

NCHRP 08-127: IMPACT OF NEW DISRUPTIVE TECHNOLOGIES ON THE PERFORMANCE OF DOTs



OVERVIEW OF RESEARCH

Research Objective: Develop a guide for state departments of transportation (DOTs) and other transportation planning agencies to understand, predict, plan for, and adapt to the potential impacts of emerging disruptive technologies.

DISRUPTIVE TECHNOLOGY, IN A FEW WORDS:

Disruptive technology displaces or innovates existing practices and produces new and improved ways of doing business.

UNDERSTANDING NEW AND POTENTIALLY DISRUPTIVE TECHNOLOGIES

Disruptive technologies are typically **combinations of several individual core technologies** such as sensors, communications, AI, or materials. They can impact a DOT's ability to effectively manage operational performance—positively or negatively. Technologies can be considered disruptive if they involve the following:

IN CONSIDERING
DISRUPTIVE TECHNOLOGIES,
DECISION-MAKERS AND
PRACTITIONERS AT DOTs MUST
ASK TWO CRITICAL QUESTIONS:

- WHAT WILL BE THE IMPACT OF DISRUPTIVE TECHNOLOGIES ON PERFORMANCE?
- WHAT CAN AGENCIES DO TO PREPARE FOR THESE IMPACTS?

- **Use case:** one or more situations in which the technology addresses a need or provides a service more effectively than existing standard practices
 - » **Example:** Connected and Autonomous Vehicles (CAVs) move long-haul freight more efficiently and more safely for carriers
- **Performance improvement:** capability to improve transportation system performance or DOT performance
 - » **Example:** CAVs improve overall system safety and efficiency
- **Business model:** A reliable and consistent process through which the technology is available to users
 - » **Example:** Freight shippers sell truck space in CAVs in an online marketplace

INTERNAL PROCESS DISRUPTIVE TECHNOLOGIES

New technologies, methods, systems, data, or concepts that DOTs can adopt or use to better manage their transportation system

- Advanced analytics
- Advanced materials and construction
- Mechanisms for innovative project delivery

EXTERNAL SYSTEM DISRUPTIVE TECHNOLOGIES

Activities on transportation infrastructure undertaken by public and private entities outside of the DOT that impact transportation system performance

- Private sector vehicle/highway products and services
- Private sector multimodal mobility services
- Advanced physical infrastructure improvement products and systems

A PLAYBOOK TO BECOME A TECH-SAVVY DOT OF TOMORROW

This project included development of a playbook intended to help guide DOTs and other transportation agencies as they undertake a journey to adapt and prepare for the types of disruptive technologies introduced in NCHRP 08-127. The playbook includes incremental steps for a DOT to take to incorporate disruptive tech into its performance management framework and organizational structure. The process developed is **modular**—DOTs can choose which step best aligns with their current state of engagement with disruptive technologies—and **cyclical**, urging DOTs to continue to monitor disruptive technologies and update their practices as the disruptive technologies evolve and mature. The actions, decision-making tools, and examples in the playbook will help DOTs prepare for, identify, and implement *disruptive* technologies.



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