



A New Path to the Future Transportation System

Exploratory Advanced Research . . . Next Generation Transportation Solutions

Anticipated shifts in fuel availability, energy use, and vehicle size and density combined with continuing technological innovation will provide new challenges and opportunities in traffic management. Developing the concept of an integrated transportation system for the future is the focus of “Feasibility for a New Concept of Integrated Active Transportation Systems,” an Exploratory Advanced Research (EAR) Program project launched by the Federal Highway Administration (FHWA) in 2009 and conducted by the University of California at Berkeley.

The Concept

The Integrated Active Transportation System (IATS) is a system in which all vehicles in all modes of transport interrelate seamlessly with each other and with infrastructure systems. Vehicles share information and actively adapt to the local situation and the larger system state to meet the transportation system objectives of mobility, safety, and energy efficiency. Accidents are infrequent, and the flow of people and goods through the system is smooth and efficient, just as people move effortlessly in many directions through large crowds without colliding and with optimal throughput. Vehicles with increasing levels of automated capability make increasingly sophisticated decisions to achieve their occupants’ transport objectives, independently or in concert with infrastructure systems. This IATS study is aimed at understanding the technical capabilities needed to realize such a

comprehensive system and the social, political, economic, and legal factors that will govern its realization.

Need for the Research

The IATS research is driven by the expectation of major changes in the U.S. transportation system over the next several decades, driven by changes in the cost and availability of conventional fuel and energy, continuing growth in urban density, and major social, economic, and political shifts that may result from global events. It is unclear, for example, how climate change, economic upheaval, peak oil, and other tectonic shifts may impact the transportation system and the realization of technological progress. Anticipated changes in vehicle size and dynamics will likely inhibit some operational aspects while introducing others. It is also likely that continued technological progress will facilitate new capabilities in safety, congestion mitigation, and energy efficiency.

In parallel with these observations is the fact that, despite 25 years of development effort, the gap between what is technically possible in the transportation system and what is actually realized out on the road continues to grow. Automated vehicles were demonstrated by the FHWA Automated Highway System Program in 1997, yet today, the only automated features available on production vehicles are parking systems and a few high-end emergency braking systems. Extensive work has been done on vehicle safety systems, which have been demonstrated for at least two decades, yet today only a few vehicles are sold with driver warning systems.

So, while it is clear that major shifts in factors associated with road transport are imminent, it is unclear how these shifts may impact the transportation system and equally unclear what may be the best way to respond to these events. By developing a deeper understanding of these impacts and a technically realistic and realizable long-term vision for the transportation system, FHWA can better plan for the future.



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Goals of the Study and Accompanying Risks

The IATS research is aimed at identifying technologies and technical strategies that can best meet expected challenges and at understanding the processes that inhibit or enhance industry's ability to apply these technologies in the transportation system. It is also aimed at developing a broad strategic framework for the evolution of the transportation system to a more integrated state where various modes are coordinated in a smoothly functioning system.

Two key, related challenges in the project are accurately projecting how social, political, economic, and legal elements relevant to transportation may evolve over the next 20 to 40 years and then determining how those changes could impact the realization of the IATS. All projections are subject to errors. To control the potential for error, this study utilizes a focused scenario development process, concentrating on specific variables or factors in each field, and a separate expert panel is assessing the integrity and realism of the analysis.

Looking Ahead

The FHWA will use the results of the IATS study to guide future research, emphasizing the technologies that are most needed to address future needs. In addition, FHWA will use the IATS technical strategy and scenario-planning results to provide leading indicators for major shifts that may impact the transportation system and to provide contingency strategies for adjustments to accommodate those shifts.

The primary benefit anticipated from the IATS research is development of a clear, long-range strategy that will allow FHWA to adapt to expected major changes in transportation constraints and needs and lead the way to a future system where goods and people flow efficiently through a cooperative infrastructure in a safe and environmentally acceptable way.

EXPLORATORY ADVANCED RESEARCH



What Is the Exploratory Advanced Research Program?

FHWA's Exploratory Advanced Research (EAR) Program focuses on long-term, high-risk research with a high payoff potential. The program addresses underlying gaps faced by applied highway research programs, anticipates emerging issues with national implications, and reflects broad transportation industry goals and objectives.

To learn more about the EAR Program, visit the Exploratory Advanced Research Web site at www.fhwa.dot.gov/advancedresearch. The site features information on research solicitations, updates on ongoing research, links to published materials, summaries of past EAR Program events, and details on upcoming events. For additional information, contact David Kuehn at FHWA, 202-493-3414 (email: david.kuehn@dot.gov), or Terry Halkyard at FHWA, 202-493-3467 (email: terry.halkyard@dot.gov).

Learn More

For more information on this project, contact Kunik Lee, Ph.D., FHWA Office of Safety Research and Development, at 202-493-3491 (email: kunik.lee@dot.gov).