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Evaluation of the Every Day Counts Program

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CRP SPECIAL RELEASE 5

Evaluation of the Every Day Counts Program

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COOPERATIVE RESEARCH PROGRAMS

FOREWORD

By Patrick Zelinski
Staff Officer
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CRP Special Release 5 presents an evaluation of FHWA's Every Day Counts (EDC) Program. The report will be of interest to those responsible for identifying and deploying innovative technologies, systems, and processes in surface transportation. The report also addresses the broader topics of technology transfer, diffusion of innovation, and methods to quantify the value of research.

This report documents an evaluation of FHWA's Every Day Counts (EDC) Program. FHWA started the EDC Program in 2009 as a state-centric initiative for identifying and deploying proven, but underutilized, innovations that can make U.S. surface transportation more adaptable, sustainable, equitable, and safer for all. By accelerating the adoption of the selected technologies and practices, the EDC Program seeks to promote an innovation-oriented culture in the surface transportation community that will ultimately facilitate and accelerate the diffusion of promising improvements in the future.

The EDC Program was assessed under the TRB-FHWA Program Evaluation (TFPE) effort. For Project TFPE-04, "Evaluation of FHWA's Every Day Counts Program," RTI International was tasked to evaluate the EDC Program's strategic and operational management, the outcomes attributable to program activities, and the extent to which those outcomes supported progress on FHWA's strategic goals. This report presents evidence regarding the efficiency, implementation, and effectiveness of the EDC Program in pursuing its goals. Also included are indicators of the outputs and outcomes generated by the program and the program's contribution to broader impacts on the culture of innovation in the surface transportation community.

ABOUT THE RESEARCH AND TECHNOLOGY EVALUATION PROGRAM

The Federal Highway Administration (FHWA) is an agency within the U.S. Department of Transportation that supports state and local governments in the design, construction, and maintenance of the nation's highway system (Federal Aid Highway Program) and various federally and tribally owned lands (Federal Lands Highway Program). A significant portion of FHWA's research activities, evolved over many years in response to successive legislative initiatives, is managed by agency staff from the Research and Technology (R&T) Program housed at the Turner-Fairbank Highway Research Center in McLean, Virginia, and other locations. The aim of FHWA's R&T activities is to support FHWA's mission through deployment of innovations that address current issues and emerging challenges, create efficiencies in the highway and transportation sector, and provide information to support policy decisions.

The FHWA Research and Technology Evaluation Program seeks to assess and communicate the benefits of FHWA's R&T efforts; ensure that the organization is expending public resources efficiently and effectively; and build evidence to shape and improve policymaking. FHWA partners with state transportation departments, local agencies, industries, and academia to conduct research on issues of national significance and accelerate adoption and deployment of promising research products.

To ensure that R&T activities are effectively and efficiently contributing to FHWA's mission, R&T staff apply leading practices in research management and occasionally undertake formal evaluations of select activities, projects, or programs. In addition, FHWA's R&T staff solicit advice from the Transportation Research Board (TRB), particularly the Research and Technology Coordinating Committee (RTCC). The RTCC issues annual reports commenting on R&T programs generally and suggesting adjustments to program strategies and approaches to improve program relevance, effectiveness, and impact.

In 2014, FHWA initiated the R&T Evaluation Program with two core objectives:

1. To evaluate the selection process by which research is funded, and
2. To assess the effectiveness of selected projects within the R&T portfolio, in terms of both research outcomes and technology transfer activities.

Under the R&T Evaluation Program's initial phase, 16 evaluations were conducted by the Volpe National Transportation Systems Center.

In 2019, FHWA asked TRB to undertake management of evaluations under a second phase of the R&T Evaluation Program. TRB's activities under this TRB-FHWA Program Evaluation (TFPE) effort comprise a series of projects evaluating research activities designated by FHWA and conducted by RTI International under TRB's direction and oversight. To date, the following projects have been completed:

- TFPE-01, Asphalt Binder Quality Tester
- TFPE-02, Exploratory Advanced Research (EAR) Program
- TFPE-03, Ultra-High Performance Concrete Connections
- TFPE-04, FHWA's Every Day Counts Program
- TFPE-05, FHWA's Initiative on Integrating NEPA and Permitting

These evaluations are intended to generate evidence and provide data-driven assessments that substantiate the contributions of FHWA's R&T Program to fulfilling the agency's mission and strategic goals. The evaluations are focused on estimating and forecasting the socioeconomic returns from investments in R&T Program activities to inform future research plans and improve technology transition outcomes. To this end, the evaluations include quantitative estimates of impact metrics. In addition, the evaluations provide input on data collection, tracking, and monitoring for ongoing program evaluation and improvement.

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S U M M A R Y

Evaluation of the Every Day Counts Program

This evaluation used a mixed-methods approach but relied primarily on interviews with relevant parties and document review to assess the Every Day Counts (EDC) Program's effect on state and local surface transportation communities. Given the wide variation in EDC Program Innovations, the evaluation uses examples to illustrate the overall outcomes of the EDC Program relative to FHWA's mission and to the Program's goal to enable broader and faster deployment of underutilized innovations. The evaluation focuses on EDC Program processes, outcomes, effectiveness, and lessons learned.

When asked about the EDC Program processes, interviewees raised points about in-person and virtual Summits, the length of deployment time for Innovations, and implementation activities. A recent reduction in reporting frequency was seen as overwhelmingly positive and respondents appreciated FHWA's diligence communicating deadlines and sharing templates. The most important finding with respect to EDC Program processes relates to the selection of EDC Innovations. Although stakeholders broadly approve of the Innovations selected, there are concerns about the transparency and clarity of the selection process. Enhancing stakeholder engagement and communication is essential for addressing these concerns and ensuring the continued success of the EDC Program.

Given the wide range of conditions across the country, EDC Program outcomes are not uniformly experienced by states and local governments. Innovations that prove successful in one state can fail or flourish in others. Not every EDC Innovation is suitable for every state. Participants identified a range of outcomes that they associated with EDC Program activities, including increased awareness of new Innovations, formation of state specifications to allow and support use of Innovations, and use of the EDC initiative to achieve process changes. In some instances, the state departments of transportation (DOTs) perceived the EDC Innovations as having successful outcomes, despite not achieving widespread adoption. The interviews with state DOT representatives revealed strong agreement that the value of the EDC Program is rooted in quality information about new Innovations, the opportunity (via demonstration projects) to see how Innovations can be implemented, and peer-to-peer exchanges that facilitate practical understanding of where, how, and when to use EDC Innovations.

Overall, the EDC Program is seen as well-run and effective. The state DOTs were satisfied with the EDC Program support, the resources provided, the collaborations, and the overall support received from the EDC Program. In addition to being supportive and responsive, EDC staff were lauded for the quality and depth of their technical assistance. This technical assistance was often critical to overcoming project barriers when most state DOT personnel had little knowledge about or experience with using an EDC Innovation.

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CRP Special Release 5 presents several options that FHWA can consider for the future of the EDC Program. These options all entail trade-offs in terms of the support and funding of the program and are primarily adjustments to discrete elements of the program. These options include

- Making the selection process more transparent to program stakeholders,
- Changing the duration of EDC Rounds,
- Selecting EDC Innovations that cover different scales and complexity,
- Tracking the uptake of Innovations beyond their EDC Round timeframe, and
- Redesigning the Progress Report structure to be easier to apply, with more training on how stakeholders can assess progress.

As a potential approach to enhancing the reporting system, the EDC Program could develop a catalog of measures from which each state could select the most relevant for their selected Innovations and projects. Additional training, for individuals responsible for developing and updating measurement reports, could enhance accurate and actionable reporting.

The EDC Summits serve as valuable platforms for showcasing Innovations, engaging participants, and fostering dialog on (1) the potential benefits generated by the Innovations and (2) approaches to implementation. These events facilitate networking opportunities, knowledge dissemination, and collaboration among transportation professionals and enhance awareness and support for EDC Innovations. Although there was a clear preference for in-person events for networking, the virtual options provide additional opportunity for inclusiveness. In the future, identifying specific objectives for the different modalities could increase the benefits of virtual and in-person engagement and build a more robust community of practice among EDC Program participants.

Introduction

At the request of the Research and Technology (R&T) Program of FHWA, TRB engaged RTI International to perform an evaluation of the Every Day Counts (EDC) Program. FHWA began the EDC Program in 2009 as a state-centric initiative for identifying and deploying proven, but underutilized, innovations that can make U.S. surface transportation more adaptable, sustainable, equitable, and safer for all. By accelerating the adoption of the selected technologies and practices, the EDC Program seeks to promote an innovation-oriented culture in the surface transportation community that will ultimately facilitate and accelerate the diffusion of improvements in the future.

This evaluation project was conducted under the TRB-FHWA Program Evaluation (TFPE) initiative. The TFPE supports the R&T Evaluation Program and aims to assess the following five aspects of FHWA research efforts:

- **Efficiency:** Are the project's activities conducted with an appropriate use of resources, such as budget and staff time (e.g., research and implementation approach, funding level)?
- **Implementation:** Is the project being applied and/or adopted by the users (e.g., is there a change in culture or in the state of the practice)?
- **Effectiveness:** Is the project achieving the goals and objectives it was intended to accomplish (e.g., what is the impact)?
- **Cost-effectiveness:** Does the value or benefit of achieving the project's goals and objectives exceed the cost of producing them (e.g., what is the return on investment and cost-benefit ratio)?
- **Attribution:** Is the project addressing the agency's strategic goals (e.g., what are the outcomes)?

CRP Special Release 5 provides a summary of the EDC Program evaluation conducted from 2023 through 2024. Chapter 1 presents a brief overview of the EDC Program, including its major activities, as well as the overall objectives of this evaluation and the theoretical framing for the evaluation design. Chapter 2 provides the key details of the evaluation method and plan, including the logic model detailing how the EDC Program attempts to achieve its objectives. Chapter 2 also includes the central evaluation questions (EQs) addressed by this effort. Chapter 3 summarizes the data collected from all sources for the evaluation and the results of the data analysis. Chapter 4 details specific findings derived from the evidence collected, while Chapter 5 provides overall findings for each of the EQs. Chapter 6 presents overall conclusions from this evaluation project.

1.1 Background on the EDC Program and This Evaluation

FHWA is a component agency of the U.S. Department of Transportation. Within FHWA, the Technology and Innovation Deployment Program (TIDP) funds efforts to increase the use of new technologies and approaches that can speed the planning and completion of transportation

projects. TIDP's efforts are authorized by the Infrastructure Investment and Jobs Act of 2022 (also called the Bipartisan Infrastructure Law) and its predecessors. The EDC Program is a key component of the TIDP objective to accelerate the adoption of new technologies, methods, and practices that speed the completion of transportation construction projects, enhance road safety, improve roadway maintenance and operations, and increase the efficiency of the surface transportation system.

EDC Program Development and Activities

In 2009, then-FHWA Administrator Victor Mendez announced the launch of the Every Day Counts Initiative. Mendez envisioned an approach that would increase the rate of adoption of new technologies, organizational practices, and business approaches (Mendez 2013). For the first set of innovations to be supported by the EDC Program, Mendez identified three areas of focus: shortening project delivery, accelerating technology and innovation deployment, and FHWA's "Going Greener" initiative. In August 2009, a joint committee of key organizations in surface transportation, including the American Association of State Highway and Transportation Officials (AASHTO), the Association of General Contractors (AGC), and the American Road & Transportation Builders Association (ARTBA), created a task force that met to develop recommendations for the EDC Initiative, issuing a set of recommendations in August 2010. The EDC Program launched in 2011, designating 14 EDC Innovations for acceleration (EDC Program n.d.).

The Moving Ahead for Progress in the 21st Century (MAP-21) Act, enacted in 2012, assigned FHWA the specific task of promoting the adoption of innovative technologies to speed the delivery of infrastructure projects. The EDC Program became the responsibility of what is now the Accelerating Innovations Program Team (formerly the Center for Accelerating Innovation [CAI]) within the Office of Innovation and Workforce Solutions. Under the Fixing America's Surface Transportation (FAST) Act, signed in December 2015, FHWA is required by statute to identify and promote new sets of innovations every 2 years, establishing the legal mandate for the EDC Program. The EDC Program is not specifically referenced or mentioned in the Bipartisan Infrastructure Law but continues to operate based on the mandate and processes established previously.

The EDC Program has established a 2-year cycle, or EDC Round, for program activities. The program conducted its first Round in 2011, and its most recent (the seventh) was announced in December 2022. For each Round, the EDC Program defines and selects a specific set of technologies, practices, or approaches—called EDC Innovations—for which it will encourage adoption by state DOTs. As shown in Figure 1, the initial Round of the EDC Program promoted 14 Innovations. The number of Innovations in subsequent EDC Rounds decreased, with seven Innovations promoted in EDC Round 6. (As presented in Appendix A, EDC Round 7 had seven Innovations.)

Within each EDC Round, FHWA staff, state DOT personnel, and other interested parties engage in a structured sequence of activities under the EDC Program as described below and shown in Figure 2.

1. **Identification and Selection of EDC Innovations.** FHWA gathers input from the transportation community, including state DOTs and industry associations, on proven but underutilized innovations. Incorporating internal screening criteria and external feedback, FHWA selects a subset of innovations to promote for the coming EDC Round.
2. **Implementation Team Orientation.** Program staff work across FHWA to organize an Innovation Deployment Team (IDT) for each EDC Innovation. Each IDT engages subject matter experts from across the transportation community to develop an Implementation Plan to guide and inform state efforts to implement that innovation. The EDC Program also provides

Figure 1.   Count of EDC innovations by EDC Round.

Figure 2.   Progression of activities in each EDC Round.

training to IDTs on how to refine Implementation Plans and how to promote Innovations, as well as support for engaging consultants and other experts to help on Innovations.

3. **EDC Summit.** After the public announcement of the EDC Innovations for the Round, FHWA organizes a national summit to present selected Innovations to the wider transportation community and engage in discussions about each EDC Innovation and its benefits. Originally an in-person conference, the summit shifted to being a virtual gathering at the start of the COVID-19 pandemic.

4. **State Transportation Innovation Council (STIC) Caucus.** After the EDC Summit, each DOT works with its corresponding FHWA Division Office to convene relevant transportation organizations (e.g., contractors, consultants, municipal authorities) as the STIC. Collectively, the STIC assesses the current adoption level within the state for the Innovations and, during the Caucus, determines which Innovations the state will implement during that EDC Round. Each state is eligible to receive funding of $100,000 per EDC Round to fund projects authorized by its STIC. (Note: the STIC incentive funding was increased to $125,000 per state after this evaluation was conducted.)

5. **Implementation.** The EDC Coordinator in each state's Division Office reports on which Innovations in the EDC Round the state DOT plans to implement. The IDT plans outreach and training and provides the state DOTs with information and technical assistance to facilitate deployment of each EDC Innovation. Common tools developed to support implementation include
   - Educational webinars presented by experts,
   - Videos describing the innovation,
   - Case studies on how other state DOTs implemented the innovation,
   - Peer exchanges where state DOTs can discuss the innovations and share their own strategies and successes in implementing the innovations, and
   - Decision support tools (e.g., cost-benefit analyses and business cases) to help state DOTs understand how to demonstrate the value of an innovation relative to the risks of implementation.

States work with FHWA Division Offices to track the status of implementation efforts for those Innovations during a 2-year period.

EDC Innovations are not necessarily discrete technologies or practices. Instead, they may encompass a broader set of related systems and practices around a given aspect of state DOT operations. For example, the e-Construction Innovation in EDC Round 3 noted that "The e-Construction process includes electronic submission of all construction documentation, electronic document routing and approvals (e-signatures), and digital management of all construction documentation in a secure environment" (EDC Program 2015). Given that the Innovations are focused on existing but underutilized systems and practices, they may bundle together related technologies and assign them a new label for easy reference. One EDC Innovation combined several countermeasures designed to improve pedestrian crossings and reduce accidents and promoted that set of discrete innovations as Safe Transportation for Every Pedestrian, or STEP.

The EDC Program expects adoption of these designated Innovations to advance the mission of FHWA in several domains: shortening the time required for road construction while ensuring accountability in the use of public highway funds, enhancing traveler safety and health, increasing the efficiency and capacity of the surface transportation system, and making the highway system more sustainable and durable. Throughout its history, the program has followed a few core principles that have influenced its operation:

- A focus on accelerating the deployment of proven, yet underutilized, market-ready innovations.
- Identification of candidate innovations by collecting input from a diverse range of interested parties across the surface transportation community—an approach often labeled "open innovation" (U.S. GAO [Government Accountability Office] 2016).

- Provision of information for state DOTs and other transportation groups to decide, based on their own priorities, which Innovations to promote. The EDC Program does not dictate the implementation of Innovations by the states. The EDC Program also does not subsidize deployment of Innovations but does facilitate access to FHWA funding programs supporting deployment (e.g., the Accelerated Innovation Deployment [AID] Demonstration Program).
- Conduct of systematic reporting and follow-up to track progress in implementing Innovations, documenting of benefits and lessons learned, and assessment of the diffusion of EDC-supported Innovations across the states.

After a Round is completed, support for many EDC Innovations is continued by FHWA teams, including the FHWA Resource Center and Headquarters Program Offices, ensuring that content developed by the EDC Program remains accessible and that states wishing to implement an EDC Innovation in the future can access those resources.

1.2 Evaluation Objectives

As noted earlier, this evaluation was conducted under the TFPE Program, where FHWA seeks an assessment of the efficiency of FHWA activities, the way that activities are implemented, the effectiveness of activities in terms of performance and cost, and the outcomes attributable to those activities. This evaluation faced several challenges in pursuing these objectives:

- The efficiency of a program is best measured by comparing it to peer efforts; however, very few federal programs resemble the EDC Program, especially in its focus on the diffusion of market-ready innovations.
- The EDC Program has encompassed a wide number and diversity of Innovations, leading to variation in implementation practices and patterns.
- Given the diversity among its Innovations, measures of efficiency (outcomes relative to inputs) also vary widely and cannot be captured by a standard set of metrics.
- The cost-effectiveness (outcomes relative to funds invested) of the EDC Program cannot be calculated easily, given that some of its key outcomes (such as improvements in the adoption of Innovations at state DOTs) cannot be expressed as financial gains.
- The outcomes of the EDC Program are influenced by many factors beyond the control of the program. By design, the EDC Program is state-led, and FHWA cannot compel implementation of EDC Innovations. This situation complicates any effort to attribute precisely changes in the surface transportation ecosystem to the EDC Program's efforts.

The EDC Program works through its Innovations to change behaviors and activities in state DOTs by providing DOTs with information, resources, and guidance in adopting unfamiliar technologies and practices at a faster rate. Adopting an innovation is a risky activity, and state DOTs have a reputation for being risk-averse. The aversion to risk is well-justified; state DOTs often implement projects that are costly using public funds, and the consequences of failure can be very visible to the public (e.g., cost overruns in a construction project or failure to ensure that roadways are equipped to handle growing traffic or reduce accidents).

The evaluation of the EDC Program focused on how the program influenced state DOT decision-making about the implementation of EDC Innovations. The evaluation was designed to assess four aspects of the EDC Program's operations and results:

1. Strategy and Processes. The evaluation looked at how well the EDC Program's design and the management of program activities supported the EDC Program's key objective—accelerating deployment of proven yet underutilized Innovations.
2. Outcomes. The evaluation gathered evidence showing what the state DOTs were able to achieve with the aid of the EDC Program in terms of implementing Innovations and improving the deployment of Innovations over time.

3. Effectiveness. The evaluation examined how the expected outcomes of the efforts to promote EDC Innovations aligned with FHWA's mission, consistent with the federal role in the U.S. surface transportation sector.
4. Lessons Learned. The evaluation explored options for future revisions to the EDC Program's design and processes, including the potential trade-offs that each option would involve.

The goal of this evaluation was to provide FHWA with data, findings, and perspectives about the accomplishments of the EDC Program, its possible strengths and weaknesses, and ideas to consider for future policy and program changes aimed at improving the program's outcomes.

1.3 Innovation Diffusion and Adoption Frameworks

To develop the evaluation design, the authors of this Special Release drew on frameworks and theories in the published scholarly literature on the diffusion of innovations. Much of the research on innovation focuses on how organizations **generate** innovations—less work examines how organizations **adopt** innovations. A common observation is that even those innovations that offer significant advantages over current technologies or processes take longer than might be expected to achieve widespread acceptance and adoption. The study of the diffusion of innovations emerged from multiple disciplines, including psychology, communication, anthropology, and marketing (Rogers 1976). [Prof. Everett Rogers wrote one of the seminal works integrating various streams of literature, *Diffusion of Innovations* (Rogers 1983).] The evaluation herein uses insights from Rogers and other scholars of innovation diffusion to analyze how the EDC Program influences the adoption of innovations in state DOTs.

In the context of the EDC Program, an "innovation" is framed using Rogers's construction. An innovation is not necessarily something "new to the world" (i.e., a technology or system that is newly invented) but rather something new to the adopting organization. This encapsulates the EDC Program's objective of accelerating the deployment of "proven, yet underutilized" innovations. An EDC Innovation may already be well-tested and mature, but state DOTs may still be largely unaware of it.

Rogers's theory examines four **elements** that shape how rapidly an innovation is adopted:

1. The characteristics of the innovation (i.e., what would convince an organization to use that innovation);
2. The communication channels for learning about the innovation;
3. The time required to decide to use the innovation; and
4. The social dynamics within the organization or its immediate community.

Although somewhat idealized, the model developed by Rogers identifies five **stages** in adopting an innovation:

1. Awareness (when the adopter is alerted to the existence of an innovation);
2. Information and persuasion (when the adopter learns the advantages and disadvantages of adoption);
3. Decision (when the adopter commits to implementing the innovation or rejects it);
4. Implementation (when the adopter attempts to use the innovation in an operational context); and
5. Confirmation (when the adopter validates the decision to adopt and assesses whether and how to continue use).

To accelerate the deployment of innovations, the EDC Program's activities would need to facilitate progress across all five stages. As noted by some critics of the Rogers theory (van Oorschot, Hofman and Halman 2018), an organization's perception of an innovation can slow

or complicate adoption. An organization may be reluctant to implement an advantageous innovation if the organization is ill-equipped to appreciate the benefits relative to the costs of that innovation (an information deficit). An innovation may pose one or more of the following types of risks to the adopting organization:

- Technical—the innovation may not perform as promised/expected;
- Organizational—the innovation may disrupt norms and processes (e.g., by requiring joint action across organizational silos);
- Political—implementing the innovation may result in a backlash by the organization's members and supporters (e.g., by creating a performance problem that undermines public trust); or
- Workforce and capacity—the organization may lack the skills and expertise needed to implement the innovation properly.

Even with a strong business case for adoption, implementing the innovation may be blocked by an organization's inherent risk aversion—if the organization is skeptical that the benefits of the innovation will exceed the actual risks. As a result, the organization will demand additional evidence or strong external incentives before deciding to implement the innovation (Daglio et al. 2015). This situation is prevalent throughout the private sector across different countries. The Organisation for Economic Co-operation and Development (OECD) has spent considerable time and resources on frameworks for innovation in the public sector during the past decade to "help governments understand and harness their innovative capacity" (Kaur et al. 2022). The OECD's Observatory of Public Sector Innovation (OPSI) developed the Innovative Capacity Framework to identify approaches to promote innovation in private-sector agencies. The Framework takes a broad view of three levels of the systemic elements and actors within the public sector—the individual (including team dynamics), the organization, and the public-sector system (including broader global and environmental influences)—and relates these to the following four areas:

- Purpose: what elements across the system are driving the intent to innovate?
- Potential: what elements across the system may influence whether innovative efforts are attempted?
- Capacity: what is needed to implement innovative efforts, including testing and piloting?
- Impact: how is the effect of innovative efforts understood and informing future practice?

Whereas the Framework identifies factors and evidence across three levels and four focus areas, in practice, the Framework needs to be tailored and contextualized depending on the ambitions, context, and constraints within the focus area (Kaur et al. 2022). This CRP Special Release incorporates guidance provided by the Framework. Similar to previous studies (Arundel, Bloch, and Ferguson 2019; Arundel, Bloch, and Ferguson 2016), this evaluation uses the Framework to adapt questions about private-sector innovation for use in the study of public-sector innovation and analyzes the effects of the EDC Program on innovation capacity using some of the constructs in the Framework. This Special Release also recognizes that external conditions may affect the deployment of innovations within an organization. The Technology Delivery System model illustrates a framework that addresses the effects of external conditions on innovation deployment and points out that contextual factors can influence the timing and success of innovation deployment, such as the existence of technical standards and regulation, and the existence of organizations providing complementary skills and capabilities enabling the appropriate use of the innovation (Wenk and Kuehn 1977).

Even if all conditions favor implementing an innovation, the OECD's Framework for public-sector innovation points out that an organization's culture may work against any decision to embrace that innovation. Anthropologists define organizational culture as the set of norms, incentives, and beliefs (often unwritten) that have evolved in an organization to shape behaviors. An organization may have a culture that is so risk-averse that it will reject almost any innovation, no matter how

advantageous. Given that organizational culture is tacit rather than explicit, changing organizational culture is difficult and time-consuming. Organizations that have suffered from repeated failures in innovation will tend to create an internal culture that rejects further innovations.

One of the ultimate objectives of this evaluation effort was to characterize or measure the success of the EDC Program in altering the culture within state DOTs to make them more open to deploying innovations. As with risk aversion, repeated success in adopting Innovations make organizations more amenable to adopting Innovations over time. The OECD's studies indicate that innovation-oriented organizations develop incentive systems and organizational capacity that facilitate innovation deployment. As discussed in Chapter 2, this evaluation included an investigation of how the EDC Program encourages the development of systematic approaches in state DOTs for assessing potential innovations and developing the capacity to deploy innovations.

Evaluation Method

The design and execution of this evaluation project conform to the standards and guidance set by authorities in program evaluation, including the American Evaluation Association, the U.S. Government Accountability Office (U.S. GAO), and the OECD. The evaluation adhered to the following principles to ensure its integrity:

- The evaluation was theory driven, grounding its analysis in the literature on public-sector innovation and on innovation diffusion.
- The evaluation was informed by an analytical program logic model (described in this chapter) that established primary and secondary EQs for the study.
- The evaluation generated data and evidence to reinforce the objectivity and rigor of its analysis and conclusions.
- The evaluation design allowed for ambiguity and flexibility, as the evaluation team faced uncertainties about the availability of critical data and difficulties in establishing the Program's outcomes and the attribution of outcomes to program activities (as noted in Chapter 1).

These principles helped to ensure that the evaluation was conducted with integrity and consistency.

2.1 Evaluation Scope

The evaluation team first established the scope of the evaluation by defining clear parameters (e.g., the timeframe for the activities covered, the range of program activities analyzed, and the nature of the evidence to be collected and analyzed). Practical considerations, such as data availability and access, also shaped the evaluation scope. The scope was defined to ensure that the overall evaluation was comprehensive and balanced, given the limitations discussed below.

The evaluation included the 53 unique Innovations covered in EDC Round 1 through Round 6 (noting that several Innovations were promoted across more than one Round). However, during Round 1, the EDC Program was still developing and improving the documentation and processes that became more systematic in later Rounds. Therefore, Round 1 Innovations were largely excluded from the evaluation's analysis. Still, Round 1 provided important lessons learned for the EDC Program that informed the later development of the EDC Program's practices, so the Round 1 Innovations were examined to provide context for assessing the Program's processes and strategy. Innovations in Round 7 were largely excluded from the evaluation, because they were announced in December 2022 and were still being implemented while this evaluation was conducted. The evaluation focused on 42 unique Innovations from EDC Round 2 through Round 6.

As a program-level evaluation, this effort did not focus on the value or impacts generated by each individual EDC Innovation. The innovations are very diverse and cover many aspects of surface transportation; thus, a complete accounting of all their intended and realized outcomes would

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be impossible to compile. Instead, the evaluation was scoped to use examples of Innovations to illustrate the overall outcomes of the EDC Program relative to the FHWA mission and to the Program's aim of enabling broader and faster deployment of underutilized innovations. The central questions addressed by this evaluation (discussed in Section 2.4) address the program-level activities and outcomes, rather than assessing innovation-specific activities and results.

The evaluation encompassed EDC Program activities related directly to supporting the innovations deployed and program management, including the full life cycle of program planning, execution, and assessment. The evaluation addressed the major activity areas identified in the logic model (Section 2.3):

- Overall program management;
- Selecting and supporting EDC Innovations;
- Generating and disseminating knowledge about EDC Innovations;
- Tracking and reporting implementation progress; and
- Sharing of lessons learned and best practices.

2.2 EDC Program Logic Model

To identify how the EDC Program generates impact, the evaluation developed the program logic model shown in Figure 3. The logic model is a simplified view of the EDC Program that highlights its key elements and connects them to anticipated intermediate outcomes expected to translate to the overall program impact.

Key Inputs	Activities	Participants	Outputs/Short-term Outcomes	Medium-term Outcomes	End Outcomes/Impacts
From FHWA, States, Partners, Contractors: Funding Staff, Expertise Priorities Leveraged stakeholder contributions	• Manage EDC program • Select Innovations (call for ideas, stakeholder report, summits) • Support Innovations (as states choose and implement) • Facilitate collaboration • Generate & disseminate knowledge • Build supporting infrastructure (process initiatives) • Build evidence/ experience (technical initiatives)	**Internal (FHWA) stakeholders** • FHWA leadership • EDC program staff • Innovation Team Leads • Subject-matter experts **External Stakeholders** • State DOT representatives • Local, regional, tribal gov't transportation representatives • Associations • Industry • Consultants	• Multi-stakeholder coordination on EDC initiatives • Guidance, training on approaches to implement each EDC innovation • Multi-level government relationships built • Communication channels improved • New practices and policies facilitating innovation • Increased visibility, buy-in of initiatives among FHWA leaders • Exchange of lessons learned among states	▪ Increased state, local, regional capacity to adopt innovations ▪ Credible reports on advantages of adopting EDC initiatives ▪ EDC initiatives are shared, replicated ▪ More standards, policies push change ▪ Formal and Informal community support for initiatives, innovation ▪ More have skills, positive attitudes for adopting innovations ▪ Increased adoption of EDC-supported Innovations	**FHWA Leadership** ○ Effective program management ○ Contributions to FHWA strategic goals **Improved Innovation Culture-**Extent to which: ○ More compelling cases and drivers for innovation ○ Innovating perceived as less risky and more feasible ○ More capacity for innovation (Champions, networks, skills, resources, and infrastructure) ○ Documented Impacts from increase in the adoption of surface transportation innovations
CONTEXTUAL INFLUENCES:		Complexity of highway systems/domains, need to balance diverse public values and needs, high uncertainty, difference in state contexts, federal highway spending and priorities, etc.			

Figure 3.   Program logic model of the EDC Program and its potential impact.

The logic model specified the key resources and commitments needed to make the EDC Program successful (inputs), the activities undertaken within the program and the key organizations (participants) involved, the immediate results of those activities (outputs), and the likely evidence showing downstream benefits, changes, and other medium- to long-term outcomes that may be attributable to the EDC Program. Using the model, the evaluation team determined the data collection methods appropriate for gathering the evidence related to model elements, identified from whom and where the data would be gathered, and designed the quantitative and qualitative analyses to investigate all aspects of the program and to answer the evaluation questions.

The logic model also clarifies the EDC Program's "theory of change"—the rationale for determining and designing the Program's activities to achieve its desired outcomes. The EDC Program creates change on two levels: (1) the level of the Innovations within each 2-year Round and (2) the long-term organizational level (over the course of multiple Rounds). Within each Round, the program is designed to accelerate the deployment of individual Innovations by addressing four conditions affecting the diffusion of innovations among state DOTs:

- Lack of awareness. DOTs may not be aware of innovations proven to generate important benefits to surface transportation. The EDC Program builds awareness about available innovations by selecting, defining, and publicizing the Innovations in each EDC Round.
- Uncertainty about value. DOTs may be uncertain about the value of innovations because they lack the ability to assess the benefits generated by those innovations relative to their costs and risks. Through educational resources outlined in the implementation plans, the EDC Program assists the DOTs with how to properly assess risks and benefits for each innovation.
- Skepticism about value. DOTs may be skeptical about innovations because they undervalue the potential benefits of implementation. The EDC Program demonstrates the value of each innovation through case studies, data sets showing the results of past implementations, and decision support tools.
- Lack of capabilities, resources, or skills. DOTs may be deterred from deploying innovations because they believe that they lack key capabilities, resources, or skills required for implementation. The EDC Program facilitates information exchanges where DOTs can learn from their peers in other states about strategies and approaches leading to successful innovation implementation.

At the organizational level, iterative support by the EDC Program to encourage the deployment of valuable but underutilized innovations across multiple Rounds enhances the innovation capacity at state DOTs, which in turn engenders an innovation-oriented culture across the U.S. surface transportation community.

2.3 Evaluation Questions and Approach to Evidence-Building

To match the four aspects of the EDC Program addressed by this innovation (listed in Section 1.2), the evaluation focused on four major evaluation questions:

1. Strategy and processes question: How is the EDC Program designed, structured, and operated to support state-led deployment of underused innovative technologies and project delivery approaches?
2. Outcomes question: What are potential and realized outcomes of EDC-funded, state-led deployment projects, and how did EDC Program activities contribute to those outcomes?
3. Effectiveness question: How have the EDC Program's outcomes contributed to achieving programmatic and FHWA strategic objectives, including catalyzing efficiencies that support deployment of innovations in the highway ecosystem?

4. Lessons learned question: What factors influenced the effectiveness and outcomes of the EDC Program and what might be done differently in the future to improve program results?

One key finding of the Scoping Report was that the EDC Program supports a diverse assortment of innovations that spans many aspects of surface transportation, from highway construction to safety to road operations. The EDC Innovations are not easily comparable in terms of their complexity, the organizations involved, or their intended outcomes. Recognizing this, quantitative approaches alone would fail to capture the full effects of the EDC Program. Instead, this evaluation adopted a "mixed-methods" design integrating qualitative and quantitative data using multiple techniques for collection and analysis. The primary data sources were Program-related documents (published by the FHWA and by state DOTs and their contractors) and key informant interviews. The documents provided qualitative, descriptive data about the EDC Program and its Innovations and generated some quantitative data about activities and outputs. Interviews were conducted with staff from FHWA headquarters offices and division offices, representatives from state DOTs, and other organizations such as trade and professional associations in the surface transportation sector. The evaluation team also conducted a literature review on the dynamics of innovation in the private sector (and especially in state DOTs) and analyzed data on activities provided by the EDC Program.

Each method and technique used in this evaluation followed procedures described in the evaluation literature, such as Ruegg and Jordan (2007). The matrix presented in Table 1 connects the four aspects of the evaluation described in Section 2.3 to the key elements in the program logic model. (See Appendix C for the full Evaluation Planning Matrix.) To integrate all elements of the logic model and characterize program-level outcomes, the evaluation also used the case study method to illustrate the cumulative outcomes of multiple Innovations (Yin 1992). This approach is described in Section 3.4.

Table 1.   Condensed evaluation method matrix.

Evaluation Aspect	Logic Model Elements	Data Sources	Data Analysis
Process Evaluation	Inputs Activities Outputs Short-term outcomes	Document review Portfolio data Stakeholder data Literature review Exploratory Interviews	Quantitative analysis Qualitative analysis
Outcome Evaluation	Short-term outcomes Longer-term outcomes and impacts	Document review Portfolio data Interviews	Quantitative analysis Qualitative analysis Case studies
Effectiveness Evaluation	Alignment of short-term and long-term outcomes to program and FHWA strategic goals	Interviews Stakeholder data Portfolio data	Quantitative analysis Qualitative analysis Case studies
Lessons Learned	All program elements	Integrative analysis Involving all the above	

CHAPTER 3

Data Collection and Analysis

This chapter presents the methods used to collect and analyze data from the selected sources.

3.1 Stakeholder Lists and Relational Analysis

Because this evaluation relied heavily on qualitative data and analysis, the evaluation team first sought to identify strong candidates for interviews and focus groups. **Program stakeholders** were individuals affiliated with organizations that participate in some or all program activities, from defining the program's overall goals and directions, to selecting initial ideas for EDC Innovations during the call of ideas, to the implementation stage of the EDC Innovations. **Internal stakeholders** were those affiliated with FHWA, such as FHWA leadership, EDC Program staff, and representatives of other FHWA programs, departments, and offices. **External stakeholders** were representatives of organizations that are not FHWA and include state DOTs, local government agencies, national associations, industry, as well as consultants hired by the EDC implementation teams to support the dissemination of innovations by the FHWA to support EDC Innovations. The evaluation team generated lists of potential participants from the document review (described below) and from individuals recommended by the EDC staff as well-informed on the EDC Program's goals and activities (see Table 2).

A goal of the evaluation design was to ensure that the full spectrum of perspectives was captured in the data collection and analysis, and that the evidence for evaluation findings was not biased in favor of a particular group. The data collection also was sensitive to the different positions of groups within the program's structure. Because the EDC Program is a state-led effort by design, state-level stakeholders are overrepresented. The availability of the contact data and the degree to which the contacts listed were representative of their associated groups affected decisions on data collection, as described in the next subsection.

3.2 Interviews

Initially, the evaluation team conducted seven background interviews to obtain historical information relevant to process evaluation and contextual information to inform the design of subsequent data collection and analysis techniques. The background interviews provided the research team with situational awareness about the different types of stakeholders involved in EDC and the specific roles staff perform to select, promote, and implement Innovations. With this awareness, the research team determined that individual interviews and focus groups would be appropriate and efficient data collection methods for eliciting comprehensive input from the range of EDC stakeholders were developed.

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Table 2.   Sample stakeholder groups.

Contact List	Description & Volume	Data Quality & Availability
Accelerating Innovations Program	EDC, STIC, and AID Program Coordinators, and the Director for the Accelerating Innovations Program Office.	Full contact information available on FHWA website.
Industry Group	28 individuals representing 16 transportation industry groups and associations.	Full contact information provided by Program Team staff.
State EDC Coordinators	One FHWA Division Office contact representing each state and U.S. territory. Total of 55 contacts in the list.	Full contact information available on FHWA website.
STIC Network	One contact for each state and U.S. territory DOT and FHWA Division Office. Total of 109 contacts in the list.	Names and organizations listed on FHWA website.
Implementation Team Members	Innovation team leaders (FHWA) and supporting members for each initiative. Total of 108 team leaders and 245 supporting members compiled to date.	Contact information for team leaders available on innovation fact sheets. RTI compiled contact information for supporting members from summit videos, implementation plans, and interviews.
Recommended Contacts	Individuals recommended by the TRB or by previous interviewees when asked for contacts involved in/knowledgeable about EDC Innovations.	Contact information provided by recommending individuals.

Separate interview guides were developed for FHWA staff, state DOT staff, and representatives of member associations representing the surface transportation community. Appendix D contains the interview guide developed for state DOT staff with fewer than 3 years of experience with the EDC Program. The interview guides contain semi-structured questions tailored to the background and roles of these individuals. Each interview lasted 30 to 60 minutes. All interviews were conducted using web video conferencing (e.g., Zoom) or by phone. After obtaining consent from the subject, interviews were recorded for use in validating notes taken for later analysis. In some instances, the research team conducted follow-up interviews with individuals who agreed to speak with us more than once. Those were not counted as separate interviews in the interview tracking.

Table 3 provides a summary of the number and type of interviews conducted. As noted above, internal stakeholders were those who are part of the FHWA and charged with supporting the implementation of the EDC Program, including work by the FHWA to support EDC-designated Innovations. External stakeholders were primarily representatives of state DOTs, but included representatives from associations, universities, and others who work with state and local authorities on developing and selecting Innovations. Additional interviews were conducted for the integrative case studies, as discussed in Section 3.4 below.

Table 3.   Interviews completed.

Stakeholder Type	Completed Interviews
Internal	33
External	20
Total	53

Table 4.   Overview of documents analyzed.

Document Type	Description
Implementation Plans	Created by IDTs to guide implementation of Innovations
FHWA Website Content*	General information on the EDC, STIC, and AID programs
EDC Summit & Baseline Reports	Overview of EDC summits and state-level goals
Progress and Final Reports	Summarize the status of deployment of innovations
Newsletters	Updates with developments, success stories, and EDC resources
Legacy Reports	Reflections on EDC Program accomplishments across Innovations

* The FHWA website for the Every Day Counts Program and related activities contains numerous pages of content that cannot be counted as conventional documents. The evaluation team reviewed all relevant content available through the website.

3.3 Document Review

This section describes document review undertaken to answer the key evaluation questions and inform other components of the project. Table 4 lists the types of documents reviewed.

3.4 Implementation Plans

EDC implementation plans are developed by the IDTs to help guide states in understanding, assessing, and implementing innovations not yet widely used and known in the transportation industry. The IDTs receive training organized by the EDC Program to assist them in formulating and organizing these plans. Although not completely standardized, each plan presents similar information, including but not limited to a background description of the EDC Innovation, the challenges associated with it, and the various parties involved in implementation. The plans provide guidance on assisting state DOTs and other parties in adopting and institutionalizing each innovation and define obstacles to overcome. EDC Innovations for which the implementation plans have been analyzed are as follows:

- Collaborative Hydraulics
- Advanced Geotechnical Methods in Exploration
- Data Driven Safety Analysis
- e-Construction
- e-Ticketing and Digital As-Builts
- Smarter Work Zones
- Stakeholder Partnering
- Targeted Overlay Pavements Solutions
- Value Capture
- Weather-Savvy Roads

Although implementation plans are written by and for the IDTs and not for public distribution, these documents provide information relevant to the process evaluation questions and to designing metrics for capturing the Program's outputs and outcomes. A description of these documents is included in Appendix C.

3.5 FHWA Website Content

The FHWA maintains a website with sections for the EDC Program, the STIC Network, the AID Demonstration Program, the Accelerating Market Readiness (AMR) Program, and other resources. Below is the content from the FHWA website reviewed:

- EDC Program site
- STIC Network site

- AID Demonstration Program site
- AMR Program site

These websites provided the basis for an initial database of EDC Innovations developed for this evaluation. The database includes key information on each innovation, a list of contacts for the EDC Program and contacts for each implementation team, and a taxonomy to classify EDC innovations along various parameters. The website also provided evidence of how the EDC Program engages key stakeholders through its various activities, including EDC summits and newsletters.

3.6 EDC Summit Summary and Baseline Reports

The EDC Summit Summary and Baseline Reports provide an overview of each of the EDC Summits and show the estimated level of adoption (implementation stage) for each state for each Initiative. These reports were used to analyze the development of specific innovation ideas, as well as the change in overall innovative topics from year to year. Six Summit Summaries and Baseline Reports are available for analysis.

3.7 EDC Progress and Final Reports

For each Round, the EDC Program staff publishes progress reports and a final report. The final reports exist for every Round except EDC Round 1. One progress report was published in EDC Round 2, and each subsequent Round has three progress reports, published every 6 months. These documents aim to summarize the status of deployment for the Innovations from their respective Rounds. All the reports include a description of each innovation; maps and charts for each innovation that show the implementation stage for each state; and an EDC Innovation "Spotlight" that focuses on the impacts of the innovation in a single state. The implementation stages show the status of deployment at the time of the report for the innovations and have been standardized since EDC Round 3. The Innovation Spotlight included a small section in EDC Rounds 2 and 3 but grew to a full page in EDC Rounds 4, 5, and 6. EDC Rounds 2, 3, and 4 include an additional section called Project Highlights, which summarizes the impacts and status of the innovation across several select states. Last, EDC Rounds 5 and 6 include an appendix in the form of a table that includes the implementation stage for each state and each innovation.

The final reports were used to determine how the status of deployment, or implementation stage, has changed as time passed for each innovation. The authors compared the status at the time of the final report to statuses reported in the baseline and progress reports. Progress reports were useful in getting a sense of activities, challenges, and outstanding needs throughout the process.

3.8 Newsletters and Legacy Reports

The EDC Program offers two newsletters: *EDC News*, a biweekly publication, and *Innovator*, released bimonthly. These newsletters serve as sources of information and inspiration in the transportation sector. *EDC News*, launched in 2013, keeps professionals updated with the latest developments, success stories, and valuable resources related to the EDC Program. In contrast, *Innovator*, dating back to 2007, takes a broader perspective, spotlighting innovative practices, technologies, and Innovations spanning the entire transportation sector. Beyond the EDC Program Innovations, *Innovator* covers a wide array of innovations, including those within the STIC Innovations and state-led projects. Together, these publications shed light on the transformative potential of innovation in shaping the future of transportation and highway construction and showcase the achievements of the EDC Program and Innovations. To date, there have been

98 issues of *Innovator* and 271 issues of *EDC News*. As of March 2023, *EDC News* had 34,154 subscribers and *Innovator* had 20,303 subscribers. The "open rate" (share of emailed publications opened by the recipient) for both newsletters averages 25% to 30% per issue, putting them in the top 20% of federal newsletters based on that metric.

3.9 Integrative Analysis and Case Studies

Interviews and document analysis were merged into a single process for quantitative analysis. Excerpts from transcripts were copied into a qualitative data management system and reviewed by team members to develop a content coding system to track both common interview themes and unique perspectives conveyed in the interviews. The coding scheme was developed from the evaluation questions and during the analysis phase, the evaluation team reviewed the coded excerpts and synthesized them into more general findings for each evaluation question.

To bring together the disparate array of data sources and items, the evaluation team researched structured case studies, each focusing on a key thematic area that encompasses multiple EDC Innovations. Evaluations contain case studies to investigate how complex processes unfold in a program; how programs deal with situations with a high degree of variability in their interventions and contexts; and how a program adapts to a changing environment. The EDC Program involves a diverse set of Innovations implemented in organizations that range widely in scale, scope, and stakeholder management. By using a series of case studies, the evaluation can provide a limited degree of generalization in its findings (Yin 1992). The case studies used in this evaluation helped the team to investigate the complex path through which program activities contribute to long-term outcomes and fulfill both programmatic and FHWA strategic goals.

The case studies for this evaluation encompassed developments through successive Rounds of the EDC Program. The EDC database developed by the evaluation team classified Innovations based on a standardized set of characteristics and terms, looking at the nature of the innovation, the intended outcomes, and the transportation topics related to that innovation. The team then selected clusters of innovations to investigate, comparing similarities among innovations within a thematic area and contrasting the management of EDC Innovations between thematic areas. Each case study examined the following aspects of the given innovation:

1. Background on the innovation covered, including the initial development and how the feasibility of the innovations was proven;
2. The specific problem or need in the surface transportation community addressed by the innovations, and how they relate to EDC and FHWA goals;
3. The criteria and conditions examined by the EDC Program in selecting each EDC Innovation;
4. EDC Program activities undertaken to promote adoption of the innovation;
5. Initial response from EDC stakeholders, including the benefits highlighted and barriers encountered that factored into the decision to adopt each innovation covered;
6. Comparative study of the diffusion of the innovations across diverse state DOTs;
7. Patterns and scale of adoption of the innovations after the end of the EDC Program support; and
8. Ultimate outcomes of the innovations covered, the approaches used by organizations to adopt Innovations after involvement with the EDC Program, and the innovation culture.

The evaluation team conducted case study research on the following EDC Innovations:

- Geosynthetic Reinforced Soil-Integrated Bridge System (GRS-IBS)
- 3D Engineered Models
- Intelligent Compaction
- Data-Driven Safety Analysis

- e-Construction
- Pavement Preservation
- Using Data to Improve Traffic Incident Management
- Weather-Responsive Management Strategies
- e-Ticketing and Digital As-Builts

The evidence collected through these case studies is integrated into the findings presented in Chapter 4 and Chapter 5. Using the case study method enabled the evaluation team to understand how support for EDC Innovations evolved within each Round and across multiple Rounds as the EDC Program matured.

Observations and Key Findings

This section presents findings from interviews and document analysis reflecting the sentiments heard from multiple stakeholders, combined with data extracted from document review and the case studies. The following topics are discussed in the rest of this chapter

- Views on the Selection of EDC Innovations
- The Value of State Transportation Innovation Councils
- Implementation Resources and Benefits
- Addressing Inherent Constraints on Innovation
- Reporting on Implementation and Communication of Results

4.1 Views on the Selection of EDC Innovations

This section presents perceptions from stakeholders on clarity and transparency of the innovation selection process. The selection of EDC Innovations plays a pivotal role in advancing transportation innovation and delivering benefits to stakeholders. Whereas stakeholders broadly approve of the Innovations selected, there are concerns regarding the transparency and clarity of the selection process. Enhancing stakeholder engagement and communication is essential for addressing these concerns and ensuring the continued success of the EDC Program.

Community Understanding of the Selection Process

The individuals interviewed thought that the EDC Program's innovations were valuable, although they might have doubts about one or two of the dozens of Innovations promoted. Several stakeholders interviewed stated that they would prefer more explanation from the EDC Program on how Innovations for each Round are selected. They commented that while the revealing of the Innovations was dramatic, it detracted from the idea that the EDC Program listens to the surface transportation community when making those selections. Although most stakeholders are satisfied with the Innovations chosen, there is a gap in understanding of how their input contributes to the final selection. This point was raised primarily by a few EDC coordinators and some staff from state DOTs. For example, one EDC Coordinator felt that the program was good about soliciting candidate Innovations but could not see that the community's input was considered during selection. Another state DOT staff member suggested that the EDC Program reveal the candidates for EDC Innovations that were NOT selected for each Round, so that state DOTs would have a better idea about what kind of ideas are screened out. Another state DOT representative suggested a different approach to selection, where the state DOTs review the candidate Innovations and decide which ones are selected. This person acknowledged

that managing such a process "may pose challenges with a multitude of entities and potential innovations."

> I'm not sure where they generate the topics from. Although I never find them to be irrelevant. But I personally have never seen like an input process come through for, but that probably exists and I've just not seen it.
>
> – State DOT Representative

> I feel like sending ideas is open. How it gets narrowed down and all that is like a black box to me, but I don't necessarily need to be part of that, you know, so I do feel like there's not a lot of participation during that phase of it, but I'm not sure if there really needs to be, you know?
>
> – State DOT Representative

A few external stakeholders commented positively on the decline in the number of innovations per Round, falling from 14 in EDC Round 1 to 7 in both Rounds 6 and 7. One of these individuals thought that seven was a reasonable number of Innovations for each state to consider at the start of the Round and that selecting a greater number of Innovations would be challenging. The prevailing view was that with seven innovations, the states could devote enough time to learning about and considering each, and the number still could accommodate enough of a variety of Innovations that at least some would be attractive to every state.

Opportunities for Broader Stakeholder Engagement

Efforts to broaden stakeholder engagement and input have been recognized within the program. FHWA stakeholders recognize that the Program Office collects ideas from various sources beyond state DOTs and AASHTO, such as associations, FHWA Offices, tribal governments, and local stakeholders. FHWA interviewees noted that more could be done to incorporate perspectives from local agencies, tribal governments, and contractor associations when selecting Innovations to promote, as those parties have an interest in how states adopt EDC Innovations but face conditions and concerns specific to their organizations.

Considering States' Constraints during Selection

Most interested parties appreciate that the EDC Program is indeed "state-led," as the state DOTs can elect to implement an EDC Innovation but are not pressured to do so. Several of the stakeholders raised concerns about properly considering practical and other constraints that might prevent certain states from implementing an innovation. The focus of the program on more process-oriented Innovations has brought up some new challenges. Unlike design and construction projects, which can be implemented relatively quickly, process-oriented Innovations often involve changes to policies or procedures, requiring extensive coordination and negotiation among stakeholders. This complexity can lead to slower progress and heightened resistance from parties unwilling to modify existing policies.

4.2 Value of State Transportation Innovation Councils

As noted earlier, the STICs play a key role in the EDC Program. As a multistakeholder forum, the STICs convene summits where state DOTs can have open discussions with other key stakeholders in the transportation ecosystem—private contractors, university researchers, local planning agencies, and others. The STICs are charged with naming the EDC Innovations that the state DOT will implement during an EDC Round. STICs also each can receive $100,000 in funding for innovation-oriented projects (recently increased to $125,000), such as demonstrations of new technologies.

STICs as an Innovation Support Mechanism

For most states, the STIC is viewed as a useful mechanism for convening key players from the state surface transportation community and focusing their attention on innovation. Some states are using STICs to coordinate additional programs (e.g., state-level versions of the EDC Program). One state participant described their STIC this way:

> Our STIC doesn't meet all that frequently, but it exists because of this process. . . . There are good conversations about things and how they work on the state level, the local level, all that kind of stuff. And it sort of ties our research efforts into implementation and how we [are] getting things out on the ground when we come up with new ideas. And all of that stems out of the Every Day Counts process.

The STIC was highlighted as instrumental in facilitating major innovations. For instance, Innovations such as GRS bridges and traffic queue warning systems received support through these grants, leading to their integration into standard practices. The flexibility and seed funding provided by such programs were used as examples for enabling pilot projects and enabling experimentation. Many states use the STIC grants to seed the deployment of EDC Innovations and for other innovations running in parallel to EDC Innovations.

> For a lot of the State DOTs, a STIC grant is not life-changing money for an innovation, but it's really good seed money. It's a beginning. And we've used the STIC grant just about every year since 2014 to get some innovations off the ground, some of which were tied to EDC, some of which were running parallel to, and some that were not related at all.
>
> – State DOT Representative

On the other hand, other state DOT stakeholders noted that the $100,000 is a limited amount that has not increased over the life of the program. (The STIC funding was increased to $125,000 after this evaluation project, in part to respond to these concerns.) Given cost increases, $100,000 was seldom sufficient to sponsor even a single project at a university. Deploying STIC funds also triggers accounting and reporting requirements, and some state DOTs stated that at $100,000, the amount awarded generated more hassle than benefit.

> STIC funding is tough. [. . .] It's not a lot of money and there's a lot of ropes to get through to utilize the funding and having the match funding and having to report on it every six months and working through the whole process of the application. And, and it's a lot of work just for not a ton of value.
>
> – State DOT Representative

Additional Incentives

In addition to STIC funding, the EDC Program offers limited direct assistance to support champions of innovation. Participants found these EDC Innovation-specific funds can fund small but crucial activities. A state DOT participant involved in working with first responders on Traffic Incident Management (TIM) noted that flexible funding can offer great value:

> We have to compete nationally, but we, we've used a lot for things like . . . to pay for travel funds. And it's not a lot of money. I mean, it might be a trip where you can send five people and it's about $7,000 or something. We had [a peer exchange] with [participation from] the state patrol . . . [I]f they didn't have that $7,000, they would not have been able to do that peer exchange, at least in person. So that was huge to them.

4.3 Implementation Resources and Benefits

The EDC Program is viewed as being especially helpful by supporting IDTs, raising awareness of innovations through outreach and electronic communications, and encouraging state DOTs to consider a range of EDC Innovations. Internally, FHWA staff involved in the EDC Program

gave high marks to the EDC Program Office, and in particular to the CAI Director and the long-standing EDC Program Coordinator, for providing helpful advice, being responsive to requests, and championing the program. External stakeholders also shared positive experiences working with the EDC Program staff and highlighted the assistance that they have received from the FHWA Resource Center during implementation.

Given that the EDC Program is designed to boost the deployment of "proven yet underutilized" innovations, implementation is the focus of EDC Program activities, the major benefits and challenges of the EDC Program are apparent here.

Access to Information

An initial priority for a state considering the implementation of an EDC Innovation is gathering sufficient evidence and information to understand the risks and benefits involved. External stakeholders were broadly satisfied with how the EDC Program supports the dissemination of information. The monthly webinars were mentioned by FHWA as a great resource to share valuable information for state champions to participate and get involved. Interviewees also appreciated EDC newsletters, demonstration projects, and site visits as other useful resources to gain confidence in the choice to implement an Initiative.

As noted elsewhere, a barrier to the adoption of some proven EDC Innovations is a lack of awareness among state DOTs that the innovation exists. The Data-Driven Safety Analysis (DDSA) Innovation in EDC Rounds 3 and 4 promoted the use of computer modeling and data analytics as one approach to integrate safety considerations in roadway design. This approach had been published by AASHTO in 2010 as the Highway Safety Manual (HSM), but FHWA found that few states were aware of the HSM or how it could be useful. Rather than creating an Innovation specific to the HSM, the EDC Program designed the DDSA Initiative with a broader scope looking at all uses of digital data to enhancing roadway safety. Given the novelty and complexity of some elements of DDSA, state DOTs stated that peer exchanges were especially useful in advancing implementation. In particular, one exchange held during EDC Round 4 involved participants from 43 states. Case studies of states that successfully implemented DDSA, developed by the EDC Program or sometimes prepared by the states themselves, also provided helpful support.

One party mentioned a particular benefit to the information shared by the EDC Program. While leading the implementation of an EDC Innovation, this person found that his managers were more easily persuaded to support the EDC Innovation because he used data from the EDC Program at the FHWA website. State DOTs are more likely to trust data and guidance from the FHWA than similar information from consultants.

However, some shared that sometimes there was too much information coming their way and it was hard to know what was beneficial and what was not. These stakeholders noted that their schedules and workload did not provide enough time to review all the materials provided, so they could use some guidance on where they should focus their limited attention. Additionally,

some state DOTs perceived that, although information was very helpful and there was good data to support the EDC Innovations they were promoting, more support for marketing was needed.

Access to Experts and Customized Guidance

One feature of the EDC Program raised repeatedly by stakeholders as a clear benefit is the Program's work to provide state DOTs with access and knowledge from other state DOTs. Both state DOT participants and representatives of IDTs (mostly FHWA staff) noted repeatedly that the state DOTs are most eager to learn from each other.

> Before rolling out e-Ticketing and Digital As-Builts technologies, the EDC Program held the annual summit, conducted case studies, and provided relevant data as part of the implementation plan. Among these activities, peer exchanges emerged as the most impactful, allowing lead states to showcase their adoption of the innovation, thus encouraging other states to follow suit. Currently, efforts are underway to compile a "Getting Started Guide" along with complementary how-to documents and case studies to facilitate the adoption process.

In that vein, the peer exchanges organized and supported by the program were highlighted by multiple stakeholders as extremely valuable. As one stakeholder put it, there is no substitute for learning about implementation from "someone who's been there."

> The peer exchange aspect is probably the most outstanding one because it can take so many formats. Again, it can be in person, it can be virtual, it can be a smaller group, it can be a larger group. It can be a scan tour where you go and see how another state has piloted innovation and decide if that will work for you or if you need to do some tweaks.
>
> – EDC Coordinator

After the peer exchanges, the monthly webinars were also mentioned frequently as a mechanism to hear presentations from representatives of "early adopter" states. One EDC Implementation Team Member summarized their experience like this:

> Webinars are pretty well-attended; the case studies and facts sheets are popular. We utilize face to face interactions with peer exchanges and demos, tech demos are very popular, we find that face to face interaction is the most beneficial.

The national EDC Summit is also a key activity for learning about the new Round's EDC Innovations, often from state DOTs involved with the IDTs. However, several stakeholders noted that the value of the summit has decreased since moving to a virtual format due to the COVID-19 pandemic. Most regional meetings and summits for state-level EDC discussions have also become virtual. Stakeholder feedback suggests that the virtual format lacks the personal touch and interactive opportunities that in-person events provide.

There is also frustration with repeated virtual events (e.g., webinars and online peer exchanges), particularly when topics overlap, leading to a sense of monotony and reduced engagement. One state DOT representative noted, "I don't like repeated virtual requests for peer exchanges and summits when the topic has a lot of overlap. Like, there's only so many times I want to be in a virtual room with the same people talking about kind of the same topic."

One significant outcome of these exchanges was the formation of communities of practice within various sectors and specific innovations. These networks facilitate ongoing communication, webinars, and discussions about specific innovations, fostering enduring relationships among participants. This cultural aspect of relationship-building is deemed crucial, as it encourages collaboration among stakeholders who share common goals and challenges. Stakeholders recommended identifying ways to maximize benefits of virtual and in-person engagement for community building and knowledge sharing. One state DOT representative noted, "And together, that information sharing, that peer exchanging that would happen was really, really, really powerful for us. You know, not to take anything away from the topics, but I think that's what's really important about is that culture. It kind of forced us all to the table to talk about some of those things."

4.4 Addressing EDC Innovation Risks, Challenges, and Culture

The OECD and others have documented the challenges that public-sector organizations face in developing an innovation-oriented culture. As noted in Chapter 1, risk is inherent in implementing innovations, as the adopting organization lacks familiarity with the innovation. The EDC Program addresses the potential risks and challenges of the EDC Innovations through the implementation plans, which outline strategies to help state DOTs understand the risks and challenges of implementation. The plans also describe resources and activities to help state DOTs mitigate these risks and overcome challenges.

The EDC Program seeks to facilitate the deployment of EDC Innovations through its activities and resources. By doing so repeatedly, the program can enable each state DOT to find a "playbook" for implementing innovations, giving them the capacity to properly estimate the risks involved in future implementations and then develop their own plans. Some of the strategies employed by the EDC Program are described here.

Assisting with Financing and Funding

For implementations that involve substantial upfront or ongoing costs, the EDC Program can connect state DOTs to the FHWA Resource Center (see box). Those staff, with the state's FHWA Division office, can identify sources of funds to support implementation. Dedicated programs to accelerate deployment can be accessed for the implementation of EDC Innovations.

EDC Innovations focused on digital systems and processes, including e-Construction, e-Ticketing, and 3D Engineered Models, often involved financial investments prior to implementation. In the e-Construction Innovation, the IDT found that the high start-up costs (for IT hardware and software systems) and substantial re-training posed challenges that slowed adoption in state DOTs. The FHWA encouraged the use of STIC and AID funds to states seeking to implement e-Construction and e-Ticketing.

Managing Organizational Dynamics and Barriers

EDC Innovations often entail two key organizational risks. **Internal risk** comes from potential resistance to innovation from within the state DOT. The resistance can stem from uncertainty

about innovation, comfort with established routines and processes, and fears that an innovation will disrupt existing DOT offices and their designated responsibilities. For example, EDC Innovations to digitize different processes within DOTs may require information sharing between safety departments, maintenance and operation, and planning. This is the case with the Data-Driven Safety Analysis Innovation (see box). **External risk** stems from the need to coordinate across different stakeholder organizations to implement the innovation. For example, the Data Analytics case notes that Innovations such as TIM require cooperation among state DOTs, first responders, and local governments.

Each EDC Implementation Plan typically identifies the key internal and external stakeholders who need to be involved in a successful deployment of that Initiative. The plan gives the state DOTs early warning about the problems that could occur if a key stakeholder is overlooked. For external organizational issues, the plan will likewise identify other organizational stakeholders to be consulted. The EDC activities, such as peer exchanges and webinars, are open to those other stakeholders. The state DOT can also leverage any data or other resources provided on the EDC website. The communities of practice mentioned above are a common mechanism for coordinating deployments across organizational boundaries, as well as sharing knowledge to facilitate implementation.

Data-Driven Safety Analysis Innovation

Some Innovations promoted by the EDC Program required collaboration and coordination across traditional organizational boundaries. For the DDSA Initiative, state DOTs found that the safety section held most safety data, but the analytical models required additional data (roadway feature data, traffic volume) held by other departments and even other agencies. The EDC Program extended DDSA into Round 4 to facilitate involvement by new partners in implementation, especially local agencies, tribal governments, and rural authorities. For example, the Kentucky DOT examined three rural counties and brought first responders (police and fire) into the discussion. Those emergency responders were very familiar with sections of roads and the types of features present where severe crashes had occurred, which provided a way to prioritize DDSA implementation. Their participation was supported in part by EDC Program resources.

Managing Political Risk: the Role of Champions

Deployments of EDC Innovations in a state DOT can be derailed by environmental factors, such as a change in leadership that moves the organization in a different direction, or a budget cut that suddenly eliminates resources to support deployment. To ensure successful implementation, several implementation plans noted the importance of "champions"—individual staff members who are excited about the EDC Innovation and push to enable deployment. The Final Report for EDC Round 3 includes a quote from Jennifer Cohan, then the Secretary of Transportation for the state of Delaware (FHWA 2017):

> An innovative culture is difficult to quantify, but it starts with innovation champions and making sure the message reaches every person in the department that they are empowered to innovate. It's a top-down, bottom-up mentality.

Champions generally self-identify at the start of an implementation effort. They often can maintain the momentum behind a deployment when organizational barriers arise. One key

function of a champion is to recruit staff who may be indifferent to the EDC Innovation but can be convinced to contribute to the effort. An EDC Coordinator noted, "And those are some of the ones we have to kind of work on a little bit more because they're kind of a little voluntold to do this and they have to try to fit it into their current job. And it wasn't something that they started out with a passion for."

Risk from Insufficient Human Capital

A common message from stakeholders was that most state DOTs suffer from personnel shortages. State DOT representatives were concerned about how the loss of experienced personnel through attrition detracts from their agencies' expertise and institutional knowledge. The dearth of trained staff was cited by many stakeholders as a key barrier to EDC Innovation adoption. An EDC State Coordinator commented, "[The States] just can't afford to hire people. They can't afford to keep people. And on top of that, the people that they do have are busy doing all kinds of other things."

The EDC Program has been addressing this somewhat through specialized training associated with its Innovations and person-to-person knowledge exchange. Unfortunately, sometimes the key to successful deployment is the insight generated by experience, so new staff have not had the opportunity to build that foundational knowledge-base. For example, during a pilot project for Intelligent Compaction (IC) state workers did not have the time to enter density testing values into a spreadsheet so they could be compared with compaction measurements. For this reason, potential IC advantages were unable to be verified and reported, resulting in a failure to complete the implementation. While that missing step seemed simple, the shortage of personnel was the cause of the problem. A state DOT staff member involved in that effort noted, "They're [state DOT workers] not here to defend themselves. I'm giving them credit. They were buried. They had a lot to do with a big job. They're under-staffed. I guarantee all those things were the case."

This lack of state staff time may limit states participation in future EDC Innovations. One state DOT representative indicated that innovation activities need to be integrated into formal responsibilities with dedicated work time. "I don't think there's a lack of desire to be innovative . . . I mean, these people all have their day jobs . . . they have to be able to weave in what they're trying to be innovative at within that." A state DOT manager noted, "Staffing is an issue for adoption, decisions depend on the culture and leadership of DOTs, but there is only so much state DOTs can do. A lot of states are restricted to a couple Initiatives and can't do them all."

> The integration of new information systems and technologies in highway construction has required state DOTs to leverage and advance their workforce's existing digital skills and competencies. The EDC Innovations related to digitization addressed this barrier directly. In the 3D Engineered Models Innovation, the EDC Program worked first on developing awareness among owners, contractors, engineers, and industry on 3D modeling and its benefits. Then, the EDC Program aimed to boost human capital by increasing the number of professionals within each target area in the workflow, processes, and procedures of 3D modeling. In addition, the EDC Program deployed on-the-ground technical assistance to help states use the technologies using hands-on demonstrations.

4.5 Reporting on Implementation

The EDC Program includes a provision for states to report on the initial level of implementation for each EDC Innovation at the start of each Round and update their progress every 6 months through the Round. A recent reduction in reporting frequency was seen as overwhelmingly positive and stakeholders appreciated the diligence from FHWA on communicating deadlines and sharing templates.

Interview comments indicate that some stakeholders have difficulty with the definitions for certain implementation stages when applied to specific EDC Innovations. The EDC Progress Reports require that the state select which of the five levels of implementation the state has achieved (see Figure 4). The IDTs generally try to define the criteria for a state to qualify for advancing to a higher level of implementation, but even the IDT team leaders found some EDC Innovations were not structured to help. Two respondents noted that the progress reports for each state are filed by the EDC Coordinator for that state, who is often not a technical expert in every innovation and may not properly judge the state's implementation level.

The IDT team members and state DOTs noted that the current reporting structure lacks the granularity needed to be actionable. For example, the Pavement Preservation Innovation promoted the implementation of 8 to 10 different paving materials and techniques. A state that uses some of those techniques in a few geographic areas could be considered at the demonstration stage (limited testing), but if the instances of implementation represent full deployments, it might be considered at the institutionalized stage. The Pavement Preservation IDT developed its own set of stages with accompanying criteria, allowing states to report themselves as follows:

- **National Leader:** The Transportation Agency has successfully deployed revised preservation treatment specifications, provided training for construction and inspection personnel, incorporated improved material qualities into treatment specifications, or adopted improved construction practices on at least three projects or 10 miles of preservation treatment.
- **Under Assessment:** The Transportation Agency has chosen and constructed one or two new successful pavement preservation projects applying the improved construction practices.
- **Exploring:** The Transportation Agency has requested information and/or training about revised specifications, inspection methods, construction technologies, or quality materials.
- **Discussing:** The Transportation Agency is seeking information and designing a new pavement preservation treatment.

Not Implemented	The State has not started planning to implement the innovation.
Development Stage	The State is developing an implementation process and building support by participating in webinars and peer exchanges, and collecting guidance and best practices.
Demonstration Stage	The State is testing/piloting the innovation.
Assessment Stage	The State is assessing the performance of the innovation and adjusting any processes for full deployment.
Institutionalized	The State has adopted the innovation as a standard practice and uses it regularly on projects.

Figure 4.   EDC reported implementation stages. Source: EDC Program Documentation.

> The e-Construction Innovation was not a single technology, but instead encompassed multiple systems and processes that represented different components of Construction Information Management (CIM). That approach helped state DOTs implement the EDC Innovations, because they could choose among different technologies in each EDC Innovation to implement first. However, this complicated reporting on implementation progress, as the deployment of only some technologies in only some instances could constitute "institutionalization" in a local context. Determining the point at which a state had implemented a sufficient set of technologies to move to a more advanced level of implementation could generate confusion, and some IDTs had to develop and encourage creative methods to help states properly classify their levels of implementation.

Reporting requirements have been a source of tension for EDC Program participants. A few stakeholders recognized that the EDC Program is faced with a quandary. Its progress reporting system needs to use a single standardized scale for representing implementation progress. However, EDC Innovations vary greatly in nature, and the level of deployment is often unevenly distributed across a state. The state DOTs and EDC coordinators are caught in a situation where they try to reconcile these needs, leading to administrative headaches. As one FHWA staff person summarized, "The challenge is to give EDC a way of measuring success, the reporting piece is a sore subject for starts. We participated in at least 6 calls with states for EDC 7 assuring them not to worry too much about reporting, that contractors can help with reporting. We have been successful in convincing states we won't harass them and that we will help states work through this process—The 'EDC police' won't come after you."

CHAPTER 5

Findings by Evaluation Question

This section presents findings by each of the evaluation questions:

- How is the EDC Program designed, structured, and operated to support state-led deployment of underused innovative technologies and project delivery approaches?
- What are potential and realized outcomes of EDC-funded, state-led deployment projects, and how did EDC Program activities contribute to those outcomes?
- Have the EDC Program's outcomes contributed to achieving programmatic and FHWA strategic objectives, including catalyzing efficiencies that support deployment of innovations in the highway ecosystem?
- What factors influenced the effectiveness and outcomes of the EDC Program and what might be done differently in the future to improve program results?

5.1 EDC Program Design, Structure, and Operations

EQ #1: How is the EDC Program designed, structured, and operated to support state-led deployment of underused innovative technologies and project delivery approaches?

The hallmark of the EDC Program is that it leaves the decision to deploy an Innovation in the hands of the state DOT. The EDC Program Office offers resources, technical assistance, and training to support states in implementing selected Innovations. Program support includes selection of relevant Innovations and providing guidance on decision-making from relevant stakeholders at the state level, as well as support for implementation by providing training to program staff, identifying experts, and sharing best practices and tools to facilitate adoption and deployment of Innovations. As one stakeholder noted, "The longevity of [the EDC Program] is a testament to how effective it has been."

The EDC Program itself appears very efficient, operating with a very small program staff. This is possible because the EDC Program uses relationships across the FHWA and across the entire surface transportation community. EDC state coordinators are staff members based out of state-specific FHWA Division offices. IDTs are usually led by FHWA staff, but the team members may be drawn from state DOTs, associations, consulting organizations, private firms, and universities. The IDT leaders have funding available to support promotional and educational activities, so their time on an EDC Innovation is covered by the program. This vast network of contacts is manageable in part because the CAI Director and the long-serving Program Coordinator are well-known across the FHWA and highly respected. The EDC Program would be challenged to find effective replacements if these individuals retired or moved to new positions. Many stakeholders emphasized that the EDC Program staff were very supportive, helpful, and responsive to requests and to suggestions.

Collaboration is a key aspect of the EDC Program. FHWA collaborates with the transportation community to select proven yet underutilized innovations. These selections are based on internal screening criteria and external feedback. Openness to community input is also a key feature of the program. In the past, the EDC Program solicited proposed innovations via public Requests for Information, but in recent Rounds, it appears that the call for candidate Innovations relies on direct communication with specific stakeholder groups. While the Innovations are solicited through an open process, the broader surface transportation community does not have a clear understanding of the final selection of EDC Innovations.

The EDC Program has created key templates for helpful documents supporting implementation, such as implementation plans, case studies, Initiative fact sheets, and guidance documents. In addition, the program disseminates information through regular newsletters and other periodicals and contributes to FHWA's *Public Roads* magazine. This communication is crucial to raising awareness about the program and its innovations across the surface transportation community.

> States were primed to implement Using Data to Improve Traffic Incident Management (TIM), an EDC-4 Innovation, after TIM training promoted during EDC-2 achieved broad adoption. Twenty-six states opted into this EDC-4 Innovation, although FHWA staff believe that other states made implementation efforts without formally notifying the EDC Program. Numerous examples of successful TIM data collection implementation and their results were collected with the support of the EDC Program, and EDC staff helped greatly in broadening awareness and appreciation of the innovation.

To support cross-jurisdiction collaboration and adaption of existing EDC Innovations, FHWA organizes a national summit to showcase the Innovations to the wider transportation community. This summit serves as a platform for discussions regarding the benefits and implementation strategies of each innovation. Additionally, after the summit, state DOTs convene with relevant stakeholders from their STICs to assess adoption levels and determine which Innovations to implement during the EDC Round. States receive funding to support projects authorized by their STICs, emphasizing the Program's commitment to state-led deployment decisions. Throughout the process, systematic reporting and follow-up mechanisms track progress, document benefits, and assess the diffusion of EDC-supported Innovations across states, ensuring accountability and continuous improvement in the Program's effectiveness.

One important finding concerns the metrics that could be used to assess the performance of the EDC Program. Respondents noted that it is unrealistic to assume that the EDC Program would be able to convince all states to adopt every EDC Innovation. Some EDC Innovations are not viewed as relevant or appropriate for certain states. For example, a highly urbanized state would not put a priority on an innovation focused on rural roads. Another factor is that some states have already implemented certain EDC Innovations before they were promoted by the program. Thus, those states may appear to make "no progress" toward implementation because they have largely reached that goal. This means that the EDC Program should not be expected to achieve implementation of its Innovations across all states.

Tracking implementation among the states that opt into EDC Innovations provides a more reasonable baseline. If a significant share of those states make progress according to the

> For some EDC Innovations, implementation required more than awareness and education. In the implementation of the e-Construction Innovation, for example, some barriers to adoption were legal rather than technical. Laws in some states required that contracts be signed on paper in blue or black ink, preventing the use of digital signatures. In particular, some documents had to be signed and dated in ink by a Professional Engineer and include that person's seal embossed on the document to reflect their status. Implementation of some EDC Innovations may fall short of expectations due to such circumstances far beyond the control of the EDC Program.

implementation stages in progress reports, the program appears successful. However, the progress reporting format introduces some challenges. For example, in large states, surface transportation operations are so vast and decentralized that the state DOT itself cannot assess how widely an EDC Innovation has been adopted. Although maps and other measures in the EDC Program's progress and final reports are useful indicators, they do not define what constitutes "success" for the EDC Program.

The position of the EDC Program, and the reorganization of its broader unit, causes some concern among stakeholders. One team leader in a FHWA state Division Office explained how a lack of organizational consistency has affected the perception of the Program's status and capacity. This individual observed, "Federal Highway Administration's top leadership for innovation has been really inconsistent in the last three years. Keeps moving around. I think it's under the office of like CFO or something. Now, I'm not really sure, but I think that inconsistency doesn't help a program we're supposed to be touting across the country."

5.2 Outcomes Supported by EDC Program Activities

EQ #2: What are potential and realized outcomes of EDC-funded, state-led deployment projects, and how did EDC Program activities contribute to those outcomes?

The potential outcomes of EDC-funded Innovations include reducing the time needed to complete surface transportation projects, lowering construction and life-cycle infrastructure costs, increasing transportation safety, and making surface transportation more adaptable, sustainable, equitable, and safer. Realized outcomes vary by specific EDC Innovation; in some instances, states achieved desired program outcomes such as cost savings, shorter construction times, or greater safety. High-friction surface treatments, promoted in Round 2, have reduced crashes in states such as Kentucky and Washington, directly improving road safety. Given the decentralized nature of adoption, state-specific factors that affect adoption, and lack of consistent measurement, it is challenging to systematically determine the extent to which outcomes have been realized. For example, participants involved in EDC Innovations in the Data Analytics case noted that those Innovations largely aimed at reducing road fatalities and other harm to motorists. Despite these efforts, fatalities per road mile have increased in most states, but the trend is driven by factors such as driver behavior. Evaluation Question 4 contains a section that presents some options to increase the rigor and consistency of program measurement.

Participants identified a range of different outcomes that they associated with program activities including increased awareness of new EDC Innovations, formation of state specifications to allow and support use of EDC Innovations, and use of the Innovations to achieve process

changes. In some instances, the state DOTs perceived the EDC Innovations as having successful outcomes despite not achieving widespread adoption. For example, one state believed they were successful because they had developed internal technical understanding, along with design guidance, standard details, and a special provision, to enable an alternative to the traditional construction method. However, few projects have used these alternative methods, and they were not found to be more cost effective than the prevailing construction method.

> In EDC Round 2, the program promoted Intelligent Compaction (IC), a technology first deployed in Europe many years before the United States. To ensure the design performance of pavements, both the base materials and subgrades must be compacted properly. IC-equipped rollers integrate several components: high order GPS (global positioning system), accelerometers, onboard computer reporting systems, and infrared thermometers. The combination of all these systems provides valuable, real-time information to the machine operators. State DOTs attempting to deploy IC needed to find suppliers who could provide this integrated solution. The lack of incompatible data formats often complicated adoption.
>
> As soon as the EDC Innovation started, FHWA staff met with the different equipment manufacturers to address this concern. FHWA encouraged technological standardization of their products so that it would be easy for contractors and State DOTs to adopt the technology. The FHWA provided additional support, such as funding the development and training on VETA (a software that allows project personnel to view and analyze data from various IC machines quickly) and the creation of guide specifications from both FHWA and AASHTO. The FHWA also encouraged manufacturers to develop IC retrofit devices for non-IC rollers, reducing the costs associated with IC implementation. These resources, tools, and coordination efforts directly addressed key barriers, facilitating broader implementation of IC.

EDC Program activities contribute to outcomes, although to what extent may be unclear. During interviews with state DOT representatives, there was strong agreement that EDC's value is rooted in quality information about new Innovations, the opportunity via demonstration projects to see how Innovations may be implemented, and peer-to-peer exchanges that facilitate practical understanding of where, how, and when to use new Innovations. The EDC Program provides extensive technical assistance to support state staff as they implement unfamiliar technologies (see box). Many of the individuals interviewed for this case study stressed how helpful and timely EDC's technical assistance was as they tried to implement these Innovations.

The ultimate test of the EDC Program's effect is whether Innovations would be deployed at the same rate as observed today if the EDC Program did not exist. There was broad consensus that while the EDC Programs effect on accelerating innovation was not consistent, important innovations would languish unnoticed and be underutilized but for the efforts of the EDC Program. State DOT personnel are, in general, under pressure to perform and spreading their attention across different priorities, so they have no capacity to spot useful innovations in the environment. Many external stakeholders confirmed that they would not know about key innovations, or the significance of those innovations, without the information and expertise provided by the EDC Program.

5.3 Contributions by EDC to FHWA Strategic Objectives

EQ #3: Have the EDC Program's outcomes contributed to achieving programmatic and FHWA strategic objectives, including catalyzing efficiencies that support deployment of innovations in the highway ecosystem?

This evaluation provides evidence that EDC's activities have contributed toward raising awareness of underutilized innovations for surface transportation projects, and that those innovations align with the mission of FHWA. The Innovations selected are generally recognized as useful for key goals, such as improving road safety and accelerating project delivery. It is much harder to determine whether a different set of Innovations would contribute more substantially to the FHWA mission.

Our expert interviews revealed some factors, such as technical complexity, lack of contractor support and engagement, and inconsistent benefits that have negatively affected the EDC Program's ability to effectively deploy and organically spread innovations. The FHWA must balance the need to maintain Program efficiency with the desire to diffuse knowledge of innovations as widely as possible. Not every innovation will be uniformly applicable to each state, and despite EDC efforts, some states will not implement innovations.

EDC has successfully advanced FHWA strategic objectives such as state compliance with federal statutes on asset management (23 USC 119 2011) and on performance management (23 USC 150 2012). These laws require states to include consideration of EDC Innovations such as pavement preservation as part of their long-term business practices that support federal funding. Program outcomes such as improved highway safety, which was promoted in Innovations such as high-friction highway surfaces, smarter work zones, and weather-savvy roads, support federal road safety objectives. Still other EDC Innovations, notably advanced geotechnical methods in exploration, modernized business practices, prefabricated bridge elements and systems, and collaborative hydraulics, all reduce construction time and cost. This more efficient use of taxpayer dollars frees up federal and state funds for additional projects.

Perhaps the most important and lasting impact of the EDC Program is its ability to allow states to experiment with self-selected innovations, giving state DOTs the opportunity to learn about, discuss, and potentially implement innovations that can bring substantial benefits to the surface transportation community with less risk. Experiencing small wins through the EDC Program may make these organizations more open to deploying technologies and process changes in the future. This repeated pattern of success with EDC increases the state DOTs' tolerance for change and helps them become more receptive to innovation over time.

All of this suggests that the EDC Program does play a role in promoting a culture of innovation in state DOTs. By mitigating risks, providing strategies to overcome challenges, and offering timely and informative resources, the EDC Program makes the implementation of its Innovations less daunting and therefore more realistic for risk-averse DOTs. There is no data set available, however, that can measure the marginal effect of the EDC Program on organizational cultures, or on the rate of EDC Innovation adoption. By its nature, the EDC Program lacks a counterfactual (a view of the world if the program had not existed). The evaluation's qualitative methods provided some systematic evidence that state DOTs are becoming more adept at deploying the innovations of greatest interest to them, and the EDC Program supports this. EDC external stakeholders interviewed did detect that state DOTs displayed greater capacity to deploy innovations and were more open to innovations thanks to the program.

The evaluation team observed, however, that the EDC Program does not provide general guidance on the strategies to adopt when deploying innovations in state DOTs. Some form of meta-analysis across Innovations might better establish if there are "best practices" in implementing

EDC Innovations. The case studies in this report provide a potential approach to that analysis. While the EDC Program references known best practices in innovation (e.g., the role of champions), it does not seem to have a common framework that suggests consistent pathways to enduring success in the deployment of innovations. There is a substantial academic literature on best practices in innovation in organizations, like the studies by the OECD, so the EDC Program could see if the experience of state DOTs aligns with that body of research. (It should be noted, however, that most of this literature describes best practices for organizations that *produce* innovations adopted by others, and relatively less research is available on best practices for adoption of innovations.)

5.4 Success Factors and Future Options for Program Effectiveness

EQ #4: What factors influenced the effectiveness and outcomes of the EDC Program and what might be done differently in the future to improve program results?

The EDC Program has demonstrated several strengths in its implementation, contributing to its overall success. The EDC Program is widely regarded as a positive initiative within the transportation community. Its collaborative approach, strategic selection of innovations, emphasis on peer learning, and provision of technical support have contributed to its success in accelerating the deployment of underutilized technologies and project delivery approaches, ultimately improving the efficiency, safety, and sustainability of transportation systems nationwide.

One key success factor is the selection of innovations. Through collaborative efforts with the transportation community, the EDC Program identifies and promotes innovations that have the potential to address critical challenges and improve transportation systems. While the program solicits ideas and inputs widely, there is room to expand the diversity of the parties consulted to include more input from tribal governments and local governments. In the future, selection of Innovations may become more challenging, more complex, and process-oriented. This shift in the focus of Innovations may require the program to look closely at the amount of time needed for implementation and the amount of consultation that will be needed from diverse parties.

Interested parties largely approve of the selection of innovations so far and think that FHWA does a good job in identifying proven yet underutilized innovations with strong potential benefit. On a broader note, a few stakeholders wondered if the EDC Program had already identified all the most useful innovations (the "low-hanging fruit"), and that it may get increasingly difficult to identify worthwhile innovations in the future.

The EDC Program support plays a crucial role in EDC Innovation adoption. Clear and transparent communication channels ensure that stakeholders are informed about the latest innovations, implementation strategies, and available resources. By providing accessible and comprehensive materials, such as guidelines, case studies, and success stories, the program equips state DOTs and other stakeholders with the necessary information to make informed decisions and effectively implement EDC Innovations.

Based on ideas contributed by stakeholders during interviews, there are some options for future programs and operations that could be considered. These are discussed below.

Options for the Initiative Selection Process, and Transparency for Stakeholders

As noted in Chapter 4, some stakeholders felt that the EDC Program could be more transparent about how the final set of Innovations is decided. Some options here include publishing

lists of innovations proposed as candidates, or at least a list of "finalists" that can accompany the unveiling of the EDC Round's Innovations. Another option is to release the final set of Innovations earlier than the national EDC Summit, so that state DOTs might "do their homework" and come to the summit with informed questions.

A few stakeholders expressed views that although the FHWA took input from the surface transportation community, its selection of Innovations showed a desire to "push" specific innovations developed at the FHWA. While these individuals had no strong evidence to support this perception, it is worth noting that some members of the community have that concern.

Options for the Duration of EDC Rounds

Several parties expressed some dissatisfaction with keeping each Round at 2 years. These people noted that for many Innovations, 2 years is far too short to learn about it, plan for adoption, and achieve institutionalization. The EDC Program has addressed this issue in part by extending some Innovations into a second Round or building on an innovation with a related effort in subsequent Rounds.

The effectiveness of the program may be improved by extending the innovation deployment period from 2 to 3 years. EDC could use the first year to undertake preliminary actions to facilitate implementation. These activities could include

1. Contracting with technical experts who will provide innovation support;
2. Formal assessment of market readiness/market research about where Innovations are most wanted/useful;
3. Internal FHWA communication to ensure groups across the agency are informed about Innovations; and
4. Soft communications with trade groups/advocacy groups to gather support/identify possible risks and barriers.

Allocating more time at the start of the cycle for these activities early would allow deployment teams to have a full 2 years to provide technical assistance and support for innovation adoption to state and local transportation organizations.

> The DDSA Innovation illustrates why a 2-year Round may not be sufficient to promote certain types of innovations. DDSA in practice required information sharing, coordination, and communication across multiple stakeholders. Given the breadth of DDSA as a new practice, the IDT found that a single 2-year Round was not sufficient for many states to institutionalize this innovation, and most only implemented DDSA on specific roads. Extending DDSA into Round 4 provided time to bring other stakeholders into the implementation process. While adoption was spotty during Round 3, 48 states opted to implement DDSA during Round 4.

At the same time, a few stakeholders noted that the 2-year duration is a fair compromise. Technologies move at different speeds, and 2 years is a short time for implementing new pavement technologies but a long time in the implementation of new information technologies. Two years offers the EDC Program the opportunity to spot and promote promising innovations that arise, without too much delay, while also affording time for implementation. Also, since the EDC

Program serves to introduce state DOTs to specific Innovations but does not direct deployment, the 2-year period may be sufficient to ensure that the program informs stakeholders about an innovation and provide the necessary educational resources. After that point, implementation of the innovation is the responsibility of the state DOTs and not the EDC Program.

Re-scaling Innovations

As noted in Chapter 1, the EDC Program tends to define innovations broadly, encompassing a range of technologies or practices. This may make innovations appear to involve much more substantial deployment than warranted. Although the EDC Program adopts expansive definitions for its innovations so that more states can find some element of interest, it also may seem that each requires investigating several technologies. Several stakeholders point out that one of the more successful EDC Innovations, SafetyEdge, was a relatively simple attachment to a paver to shape a roadway curb leading to less severe accidents. The EDC Program could offer a mix of Innovations that range from inexpensive, simple, and incremental to more sophisticated and substantial. Also, state DOTs may choose to deploy some components of an EDC Innovation and not others, which can complicate how implementation is reported.

> Through the DDSA Innovation, the EDC Program took underutilized approaches to safety analyses published in the AASHTO HSM and other sources and raised awareness and the benefits of such approaches and helped state DOTs develop implementation strategies in terms of policies and procedures. As a result, some states have published guidelines that require the use of DDSA in road project design. By structuring the EDC Innovation as a set of practices and tools, the EDC Program provided state DOTs with the option to adopt them incrementally.

Extending EDC Involvement in Innovations

A clear limitation of the EDC Program is that it influences adoption of its innovations for a defined set of 2-year Rounds, but then moves on to promote additional innovations. The evaluation project's case study research showed that the EDC Program does link some related Innovations together, such as those related to digitization of construction processes or implementation of advanced data analytics. These cases reflected efforts to focus on key sets of innovations over a period of 6 to 10 years at least. The case studies show that EDC Innovations rarely repeat. Even in such cases, the involvement of the EDC Program in facilitating deployment of an innovation may still end well before state DOTs are able to achieve implementation.

The FHWA would need to track implementation of EDC Innovations beyond their EDC Rounds. The programs in the Resource Center and various FHWA Offices may fill this gap to some extent, but their efforts to track the progression of deployment across the state DOTs also have limits. Retrospective assessments of EDC Innovations conducted by the Volpe Center often include more systematic studies of their diffusion. Future evaluations of the EDC Program would be more informative if implementation of the Innovations in a particular Round could be tracked and recorded well beyond the 2-year timeframe. This would also help to determine whether the EDC Program is contributing to long-term change in surface transportation.

Redesigning the Progress Report

Robust reporting mechanisms track progress, document outcomes, and capture lessons learned, facilitating accountability and continuous improvement. This emphasis on dissemination support, communication, and reporting enhances transparency, fosters collaboration, and strengthens the overall effectiveness of the EDC Program in advancing transportation innovation and improving infrastructure nationwide. However, the current format and structure of progress reports seem unsatisfactory to many stakeholders. The current "implementation status" measures are so broad that they are not particularly informative and cannot provide details that make their metrics actionable.

To better capture program outcomes and outputs, the EDC Program could move from a single implementation metric and instead develop a catalog of potential measures from which each state can select the most relevant measures for its selected Innovations and projects. While stakeholders agree that the goal of the innovation is something that can be called "institutionalization," what types of events signify institutionalization is less clear. Some other indicators suggested by stakeholders include

- Adoption of an EDC Innovation in a national standard,
- Listing an EDC Innovation as an accepted practice in surface transportation, and
- Publicity given to an EDC Innovation as an example of best practice.

Even these measures may have limitations. One stakeholder noted that certain EDC Innovations are implementations of proprietary, patented technologies, and in the past, the FHWA has discouraged the use of proprietary technology in standards.

With any new reporting system, the EDC Program will need to train participants on the new system and its accompanying standards and metrics. Any change in reporting is likely to entail careful consideration of trade-offs, and the burden on the state DOTs must be a variable in that consideration.

CHAPTER 6

Conclusions

This evaluation report presents evidence regarding the efficiency, implementation, effectiveness and attribution of the EDC Program, its outputs and outcomes, and some evidence suggesting the Program's broader impacts. The EDC Program is an unusual undertaking, in that it focuses purely on the diffusion of Innovations with little attention to generating them. This is a critical element in bringing new techniques and technologies into practice, and the EDC Program illustrates why this is an important part of the technology life cycle.

Overall, key stakeholders and other indicators show that the EDC Program lives up to its goal of being a state-led program that identifies proven yet underutilized Innovations, and then promotes their implementation across the U.S. surface transportation sector. While rooted in the objective of accelerating project delivery, the program has expanded into new domains and new objectives. It remains consistent, however, in helping to accelerate Innovation deployment, and at least indirectly instill a culture of innovation in many state DOTs.

The diversity and range of the EDC Program complicated this evaluation study, necessitating a largely qualitative approach. With the evidence gathered, however, future evaluations could pursue more detailed assessments of program aspects, such as how to measure its true impact or how to model its approach to EDC Innovation diffusion. The reporting format and system for the EDC Program appears to be an element that stakeholders find most problematic. Rigorous evaluation techniques could help to inform the design of a new reporting system that captures the multiple effects of the EDC Innovations.

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Glossary

Term	Definition
Candidate Innovation	A specific innovation in surface transportation considered by the EDC Program for inclusion in a future EDC Round.
Diffusion of Innovations	The adoption of innovations across multiple organizations.
EDC Innovation	A specific set of technologies, practices, or approaches selected by the EDC Program for promotion in the surface transportation community and presented at the EDC Summit.
EDC Round	A 2-year period in which a collection of EDC Innovations is supported by the EDC Program.
EDC Summit	A summit (in-person or virtual) where transportation leaders from across the country gather to discuss and identify opportunities for implementing EDC Innovations in their respective states.
Evaluation project	The project to assess the Every Day Counts Program conducted by RTI. Also referred as "evaluation" or "project."
External stakeholders	A person or organization outside of the FHWA that is involved in enabling the outcomes of the EDC Program.
Impact	Positive and negative, primary and secondary long-term effects produced by an intervention, directly or indirectly, intended or unintended. See also Outcome.
Implementation	The process of deploying an EDC Innovation in an operational setting.
Implementation Deployment Team	A group of experts recruited by the EDC Program to develop the plan of activities and resources that will support state DOTs who choose to adopt an EDC Innovation.
Industry stakeholder groups	Members of trade and professional associations who communicate and collaborate with the FHWA on the EDC Program.
Innovation	The implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations (OECD 2005).
Internal stakeholders	A person affiliated with the FHWA.
Outcomes	Changes or benefits resulting from activities and outputs. Short-term outcomes produce changes in learning, knowledge, attitude, skills, or understanding. Intermediate outcomes generate changes in behavior, practice, or decisions. Long-term outcomes produce changes in condition. See also Impact.
Outputs	A product or consequence generated by a program activity.
Potential innovation	An innovation proposed by the surface transportation community to the EDC Program for possible selection as a candidate EDC Innovation.
Program	Any activity, project, function, or policy that has an identifiable purpose or set of objectives (GAO 2011).
Program Logic Model	A schematic and description of the rationale for how the program is designed and why it is expected to produce its intended results.
Research	Creative work undertaken on a systematic basis to increase the stock of knowledge, including knowledge of man, culture and society (OECD 2002).
Theory of Change	Description of how a programmatic intervention is expected to induce a change in the program's participants or environmental conditions.

Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
AGC	Association of General Contractors
AID	Accelerated Innovation Deployment Program
AMR	Accelerating Market Readiness Program
ARTBA	American Road & Transportation Builders Association
CAI	Center for Accelerating Innovation
CIM	Construction Information Management
DBE	Disadvantaged Business Enterprises
DDSA	Data-Driven Safety Analysis
DOT	(State-level) Department of Transportation
EAR	Exploratory Advanced Research Program
EDC Program	Every Day Counts Program
EQ	Evaluation Question (for this study)
FAST	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
GRS	Geosynthetic Reinforced Soil
HMA	Hot Mix Asphalt
HSM	Highway Safety Manual
IBS	Integrated Bridge System
IC	Intelligent Compaction
IDT	Innovation Deployment Team
MAP-21	Moving Ahead for Progress in the 21st Century Act
OECD	Organisation for Economic Co-operation and Development
OPSI	OECD Observatory of Public Sector Innovation
R&T	Research and Technology
RTCC	Research Technology Coordinating Committee
STIC	State Transportation Innovation Council
TFPE	TRB-FHWA Program Evaluation
TIDP	Technology and Innovation Deployment Program
TIM	Traffic Incident Management
TRB	Transportation Research Board
WMA	Warm Mix Asphalt

APPENDIX A

EDC Innovations

EDC Round	Innovation
EDC-1 (2011-2012)	Geosynthetic Reinforced Soil-Integrated Bridge System (GRS-IBS)
EDC-1 (2011-2012)	Prefabricated Bridge Elements and Systems (PBES)
EDC-1 (2011-2012)	Adaptive Signal Control Technology (ASCT)
EDC-1 (2011-2012)	Construction Manager/General Contractor (CM/GC)
EDC-1 (2011-2012)	Design-Build (D-B)
EDC-1 (2011-2012)	Use of In-Lieu Fee and Mitigation Banking
EDC-1 (2011-2012)	Clarifying the Scope of Preliminary Design
EDC-1 (2011-2012)	Flexibilities in Right-of-Way
EDC-1 (2011-2012)	Planning and Environment Linkages (PEL)
EDC-1 (2011-2012)	SafetyEdge^{SM}
EDC-1 (2011-2012)	Warm Mix Asphalt (WMA)
EDC-1 (2011-2012)	Enhanced Technical Assistance with Ongoing Environmental Impact Statements
EDC-1 (2011-2012)	Flexibilities in Utility Accommodation and Relocation
EDC-1 (2011-2012)	Programmatic Agreements (PAs)
EDC-2 (2013-2014)	Accelerated Bridge Construction (ABC)
EDC-2 (2013-2014)	Alternative Technical Concepts (ATCs)
EDC-2 (2013-2014)	Locally Administered Federal-Aid Projects
EDC-2 (2013-2014)	Intersection and Interchange Geometrics
EDC-2 (2013-2014)	National Traffic Incident Management Responder Training (SHRP2 L12)
EDC-2 (2013-2014)	Construction Manager/General Contractor (CM/GC)
EDC-2 (2013-2014)	Design-Build (D-B)
EDC-2 (2013-2014)	3D Engineered Models for Construction
EDC-2 (2013-2014)	Geospatial Data Collaboration
EDC-2 (2013-2014)	Implementing Quality Environmental Documents (IQED)
EDC-2 (2013-2014)	High-Friction Surface Treatments (HFST)
EDC-2 (2013-2014)	Intelligent Compaction
EDC-2 (2013-2014)	Programmatic Agreements (PAs)
EDC-3 (2015-2016)	Geosynthetic Reinforced Soil-Integrated Bridge System (GRS-IBS)
EDC-3 (2015-2016)	Ultra-High-Performance Concrete (UHPC) Connections for Prefabricated Bridge Elements
EDC-3 (2015-2016)	Improving DOT and Railroad Coordination (SHRP2 R16)
EDC-3 (2015-2016)	Locally Administered Federal-Aid Projects: Stakeholder Partnering
EDC-3 (2015-2016)	Regional Models of Cooperation
EDC-3 (2015-2016)	Road Diets (Roadway Reconfiguration)

(continued on next page)

A-1

EDC Round	Innovation
EDC-3 (2015-2016)	Smarter Work Zones
EDC-3 (2015-2016)	3D Engineered Models : Schedule, Cost, and Post- Construction
EDC-3 (2015-2016)	e-Construction
EDC-3 (2015-2016)	Improving Collaboration and Quality Environmental Documentation (eNEPA and IQED)
EDC-3 (2015-2016)	Data-Driven Safety Analysis (DDSA)
EDC-4 (2017-2018)	Collaborative Hydraulics: Advancing the Next Generation of Engineering (CHANGE)
EDC-4 (2017-2018)	Ultra-High-Performance Concrete (UHPC) Connections for Prefabricated Bridge Elements
EDC-4 (2017-2018)	Community Connections
EDC-4 (2017-2018)	Road Weather Management - Weather-Savvy Roads
EDC-4 (2017-2018)	Automated Traffic Signal Performance Measures (ATSPMs)
EDC-4 (2017-2018)	Using Data to Improve Traffic Incident Management
EDC-4 (2017-2018)	e-Construction and Partnering: A Vision for the Future
EDC-4 (2017-2018)	Integrating NEPA and Permitting
EDC-4 (2017-2018)	Data-Driven Safety Analysis (DDSA)
EDC-4 (2017-2018)	Pavement Preservation (When, Where, and How)
EDC-4 (2017-2018)	Safe Transportation for Every Pedestrian (STEP)
EDC-5 (2019-2020)	Collaborative Hydraulics: Advancing the Next Generation of Engineering (CHANGE)
EDC-5 (2019-2020)	Crowdsourcing for Operations
EDC-5 (2019-2020)	Virtual Public Involvement
EDC-5 (2019-2020)	Project Bundling
EDC-5 (2019-2020)	Value Capture: Capitalizing on the Value Created by Transportation
EDC-5 (2019-2020)	Advanced Geotechnical Methods in Exploration (A-GaME)
EDC-5 (2019-2020)	Unmanned Aerial Systems (UAS)
EDC-5 (2019-2020)	Reducing Rural Roadway Departures
EDC-5 (2019-2020)	Safe Transportation for Every Pedestrian (STEP)
EDC-5 (2019-2020)	Weather-Responsive Management Strategies
EDC-6 (2021-2022)	UHPC for Bridge Preservation and Repair
EDC-6 (2021-2022)	Crowdsourcing for Advancing Operations
EDC-6 (2021-2022)	Virtual Public Involvement (VPI)
EDC-6 (2021-2022)	Next-Generation TIM: Integrating Technology, Data, and Training
EDC-6 (2021-2022)	e-Ticketing and Digital As-Builts
EDC-6 (2021-2022)	Targeted Overlay Pavement Solutions (TOPS)
EDC-6 (2021-2022)	Strategic Workforce Development
EDC-7 (2023-2024)	Innovation for a Nation on the Move
EDC-7 (2023-2024)	Nighttime Visibility for Safety
EDC-7 (2023-2024)	Next-Generation TIM: Technology for Saving Lives
EDC-7 (2023-2024)	Integrating GHG Assessment and Reduction Targets in Transportation Planning
EDC-7 (2023-2024)	Enhancing Performance with Internally Cured Concrete (EPIC2)
EDC-7 (2023-2024)	EPDs for Sustainable Project Delivery
EDC-7 (2023-2024)	Rethinking DBE for Design-Build

Detailed Evaluation Planning Matrix

Evaluation Questions and Sub-questions	Data Sources								
	Document review	Program data	Portfolio data	Stakeholder lists	Lit review	Interviews	Focus groups	Surveys	Case studies
1. Strategies and Processes: How is the EDC Program designed, structured, and operated to support state-led deployment of proven technologies that are lagging in adoption?									
1.1 What are the EDC Program's objectives and strategy? Have these evolved over time and if so, why?	X		X						
1.2 What are the processes the EDC Program uses to conduct planning, implementation management, and assessment processes, and have these evolved over time?	X					X			
1.3 As the program is planned and implemented, who does the EDC staff work with, for what end, and for whom? [who are stakeholders and what role(s) does each type play (we need to have clear tags for each role)]		X							
1.4 Collaborations specific to EDC initiatives: Who are collaborators and what role(s) does each type play? What inputs, activities, and resources do they provide?	X			X					
1.5 What are the challenges and opportunities for FHWA and states to deploy emerging new processes/business models during the timeframe of this evaluation?	X								
1.6 What are the general processes for implementing EDC Initiatives in the states?					X	X	X	X	
1.7 In general, who do the states involve in their decisions about implementation of EDC Initiatives (advisors, participants, other stakeholders?)	X					X			
1.8 In general, how does the context differ for states for innovations in highway systems, and how does this reflect challenges and opportunities for adoption of innovative technologies and practices? [population, population density, median income, topography, weather, etc.]					X	X	X	X	
1.9 For selected states, what does the specific context of the state and their strategies for the EDC Initiatives, suggest about the characteristics of the innovation culture in that state (drivers, how people see potential in attempting to implement, capacity for, and knowledge of observed impact)?	X				X	X	X	X	X

B-1

Evaluation Questions and Sub-questions	Data Sources								
	Document review	Program data	Portfolio data	Stakeholder lists	Lit review	Interviews	Focus groups	Surveys	Case studies
2. Outputs and Outcomes. What are potential and realized outcomes of FHWA EDC Program activities to support emerging innovations and state-led implementation of EDC initiatives?						X		X	X
2.1 Outputs and Shorter-term Outcomes. What are potential and realized outputs and outcomes of FHWA EDC Program strategies and activities to support emerging innovations and state-led implementation of EDC initiatives?		X				X		X	X
2.2 What are Intermediate Outcomes (potential and realized) of the FHWA EDC Program to support emerging innovations and state-led implementation of EDC initiatives?						X		X	X
2.3 What are the End Outcomes and Impacts (potential and realized) of the FHWA EDC Program?						X		X	X
3. Program Efficiency and Effectiveness: Are the EDC Program's strategies and implementation supporting the achievement of the program's mission and the FHWA's strategic objectives, including catalyzing efficiencies that support deployment of innovations in the highway ecosystem?	X		X		X	X		X	
4. Future Options: What factors influenced the effectiveness and outcomes of the EDC Program and what might be done differently in the future to improve the Program?						X	X	X	X

APPENDIX C

Description of Implementation Plans Reviewed

The EDC-3 e-Construction Implementation Plan, published in January 2015, was a joint effort by FHWA and AASHTO to facilitate the implementation of paperless systems for construction administration and delivery. The e-Construction concept focuses on a central document management system through which a state DOT can store all construction documentation; enable electronic submission, routing, and approval of documents; and ensure that the documents are stored in a secure environment that minimizes duplication while supporting access to data. The plan notes several technical and organizational challenges to adoption and presented a set of activities (including information exchanges, coordination between FHWA and AASHTO, and evaluation methods) to promote implementation across state DOTs.

The EDC-3 Smarter Work Zones Implementation Plan was published in February 2015 as a response to the large number of travel delays, injuries, and fatalities documented by the FHWA's Work Zone Management Program in previous years. Thus, the main objective of the initiative is to increase the safety and operational efficiency of work zones through project coordination and an increased use of technology. Specific methods include queue and spend management that will aid in maintaining traffic flow in work zones and decrease driver apprehension.

The EDC-3 Stakeholder Partnering Implementation Plan was published in March 2015 and focuses on providing a mechanism for departments to establish active partnerships among stakeholders so that they can work together to improve the Local Public Agency (LPA) programs. LPA Programs sometimes use federal funds to maintain roads and bridges in their areas. This increase in available capital permits projects to be carried out more feasibly but necessitates adherence to many federal regulations and collaboration with the FHWA. Thus, the main objective of this initiative is to strengthen this partnership and identify opportunities for streamlining the collaboration processes.

The EDC-4 Weather Savvy Roads Implementation Plan was published in September 2016 with the goal of eliminating obstacles to accessible and precise information regarding weather and its impact on roads. The first innovation focuses on collecting this information and the second focuses on distributing it. The central output of this plan will be a mechanism to provide predictive and real-time precise, coordinated, and road-specific weather information to traffic managers and the public so that individuals in both groups can make informed decisions.

The EDC-4 Data-Driven Safety Analysis Implementation Plan was published in February 2017. The plan described two general methods of advanced data analysis for improving road safety: predictive analysis (i.e., identifying roads providing the best opportunity for safety improvement and the likely effect of such improvements) and systemic analysis (i.e., identifying roadway features that are highly correlated with specific types of crashes). The plan outlines the tools available for these forms of analysis, processes to follow for their implementation and use, and the benefits to be expected after using these approaches.

C-1

The EDC-4 Collaborative Hydraulics Implementation Plan was published in March 2017. The main objective of the initiative is to advocate for and promote the increased use of new hydraulic modeling tools in the transportation industry. Despite the development of two-dimensional (2D) and three-dimensional (3D) modeling tools and the increased use of these tools in other industries, hydraulic designers in the industry commonly use one-dimensional tools. 2D and/or 3D modeling tools yield more detailed and accurate data, thus allowing for faster project delivery times.

The EDC-5 Advanced Geotechnical Methods in Exploration Implementation Plan, published in February 2019, introduces geotechnical tools that are underused in the transportation industry. Increased use of these tools will enhance the information available to engineers for characterizing the ground conditions for roads and thus enable more area-specific road construction.

The EDC-5 Value Capture Implementation Plan, published in February 2019, promotes value capture as a feasible method of acquiring funds for transportation departments. Value capture is a set of techniques that generally take advantage of the increase in property values, new transportation-related real estate opportunities, and/or the benefits of new transportation facilities to fund infrastructure improvements. Surface transportation investments often enhance the value of private land near the transportation infrastructure. Value capture encompasses policy measures (such as surtaxes or investment commitments) meant to ensure that the public can leverage some of those private gains.

The EDC-6 e-Ticketing and Digital As-Builts Implementation Plan, published in February 2021, integrates e-Ticketing—the digital exchange of product information across the construction process—with systems and procedures to store all historical and current records of infrastructure projects in a digital format. These Innovations increase construction efficiency, reduce loss or error from repeated data entry, and streamline data and document management. This plan provided a structured approach to scoping the implementation of these Innovations, foreseeing barriers and risks, developing work plans, and tracking progress toward full implementation.

The EDC-6 Targeted Overlay Pavement Systems Implementation Plan was published in February 2021. The goal of the project is to ensure safe, long-lasting, and reliable roadways through the use of overlay pavement procedures. This will result in safer work zones due to increased skid resistance, reduced hydroplaning and splay and spray, and extension of pavement life.

A P P E N D I X   D

Interview Guides

D.1 Interview Guide for FHWA Staff Engaged in the EDC Program

Introduction (~5 min)

Thank you for taking the time to meet with us today. My name is X and this is Y. We work at RTI International, which is a not-for-profit research institute based in Research Triangle, North Carolina. RTI and the Transportation Research Board at the National Academies have been commissioned by the FHWA Research and Technology (R&T) Program to conduct an external evaluation of the Every Day Counts Program. The information you provide today will help our project team to develop an understanding about

- The program's management processes
- The success of the program in terms of outputs, outcomes and impacts to the culture of highway transportation innovation
- Any lessons learned from the program

We would like to record and transcribe this discussion to capture your responses correctly and completely. We will not make the transcripts available to anyone outside of the project team, and the transcripts will be destroyed at the end of the project. We will summarize what we learn from these interviews in a report to FHWA and TRB. We will not attribute quotes to you directly in the report. Do we have your permission to record our interview? _____Yes ____No

There are no right or wrong answers; we are interested in your perspectives, opinions, and experiences. Your participation is completely voluntary; you may end the interview at any time; and if we ask a question that you'd prefer not to answer, just tell us, and we'll skip over it. Do you have any questions for us before we begin?

Background (~15 min)

1. What positions have you held in the highway transportation area (FHWA, state level)?
2. When were you first aware of the EDC Program?
3. Have you worked directly[1] on a state-led initiative during one of the EDC rounds?
4. [If yes] Over what time period (or for which rounds)?
5. Which initiative or initiatives were you involved in?
6. Could you tell us more broadly about your involvement in EDC Program activities? [Examples follow]
   – Provided suggestions for EDC initiatives
   – Consulted by EDC Program about selection of initiatives

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[1]"Worked directly" means that you helped with selection, planning, reporting, or implementation of a specific state-led EDC initiative featured in an EDC Round.

- Developed content for EDC initiatives, including implementation plans
- Participated in EDC Summit
- AND/OR Assisted or facilitated state DOT efforts to implement EDC initiatives.

Strategy and Processes (~20 min)

7. First help us understand what your state does. We'd like to hear more about at least one of the state-level EDC initiatives you were directly involved in.
    7a. Could you give us more details about the initiative—what criteria and process is used to select EDC Initiatives to pursue, who was involved in the selection, and what were the expected benefits of implementation?
    7b. What did the state do to implement the initiative?
    7c. Who were the key participants in the implementation, and what did they do?
    7d. What challenges or barriers complicated or prevented implementation of the initiative? [Address the following]
        - Issues with the implementing organization (internal resistance, management)
        - Issues with the nature of the innovation (complexity, cost)]
        - Systemic or cultural issues (lack of cooperation or communication among partners)
        - Lack of resources and skills
    7e. If one example is given, ask how similar was this initiative to the other implemented in your state? Briefly explain any differences.
8. In your experience, does the EDC Program overall generate value or provide benefits to state participants in EDC initiatives and related activities? If yes, what EDC activities seem most valuable? [Examples follow]
    - STIC Council support
    - Raising awareness of innovations to implement
    - Providing guidance, data, and knowledge to adopt innovations
    - Facilitating communications and collaborations across sectors of the transportation community
9. Did EDC Program efforts reduce challenges or barriers (risks) to your state's implementation of EDC and related initiatives? If so, please explain.

Outcomes and Impacts (~5–10 min)

10. What were the end results of the EDC Initiatives your state implemented?
11. What specific benefits were generated by implementation of the EDC initiative(s) you have experience with (such as increased safety, lower construction costs). Were any such benefits documented and if so, where might we find that documentation?
12. Has your state continued to advocate for and implement any of these EDC Initiatives, and/or established policy at the state level to incentivize or require the utilization of these Initiatives? If so, please provide detail or a source we can find.
13. In your experience and interactions with state DOT staff involved with activities around emerging highway technologies, is there less, about the same, or more of the following characteristics now than there was 10 years ago? Could you elaborate? [Examples]
    - Individuals are motivated through incentives and rewards for innovative practices?
    - Staff are being empowered, or given proper authority, to propose and/or lead the adoption of innovations?
    - The state DOT staff and others involved have the knowledge, skills, and experience to plan and implement EDC and other innovative activities?
    - Innovation is celebrated and recognized as valuable by state DOT staff and others involved with state efforts to innovate within the highway system?
    - The amount of specific and flexible financial resources available for EDC and similar innovative efforts?

Lessons Learned (5 min)

14. Overall, how would you describe what seems to be working well about the EDC Program? What needs improvement?

Wrap-up (~10 min)

15. Can you recommend anyone you know familiar with state efforts related to EDC who might be able to address these questions?

16. Are there any other thoughts you have about the EDC Program that you would like to share?

D.2 Interview Guide for State DOT Staff Engaged in the EDC Program

Section 1. Introduction/Purpose of Interview [5 min]

Thank you for taking the time to meet with us today. My name is X and this is Y. We work at RTI International, which is a not-for-profit research institute based in Research Triangle, North Carolina. RTI and the Transportation Research Board at the National Academies have been commissioned by the FHWA Research and Technology (R&T) Program to conduct an external evaluation of the Every Day Counts Program. The information you provide today will help our project team to develop an understanding about:

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There are no right or wrong answers; we are interested in your perspectives, opinions, and experiences. Your participation is completely voluntary; you may end the interview at any time; and if we ask a question that you'd prefer not to answer, just tell us, and we'll skip over it. Do you have any questions for us before we begin?

Section 2. Interview Questions [45 mins]

<div align="center">****Pause in between questions and ask for clarity****</div>

Background Questions [5 mins]

We'd like to know more about your connection to the EDC Program and any involvement you've had with its state-led implementation of EDC initiatives and activities. "Initiatives" refers to the innovations and other technologies promoted by the EDC Program for implementation.

What positions have you held in the highway transportation area (FHWA, state level)?
When were you first aware of the EDC Program?
Have you worked directly on a state-led initiative during one of the EDC rounds?
- [Clarification] "Worked directly" means that you helped with selection, planning, reporting, or implementation of a specific state-led EDC initiative featured in an EDC Round
- [If yes] Over what time period (or for which rounds)?
- Which initiative or initiatives were you involved in?

IF INTERVIEWEE HAS BEEN WORKING WITH State-led EDC PROGRAM INITIATIVES FOR 3 OR MORE ROUNDS AND HAD DIRECT INVOLVEMENT IN MORE THAN ONE EDC INITIATIVE, GO TO **Section 3b. Questions for Person with More State** DOT/other State level EDC-related effort (e.g., STIC Co-Chair). OTHERWISE, PROCEED WITH THIS GUIDE.

Section 3a. Questions for Person with Less Experience

(involved with EDC program for less than 3 rounds OR involved in only 1 initiative – Field Level)

First, we'd like to hear details about your experiences interacting with the EDC Program and your experiences with the State DOT's strategy and processes for selection and implementation of EDC Initiatives.

4. Could you tell us more broadly about your involvement in EDC Program activities? [Examples follow]
   – Provided suggestions for EDC initiatives
   – Consulted by EDC Program about selection of initiatives
   – Developed content for EDC initiatives, including implementation plans
   – Participated in EDC Summit
   – AND/OR Assisted or facilitated state DOT efforts to implement EDC initiatives

Assess Strategy and Processes [20 mins]

We have a few questions regarding your perspective on the strategies and processes of the FHWA EDC program. We hope to assess the role of the EDC Program in facilitating or enabling the state-led deployment of proven but underutilized technologies.

5. First help us understand what your state does. we'd like to hear more about at least one of the state-level EDC initiatives you were directly involved in.
   5a. Could you give us more details about the initiative—what criteria and process is used to select EDC Initiatives to pursue, who was involved in the selection, and what were the expected benefits of implementation?
   5b. What did the state do to implement the initiative?
   5c. Who were the key participants in the implementation, and what did they do?
   5d. What challenges or barriers complicated or prevented implementation of the initiative? [Address the following]
      – Issues with the implementing organization (internal resistance, management)
      – Issues with the nature of the innovation (complexity, cost)]
      – Systemic or cultural issues (lack of cooperation or communication among partners)
      – Lack of resources and skills
5. If one example is given, ask how similar was this initiative to the other implemented in your state? Briefly explain any differences.
6. We want to know how the EDC Program affects your state's implementation of EDC and related innovative initiatives
   6.1. In your experience, does the EDC Program overall generate value or provide benefits to state participants in EDC initiatives and related activities? If yes, what EDC activities seem most valuable? [Examples follow]
      – STIC Council support
      – Raising awareness of innovations to implement
      – Providing guidance, data, and knowledge to adopt innovations
      – Facilitating communications and collaborations across sectors of the transportation community
   6.2. Did EDC Program efforts reduce challenges or barriers (risks) to your state's implementation of EDC and related initiatives? If so, please explain.

Outcomes and Impact [5 mins]

Now we will shift gears about and talk about outcomes and impact. We have a couple of questions looking at such broader impacts of the program.

7. What were the end results of the EDC Initiatives your state implemented?
    7.1. What specific benefits were generated by implementation of the EDC initiative(s) you have experience with (such as increased safety, lower construction costs)? Were any such benefits documented and if so, where might we find that documentation?
    7.2. Has your state continued to advocate for and implement any of these EDC initiatives, and/or established policy at the state level to incentivize or require the utilization of these initiatives? If so, please provide detail or a source we can find.
8. In your experience and interactions with state DOT staff involved with activities around emerging highway technologies, is there less, about the same, or more of the following characteristics now than there was 10 years ago? Could you elaborate? [Examples]
    8.1. Individuals are motivated through incentives and rewards for innovative practices?
    8.2. Staff are being empowered, or given proper authority, to propose and/or lead the adoption of innovations?
    8.3. The state DOT staff and others involved have the knowledge, skills, and experience to plan and implement EDC and other innovative activities?
    8.4. Innovation is celebrated and recognized as valuable by state DOT staff and others involved with state efforts to innovate within the highway system?
    8.5. The amount of specific and flexible financial resources available for EDC and similar innovative efforts?

Lessons Learned [5 mins]

9. Overall, how would you describe what seems to be working well about the EDC Program? What needs improvement?

Wrap Up

10. Can you recommend anyone you know familiar with state efforts related to EDC who might be able to address these questions?
11. Are there any other thoughts you have about the EDC Program that you would like to share?

Section 3b. Questions for Person with More State DOT/other State-level EDC-related effort (e.g., STIC Co-Chair)

(involved with EDC program for 3 or more rounds OR involved in 3 or more initiatives)

First, we'd like to hear details about your experiences interacting with the EDC Program and overall impressions of the program- and State-level strategy and implementation.

4. Could you tell us more broadly about your involvement in EDC Program activities? [Examples follow]
    – Provided suggestions for EDC initiatives
    – Consulted by EDC Program about selection of initiatives
    – Developed content for EDC initiatives, including implementation plans
    – Participated in EDC Summit
    – AND/OR Assisted or facilitated state DOT efforts to implement EDC initiatives
5. What are your impressions of your state's strategies, selecting, planning, implementation, and assessment of EDC Initiatives? What aspects are done well, and where could there be improvements at the state level?

6. In your experience, does the EDC Program strategy correctly target the challenges and barriers at the state and local levels to broader implementation of emerging innovations in the highway system? If yes, what activities seem most valuable? Please mention specific instances or examples of benefits you have observed, if any. [Examples follow]
   – STIC Council support
   – Raising awareness of innovations to implement
   – Providing guidance, data, and knowledge to adopt innovations
   – Facilitating communications and collaborations across sectors of the transportation community
   – Reducing risks

Outcomes and Impact [5 mins]

Now we will shift gears and talk about outcomes and impact. One area we have been asked to research is how the EDC Program helps states to be positioned better to adopt innovations that will facilitate or accelerate the use of existing but underutilized innovations, such as processes for road construction, or to bring about increased highway safety. We have a couple of questions looking at such broader impacts of the program.

7. We would like to know the end result of the EDC Initiatives your state implemented.
   7.1. What specific benefits were generated by implementation of the EDC initiative(s) you have experience with (such as increased safety, lower construction costs)? Were any such benefits documented and, if so, where might we find that documentation?
   7.2. Has your state continued to advocate for and implement any of these EDC initiatives, and/or established policy at the state level to incentivize or require the utilization of these initiatives? If so, please provide detail or a source we can find.
8. In your interactions with state DOT organizations and other organizations involved with activities around emerging highway technologies, is there less, about the same, or more of the following than there was 10 years ago? Could you elaborate? [Examples]
   8.1. The requirements and incentives that push or pull states to pursue more innovative business models and emerging technologies related to the highway systems?
   8.2. The tolerance overall for risk taking in state-led efforts?
   8.3. The extent to which information, data and knowledge are shared within and across organizations to improve innovation efforts?
   8.4. The extent to which the impact and value of innovations such as EDC supports are understood and measured in the highway system?
   8.5. The amount of specific and flexible financial resources available for EDC and similar innovative efforts?

Lessons Learned [5 mins]

9. Overall, how would you describe what seems to be working well about the EDC Program? What needs improvement or change because of new developments?

Wrap Up

10. Can you recommend anyone else you know outside of FHWA who might be able to address these questions?
11. Are there any other thoughts you have about the EDC Program that you would like to share?

Abbreviations and acronyms used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAST	Fixing America's Surface Transportation Act (2015)
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GHSA	Governors Highway Safety Association
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S. DOT	United States Department of Transportation