

Demographics, Destiny, and Anticipating the Future of the Transportation System

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The United States' demographic profile is changing. Tomorrow's America will be older, more ethnically and culturally diverse, experience more immigration both internally and internationally, and have a new generation of better educated women. How will these potentially disruptive demographics affect the future of the transportation system? This article outlines the objectives of a U.S. Department of Transportation, Research and Innovative Technology Administration's University Transportation Centers Program's Spotlight Conference on the *Impact of Changing Demographics on the Transportation System*, held at the National Academies, Washington, DC, October 2008. Seven of the several papers presented are published here as a special issue to identify key research questions and implications for both policy and practice.

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Demographics is destiny. This oft-quoted phrase rings fear and opportunity—fear that accompanying change will disrupt business as usual and opportunity for those seeking innovation. There is perhaps no other social force more defining than changing demographics. And, the face of America is changing.

If demographics is truly destiny—what is the impact of changing demographics on the future of the transportation system? What is the new face of America? How will they travel? Where will they want to go? What will

their evolving lifestyles be and what new demands will they place on the transportation system? More than moving people, how will changing demographics affect the work of transportation? How will public policies and private practices evolve to meet new demands of mobility and safety? In the future, who will do the planning, the construction, operations, maintenance, and management of public and private transportation and logistics systems nationwide?

Examining these questions is to gain insight into the future of transportation and to understand the *requirements definition* for tomorrow's transportation system. This was both the strategy and the objective of a "Spotlight Conference" held in collaboration with the Transportation Research Board on October 27 to 28, 2008 in Washington, DC, sponsored by the U.S. Department

Authors' Note: The "Impact of Changing Demographics on the Transportation Systems" Spotlight Conference was sponsored by the U.S. DOT Research and Innovative Technology Administration's University Transportation Centers Program and convened by the National Academies Transportation Research Board. Thomas Palmerlee of the Transportation Research Board and U.S. DOT's Robin Kline provided significant support and assistance to make this event a success. Please address correspondence to Joseph F. Coughlin, New England University Transportation Center & AgeLab, Massachusetts Institute of Technology, 77 Massachusetts Avenue, E40-279 Cambridge, MA 02139; e-mail: coughlin@mit.edu.

of Transportation Research and Innovative Technology Administration's University Transportation Centers Program.

For nearly 25 years, the U.S. Department of Transportation's University Transportation Centers Program has conducted an agenda-setting program of research, education, and technology transfer. In partnership with 60 sponsored centers and 125 universities nationwide, the University Transportation Centers Program has been able to engage the private sector as well as leverage state and local collaboration to develop the foundation of tomorrow's transportation system while providing the people and working knowledge necessary to ensure that today's system supports the livability, sustainability, safety, and economic infrastructure necessary to enhance the quality of life of all Americans.

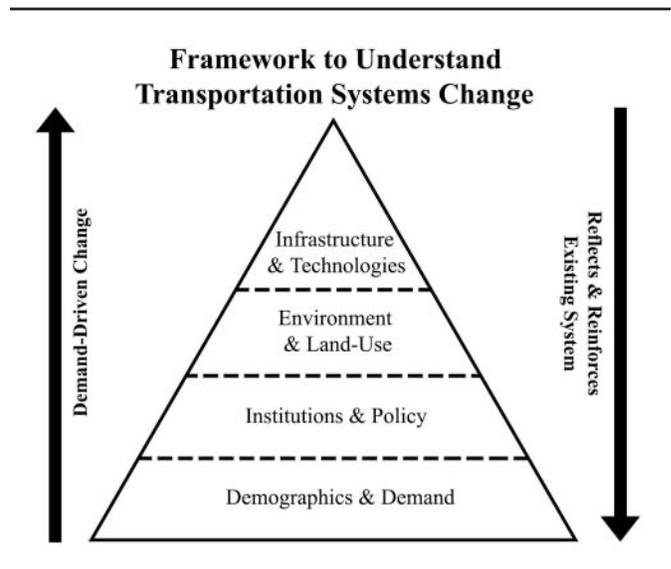
This national investment in university-based research and education has produced students, new technologies, new methods, and new understanding. In turn, these have led to innovations and outcomes benefiting the entire nation. These include the introduction of new methods to estimate travel demand to guide Federal and state transportation investments; public education materials to help individual families and physicians make decisions on when it is or is not safe to drive; development of new techniques and technologies to improve the safe and efficient movement of people and freight; next-generation professionals to bring next-generation thinking to public agencies and private firms; as well as countless other projects that address energy, environment, efficiency, workforce, security, economic competitiveness, and infrastructure.

A Systems Approach to Transportation Change

The transportation system is often described as a mixture of infrastructure and vehicles carrying people and freight across the nation. Although this focus on what is *seen* is not incorrect, it is incomplete. A true systems view of transportation integrates infrastructure, vehicles, and related technologies along with the dynamics of the people and organizations that place demands on it, the public-private institutions that govern it, and the environmental context within which it operates.

Figure 1 presents a framework to understand transportation systems change. It assumes that the system initially responds to demand generated by people and their lifestyles—transportation becomes an enabler where people want to go, moving the *things* they want, and defining how individuals choose to live with each other. These are more than questions of throughput and

Figure 1
Framework to Understand Transportation Systems Change



capacity, they translate into political demands that shape transportation-related institutions and policies that organize, build, operate, and manage the infrastructure and services needed. Over time these demands, policies and practices of both public and private institutions form the contours of how transportation goals are balanced with economic and environmental values. Finally, the most visible part of the system is made apparent—the infrastructure and related technologies. These technologies include the vehicles, management systems, and increasingly, the intelligence that enables people and organizations to articulate their real-time demands on the system.

This framework offers a relatively logical progression of an approach that depicts a *responsive* system to meet the demands of people. Change is seen as demand driven; as demand changes, so does the system. Unfortunately, this is not entirely the case. As institutions, policies, practices, technologies, and land-use patterns are developed, they form their own *structured bias*. That is, the weight of historical *ways of doing things* often becomes a barrier to interpreting new demands and innovation. As Figure 1 shows, there can be downward pressure on new demands or ideas attempting to articulate change. Once built, as the nation's current system has been developed over the last century, institutions, land-use patterns, infrastructure, and the technologies used serve to reflect and reinforce yesterday's definition of demand.

To counter this *structured bias* that slows innovation, forward-looking decision makers, organizations, and researchers must seek to identify factors that indicate

that real change is ahead. For transportation, demography may be destiny.

Demographics and Transportation Systems Change

Over time, demographic change will drive system change. The United States is facing profound demographic transition. Consider the following:

- One baby boomer is turning 63 every 7 seconds; age-wise the United States is forecasted to become a nation of *Floridas* in nearly 20 years.
- Immigration, both internally and from abroad, is changing the geography of economic opportunity, mobility demands, and population growth.
- Changing ethnic and racial mix is introducing new household composition patterns and preferences for transportation options.
- A new generation of educated and professional women will place different demands on the system requiring it to be robust enough to enable their complex trip making as well as their unique safety needs.

Today's transportation system and the land-use patterns it enabled developed over the last 60 years. Among other objectives, the system was designed to support the 9 to 5 journey-to-work trip (mostly by males) from a within city or suburb-to-city location—tomorrow's traveler is likely to be older, female, racially and ethnically more diverse, and working flexible hours 24/7 across sprawling regions.

The articles contained in this special issue were part of the Spotlight Conference sponsored by the U.S. Department of Transportation Research and Innovative Technology Administration's University Transportation Centers Program on the *Impact of Changing Demographics on the Transportation System*. The Spotlight Conference was a forward look to *anticipate* the impact of new and potentially disruptive demographic trends, associated research questions, and practical implications for policy and practice.

The 2-day conference held at the National Academies' Keck Center in Washington, DC, contained a series of plenary papers, section papers and presentations as well as poster sessions addressing

- aging and demographic transition,
- immigration internally and from abroad,
- changing racial and ethnic mix, and
- gender differences.

A selection of the plenary papers is presented in this special issue. Addressing aging, University of Michigan's David Eby and Lisa Molnar provide an article "Older Adult Safety and Mobility: Issues and Research Needs." Their article presents an exhaustive review of the multiple themes surrounding older drivers and safety as well as some of the shortfalls in alternatives to driving. Perhaps most compelling is their integration of research that links medical and health issues with the driving decision as well as the potential of improved driver screening and assessment methods.

Joseph Coughlin's article "Longevity, Lifestyle and Anticipating the New Demands of Aging on the Transportation Enterprise," takes an *enterprise* approach to aging and transportation asking how might the evolving lifestyles of aging baby boomers change travel demand? Will they be working? Will older women be more like their fathers in travel behavior? Where will they live—and if they do not drive, how will they meet their mobility needs? Finally, aging presents challenges beyond mobility. Coughlin identifies a critical issue for both public and private transportation organizations: how to address transportation workforce shortages in key skill areas as well as how to manage the knowledge that may be lost as the boomer generation retires across the transportation enterprise?

Immigration is an issue that crosses many policy domains. Daniel Chatman, Rutgers University provides an examination of how immigration will affect transportation. In his article "Immigrants and Travel Demand in the United States: Implications for Transportation Policy and Future Research," Chatman notes that immigrants account for the majority of recent urban population growth in the United States. Among the significant observations he identifies is that foreign-born immigrants are much more likely than native born travelers to use transit, car pool, walk, bike, or other transportation alternatives. Continuing immigration offers both a potential opportunity and challenge to planners to maximize existing infrastructure and to anticipate the new needs of new Americans.

Gender differences in travel demand and safety are major issues for researchers as well as public and private decision makers. Randall Crane, University of California, Los Angeles, presents "Sex Changes Everything: The Recent Narrowing and Widening of Travel Differences by Gender." Crane's data-driven piece finds a growing similarity between the genders while there remain a number of variables that may cloud our ability to predict future female (or male) travel demands, for example, impacts of age and racial differences.

University of Arizona's Sandra Rosenbloom and Cambridge Systematics's Susan Herbel's article "The Safety and Mobility Patterns of Older Women: Do Current Patterns Foretell the Future?" present a policy paradox for researchers and policy makers alike. Older women tend to be safer than their male counterparts because they drive less, self-regulate their driving more, and give up the keys earlier. Although this may be a *safety* victory, it is also a story of lost mobility. The authors aptly observe that the next generation of women will be more dependent on the car and that they may suffer even greater mobility losses should they follow the transportation patterns of their mothers.

"Disaggregating Race and Ethnicity: Toward a Better Understanding of the Social Impact of Transport Decisions" by Beverly Ward, National Resource Center for Human Service Transportation Coordination, provides an overview of travel differences among ethnic and racial groups in the United States. While she identifies important workforce and safety issues, Ward provides a basis for future research and policy inquiry looking at race and ethnicity at the intersection of age, functionality, as well as region showing that transportation and social policy will continue to be intertwined.

Heather Contrino, U.S. Department of Transportation's Federal Highway Administration, provides an early analysis of the Highway Performance Monitoring System, Traffic Volume Trends, and preliminary 2008 National Household Travel Survey showing that the United States' travel behaviors are changing as a result of demographics as well as the intervening effects of fuel prices and the economic downturn. Although Vehicle Miles Traveled (VMT) and vehicle ownership has seen a steady increase in decades past, Contrino's article "Demographics Matter: Travel Demand, Options, and Characteristics among Minority Populations," suggests that there may be a slowdown in VMT. This change in demand may be linked, in part, to patterns of income, household location, and vehicle ownership as related to different racial and ethnic groups in the United States.

These seven articles are part of a larger contribution made by the Spotlight Conference. Nearly 40 papers, posters, and presentations were presented to an audience of more than 100 people from government, industry, and academia. Together these presentations, and the engagement with the attendees, provided valuable insights into

changing demographics and the future of transportation. The following people made this work possible.

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