CRITICAL ISSUES IN TRANSPORTATION 2019

Photo: National Renewable Energy Lab

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Above: *Critical Issues in Transportation 2019* addresses 12 interrelated transportation topics in need of research, policy discussion or collaborative problem solving. Some entities, such as the Port of Long Beach in California, may face nearly all of the issues.

TRB released its first critical issues list in 1974. For 45 years, regular updates to the list have focused attention on key transportation issues and opportunities shaping research, policies, programs, and projects at the national, state, and local levels.

The development of *Critical Issues in Transportation 2019* was led by the TRB Executive Committee Subcommittee on Planning and Policy Review, with participation from 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.

Highlighting the importance of the report, the National Academies Report Review Committee oversaw peer review of and subsequent approval of the document through a rigorous report review process. Because of this, for the first time, the *Critical Issues* document is a publication of the National Academies of Sciences, Engineering, and Medicine.

Critical Issues

Presented in *Critical Issues 2019* are high-level, challenging questions about 12 interrelated topics. These framing questions focus on critical issues facing transportation in the next 10–20 years that can be addressed

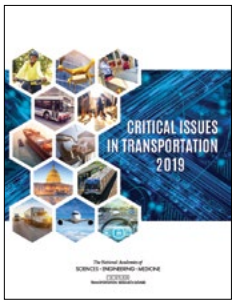

Photo: Antonio R. Villaraigosa, Flickr

A container is placed on an electric port truck in the Port of Los Angeles. *Critical Issues 2019* covers topics important to ports: goods movement, energy and sustainability, and transformational technologies.

through research, policy discussion, and collaborative problem solving in the near term.

The Executive Committee examined the many factors influencing the transportation system's ability to meet the diverse needs of society in an era of unprecedented change: demographic changes, economic growth, technology advancements, and new energy resources, as well as safety, security, equity, and resilience concerns.

Although the critical issues are presented from a U.S. perspective, most of the topics are global in scope. In addition, the United States can benefit from international research and experience, informing the discussion of appropriate policies and programs.

The following 12 topics form the basis for *Critical Issues 2019*:

- Transformational technologies and services,
- Energy and sustainability,
- Serving a growing and shifting population,
- Resilience and security,
- Safety and public health,
- Equity,
- Governance,
- System performance and management,
- Funding and financing,
- Goods movement,
- Institutional and workforce capacity, and
- Research and innovation.

These topics include ongoing concerns as well as new and emerging issues. The framing questions reflect both the increasing complexity and challenges facing society and all transportation modes and the opportunities for innovative solutions. A few topic areas are highlighted below to offer a perspective on the new and emerging issues.

Transformational Technologies and Services

This topic reflects the rapidly changing environment of connected, automated, and autonomous vehicles, marine vessels, and aircraft. Also addressed are the combination of new technologies and innovative entrepreneurship that have led to innovations in ride-, car-, and bikesharing as well as in e-commerce.

Framing questions focus on the impact of Uber, Lyft, and other transportation network companies (TNCs) that have emerged in the past decade as new travel options in urban areas. To ensure mobility enhancements for all population segments and to avoid unintended consequences, it is imperative to gain a better understanding of the operation and use of these services and their influences on vehicle ownership, public transit ridership, vehicle miles traveled, and vehicle emissions.

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Other questions in this topic address the safe introduction of connected and automated vehicles as well of as fully autonomous vehicles, vessels, and aircraft. Identified are the many issues associated with security, human factors, regulatory oversight, insurance, and consumer acceptance of connected and automated vehicles as well as their interaction with pedestrians, bicyclists, and other vulnerable road users.

Additional framing questions focus on current and future communication tech-

Photo: Boenau, Pixabay

Innovations in ride-, car-, and bikesharing transform mobility and have significant impacts on transit use, vehicle ownership, and emissions.

Photo: Jerry Huddleston, Flickr

The costs of moving agricultural and energy products from rural areas affect the prices paid by consumers for the products.

nologies, including dedicated short-range communications and fifth-generation Wi-Fi, or 5G, and on the roles of federal, state, and local agencies in regulating and overseeing pilots, demonstrations, and deployment of different technologies.

Transformational technologies and services influence many of the other cross-cutting topics in *Critical Issues 2019*. For example, individuals with disabilities and those without smartphones, credit cards, or bank accounts may not be able to access TNC services, and this raises equity concerns. Transformational technologies also factor into questions on sustainability, funding and financing, and future workforce needs.

Serving a Growing and Shifting Population

This topic recognizes that, although urban areas are the nation's economic engine, it also is vital to address transportation needs in megaregions and rural areas. The challenges and opportunities in megaregions and rural areas are very different, but both areas provide essential support to the economy and quality of life in the United States.

The continuing growth of megaregions contributes to increasing traffic congestion, and the movement of people and goods across metropolitan areas and state lines creates unique issues. Questions on the most appropriate modes are presented, as well as on funding and financing methods for multiagency, multiple-jurisdiction projects.

Rural areas face significant challenges that affect all segments of society. Railroads, the inland and coastal water systems, roads, airports, and pipelines all support the movement of agricultural products and energy extraction and production, influencing the prices consumers pay in stores and at the gas pump.

Like their urban counterparts, rural residents need mobility and safe travel options. Rural transit systems face increasing demands to serve a population of residents that are older, have disabilities, or need to travel long distances to health care and social services. Rural residents involved in traffic crashes, including single-vehicle lane-departure crashes, face long travel distances to hospitals, compromising emergency response times and chances for survival.

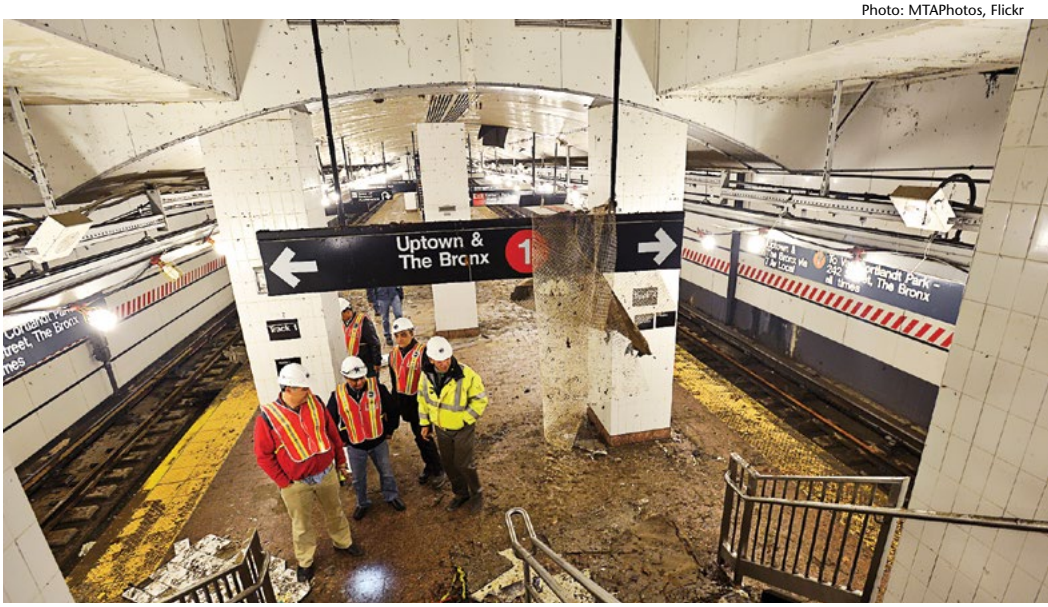
The rural transportation network offers access to national and state parks, recreation areas, and cultural sites for residents and visitors. Transportation is vital to the travel and tourism industry, supporting local jobs in rural areas throughout the country.

Framing questions for this cross-cutting topic include examining cost-effective transportation modes and policies to improve internal megaregion travel, ensuring connectivity to other regions, and innovative mobility services providing access to jobs, public and private services, education, and health care for rural residents.

Resilience and Security

Hurricanes Harvey and Maria in 2017 are just two recent examples of extreme weather events disrupting the lives of millions of people and costing billions of dollars in infrastructure and property damage. Intense rainfall, superstorms, tornadoes, and fires have taken their toll on transportation facilities across the country.

Photo: MTAPhotos, Flickr



Metropolitan Transportation Authority workers survey Hurricane Sandy damage at the South Ferry subway station in New York in 2012. As extreme weather events become more common, strategies to mitigate damage become more necessary.

Manmade disasters, including terrorism and cyber attacks on infrastructure, also can cause major damage and distress to the transportation system.

Framing questions focus on developing strategies to meet threats and to mitigate the vulnerabilities of communities throughout the country as well as on the public- and private-sector groups responsible for the transportation system. Other questions address incorporating climate-science data into transportation planning and project development, expanding cybersecurity within transportation agencies, and enhancing security in all modes. Also suggested is an increase in methods of sharing best practices among public- and private-sector partners.

Photo: Sadie Colbert, U.S. Air Force

Primary among new safety challenges in transportation is mobile phone distraction, affecting drivers, pedestrians, and aircraft and rail operators.

Safety and Public Health

Safety continues to be a critical transportation issue—and well it should be, considering the nearly 40,000 fatalities on the nation's roadways each year. With safety-enhancing advancements in roadway and vehicle design, the framing questions on this topic have changed. Many questions now focus on such issues as distracted drivers and pedestrians, whose attention often is split between driving or walking and using electronic devices—for example, texting on cell phones. Texting by operators also has been a concern in recent helicopter and rail crashes.

Framing questions across all modes on this topic focus on interventions for reducing crashes involving distractions, alcohol and drug impairments, and operator fatigue, and on strategies to reduce the growing number of pedestrian and cyclist injuries and fatalities.

By grouping safety and public health, *Critical Issues 2019* further focuses framing questions on the impacts of emissions, noise, urban heat islands, the spread of infectious diseases, and other related concerns. Developing new methods and technologies to reduce vehicle-based emissions continues to be an important area of study.

The growth of unmanned aerial vehicles and unmanned aircraft systems also is covered in this topic, with questions addressing these new sources of safety risk and their regulation and user acceptance.

Photo: Paul Novarese, Flickr

Memphis International Airport, home to the FedEx Express global hub, operates the second-busiest cargo operation in the world. *Critical Issues 2019* addresses needed system efficiency for freight movement.

Goods Movement

The nation's economy depends on an efficient system for moving freight domestically and internationally. This topic also recognizes that freight transportation is a complex system involving private carriers that operate on both public and private infrastructure, with federal, state, and local agencies regulating many aspects of the system. The growth in international trade, e-commerce, and urban freight delivery all affect different elements of the transportation system.

Framing questions address the use and impact of transformational technologies in all freight modes, innovative applications for urban goods movement, new analytical methods and sources of freight data, and labor shortages in trucking and freight operations. Other questions address the impacts of ocean megavessels, truck size and weight, and airport freight capacity.

Using *Critical Issues 2019*

Identifying these critical issues is just the beginning of the process. The impact comes in how the issues are used to undertake research, policy discussions, and outreach to improve transportation. The *Critical Issues 2019* document helps guide TRB activities and is a valuable resource for sponsors, stakeholders, and other groups.

TRB is the go-to place for unbiased, forward-looking research, innovative solutions, and information sharing to address cross-cutting, critical topics. The TRB Executive Committee is using the

identified issues to update its strategic plan and to organize policy sessions, including a January 2019 session on rural transportation and a planned session on distracted driving in June.

Many of the experts on these *Critical Issues 2019* topics are active in TRB. The standing committees and task forces address the critical issues at Annual Meeting sessions, specialty workshops, and conferences. Committees develop research problem statements focusing on the topics, and many embark on other activities to engage key stakeholders. Additionally, the critical issues are often used in formulating and updating committee triennial strategic plans to help focus activities.

The groups overseeing TRB's Cooperative Research Programs, including the National Highway Cooperative Research Program and the Transit Cooperative Research Program, benefit by using the critical issues to develop or refine problem statements. Groups and researchers also can use the issues to identify research for the different synthesis and Innovations Deserving Exploratory Analysis programs.

Sponsors, universities, and other stakeholder groups regularly use TRB's *Critical Issues* document to help guide research, education, professional capacity building, and outreach activities. University Transportation Centers sponsored by the U.S. Department of Transportation often address aspects of the critical issues identified by TRB.

As TRB approaches its centennial in 2020, the development of *Critical Issues 2019* has never been more important, relevant, or meaningful.

The *Critical Issues 2019* document can also help facilitate and enlighten policy discussions at the federal, state, and local levels that then may lead to actions addressing key concerns and improving the transportation system for all users.

Communicating the critical issues to the public and to various interest groups can further enlighten the conversation on national, state, and local transportation; providing ongoing information on cross-cutting issues as research results become available adds value to these discussions. *Critical Issues 2019* will continue to foster international collaboration and cooperation on research and information sharing. Learning from projects in other countries and sharing findings with colleagues abroad can enhance collaborative relationships across the international research community.

As TRB approaches its centennial in 2020, the development of *Critical Issues 2019* has never been more important, relevant, or meaningful. After all, if the questions surrounding how to improve the transportation system were easy, they would have been answered by now. TRB is well positioned to identify and address critical issues and ensure that transportation meets the future needs of all segments of society in an ever-changing world.

Photo: Rick Schwartz, Flickr

I-75 over the Manatee River in Florida. Researchers, policy makers, and transportation agencies can use the issues outlined in *Critical Issues 2019* as a valuable guide for improving transportation nationwide.