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.

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:

- **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

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?

<table>
<thead>
<tr>
<th>INTERNAL PROCESS DISRUPTIVE TECHNOLOGIES</th>
<th>EXTERNAL SYSTEM DISRUPTIVE TECHNOLOGIES</th>
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<tbody>
<tr>
<td>New technologies, methods, systems, data, or concepts that DOTs can adopt or use to better manage their transportation system</td>
<td>Activities on transportation infrastructure undertaken by public and private entities outside of the DOT that impact transportation system performance</td>
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<tr>
<td>Advanced analytics</td>
<td>Private sector vehicle/highway products and services</td>
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<tr>
<td>Advanced materials and construction</td>
<td>Private sector multimodal mobility services</td>
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<tr>
<td>Mechanisms for innovative project delivery</td>
<td>Advanced physical infrastructure improvement products and systems</td>
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DISRUPTIVE TECHNOLOGY, IN A FEW WORDS:

Disruptive technology displaces or innovates existing practices and produces new and improved ways of doing business.
This project included development of a playbook intended to help guide DOTs and other transportation agencies as they undertake a journey to adopt 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.

0. **EDUCATE YOURSELF AND YOUR TEAM**
JOIN THE NATIONAL CONVERSATION

1. **UNDERSTAND THE CONTEXT FOR TECHNOLOGY CHANGE**
ESTABLISH A FUTURE DIRECTION AND LINK TO CURRENT PLANS AND PROCESSES

2. **IDENTIFY WHICH DISRUPTIVE TECHNOLOGIES ARE RELEVANT TO DOT OBJECTIVES**
TRACK KEY TECHNOLOGIES AND PRIORITIZE THEM FOR IMPLEMENTATION

3. **UPDATE PERFORMANCE MANAGEMENT FRAMEWORKS**
DEVELOP SPECIFIC ORGANIZATIONAL IMPROVEMENTS

4. **IDENTIFY EXTERNAL AND INTERNAL MANAGEMENT STRATEGIES FOR DISRUPTIVE TECHNOLOGIES**

5. **PLAN THE CHANGE MESSAGE**
IMPLEMENT CHANGE
TRAIN FOR NEW NEEDS AND MANAGE ON AN ON-GOING BASIS

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