio; Ann Arbor, Mich.; and Gainesville, Fla. Speakers and participants discussed planning, vehicle and service procurement, implementation and operation, evaluation, and research associated with deploying autonomous shuttles. Speakers in a second workshop introduced blockchain technology fundamentals and use cases in transportation, including examples focusing on ports, tolling and smart contracts.

The opening session featured highlights of TTI research associated with wrong-way driving, smart intersections and smart work zones, as well as the Texas A&M University Civil Engineering Department’s involvement in the GM Challenge. Speakers from the Texas Department of

6



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*Katie Turnbull
TTI Executive Associate Director*



Transportation, the Florida Department of Transportation, and DriveOhio provided updates on demonstrations and pilots under way at the state level.

Topics covered during the conference sessions focused on smart infrastructure and vehicles, user perspectives on technologies, automation in the trucking industry, safety, and pilots and deployments of different technologies. Numerous networking opportunities were provided, including talking with students and peers during a poster session.

“I found the conference to be enormously useful, both in terms of content and the wonderful network of people I was able to meet,” noted Jordon Coleman, general counsel with Kodiak Robotics, who spoke on the safety and CAVs panel. “The panel provided an excellent platform to further the safety dialogue among diverse stakeholders.”

The conference concluded with an optional tour of research projects and facilities at the A&M System’s RELLIS Campus. The Texas A&M Technology Advisory Council also met during the conference.

It was just 36 months ago, at the first Transportation Technology Conference, that the RELLIS Campus initiative

was announced by A&M System Chancellor John Sharp. His vision of converting a 2,000-acre former U.S. Army air field into a premier campus that focuses on developing advanced engineering and educational resources is coming to fruition in record time.

“It’s only been three years, but the progress has been amazing to watch,” TTI Agency Director Greg Winfree told conference attendees. “The commitment from the A&M System, the chancellor and the Board of Regents has been impressive.”

The accelerated construction of several world-class facilities at RELLIS includes the \$80 million, 138,000-square-foot Center for Infrastructure Renewal and TTI’s own 180,000-square-foot state headquarters. Beyond buildings, groundbreaking public-private partnerships have also been established, creating new opportunities for collaboration across sector lines. ■



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TTI, Texas A&M Explore Incentivizing Active Travel with Bus Rapid Transit Lines

Leaving your keys on the counter, you shut the door and head out for the new bus rapid transit (BRT) station. The sun is warm on your skin. Your muscles warm as you walk. A little footwork on days like today beats sitting in traffic congestion or waiting for what seems like forever on the city bus.

Improving cardiovascular health is a particularly relevant topic in El Paso, Texas, where approximately 16 percent of adult residents are diabetic, and 34 percent struggle with obesity. However, there has been little research into the health benefits encouraged by BRT lines, which provide improved transit services using modern vehicles, high trip frequency and other amenities, such as bike racks in stations and on buses.

The Texas A&M Transportation Institute's (TTI's) Center for International Intelligent Transportation Research teamed up with Texas A&M University's Department of Landscape Architecture and Urban Planning (LAUP) to determine if El Pasoans are willing to walk farther as part of their daily

travel after the implementation of a BRT line in the Alameda corridor (14.5 miles and 29 stations). The BRT line, which will be completed by the end of 2019, will be the second BRT line in El Paso.

"The new BRT lines are on the leading edge of public transportation, improving the service for residents and making it more comfortable and convenient to travel. The project evaluates the potential health, environmental and time-saving travel benefits for residents who use the BRT service," says TTI Assistant Research Scientist David Galicia.

For many people, daily physical activity often consists of walking to get into the car or to and from an office building. By taking the BRT option, they may walk or bike from their home to a transit station, thereby increasing the distance they walk or ride every day (and, in theory, their heart health). To attract residents to try out the BRT alternative, researchers are considering transit-oriented multilevel intervention strategies, representing three socio-ecological domains: access, education and cost.



“Development of bus rapid transit lines in El Paso, Texas, presents an opportunity to explore transit-oriented multilevel interventions, addressing diverse, synergistic strategies that can contribute to increased physical activity and mobility,” says Texas A&M LAUP Professor Chanam Lee. The project leads include Lee, LAUP Associate Professor Wei Li, and Regent and Distinguished Professor Marcia Ory from Texas A&M’s School of Public Health. “Creating awareness of the level of physical activity associated with BRT lines will inform the next decade of transportation needs and choices made by residents.”

The project is currently in the data collection process, the first of three phases. The goal is to compare before-and-after scenarios of implementing the Alameda corridor BRT line. TTI’s role is to conduct onboard surveys with BRT riders using Sun Metro, El Paso’s metro transit system. Researchers

are employing a citizen science strategy — where members of the public participate in the investigative process — to acquire data on daily ridership, routes and destinations. After this phase, TTI’s team will produce a computer-based model to assess current conditions and build-out scenarios.

The ultimate plan is to have four corridors in El Paso connecting the entire city with BRT lines. It’s hoped that residents will leave more of their cars at home and adopt healthier walking and biking habits. If residents live and/or work along the new stops and terminals, they can save gas, access the internet while traveling, and get in steps toward improved cardiovascular health along the way, all while reducing congestion. Researchers will forecast ridership for the next 10 years to predict the longer-term footprint of implementation for the community.

Weighed down by busy schedules, people often struggle to find the time or energy for physical activity,” says National Cancer Institute (NCI) Biologist David Berrigan. NCI is part of the project’s sponsor, the National Institutes of Health. “The BRT line has the potential to attract El Paso residents with the incentive of faster, more productive travel and the added benefits of more daily walking and biking and more environmentally friendly transportation.” ■

“Development of bus rapid transit lines in El Paso, Texas, presents an opportunity to explore transit-oriented multilevel interventions, addressing diverse, synergistic strategies that can contribute to increased physical activity and mobility.”

*Professor Chanam Lee
Texas A&M Department of Landscape Architecture
and Urban Planning*



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"I view the action by the commission as a turning point in the history of traffic safety in Texas."

*Robert Wunderlich, Director
Center for Transportation Safety*

Zero Deaths Directive Applauded by Experts at 2019 Traffic Safety Conference

On May 30, in a bold move to end traffic deaths, the Texas Transportation Commission directed the Texas Department of Transportation (TxDOT) to cut traffic fatalities in half by 2035 and end them entirely by 2050. These goals are a natural outcome of the current TxDOT #EndtheStreak campaign, which "encourages Texans to drive safely to help end the streak of daily deaths on our roadways." (For more information on TxDOT's adoption of the zero deaths goal, see the press release at <https://www.txdot.gov/inside-txdot/media-center/statewide-news/012-2019.html>.)

"We all know about the causes of traffic fatalities," said Michael Chacon, director of TxDOT's Traffic Safety Division, in response to the commission's announcement. "Developing strategies to achieve this goal will take all of us working together."

Working together is one of the primary goals of the annual Traffic Safety Conference, which, coincidentally, was under way when the commission issued its directive. Some 350 transportation safety professionals gathered this year in San Antonio May 29–31 to discuss the causes of (and

strategies to prevent) traffic crashes. Hosted by the Texas A&M Transportation Institute (TTI), the conference is supported by TxDOT.

"I view the action by the commission as a turning point in the history of traffic safety in Texas," Robert Wunderlich, director of TTI's Center for Transportation Safety, told attendees.

Pedestrian Deaths on the Rise

Tragically, traffic safety trends are currently heading in the wrong direction. For example, pedestrian deaths in Texas jumped from 357 in 2010 to more than 600 last year. To highlight this problem, attendees were given a reflective vest to wear should they have a nighttime vehicle emergency. During the opening session, the attendees were shown a video demonstrating how much more visible pedestrians are to drivers when wearing a reflective vest. A walking tour highlighted numerous downtown San Antonio pedestrian safety improvements, with guides noting improvements implemented by the city.



"In Austin, pedestrians typically make up about 30 percent of our total fatalities each year. Last year, they made up 42 percent of our total fatalities," Pedestrian Coordinator Joel Meyer of the Austin Transportation Department reported during a panel discussion.

"Business as usual is not working," echoed Active Transportation Program Manager Kevin Kokes of the North Central Texas Council of Governments. "The number [of pedestrian fatalities] keeps going up. Why are we accepting so many crashes and fatalities? What can we do across the region and state to make this more of an urgent matter?"

"In Austin, pedestrians typically make up about 30 percent of our total fatalities each year. Last year, they made up 42 percent of our total fatalities."

*Joel Meyer
Pedestrian Coordinator, Austin Transportation Department*

Distracted Driving: What's the Cure?

Austin Police Detective Pat Oborski described how his department uses transit buses to observe unsuspecting drivers who are texting while driving. Austin's strict texting ban took center stage during one conference breakout session. Violators are subject to a \$500 fine if caught holding any electronic device while operating a vehicle or bicycle. Despite such efforts, Oborski says, "We still have a very big problem."

"Distraction is a significant safety concern. Over 3,000 lives were lost in 2017 in the United States," noted TTI Senior Research Scientist Mike Manser. "In Texas, about 19 percent of motor vehicle crashes involve some level of distraction."

Impairment, Self-Driving Cars, and the Promise of Safer Roadways

"We continue to lose 10,000 lives a year as a result of alcohol impairment," reported David Harkey, president of the Insurance Institute for Highway Safety, during his luncheon address. He also noted the increase in crashes resulting from more states voting to legalize marijuana. "We've shown there's about a 5 percent increase in crashes associated with that."

Impairment of the human driver certainly contributes to crashes, but the ubiquitous presence of driverless cars helping to solve that problem isn't happening anytime soon, TTI Agency Director Greg Winfree noted during his opening session speech.

"Automated travel holds considerable promise for saving lives," Winfree told attendees. "But we are 20 or 30 years away from widespread use of these new technologies. While we're preparing for this new transportation future, we need to enhance the safety and behavioral strategies we already have today."



Referring to the commission's directive, Wunderlich closed the conference by urging audience members to wake up every day thinking about ways to cut traffic deaths in their hometowns. "Maybe we won't get to zero, but I'll tell you what, we darn sure ought to try," Wunderlich stated emphatically. "I know this is the group that will help do that." ■



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IT'S COMPLICATED

Transportation's Relationship with Public Health

The intersection of transportation and health is a place where ironic and dissonant circumstances often collide.

- A driver whose life was nearly ended in a crash with one motor vehicle will typically depend upon another motor vehicle — a hospital-bound ambulance — to save his or her life.
- A person chooses to walk or bike to work or for recreation in part for health benefits, even as he or she takes on added health risks through exposure to cars and trucks zooming by alongside.
- A child with asthma depends on a car or bus for transport to a routine medical checkup, riding in a vehicle spewing toxins that exacerbate the need for such checkups in the first place.

These are just a few of the recognized ways in which the interests of transportation and public health jointly occupy a somewhat paradoxical space. Health care and health-promoting activities often depend on access to vehicular mobility, even as vehicular collisions and emissions

constitute significant public health threats. However, the detrimental health impacts of transportation aren't limited to crashes and traffic-related air pollution, as a new effort from the Texas A&M Transportation Institute (TTI) is demonstrating.

Researchers with TTI's Center for Advancing Research in Transportation Emissions, Energy, and Health (CARTEEH) — a U.S. Department of Transportation University Transportation Center — have introduced a new analytical model. It outlines 14 pathways tying transportation to specific health outcomes — four of which are beneficial, and ten of which are detrimental.

Illustrating those connections is important because it helps to break down research and practice silos that can impair problem solving, says CARTEEH Director Joe Zietsman. He says a broader and more inclusive perspective can lead to understanding how transportation's impacts on health involve complexities that reach far beyond the end of a tailpipe.

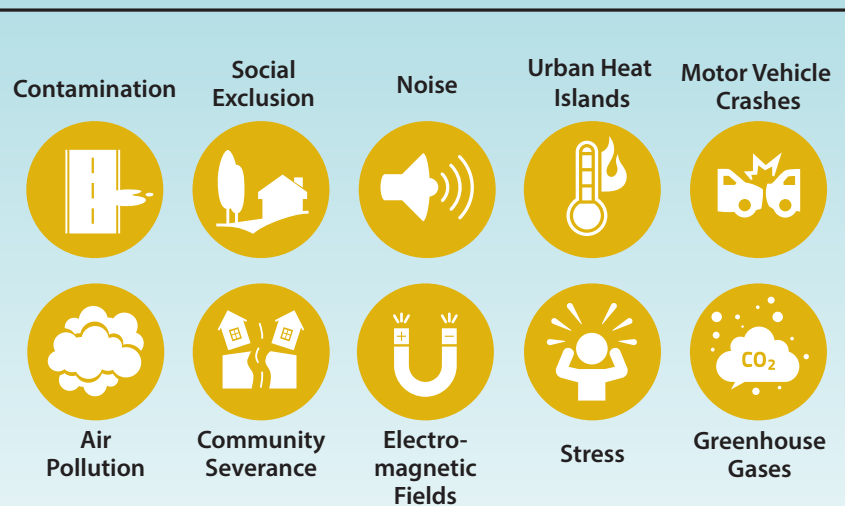
The 14 pathways represent either beneficial or detrimental contributors to health outcomes, influencing either the cause or prevention of morbidity or premature mortality. Either set of pathways can be impacted by extrinsic and intrinsic factors, such as socioeconomic status, ethnicity, age and nutrition.



BENEFICIAL TO HEALTH



DETRIMENTAL TO HEALTH



PATHWAYS TO HEALTH

“Our purpose in developing this framework is to guide future research and practice toward more integrated and systematic assessments of transportation and health,” Zietsman says. “The factors we illustrate in this model represent distinct and separate pathways, but they converge in many ways because of their interdependencies — and that helps us to evaluate their impacts on health more holistically.”

Scientists have been exploring the transportation/health nexus for more than a quarter century, but CARTEEH’s latest foray represents the most expansive effort to date, Zietsman says. The new model branches out from four factors underlying transportation:

- land use and the built environment,
- infrastructure,
- mode choice, and
- technologies and disruptors.

The 14 pathways represent either beneficial or detrimental contributors to health outcomes, influencing either the cause or prevention of morbidity or premature mortality. Either set of pathways can be impacted by extrinsic and intrinsic factors, such as socioeconomic status, ethnicity, age and nutrition.

Efforts to quantify some of the pathways have already revealed their significant impacts on health, but that’s not yet the case for all of them. The costs of vehicle crash deaths and injuries are well documented, for example, as are the morbidity costs related to physical inactivity and air pollution. However, some of those pathways more recently identified by CARTEEH — such as electromagnetic fields, contamination and stress — lack enough data to thoroughly

demonstrate their impacts. The new framework aspires to fill that need and to answer health/transportation questions that have yet to fully unfold.

Take the emergence of self-driving cars, for instance. Do new and disruptive technologies carry with them any unintended consequences for human health?

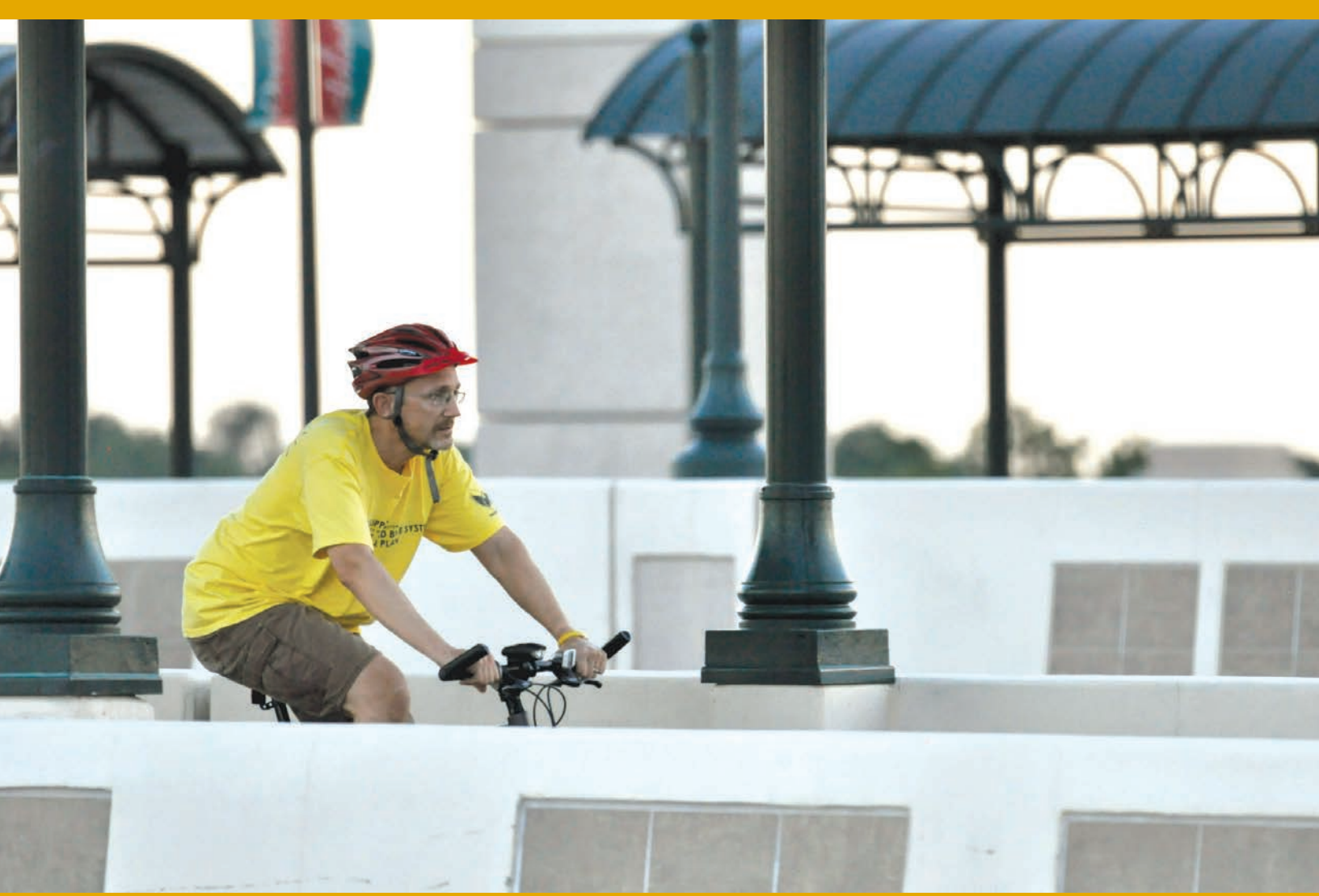
“Autonomous and connected vehicles rely upon the transmission of nearly constant electromagnetic field radiation in close proximity to the people riding in those vehicles,” explains TTI Assistant Research Scientist Haneen Khreis. “Emerging research indicates an association between those signals and adverse health effects, but so far, those connections haven’t been reliably measured. Our model highlights these associations and prompts researchers and practitioners to better consider them in a way that ultimately promotes holistic solutions that enhance the beneficial health impacts of transportation while mitigating its detrimental health outcomes.”

CARTEEH researchers are currently building on their new framework and expect to publish their expanded insights in a paper later this year.

“These areas warrant future research,” Zietsman says. “Our framework provides the basis for a systematic and well-rounded approach, and underscores the need to integrate human health into urban and transport planning and policy.” ■



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Health in Transportation Corridor Planning Framework

Why and when should transportation agencies try to address health concerns?

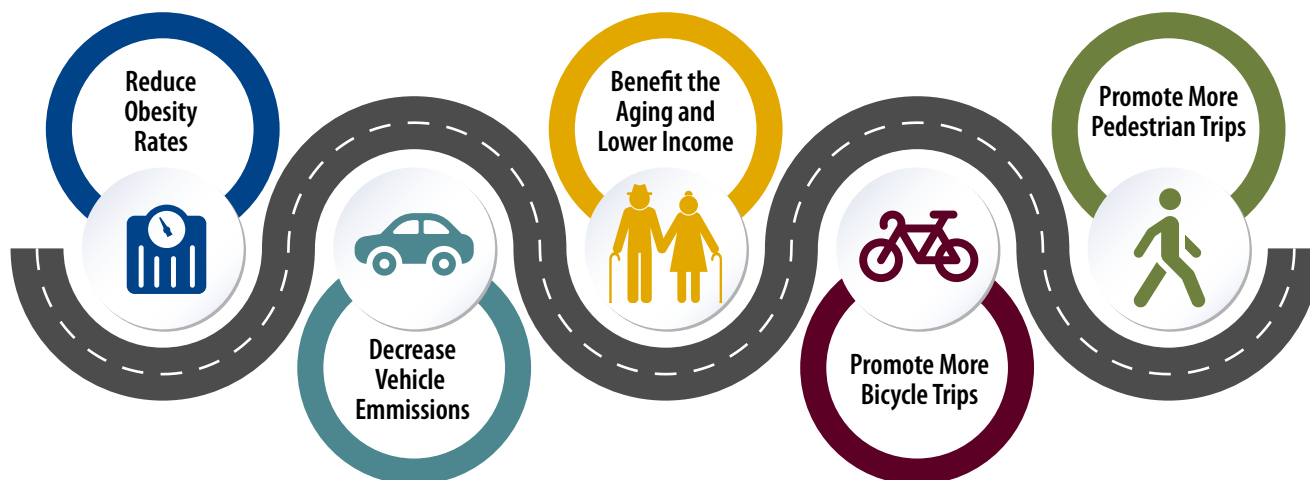
“The simple answer is because transportation decisions can impact health in the community. Considering these impacts early, as decisions are made, supports better outcomes.”

— Federal Highway Administration

In 2016, the Federal Highway Administration (FHWA) published the Health in Transportation Corridor Planning Framework, a tool for transportation practitioners at the state, regional and local levels who conduct or participate in corridor studies. Five transportation agencies across the country completed pilot testing of the tool in Phase 1 of the project. The Texas A&M Transportation Institute (TTI) and Alta Planning+Design are part of the ICF-led team conducting Phase 2, which is enhancing the framework. The Houston District of the Texas Department of Transportation (TxDOT) is one of six additional agencies FHWA selected to continue implementation testing.

“One of TTI’s roles is to assist the district in using the framework for the plan covering the I-10 West corridor between Beltway 8 and I-610 in Houston,” says TTI Associate Research Scientist Ipek Nese Sener, one of the project’s technical leads and TTI’s principal investigator. “The plan focuses on improving safety, mobility and accessibility along the corridor. For instance, we’re examining areas where pedestrian crossing facilities might benefit aging and lower-income populations needing to access businesses on the south side of the freeway.”

Health in Transportation Corridor Planning Framework



The framework is intended to be used within the corridor planning process. Six steps are outlined, each containing

- questions to consider,
- suggested partnerships and stakeholders,
- data and analytical support suggestions,
- resources, and
- examples from practice.

“Health and transportation are naturally bound together. An important next step for future research is to assess the additional pilots and make adjustments to resources, data and tools as needed.”

Ipek Nese Sener
TTI Associate Research Scientist

Since transportation planning at the corridor level is flexible and adaptable to many different issues and contexts, the framework is scalable to any type of corridor. It can be used at a single point in the process or to inform every aspect of a corridor planning study. It can also inform planning activities at both the regional and project level to support broad health goals.

In Houston, for example, the tool has helped identify a wide range of potential health impacts, including reducing obesity rates and decreasing vehicle emissions from idling vehicles by converting school drop-offs by car to pedestrian/bicycle trips. Using the tool has also increased understanding of the potential applications and the limitations of incorporating health in the transportation corridor planning framework.

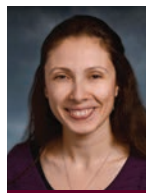
“The technical assistance from TTI has facilitated implementation of the framework by introducing evidence-based research to promote knowledge transfer while, at the same time, allowing flexibility to garner local opportunities and partnerships,” explains Ana Ramirez Huerta, transportation planner for the TxDOT Houston District.

Health issues, goals and priorities are context dependent, and the framework does not provide specific answers or outcomes. It identifies topics for consideration, as well as data, tools and resources that may prove helpful during the evaluation process. Recognizing that health professionals are highly useful partners, agencies can initiate specific types of coordination and input if and when beneficial.

“The framework has been tested in several communities, and other supporting efforts have been developed to advance understanding of multimodal connectivity and tools,” explains Beverly Bowen, the ICF project manager. “Now, transportation agencies can point to ways in which they consider health during corridor and subarea planning.”

Sener notes the progress made over the years in this research area by expanding the understanding and knowledge of health and transportation, emphasizing the importance of data-driven approaches and the role of emerging technologies.

“Health and transportation are naturally bound together,” Sener says. “An important next step for future research is to assess the additional pilots and make adjustments to resources, data and tools as needed — a challenging and exciting road ahead, but we’re in a great position with the support from local, state and federal agencies.” ■



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Identifying Transportation Solutions That Promote Healthy Aging

The quality of life and transportation access are inescapably tied, no matter who you are. But that link is especially critical if you're among those Americans classified as *older*.

And *older* is a fast-growing group. The Baby Boomer generation will be over the age of 65 by 2030, according to the U.S. Census Bureau, meaning that one in every five Americans will be of traditional retirement age (65 or older). By 2050, the bureau predicts, the 65-plus crowd will outnumber children (18 and under) for the first time in the nation's history.

As these trends unfold, research from 2015 by the National Council on Aging tells us more about this population segment. One-third say that not being able to leave home or drive is a major

concern, and 42 percent worry about becoming a burden to others. And, according to the U.S. Government Accountability Office, roughly half of older American households have no retirement savings account, a financial constraint that could limit travel options and challenge efforts to be self-reliant.

Assistant Research Scientist Ben Ettelman and his team of Texas A&M Transportation Institute (TTI) researchers studied these trends and their implications in *Identifying Transportation Solutions That Promote*

Healthy Aging for Texans. As their report illustrates, a lack of needed transportation services for aging Americans contributes to a reduced quality of life.

"The travel patterns and needs of older adults change significantly as they continue to age," says Ettelman. "And research shows that a loss of independent mobility and the ability to age in place is linked to depression, isolation and reduced quality of life."

Travel by personal auto is the preferred mode for all demographic groups, but aging creates driving performance issues, from reaction time to vision loss to judgment impairment, that develop naturally.

New technologies are enhancing how anyone can access transportation

“These technologies certainly help improve the quality of life of our aging population, but they cannot replace the components of healthy aging that the access to independent mobility provides: civil and social engagement, self-reliance, and direct human connection.”

Ben Ettelman
TTI Assistant Research Scientist

services, making it easier for the older population to age in place with greater health confidence, especially since three-fourths of people over 60 plan to stay in their current homes for the rest of their lives, according to a 2015 survey conducted by the National Council on Aging.

Transportation network companies (like Uber and Lyft) constitute an app-based, on-demand ride service, and some providers have launched programs tailored specifically to older adults. Though they may not be financially feasible for some, these services can fill gaps and reduce reliance on family or volunteer drivers.

Although associated costs and the need for special instruction may create barriers to their use, advanced vehicle technologies hold the promise to enhance safety while allowing some older drivers to spend more years behind the wheel. A few examples include:

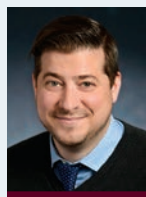
- **Lane departure warning systems** track a vehicle’s distance to pavement lane markings and provide both visual and auditory alerts when the vehicle drifts, decreasing the risk of a collision.
- **Adaptive cruise control** can help drivers avoid crashes by monitoring the buffer distance between cars and changing speeds to maintain proper distance.
- **Adaptive headlight systems**, or smart headlights, can turn lights toward a curve’s direction, automatically dim high-beam headlights, and make adjustments to allow for oncoming traffic.
- **In-vehicle information systems** can make drivers aware of congestion and traffic incidents nearby.

The rapid expansion of online shopping and home-delivery services represents other areas of opportunity for health-conscious older Americans who lack reliable transportation. For a modest cost, popular services such as Amazon Prime and Instacart deliver groceries and other staple items directly to your doorstep, and many pharmacies even deliver prescriptions.



Technology will continue to play a major role in allowing older adults to healthily age in place, Ettelman says, especially where access to needed transportation services is limited. However, where transportation and health are concerned, technology can be a double-edged sword. Advancements like online virtual doctor visits can ameliorate the isolation that older people may face by providing a form of connection. At the same time, such services could exacerbate that seclusion by inadvertently reinforcing it, if the connection lacks direct human contact. When emerging technologies that solve the core of the access problem (i.e., access to goods and services) create increased isolation of older adults, that can lead to greater mental health challenges.

“These technologies certainly help improve the quality of life of our aging population,” Ettelman says. “But they cannot replace the components of healthy aging that the access to independent mobility provides: civil and social engagement, self-reliance, and direct human connection.” ■



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DRIVEN to Improve Safety:

*TTI and Texas A&M Partners Collaborate
to Reduce Agricultural Crashes*

Driving for work can be deadly. According to the Centers for Disease Control and Prevention (CDC), motor vehicle crashes are the leading cause of work-related deaths in the United States.

Beyond the tragic loss of life or permanent injury resulting from such incidents, societal costs are mounting via rising health care costs and increasing business costs passed along to consumers. CDC reports that between 2003 and 2017, more than 27,000 U.S. workers died in crashes while on the job, costing employers about \$25 billion in 2013 alone.

Workers in the agricultural, forestry and fishing (AFF) industries experience fatal work-related vehicle crashes at a higher rate than their counterparts in other industries — four times as often, in fact. Yet, little is known about why, especially in the Southwest Agricultural Region (Arkansas, Louisiana, New Mexico, Oklahoma and Texas). AFF drivers across the region were involved in at least 4,778 crashes, 12 to 14 percent of which were fatal, serious or non-incapacitating crashes, between 2010 and 2017. Of the states studied, Louisiana and Texas reported the most work-

related AFF crashes, with Louisiana enjoying the dubious distinction of highest rate of crashes in the agricultural and logging industries.

Led by Texas A&M Transportation Institute (TTI) Research Scientist Eva Shipp, researchers from TTI and a team of Texas A&M University System agencies — including the Texas A&M School of Public Health and the Texas A&M Department of Statistics — examined Louisiana crash records from 2010 to 2015. After separating records with narratives and stratifying them by vehicle type, Shipp's team created two lists of keywords: an inclusion list and exclusion list. They then developed a semi-automated Microsoft® Excel-based algorithm to screen logging- and agricultural-related crashes using both sets of keywords, and then validated the tool using a *gold standard* set of agricultural narratives developed through manual review. (A gold standard validation process involves using a set of standard inputs that yield known outputs to test a tool's efficacy.)



\$25B 

Crash costs incurred by employers (2013)

27,000 

Number of workers killed in crashes while on the job (2003–2017)



\$1.4M

Lifetime societal costs of each fatality (2010)



4X frequency of crashes among AFF employees compared to other industries



2X Ratio of fatal or injury crashes in Louisiana involving drivers not wearing safety belts (2010–2015)

Beyond the National Highway Traffic Safety Administration's Fatality Analysis Reporting System, no regional database existed before this project was completed for crash and injury surveillance that accounted for nonfatal and less severe crashes. And parsing the reports that do exist to identify specific causal factors can be a time-consuming task.

"People often use common keywords to classify the circumstances surrounding a crash," Shipp says. "Yet, in the quest to be exacting and specific — which is absolutely essential to properly differentiating crash data — you can sometimes lose vital details that don't fit that limited nomenclature."

Capturing those details is why most crash reports include a narrative field that allows free-form reporting by the individual — usually a law enforcement officer — making the report. The narrative field can contain a gold mine of information to determine factors that contribute to crashes. Analysts can then use that data to identify potential strategies

for preventing similar crashes. To date, the only way to review these narratives has been to read them closely and note significant factors — a costly, labor-intensive process. Now, an automated, easy-to-use Excel tool is available.

"We were able to demonstrate that our tool correctly classified agricultural crash narratives 96.1 percent of the time," Shipp says. "We also showed that using the tool can reduce narratives requiring manual review by up to 59.4 percent."

The tool is free to use and available at <https://groups.tti.tamu.edu/cts/swagcrash/>. Using it, analysts can better understand what causes AFF crashes and develop interventions to prevent them. From modifying driver behavior — for example, encouraging more drivers to use seat belts, a factor in logging truck crashes — to identifying roadside safety improvements, the Excel-based tool can save not only lives but societal costs as well across the board — from prices on store shelves to the overall burden of health insurance premiums.

Shipp and her team are using the regional database they created to extend their research and refine their tool to apply to other types of crashes and crash years.

"The results of this important research by TTI and Texas A&M could help identify factors contributing to these occupational transportation fatalities," says Vanessa Casanova, associate professor at The University of Texas Health Science Center at Tyler. The study was funded by the Southwest Center for Agricultural Health, Injury Prevention and Education through a cooperative agreement with the National Institute for Occupational Safety and Health. "Once we better understand those factors," Casanova says, "we can create life-saving interventions for drivers in the agricultural sector." ■



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TTI Signs Agreements with Transportation Research Institutes in Greece

During the week of July 1, TTI signed memoranda of understanding (MOUs) with both the Hellenic Institute of Transport (HIT) at the Aristotle University of Thessaloniki (AUTH) and the National Technical University of Athens (NTUA). The purpose of the two agreements is to jointly collaborate in advancing transportation research, technology transfer and education to enhance mobility.

The delegation traveling to Greece from TTI included Agency Director Greg Winfree; Senior Research Engineer and Mobility Division Head Bill Eisele; and Juan Villa, research scientist and head of TTI's Mexico City Office.

In addition to the MOU signings at both institutions, the TTI delegation participated in a summer school hosted by HIT in collaboration with the AUTH Department of Mechanical Engineering and the Texas A&M Engineering Experiment Station (TEES), a sister agency of TTI within The Texas A&M University System. The summer school was targeted to international summer postgraduate students, graduate students and young researchers in Greece pursuing careers in digital supply chain management or interested in innovative research and trends in the supply chain and logistics fields.



Present at the TTI-NTUA MOU signing were (left to right): George Yannis, NTUA department head; Juan Villa, TTI research scientist; Andreas Loizos, NTUA laboratory director; Greg Winfree, TTI agency director; John Golias, NTUA rector; Bill Eisele, TTI senior research engineer; and Marinos Kavouras, NTUA vice rector.

In addition to supply chain and logistics research activities, TTI and HIT could pursue joint research into intelligent transportation systems, big data analytics, sustainable urban mobility and autonomous vehicle applications, among other topics.

The MOU between NTUA and TTI focuses on joint activities in the areas of connected and automated mobility, ports, railways, safety, pavement engineering, and related transportation issues and opportunities.

"We are pleased to be working with our partners at both of these institutions, as well as our sister agency, TEES," said Winfree. "There are numerous opportunities to collaborate on joint research and innovation activities to share our knowledge internationally and help educate the next-generation transportation workforce in both of our countries."

Other activities under the MOUs could involve collaborating on conference presentations and papers; jointly developing and conducting academic and professional training programs; and fostering faculty, researcher and student exchanges. ■

USDOT Awards BUILD Grant to Brazos Transit

The Brazos Transit District was recently awarded a \$14 million BUILD Grant from the U.S. Department of Transportation (USDOT) for new buses. TTI assisted with the grant proposal as part of an interagency contract between the district and the Institute. The grant will help fund replacement of more than 30 diesel buses, including 12 Brazos Transit District diesel buses and 20 Texas A&M University diesel buses, three of which will be replaced with battery-electric buses.

"Replacing these old and outdated buses with more efficient, clean diesel buses will reduce maintenance, support a state of good repair, and accommodate more riders," explains TTI Research Scientist Michael Walk,



who led the grant development process. "An innovative component of the grant is to replace three of Texas A&M's diesel buses with battery-electric buses. These buses will be used to provide service on different routes, introducing students to battery-electric buses, which is still an emerging technology." ■

Winfree Testifies at House Subcommittee Hearing

On May 21, TTI Agency Director Greg Winfree provided testimony during a U.S. House of Representatives Committee on Science, Space and Technology Investigations and Oversight Subcommittee hearing on “The Need for Resilience: Preparing America’s Transportation Infrastructure for Climate Change.” During his remarks, Winfree noted that robust research efforts must be put into place to change the traditional ways in which we design, build and maintain our infrastructure.

“As a country, we have historically responded to weather disasters in a reactive way, turning to established rehabilitation and repair practices to return service to pre-disaster levels,” Winfree testified. “As demands on our infrastructure systems grow, and the population and funding to meet those demands lags behind, that strategy is no longer sustainable. Instead, we must focus more on preparation and planning. This new mindset requires a different approach to making our existing and new infrastructure more resilient.” ■

Arambula Featured in *Asphalt Pavement* Article



Arambula

TTI Associate Research Engineer Edith Arambula’s National Cooperative Highway Research Program project on evaluating the use of recycling agents was recently featured in an article for *Asphalt Pavement*. The article, entitled “Taking RAP to the Max,” examines the barriers that prevent the use of reclaimed asphalt pavement (RAP), which is stockpiled throughout the country, and what can be done to overcome these barriers.

According to Arambula, the extent of binder availability depends on how aged the RAP is, which is a function of climatic conditions and mix temperature. Reduced binder availability must be accounted for during mix design and can often be compensated for through higher dosages of recycling agent or virgin asphalt binder. But too much recycling agent — or simply the wrong agent — can be ineffective, underscoring the need for thorough analysis. ■

Mobility Issues in the Spotlight at Annual SXSW Gathering

TTI experts joined thought leaders from around the world during the annual South by Southwest (SXSW) Festival in Austin. TTI Agency Director Greg Winfree joined health care leaders for a focus on “Plugging into Rural Healthcare Solutions” as part of the Texas A&M Power House presence at SXSW March 12. Winfree focused on transportation’s role in facilitating health care access for rural communities.

For those remote areas, Winfree said, a comprehensive community needs assessment is essential. He also emphasized the importance of bringing emerging transportation technologies to locales far beyond urban areas. For example, transportation network companies (Uber, Lyft, etc.) are experimenting with drone-like vehicles that can operate in the air space below 500 feet. “It’s conceivable that those vehicles could be applied to medical transport needs,” he said.

As part of a panel entitled “How Robo-Taxis Will Revolutionize Urban Transport” at the Smart Mobility Summit hosted by Wards Intelligence and the C3 Group, TTI Associate Research Scientist



TTI Associate Research Scientist Ipek Nese Sener shares insights about how robo-taxis may revolutionize urban transportation.

Ipek Nese Sener stressed the need for balance with all aspects of advancing automated vehicle technology, including infrastructure, safety and public policy. “The future looks really bright if we can do this the right way,” she said. ■

Turnbull Authors Critical Issues in Transportation Article



Turnbull

TTI Executive Associate Director Katie Turnbull recently authored an article for the Transportation Research Board (TRB) bimonthly magazine *TR News* summarizing the TRB report *Critical Issues in Transportation 2019*.

The report addresses 12 interrelated transportation topics in need of research, policy discussion or collaborative problem solving.

"These topics include ongoing concerns as well as new and emerging issues," Turnbull said in her article. "The framing questions reflect both the increasing complexity and challenges facing society and all transportation modes, and the opportunities for innovative solutions."

Turnbull is the past chair of the TRB Executive Committee and current chair of TRB's Executive Committee Subcommittee for Planning and Policy Review, which championed the development of the report. The chairs of TRB's more than 220 standing committees and task forces, sections, and groups — as well as the Marine Board, sponsors and key stakeholders — also participated in the report's creation. ■

Park Elected ASA Fellow in Unique Recognition



Park

TTI Senior Research Scientist Eun Sug Park has been selected as an American Statistical Association (ASA) Fellow. The prestigious honor is bestowed upon only a fraction of ASA members each year. The goal of ASA, formed in 1839, is "to promote the practice and profession of statistics."

Park began her career with TTI in 2001, accumulating numerous awards and recognitions while leading modeling and data analysis tasks in many transportation research studies for numerous state and federal agencies. Her expertise includes modeling and analysis of transportation data, safety analysis, Bayesian modeling, uncertainty assessment, high-dimensional data analysis, environmental modeling, source apportionment/identification, and assessment of health effects of multiple air pollutants.

"Being selected as an ASA Fellow is among the highest honors of my career, and it was all made possible thanks to my TTI colleagues and friends," says Park, who will be officially recognized at an awards ceremony this summer. ■

NHTSA Recognizes Wunderlich with Public Safety Award

The U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) has recognized Robert Wunderlich, director of TTI's Center for Transportation Safety, with a Public Service Award. Wunderlich's plaque reads: "For your dedication to saving lives on our highways by championing data-driven traffic safety initiatives."

This year's Public Service Awards were presented April 1 at the 2019 Lifesavers Conference on Highway Safety Priorities in Louisville, Kentucky. NHTSA first bestowed Public Service Awards last year to "celebrate and thank our hard-working partners who exemplify the highest levels of dedication to improving highway safety throughout the country."

NHTSA Region 6 Administrator Maggi Gunnels nominated Wunderlich for the award, noting that he "shines as a longtime supporter of traffic safety stakeholder work groups and teams such as the Texas Statewide Pedestrian Safety Coalition...His passion for traffic safety is infectious, unparalleled and to be celebrated."

"I view this award as the culmination of work by all the researchers and staff within the Center for Transportation Safety," Wunderlich said. "I just happen to be honored to be the director." ■



Heidi King, NHTSA deputy administrator, presents Robert Wunderlich, director of the TTI Center for Transportation Safety, with a Public Service Award at the 2019 Lifesavers Conference on Highway Safety Priorities in Louisville, Ky.

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THE LAST STOP

with Greg Winfree, Agency Director

What Goes Around Comes Around

Convenience Culture? How About Compassion Culture?

I'm a big fan of science fiction (SF) — old standards like *The Twilight Zone* and *Star Wars*, and newer classics-to-be like the Marvel movies. One reason I enjoy SF so much is that the genre often uses its fantastic landscapes and far-out circumstances to present, in stark relief, what it means to be human. "For your consideration," as Rod Serling used to say.

If you drew a Venn diagram of health and transportation, much of the overlap would be positive — when we travel for work or leisure, or to get the kids to school or visit the doctor. But there are cases of negative overlap, too: respiratory diseases exacerbated by air pollution, vehicle crashes causing injuries and death, and an overreliance on single vehicles, which can encourage illnesses like diabetes.

Mitigating the negatives with advanced transportation technologies can sometimes feel like we're dabbling in science fiction. And while some experts claim connected and automated vehicles can reduce traffic deaths (currently hovering around 35,000 a year) by as much as 80 percent, that ambitious future is still coming into focus.

Today, though, it's worth reiterating that humans — you and I — are still the central factor in the health-transportation equation. A common SF theme examines how the more reliant we become on technology, the more like that tech — cold and distant, *dehumanized* — we can become if we're not careful. Sometimes, the technology we create even decides it's better off without us. Enter Arnold Schwarzenegger's cyborg, programmed to exterminate humans by Skynet, in *The Terminator*.

Not so long ago, folks took better care of one another than we seem to today. When your nearest neighbor

was 20 miles and a few hours away by horseback, being neighborly was more than a nod to courtesy. It was a survival strategy. We depended on one another to weather natural catastrophes, and you can still see this selfless spirit captured in the newsfeed today when disaster strikes. But it sometimes takes a Hurricane Harvey or a California wildfire to bring it out.

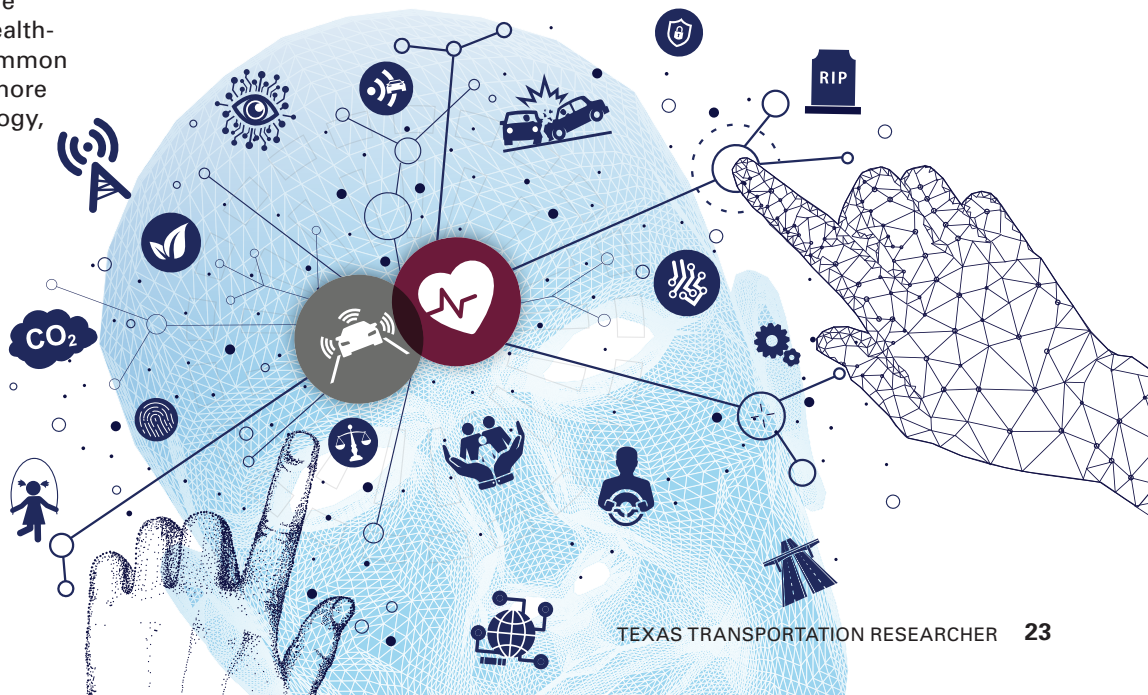
As we race through daily life,
let's remember that we're all —
every one of us — responsible for
the consequences when health

intersects with transportation. A *safety culture* isn't just about practicing safe driving behaviors; it's also about caring for one another — even if we're only 20 feet, not 20 miles, apart. It's about courtesy and consideration for others even absent bad weather.

We don't need a new policy to tell us how to act toward one another. We already know how. So, the next time you're on the road, consider prioritizing compassion over convenience. Invest some goodwill toward others in the karmic bank of the universe. Remember that what goes around comes around.

Everything we do matters. Everything we do counts. And sometimes selflessness can, ironically, be in our own self-interest. ■

It's worth reiterating that humans — you and I — are still the central factor in the health-transportation equation. A common SF theme examines how the more reliant we become on technology, the more like that tech — cold and distant, *dehumanized* — we can become if we're not careful.





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