



## WHITE PAPER

# Building Innovation Capacity

## Toll Industry Practice and Trends

January 14, 2021

### Abstract

The toll industry operates in a dynamic environment where emerging technology is accelerating the pace of change. It is facing a grand opportunity to play a key role in shaping, directing and delivering the future mobility ecosystem; being open to change and moving decisively is key. This industry scan shows that organizations are increasingly adopting innovation as a strategy for embracing change and are creating a culture that speeds the rate at which relevant ideas, technologies, and opportunities are shared, accepted and put into practice. The paper introduces seven broad observations on the state of practice, along with highlights and case studies of practice. Together, these findings demonstrate the progress that individual organizations are making in building innovation capacity and how they are doing it.

**Subcommittee Chair:** *Jeff Dailey*

**Authors:** *Mia Zmud, Steve Pustelnyk, Tyler Milligan, Heidi Corcoran, and Carolyn LaFollette*

**Subcommittee Members:** *Trey Baker (WSP), Craig Bettmann (Cogensia), James Bird (Red Fox), Steven Bird (Red Fox), Mary Biswell (OTA), Kelly Brown (Colorado HPTE), Charles Buchanan (PTC), George Christopher (Douglas Stuart), Eric Coraggio (Transurban), Heidi Corcoran (Milligan), Jeff Dailey (CTRMA), Michael Davis (RS&H), Vickie Dewey (AECOM), Federico Di Genarro (AISCAT), Bob Frey (THEA), Al Gerayeli (AECOM), Thomas Greiner (ASFINAG), Brennan Hamilton (Ford), David Hannon (I77 Partners), Kathryn Hartzell (PTC), Brad Heigel (PTC), Rick Herrington (HNTB), Sean Hill (DRJTBC), Adam Horn (HNTB), Gregory Jones (MTA), Pat Jones (IBTTA), Brian Kelley (OTC), Allison Kelly (The Ray), Geoff Korfin (Innovative Prod), Dave Kristick (Atkins), Juan Kuthy-Saenger (Atkins), Marty Lege' (Atkins), Marwan Madi (CDM), Tyler Milligan (Milligan), Elizabeth Mow (NTTA), Waseem Naqvi (Raytheon), Cindy Norcross (IBTTA), Steve Novosad (HNTB), Claudio Occhipinti (Fagan), John O'Neill (MTA), Eric Peterson (Eric Peterson), Lev Pinelis (Transurban), Kenneth Plunk (aetolls), Carl Pro (RJ Lee), Steve Pustelnyk (CTRMA), David Raines (RKK), Laura Rogers (The Ray), Paul Satchfield (FTE), Chelsea Scheid (RS&H), Michael Sexton (CTRMA), Alex Shirshov (Transurban), Jeff Siegel (HNTB), Chris Swenson (WSP), Robert Taylor (PTC), Stephen Taylor (i77 Partners), Mario Toscano (Drive Engineering), Frank Velez (NTTA), Justin Word (CTRMA), Mia Zmud (CTRMA)*

## Table of Contents

---

<b>Introduction</b> .....	<b>1</b>
<b>State of Practice</b> .....	<b>2</b>
There’s not a “one size fits all” approach to innovation.....	4
Emerging technology is driving organizations to reconsider their approach to innovation. It is becoming increasingly “need-driven.” .....	5
Organizations with successful programs have executive leadership support and a formal commitment from leaders at all levels to make innovation a priority.....	6
Making innovation viable and sustainable requires embedding it into the organizational culture, within a structured environment and with performance measures.....	7
Data is a critical element of innovation programs; organizations are increasingly recognizing the importance of data centralization (and data sharing) and the need for specialized staff. ....	9
Innovative organizations recognize the need for physical infrastructure and/or cooperative partnerships to deploy productive pilot demonstrations.....	11
Technology-driven innovation calls for flexible procurement processes.....	12
<b>Profiles of Innovation</b> .....	<b>14</b>
<b>Moving Forward – Looking Ahead</b> .....	<b>16</b>
COVID-19 Resiliency .....	17
Idea Intake Processes.....	17
Tools and Resources to Support Innovation and Technology Planning .....	20
<b>Recommendations and Next Steps</b> .....	<b>21</b>
Recommendations .....	22
<b>APPENDIX A: Quick Reference Brief   Strategy for Innovation and Technology</b> .....	<b>A-1</b>
<b>APPENDIX B: Innovation Capacity Survey Findings</b> .....	<b>B-1</b>
<b>APPENDIX C: Detailed Case Studies</b> .....	<b>C-1</b>

## Introduction

The Innovation Working Group is a subcommittee of the International Bridge Turnpike and Tunnel Association (IBTTA) Emerging Technology Committee. Its charge is to identify strategies and provide guidance for organizations to build innovation capacity and to identify emerging technologies for the purpose of additional study. This white paper provides information on innovation practices and trends within the toll industry and recommends areas for additional work.

In 2019, this working group published a whitepaper titled *Strategies for Innovation and Technology*, which offered guidance for organizations to increase their ability to innovate and provided a Technology and Innovation Matrix to identify and track emerging technologies. That guidance is predicated on the notion that achievement involves two interconnected and mutually reinforcing dimensions: building innovation capacity and engaging in regional collaboration. In the paper, a set of nine strategies was shared (see Table 1 and Appendix A).

*Table 1: Approaches for Cultivating Innovation by IBTTA Organizations*

Building Innovation Capacity	Advancing Regional Collaboration
<ol style="list-style-type: none"> <li>1. Leadership commitment</li> <li>2. Chief Innovation Officer or team</li> <li>3. Staffing and resource plan</li> <li>4. Agile management processes</li> <li>5. Future-focused technology plan</li> <li>6. Flexible procurement and contracting</li> <li>7. Data platform/sharing hubs</li> </ol>	<ol style="list-style-type: none"> <li>1. Committing to advancing regional collaboration and interoperability</li> <li>2. Regional or State transportation innovation councils/task forces</li> <li>3. Transportation Systems Management and Operations (TSMO)</li> </ol>

In this work, we assess the current state of practice within our industry for carrying out these strategies. Our industry scan included a survey and structured interviews with IBTTA member organizations. The results of the survey are compiled in Appendix B, and the structured interviews led to the development of 11 case studies captured in Appendix C.

As indicated in the survey results, IBTTA member organizations are in different places when it comes to embracing and cultivating innovation or adopting emerging technologies. This is largely because innovation can have different meanings to different organizations depending upon their business needs and strategic goals. According to Merriam-Webster, innovation means “the introduction of something new; a new idea, method, or device.” Within our industry, it means updating operational and business processes for efficiency gains. It also means enabling research and development to keep tolling relevant as transformational technology and mobility trends evolve. Regardless of each organization’s progress in building innovation capacity, this white paper can serve as a reference point or baseline of practice for organizations with an interest in innovation.

The industry scan results are documented in the next three sections of this white paper. The first section provides an overview of the state of the practice through seven broad observations, each of which is also accompanied by illustrative highlights of practice. The second section presents 11 case studies that showcase organizational approaches to cultivating innovation and/or technology initiatives. The third section introduces practices and tools that stood out as “game-changers” for advancing innovation programs and technology adoption. The final section includes conclusions and recommendations for building innovation capacity.

## State of Practice

---

The transportation industry is complex and operates in a dynamic environment where the pace of change and opportunities for transformation is on the rise. Building capacity for innovation positions organizations to adapt in this changing environment; the costs of not doing so may be great.

Our changing transportation landscape, driven largely by emerging technology and a rapidly evolving mobility ecosystem, has the potential to present competitive threats to the tolling industry. These threats go beyond falling revenue, as cited in the report, *Guide to Creating and Sustaining a Culture of Innovation*.<sup>1</sup>

Today, the toll industry plays an essential role in helping to fund, deliver, and manage key mobility infrastructure. In this evolving environment, doing business as usual won't work moving forward, particularly as agencies look to updating or replacing legacy technology and services. For example, the need for emergency roadside phones fell by the wayside with the emergence of and widespread adoption of mobile phones. While dynamic messaging signage (DMS) is a prominent safety- and communication-technology in widespread use today, with the advent of connected and automated vehicles and C2VX (cellular vehicle-to-everything) enabling real-time communications with drivers, some organizations are rethinking future investments in DMS.

The toll industry also needs to reconsider its role in the future mobility ecosystem by delivering services and products differently; otherwise, they may see their role reconfigured, diminished, or perhaps become altogether irrelevant. Today's roadways mostly enable people to go from point A directly to point B typically using one mode of travel. In the future, roadways will likely evolve into integrated mobility systems that support multi-modal trips from Point A to Point B and then to Point C with the ability to pay for the entire trip in one single transaction (tolls, mode, parking and other fees). The industry needs to be careful, selective, and strategic in decisions about investing in technology without a clear lifecycle and it also needs a seat at the table with regards to defining, preparing for, and delivering the mobility system of tomorrow.

---

<sup>1</sup> National Academies of Sciences, Engineering, and Medicine. 2019. *Guide to Creating and Sustaining a Culture of Innovation for Departments of Transportation*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25307>.

**The toll industry is facing a grand opportunity to play a key role in shaping, directing and delivering the future mobility ecosystem; being open to change and moving decisively is key.** IBTTA member organizations are already moving in this direction. Historically, toll agencies rely heavily on technology for most if not all of its operations—from back office, payments and collections, to traffic management, to customer service. Moving forward goes beyond an embracement of technology. This scan shows that organizations are increasingly adopting innovation as a strategy for embracing change and are creating a culture that speeds the rate at which relevant ideas, technologies, and opportunities are shared, accepted and put into practice. Building a culture of innovation can be challenging particularly in the public sector where a “we’ve always done it this way” mentality exists, and resources are limited and already stretched. Many organizations are overcoming this challenge and are making great strides in building their capacity for innovation.

This section presents seven broad observations that were drawn from this industry scan:

- 1 There’s not a “one size fits all” approach to innovation.
- 2 Emerging technology is driving organizations to reconsider their approach to innovation. It is becoming increasingly “need-driven.”
- 3 Organizations with successful programs have executive leadership support and a formal commitment from leaders at all levels to make innovation a priority.
- 4 Making innovation viable and sustainable requires embedding it into the organizational culture and within a structured environment.
- 5 Data is a critical component of innovation programs; organizations are increasingly recognizing the importance of data centralization (and data sharing) and the need for specialized staff to support them.
- 6 Innovative organizations recognize the need for physical infrastructure and/or cooperative partnerships to deploy productive demonstrations.
- 7 Technology-driven innovation calls for flexible procurement processes.

Each of these findings is briefly discussed below. For each, examples from peer organizations are provided.

## 1 There's not a "one size fits all" approach to innovation.

Organizations make the decision to innovate for purposes that are based on specific needs and strategic priorities. In addition to the organization need, innovation programs may also be driven by consumer demand, operational needs or trends, and newly emerging technologies, policies and practices. Grounded in an understanding of need, innovation programs can vary widely across organizations, and over time, programs may adapt and evolve as needs shift. The best approach to encourage innovation will look significantly different from one organization to another depending on organizational structure, leadership vision and culture, history of innovation, priorities, financial position, and other factors.

Building an innovation program should be considered as an iterative or evolving process. Waiting to "get it right" misses the point of innovation. Merely following another organization's approach and failing to be open to different methods could result in limited outcomes or narrowed innovations.

Many of the organizations included in this industry scan have modified the structures of their innovation teams over time based on their shifting priorities and organizational climate, but also as their capacities and talent base grows. A key to successful innovation is being flexible and allowing programs to evolve over time. In a performance-driven environment where meeting goals and demonstrating tangible gains is paramount, this is a challenge many organizations face early in their innovation journeys.

It takes a risk tolerant environment, an experimental culture and dedicated resources and staff with a personal commitment to grow innovation right. Each organization will define its own unique program, develop tailored innovation practices, and try out a blend of different approaches to address their own circumstances.

### Highlights:

- **The North Texas Tollway Authority (NTTA)** previously had a consolidated formal innovation program, but they found that this approach actually stifled innovation due to increased bureaucracy. In response, NTTA decentralized the program by embedding innovation initiatives into each individual department. This new approach decreases bureaucracy and allows each department to tailor innovation processes to their specific needs.
- Conversely, the **Maryland Transportation Authority (MDTA)** is in the process of centralizing their innovation program; what used to be known as the NG (or Next Generation) team is now the 3G (referring to the Third Generation toll system) team, and MDTA plans to transition this team into a new Office of Innovation that will collaborate across departments to roll out new technology solutions.

## 2 Emerging technology is driving organizations to reconsider their approach to innovation. It is becoming increasingly “need-driven.”

Having been relatively stable for years, the tolling industry is poised for change with emerging technology as a driving force. Surviving in a rapidly changing environment demands new responses and ways of thinking. Organizations are embracing innovation as one response to this pressure; they are using innovation to reframe their approach to the industry, and their roles within the industry. Along the way, they are discovering new ways to improve business processes, operations, and customer service. At the same time, innovation practitioners are adopting a new mindset when it comes to technology. Rather than view emerging technology as a “shiny new object” that might be fun to try out, they are first defining the problem or customer need and then seeking out the technology to best addresses or solve the problem. Another mindset change that comes with technology adoption is associated with the “fail fast” approach to innovation. According to a 2018 Forbes Article<sup>2</sup>, repeating the fast failure approach helps organizations achieve a desired outcome faster than trying to perfect a product or service (and save money spent on customization or making adjustments in operations or internal processes to accommodate the product or service). Rather, get a product or service out there, fail fast and learn from your mistakes, and quickly pivoting and getting a slightly different product or service to better suit the need. Finally, aligning innovation-related decision making with strategic priorities is becoming an essential practice. Resulting initiatives, including those involving emerging technology, are matched with a clear opportunity to address a business, operational, or customer need.

### Highlights:

- Both the **Ohio Turnpike and Infrastructure Commission (Ohio Turnpike)** and the **Pennsylvania Turnpike Commission (PTC)** have instituted innovation teams that encompass both business process improvements and technology as core focus areas. PTC’s council is established through formal policy to ensure its longevity within the organization.
- **ASFINAG** has elevated Innovation as a core business strategy with six fields of action that include building a culture of innovation, adopting technology solutions, and creating processes to ensure innovation is built into day-to-day business processes.
- At **NTTA**, innovation projects are selected with the organization’s core mission in mind and are prioritized through negotiation across departmental leaders rather than a formal prioritization framework. As an example, information technology (IT) is one area where there are often competing needs across departments. To address issues across multiple departments, NTTA has set up an IT counsel to serve as a venue for prioritizing IT needs

<sup>2</sup> See <https://www.forbes.com/sites/sunniegiles/2018/04/30/how-to-fail-faster-and-why-you-should/?sh=b7b4e4cc1779>

across the organization. As with other initiatives, elements that prioritize the agency's core mission and goals are prioritized. All other IT needs are negotiated and distributed in turn to avoid some departments being favored over others.

- Some organizations, such as the **Tampa-Hillsborough Expressway Authority (THEA)**, have approached innovation with a more technology-centric focus. They are exploring new connected corridor and connected vehicle technology solutions which align with strategic goals and objectives. Advising not to get too sold on one technology, THEA matches the technology to the need. They are on the third technology attempt related to pedestrian detection / crosswalk analytics.
- The **E-470 Public Highway Authority (E-470)** approached innovation from a business process perspective (e.g., they hired staff to manage and set up a process for innovation) and is using their established innovation process to garner new ideas and technology solutions.

### **3** Organizations with successful programs have executive leadership support and a formal commitment from leaders at all levels to make innovation a priority.

One benefit of this industry scan was the opportunity to learn about what other organizations believe to be sound foundational strategies for innovation. Our surveys and interviews demonstrated that the best starting point is to identify an “innovation owner” who has the highest level of interest (and ideally, funding authority) to launch an innovation system or program that strategically aligns with business goals. Ideally, that person has the complete support of or is a member of the executive leadership team and can propel innovation forward so that it becomes an integral part of the organization's culture, standard process, and/or everyday work. For innovation to take root within an organization, leaders at all levels must make a visible commitment to make innovation a priority. They also connect progress towards strategic goals with the ability to innovate.

The industry scan showed that innovation champions in the toll industry are typically an Executive Director or a senior officer (e.g., Deputy Executive Director, Chief Innovation Officer, Chief Information Officer or Chief Technology Officer) but they can also be individuals that work anywhere in the organization including in director or senior management positions, line management roles, and other staff. The key is that they can shape or influence the core operations of an organization with a focus on supporting innovation. Within the tolling industry, commitment to innovation is often initiated and bolstered through the strategic planning process which is built around a mission, vision and core values which emphasize the importance of innovation.

## Highlights:

- In 2016, **E-470's** Executive Director in partnership with the agency's Board of Directors incorporated a Strategic Plan, mission and core values that support technology and innovation objectives. Subsequent to the strategic plan, a structure was put into place through the E-470 workplan which aligns projects with strategic goals and priorities. In 2019, the process was further strengthened by the establishment of an Enterprise Project Management Office (ePMO) to create structure around project intake process. The ePMO is supported by a dedicated innovation team.
- While the **PTC** does not have a formal program, innovation is one of the core tenets that underpin their strategic plan and values. The CEO is a major champion of innovation and his leadership ensures that a culture of innovation extends across the organization through inclusive initiatives such as their Innovation Council.
- The **State Road and Tollway Authority's (SRTA)** Executive Director is a strong champion for innovation and is instrumental in ensuring it is part of the agency culture. As one of the agency's five core values and with a dedicated position (director of innovation and strategy) to make sure that innovation discussions happen across all departments and opportunities are aligned with strategic priorities, innovation has become embedded into the culture of the agency.

## 4 Making innovation viable and sustainable requires embedding it into the organizational culture, within a structured environment and with performance measures.

Tolling organizations embrace innovation as way to make meaningful changes in business practices and advance emerging technologies and mobility trends. However, even with a strong commitment to innovation, it is often conducted “ad hoc” and without focus on building a culture or formal process(es) to support innovation. Without a culture to support innovation, employees can easily confuse innovation with concepts like creativity or change. The concept of change often evokes a wide range of feelings and interpretations ranging from creating an unacceptable exposure to risk or on a more personal level, threatening an employee's (or department's) function or workload. This can lead to the pursuit of “opportunistic initiatives” or those that arise through immediate circumstances or on the spur of the moment without reference to a strategic plan or vision. For example, workplace restrictions due to the COVID-19 pandemic may have spurred the adoption of new or expansion of workplace collaboration tools, policies and practices (e.g., Zoom and Microsoft Teams platforms, policies to support electronic document approvals and signatures, and telecommuting policy). Opportunistic initiatives aren't inherently wrong or a bad practice; however, innovation programs that rely heavily on them compromise the long-term sustainability and limit the benefit derived through innovation, thus undermining the intent behind

embracing it in the first place. Addressing this requires building a culture that supports innovation and includes the structure and resources to support it.

Innovation also thrives in a formal, well-structured and supportive environment. Such operating models often consist of a small central team who manage processes, act as an “innovation hub,” and help innovation advocates from different departments launch initiatives. Dedicated management, technical, and data analytics innovation staff with trusted access to systems and data will facilitate momentum for innovation. Typically, innovation can be frustrated or throttled due to dependence upon staff or systems that are focused on day to day operations. As such, the pace and benefits of innovation will likely be slowed or not fully realized.

Another important component of a formal structure is measuring innovation performance. Doing so enables organizations to show that the time, all the activity, and all the capabilities being spent to push innovation is worth the time, effort and money spent. Doing so helps to justify and secure funding for continued program support or for testing and/or deploying an innovation or technology. For an organization producing products or services, measures might be gross margin, number of new patents, or sales from new products or services. For public sector organizations, examples of measures could be “friction” (how easy is it to move an idea from initial intake to final testing or deploying the idea) and “velocity” (the number of innovations that can be accomplished in a period of time). This scan indicates this is an area in which tolling industry organizations could use additional guidance on or sharing of best practice.

An emerging trend is the use of an ePMO to support innovation and technology programs. The concept is not dissimilar from program management for infrastructure programs or megaprojects. Infrastructure projects typically employ a management and technical team solely focused on the delivery of infrastructure improvements from concept through opening. Particularly among larger organizations interested in supporting innovation within departments and business units, we see the ePMO model enhanced by the adoption of larger cross-departmental innovation teams. These cross-cutting innovation teams enable “quick win” business or operations improvements and meet on a monthly or quarterly basis to share and celebrate successes.

**Highlights:**

- **E-470** has implemented an ePMO for innovation. The **Illinois tollway** is in the process of developing an ePMO to support back-end, business systems innovation.
- The **PTC** considers innovation a part of every individual's role, and a fundamental part of the agency's culture. The agency's cross-departmental Innovation Council was created through formal policy and now follows a regular cadence and is refreshed with a new internal chairperson every 2 years. It is the key mechanism for external vendors and business partners to present new technologies and products.

- Instilling innovation into the culture of an organization begins with who they hire and how they build staff at **SRTA**. With innovation as a core value, they hire and staff with that in mind. Thinking outside of the box, questioning how things get done, and finding better ways to do things are encouraged at the onset of an employee's tenure with the agency.

**5** Data is a critical element of innovation programs; organizations are increasingly recognizing the importance of data centralization (and data sharing) and the need for specialized staff.

The need for flexibility and ownership of data is becoming increasingly apparent in our industry. Strategic decisions regarding operational improvements and technology investments often depend on data analytics. The inability to easily access and analyze data can hinder the decision-making process. For example, while our electronic tolling systems generate a wealth of data, the data is frequently residing with an outside contractor, fragmented among multiple internal departments or lack an accessible user-friendly interface for running queries and conducting analytics. Often, data that is later required to meet a business need is not anticipated at the time of procurement, so contracts are not written to give the agency access to data in a convenient way. Throughout this assessment, the following observations were frequently overheard:

*“There’s a lot of data being collected, and it is not always readily available for analysis or use.” And “Data is often in the hand of the integrator—it often takes too long to access, contracts do not specify the task of manipulating and pushing data forward.”*

Financial systems also have data challenges—not all are tracked using a modern approach and business is focused on operations (e.g., tag fulfillment and revenue generation) and less so on reporting or business analytics solutions. Finally, having access to data is not of much value without the staffing, resources or an organized plan to use the data. A challenge to organizations is to demonstrate the rate of return for a data platform investment—how much they are willing to expend for the ROI return (e.g., quicker analytics).

Consolidating data into a central, accessible database has been given a high priority among many innovation programs. Tolling organizations are starting to implement internal data platforms designed to consolidate disparate data and provide convenient agency-wide access for analysis and potential dissemination to the public. Technology solutions frequently come with new data needs; they require specific data inputs, and they also generate new datasets of their own. Organizations that get ahead of these developments by hiring specialized staff and establishing adaptable data platforms make it easier to test and implement emerging technologies. But, doing it right requires awareness of needs.

In determining needs, organizations need to recognize the importance of both business and functional expertise. For example, as shared by Deloitte:<sup>3</sup>

*“A properly staffed data initiative may include design-thinking skills to help conceptualize a solution, functional domain knowledge to help identify high-value use cases and shape the solution, business skills to articulate a compelling business case, data engineering skills to provide access to the right data in the form needed, and, for Artificial Intelligence (AI) projects, AI skills to drive execution of a variety of AI technologies. Success depends on more than technology talent—it requires the right mix of skills and expertise.”*

Tolling organizations shared insights on their interests and resources related to data in the industry scan survey. When asked about the types of data science disciplines their organizations are investing, the vast majority of respondents (90%) indicated “data analysis.” But they also recognize the need for more advanced disciplines requiring predictive modeling, statistical analysis, and AI (69%, 59%, and 31%, respectively). And, given the importance survey respondents placed on data analysis as a priority discipline, it’s not surprising that nearly all organizations (96%) say they have hired one or more data analyst. See **Figure 1** below.

Figure 1: Data-related Disciplines

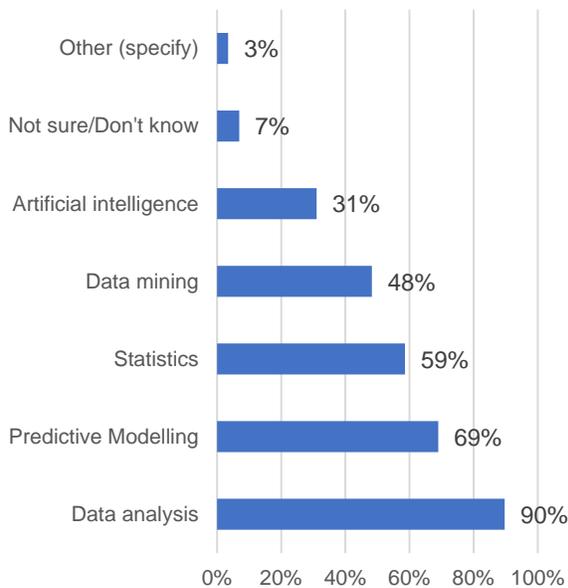
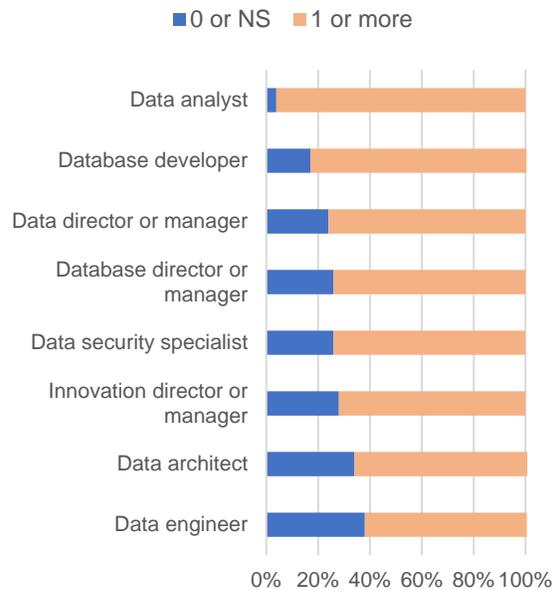


Figure 2: Data-related Positions



The industry scan demonstrates that organizations do recognize the value of data and are giving it significant thought. This working group collaborated closely with the Big Data working group.

<sup>3</sup> <https://www2.deloitte.com/us/en/insights/focus/signals-for-strategists/democratization-of-data-science-talent-gap.html>

For more in-depth guidance on getting started or evolving a data strategy refer to their 2019 and 2020 White Papers.

**Highlights:**

- The **Central Texas Regional Mobility Authority's (CTRMA)** toll and ITS project host server is currently operated by the agency's toll system integrator with data analytic functions primarily handled by outside consultants. For data analytics, Tableau is used to create performance and operations dashboards. CTRMA's ability to analyze data and advance data-driven projects is constrained by dependence upon the toll system integrator's data platform that requires specialized management skills. CTRMA is actively pursuing development of an internal consolidated data solution that pulls in information such as transaction and customer data as well as roadway operation and performance information. This new platform will allow the Authority to manage and process data more efficiently and evaluate the information in a more intelligent manner. Consultant resources will be used for more complex data analytic efforts at least until after the new system is operational.
- At **SRTA**, the innovation staff are keepers of the data. They have found that the ability to easily access and manipulate their data makes them better positioned to address operational and business deficiencies. SRTA also hired a contractor to evaluate and identify their data need and create a strategic plan around data. This process helped establish an enterprise data business plan for evaluation of data needs and manage all the initiatives. While the process is complex and takes time, they find value in it, and have completed the first phase.
- **NTTA** is investing in an integrated business intelligence platform by pulling in data from three to four systems both internal and external data feeds to the agency (e.g., back office data, demographics, DMV data, lane and toll data, phone system data). On the analytics side, the platform enables basic structuring and reporting to assess trends and more sophisticated analytics to identify anomalies in data and identify opportunities that can lead to cost reductions or efficiencies (e.g., a deep dive analysis related to toll collections to assess in state versus out of state license plate or skip tracing). The platform will also enable advanced, predictive modeling to drive improvements and assessments of operational impacts of alternative scenarios.

**6** Innovative organizations recognize the need for physical infrastructure and/or cooperative partnerships to deploy productive pilot demonstrations.

The ability to test new technologies in real-world settings is a contributing driver of innovation. When testing capabilities are limited by the lack of suitable roadside infrastructure, legal barriers, or political opposition, the pace of technological innovation can slow down. Tolling organizations

are beginning to step up to welcome innovation by outfitting their own designated test corridors for real-world testing and through public – private partnerships on technology demonstrations. As pointed out in *Dedicating Lanes for Priority or Exclusive Use by Connected and Automated Vehicles*,<sup>4</sup> tolled managed lanes offer a good testbed for emerging autonomous vehicle technologies. That’s because they are designed to manage traffic and to minimize vehicle interaction to keep vehicles moving. These characteristics reduce the complexity and lower the risk of testing prototype semi or fully autonomous vehicles at high speeds in a real-world environment.

As “real-world” testing of emerging technology progresses, developers are encountering unexpected challenges and complex challenges. For example, the ITS JPO conducted a review of the Tampa Hillsborough Expressway Authority Connected Vehicle Pilot and found that “the complexities of field testing and technology integration were *significantly underestimated*”.<sup>5</sup> While this is not the case for every joint venture or partnership, public and private sector collaborators should be prepared for unexpected challenges and difficulties.

### Highlights:

- At the forefront is **SunTrax**, a large-scale, cutting-edge facility developed by the **Florida Department of Transportation** and **Florida’s Turnpike Enterprise** which is dedicated to the research, development and testing of emerging transportation technologies in a safe and controlled environment.
- The **Ohio Turnpike** has partnered with the Ohio Department of Transportation (ODOT) to create the Drive Ohio initiative to promote smart mobility technology testing. One of Drive Ohio’s current initiatives is to establish the 33 Smart Mobility Corridor (a 35-mile stretch of U.S. 33) by installing infrastructure for connected and autonomous vehicle testing.
- The **Tampa Hillsborough Expressway Authority (THEA)** Connected Vehicle project funded through a US Department of Transportation Intelligent Transportations Systems Joint Program Office grant (ITS JPO) offered use of their Reversible Express Lanes (RELs) for testing of connected vehicle technology. That pilot encompassed 47 roadside units (RSUs) deployed along THEA’s REL and in Tampa’s Central Business District.

## 7 Technology-driven innovation calls for flexible procurement processes.

Across the board, organizations are eager to embrace innovation including emerging technology, provided it aligns with strategic projects and business needs. When purchasing emerging technology, organizations eventually face what appears to be a roadblock: traditional

---

<sup>4</sup> National Academies of Sciences, Engineering, and Medicine. 2018. *Dedicating Lanes for Priority or Exclusive Use by Connected and Automated Vehicles*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25366>

<sup>5</sup> See <https://aashtojournal.org/2020/10/23/usdot-tampa-connected-vehicle-pilot-more-complicated-than-expected/>

procurement systems. This is particularly true for public organizations. The traditional procurement process can be time consuming and is often predicated on competition among various vendors. Innovative technologies are often sole source with limited competition or unique business models that are distinct from competitors. Designing a procurement to specifically accommodate a particular technology provider can be viewed as anti-competitive and in some cases can be outright prohibited. Some organizations may have an option for sole source procurement, but that process can be plagued by bureaucratic processes that require extensive justification for pursuing a non-competitive approach. Regardless, these limitations can make pursuing technology driven pilot projects a hassle that discourages innovation within organizations.

On the flip side, businesses and organizations seeking to provide innovative solutions face their own barriers associated with traditional procurement practices. For instance, to demonstrate the value of their solutions to agencies, they must often share proprietary information and risk that their information could become public record (due to open records and freedom of information policies). Furthermore, they may be reluctant to spend time preparing unsolicited solutions that will likely not be pursued by agencies because they do not meet a direct need or are required to ultimately pursue a traditional procurement process.

While existing government procurement systems may appear to limit the spirit of innovation, a few public organizations (THEA and Pennsylvania Turnpike) have pragmatic policies that enable agencies to use non-traditional procurement processes to engage in low-cost technology and innovation demonstrations. Meanwhile, others are seeking either internal or even legislative changes as to how they approach procuring new cutting-edge technologies.

There are a number of ways public agencies are delivering innovation through existing rules using flexible procurement processes. These include applying Request for Information (RFIs) and industry forums and technology summits for early market engagement, unsolicited proposal policies, cooperative purchasing, and no-cost demonstration and innovation partnerships. For more discussion on these approaches see the “Moving Forward – Looking Ahead” section of this white paper.

**Highlights:**

- The **Georgia Department of Transportation (GDOT)** has held Industry Forums to promote open discussions with private companies about upcoming projects and technology deployments.
- **MDTA** staff have found it beneficial to attend demonstrations at conferences where they can freely ask vendors questions without the legal limitations of a competitive procurement process.

- **E-470** has developed an Innovative Idea Submission Process and form for formally submitting innovative ideas. See <https://www.e-470.com/about-us/working-with-us/innovation/> for details.
- When **SRTA** adopted the use of ISO 18000-6C readers and tags, the agency approached the procurement process with an open standard protocol that was not proprietary. By stating their need and requesting that vendors then propose the product that best meets those needs and standard, SRTA believes they achieved the best product and best price, did not limit private sector’s ability to deliver an innovative product, or require customization to meet specifications beyond the standard protocol. They also integrated innovation into their procurement to build their back office environment by breaking down the process into separate modules, allowing vendors to target and fit their product or service offering to a specific module, limiting the need for customization which adds cost and time to the process.

## Profiles of Innovation

An objective of this white paper was to document specific cases of practice as different examples of organizations with active innovation programs or initiatives. The highlights presented in the previous section offer snapshot examples of how organizations are building capacity for innovation. This section offers a holistic perspective of how organizations are approaching innovation and technology. The eleven organizations, identified in **Table 2** below, were selected for their diversity with regard to organizational size, function (e.g., public or private sector), and approach to innovation for detailed case studies. The detailed case studies are compiled in Appendix C.

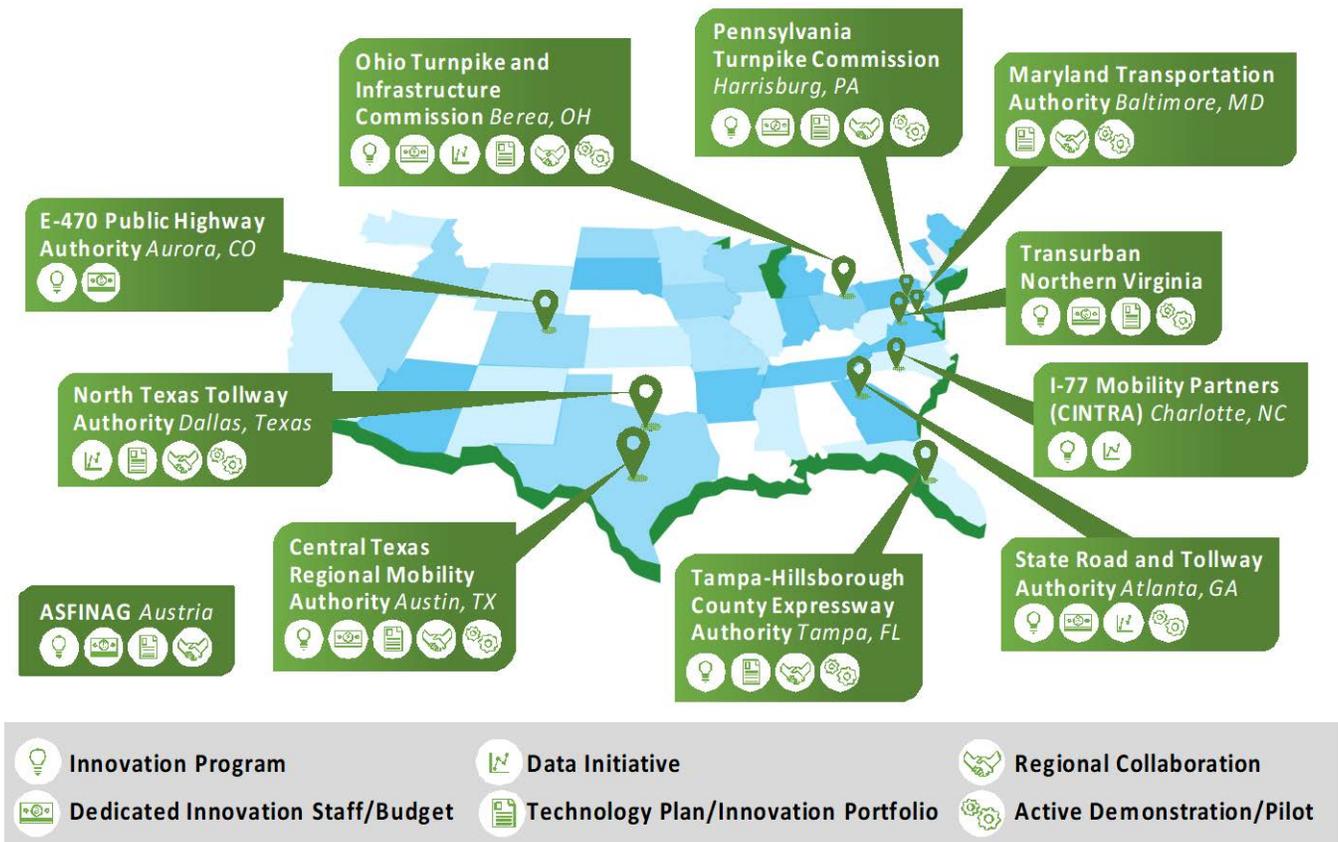
*Table 2: Case Study Organizations*

Organization, Location and Size	Innovation Approach
<b>ASFINAG</b> Austria Large/Private	<ul style="list-style-type: none"> <li>• Culture that supports innovation company-wide</li> <li>• Embedding innovation as 1 of 9 core strategies</li> <li>• Applying the “Horizon Model” to prioritize technology</li> <li>• ASFINAG TV and “Corona Challenge”</li> </ul>
<b>Central Texas Regional Mobility Authority</b> Austin, Texas Small/Public	<ul style="list-style-type: none"> <li>• Forward-thinking strategic plan and vision</li> <li>• Dedicated staff and budget for innovation</li> <li>• Dedicated roadway for demonstration projects</li> <li>• Regional collaboration to further Transportation Systems Management and Operations (TSMO)</li> </ul>
<b>E-470 Public Highway Authority</b> Aurora, CO Small/Public	<ul style="list-style-type: none"> <li>• Enterprise Project Management Office (ePMO)</li> <li>• Agile Development process</li> </ul>

Organization, Location and Size	Innovation Approach
	<ul style="list-style-type: none"> <li>Stakeholder engagement at the review cycle</li> </ul>
<b>I-77 Mobility Partners (CINTRA)</b> Charlotte, NC Medium/Private	<ul style="list-style-type: none"> <li>Data Team</li> <li>Innovation Process (corporate and subsidiary)</li> <li>Dedicated firm used to promote innovation competitions</li> <li>Delineator cleaning challenge</li> </ul>
<b>Maryland Transportation Authority</b> Baltimore, MD Large/Public	<ul style="list-style-type: none"> <li>Centralized Office of Innovation (planned)</li> <li>Prioritize internal engagement to increase buy-in on innovation</li> <li>Ideation process via RFIs or conference demonstrations</li> <li>Goal to streamline data into a single dashboard</li> </ul>
<b>North Texas Tollway Authority</b> Dallas, TX Large/Public	<ul style="list-style-type: none"> <li>Innovation grounded on core mission and goals</li> <li>Institutional alignment and decentralized process for innovation</li> <li>Data Team Initiative</li> <li>Staff engagement and consistent internal communication</li> </ul>
<b>Ohio Turnpike and Infrastructure Commission</b> Berea, OH Large/Public	<ul style="list-style-type: none"> <li>Three innovation teams drawn from cross-departmental staff</li> <li>Dynamic tracking system to track progress (gtmhub)</li> <li>External peer engagement for ideation</li> <li>Regional collaboration and demonstration partnerships</li> </ul>
<b>Pennsylvania Turnpike Commission</b> Harrisburg, PA Large/Public	<ul style="list-style-type: none"> <li>Innovation policy</li> <li>Innovation Council</li> <li>Strong commitment from executive champions</li> <li>Nurture of innovation culture</li> <li>Inclusive approach to seeking out innovation</li> </ul>
<b>State Road and Tollway Authority</b> Atlanta, GA Large/Public	<ul style="list-style-type: none"> <li>Established strategies for data analytics</li> <li>Training and forum to mitigate risks</li> <li>Regional collaboration and partnerships</li> </ul>
<b>Tampa-Hillsborough Expressway Authority</b> , Tampa, FL Small/Public	<ul style="list-style-type: none"> <li>Leverage FHWA grant to fund the CAV pilot</li> <li>Global exposure of THEA's technology initiatives</li> <li>Regional collaboration and partnerships</li> </ul>
<b>Transurban Northern Virginia</b> Large/Private	<ul style="list-style-type: none"> <li>Effective non-linear process for innovation</li> <li>A fostered innovation culture to build momentum</li> <li>Initial ad hoc outreach to business units for ideation</li> </ul>

The case studies also provide examples of the range of current initiatives among the organizations. Figure 3 below highlights the primary categories for each organization's innovation and technology advancements.

Figure 3: Location and Highlights of Case Study Organizations



## Moving Forward – Looking Ahead

As we near the end of 2020, the tolling industry continues to face a tricky balancing act: driving day-to-day operations and business functions while pursuing innovative mobility and technology solutions while *also* grappling with the side effects of COVID-19 that include reduced revenues and stagnant budgets. Still, it’s worth taking a moment to reflect amid the chaos on the progress being made by tolling organizations as an industry and individually in carrying out innovation strategies. That’s one of the values of this paper – the previous sections document progress, challenges, and many “wins” by peer member organizations.

### **But, does this mean we have arrived? Not yet.**

For some organizations, getting to this point has meant breaking new ground, while for others it has meant maintaining a delicate balance of activities, strategic focus, and partnerships. Before jumping to recommendations and next steps, this section takes one last moment for introspection. In 2019, this working group was concerned primarily with a set of basic strategies for jumpstarting organizational readiness for innovation and setting up a foundation for monitoring and tracking emerging technology. This year, in our assessment of practice, peer

organizations shared what they are doing and how it's working out. In addition, this white paper also addresses where we believe the future lies for industry innovators.

This section examines several topics that arose during the scan during conversions and working group presentations. Consider whether or how they fit into your innovation strategy or technology portfolio.

## COVID-19 Resiliency

Since the start of the COVID-19 pandemic in Spring 2020, organizations have entered into a cycle of uncertainty in which shutdown orders and a reliance on remote work (e.g., telecommuting and flex work) has greatly impacted travel and commute behaviors. As a result, transportation agencies, including toll organizations, have experienced impacts on operations and customer service, and reduced revenue and budgets. With the future of the pandemic remaining unclear, the tolling industry will likely continue to face uncertain times.

According to Gartner research, top technology trends are those that enable “organizational agility” (the ability to adapt and respond to changes in external market conditions); as organizations emerge from the pandemic, they will very likely move forward on a different trajectory rather than returning to the previous status quo.<sup>6</sup> In addition to organizational agility, Luxe research cites resiliency (the ability of an organization to bounce back from the adversity that has thrown them off course) as a critical “move forward” capability.<sup>7</sup>

Building the capacity for and embracing innovation holds the key to moving beyond COVID-19 to a new status quo—it will both enhance organizational ability and resiliency. In this challenging environment, organizations with investments in innovation may be positioned to evolve in a crisis situation. Other organizations at the nascent stage of innovation may have been thrust into an innovation mode quite unexpectedly.

Moving forward, once the pandemic has passed, it may be worthwhile to reflect upon to what extent it may have impacted or influenced the toll industry’s innovation capabilities by asking *Did the pandemic jumpstart, speed up or delay, or otherwise limit innovation or technology initiatives?*

## Idea Intake Processes

Technological innovation is driven by the private sector, but public organizations with a proclivity to new ideas can develop processes that allow them to engage meaningfully in the process. Organizations with commitments to innovation have an inherent interest and curiosity in

---

<sup>6</sup> <https://www.techrepublic.com/article/top-tech-trends-for-2021-gartner-predicts-hyperautomation-ai-and-more-will-dominate-business-technology/>

<sup>7</sup> <https://www.luxresearchinc.com/hubfs/2020%20Executive%20Summaries/1%20-%202020%20Executive%20Summaries%20-%20Press%20Versions/Lux%20Research%20-%20The%20Impact%20of%20COVID-19%20on%20Tech%20Innovation%20Executive%20Summary%20-%20press.pdf>

discovering and learning about emerging technologies, products and services; however, with emerging mobility and technology developments moving at the speed of light, they can easily become overwhelmed with information and meeting overload. With the traditional process, a Request for Proposal (RFP) outlines the goods and/or services needed and includes a generalized scope of work for the desired approach and deliverables. Vendors prepare a response in a given timeline that best meets the needs of the agency as defined in the scope of work. The agency then selects the “most responsive” vendor in accordance with a set of predefined criteria.

While the traditional RFP method works well to meet agency needs with well-defined solutions, it can limit an agency’s ability to solicit a broad spectrum of innovative solutions from the private sector in response to a specific need. To provide flexibility and encourage innovation, many agencies have implemented additional methods “upstream” of the RFP process to first convey needs – rather than solutions – to the private sector.<sup>8</sup>

In this age of rapid technology development, these upstream approaches have grown in popularity as a means for obtaining fresh and innovative ideas and technology solutions to meet stated needs or strategic objectives. Organizations can then apply the information gleaned from the submittals as the basis for a full open and competitive solicitation. These approaches do not replace or sidestep traditional procurement policy; rather, they help agencies gather ideas and solutions that will either inform future RFPs or be more suited for an alternative procurement method, such as a sole source award.

These idea intake methods– including Unsolicited Proposal policies, innovation challenges, Requests for Information (RFIs), and no-cost or low-cost Demonstration Proposals – allow organizations to learn about new ideas and technology solutions based on stated needs or strategic objectives. The best method for an agency to use will depend on the nature and scale of the need being met, the level of specificity that is already known about potential solutions, and existing partnerships with accelerators or private sponsors that the agency can leverage.

Each of these methods is briefly described as follows:

1. **Unsolicited Proposals (UP).** A way for government agencies to obtain new or innovative ideas, methods, approaches, and technologies to accomplish its mission or address a specific need. UPs are written proposals that are submitted for the purpose of obtaining an award with the government and are not in response to a formal or informal request other than a general statement of needs publicized by the agency. Generally, the proposal must be innovative and unique; be independently originated and developed by the offeror;

---

<sup>8</sup> For the purpose of this section, “private sector” encompasses a range of organizations including private companies, startups and accelerators, universities and university research centers, and not-for-profits).

and include sufficient detail to permit a determination that government support could be worthwhile, and the proposed work could benefit the government organization.

- Examples of agencies with established UP policies include: the Colorado High Performance Transportation Enterprise (HPTE), the Kansas City Area Transportation Authority (KCATA), and E-470 in Denver.
- To help guide proposals so that they meet an agency need, some agencies publish “problem statements” or “challenge statements.” These statements serve to communicate the agency’s pain points to the private sector, who can respond with unsolicited proposals in the hopes of receiving a sole source award or persuading the agency to issue a competitive RFP based on their proposed solution. LA Metro has even held Unsolicited Proposal Forums (also known as the Metro Accelerator Series) to foster dialogue with the private sector and improve the quality and relevance of proposals.
- The majority of UP policies include two phases: vendors submit a Phase 1 proposal, and if the agency wants to know more about the solution, they request a more detailed Phase 2 proposal for evaluation.
- Online platforms such as Submittable, Evalato, or Award Force are available to help collect, screen, evaluate, and manage expressions of interest from prospective vendors. These platforms allow multiple judges to review submissions and communicate with submitters and other judges as needed.

2. **Innovation Challenges.** Innovation challenges are another way for agencies to generate interest and gain a broad range of innovative ideas from the private sector in a specific category, such as equitable mobility or clean energy. Winners are generally awarded a set amount of money to implement a pilot project. Challenges can help agencies establish partnerships with think tanks or start-up accelerators. Funding for challenges can come from a combination of public and private sponsors, as evidenced by the following examples:

- USDOT Smart City Challenge<sup>9</sup>
- Bloomberg American Cities Climate Challenge<sup>10</sup>
- City One Challenge in Austin, TX<sup>11</sup>
- i77 Partners Innovation Challenge Competition

---

<sup>9</sup> <https://www.transportation.gov/smartcity>

<sup>10</sup> <https://www.bloomberg.org/program/environment/climatechallenge/>; <https://austintexas.gov/news/mike-bloomberg-names-austin-winner-bloomberg-american-cities-climate-challenge>

<sup>11</sup> <https://media.ford.com/content/fordmedia/fna/us/en/news/2020/01/21/austin-announces-winners-of-city-one-challenge.html>

3. **Request for Information (RFI).** RFIs are used to gain general information about potential vendors and the products and services they offer. The ultimate goal of sending an RFI is to see how a potential supplier's products and services can best be used to solve solutions and fit business needs. RFIs are useful for understanding what each company has to offer and evaluating each company's ability to meet the stated need. For instance, **Florida's Turnpike Enterprise** issued an RFI for its back-office SunPass system in 2019,<sup>12</sup> and **SRTA** in Georgia issued an RFI in 2020 for firms specializing in transit operations and maintenance<sup>13</sup>.
4. **No-Cost or Low-cost Demonstration Proposal (DP).** DPs (also known as "Proof of Concepts") are often used to pilot technologies or systems. Because there are de minimis or no cost involved with the DP, there is no need for a formal procurement process and a project agreement usually suffices. However, DPs are mutually beneficial to vendors and agencies; the agency receives information about potential solutions at no cost (apart from staff time to implement, etc.), and the vendor has the opportunity to test solutions in a real-world environment, essentially as a beta-test. An example of an DP is the Central Texas Regional Mobility Authority's demonstration partnership with Kapsch TrafficCom and Ford Motor Company to develop capabilities for connected vehicles to provide real-time toll rates, confirm toll payment, and offer a wider range of payment options.

Moving forward, as the toll industry's innovation efforts mature and pursuits of emerging technologies grow, organizations will become increasingly exposed to and experienced with flexible procurement processes. The sharing of experiences, lessons learned, and sample materials such as partnership agreements and RFI and other templates will be of mutual benefit to both public and private sector organizations.

## Tools and Resources to Support Innovation and Technology Planning

A successful innovation program helps organizations chart a path for adoption of new technologies, processes, and programs that are aligned with business strategy and the technology landscape. With new ideas and technology being introduced on a fast pace, a challenge lies in managing and sorting through the plethora of information, webinar invitations and industry news regarding emerging technology, business process innovations, and industry trends that bombards inboxes on a daily basis.

How can organizations see beyond what's new to what's next?

---

<sup>12</sup> [https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/info/co/news/newsreleases/092019-rfi-release.pdf?sfvrsn=ad9804e6\\_2](https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/info/co/news/newsreleases/092019-rfi-release.pdf?sfvrsn=ad9804e6_2)

<sup>13</sup> <https://www.srta.ga.gov/procurement/#20-070>

Organizations can be deliberate in their monitoring and evaluation of emerging technologies and innovations by making use of a variety of tools and resources that are readily available. These tools and resources can serve very specific and / or multiple objectives ranging from simply tracking the emergence of technology or status of technology maturity-levels (e.g., readiness to deploy), to deciphering the market trends (e.g., current and future market penetration of connected or electric vehicles) to managing innovation idea intake process and resulting innovation projects. Some tools are available at low or no cost while others require the organization to make a substantial investment.

During this industry scan, organizations mentioned several types of tools and resources they found useful in planning and managing their innovation programs. They are broadly classified here as three types of tools: Research and Advisory Services (Gartner, Forrester, InfoTech, Deloitte, McKinsey), Innovation Platforms and Program Management Tools (gtmhub, Microsoft Azure, Amazon Web Services, Planbox) and Innovation Blogs and Websites (Innovation Management, Board of Innovation, Innovation Leader). Organizations or individuals leading active innovation programs tend to invest in or refer to one or more of these tools and rely on them in guiding their business and technology decisions.

Moving forward, a deeper exploration into the tools and resources that have proven to be successful in managing innovation, removing obstacles, and encouraging participation may go far in guiding organizations as they progress in building capacity for innovation.

## Recommendations and Next Steps

---

IBTTA industry leaders are making advances in innovation that facilitate the adoption of emerging technology to transform their business practices and operations. This industry scan demonstrated that industry leadership recognizes the importance of innovation to their organizations; it is increasingly showing up in mission statements, core values, and strategic plans. In fact, 94% of survey respondents stated that their organization's leadership demonstrated a commitment to innovation and the remaining 6% shared their leadership was planning on it. Over two thirds (69%) are backing up their commitment to innovation by dedicating an individual or building teams to enable innovation. Among those that do have designated staff or departments shared they have also dedicated an executive or senior manager at this position.

Despite this, innovation and data analytics is largely under-resourced in both staffing and budget allocations, and as a result, efforts are largely ad hoc. Few organizations have formal, well-defined and centrally directed programs, with processes in place and tools to support and manage innovation. Yet, the tolling industry is making progress in advancing innovation initiatives that are process- and/or technology-driven. In step with these efforts are movements

toward more data centric organizations, with industry leaders recognizing the value of data and data analytics to inform planning, operations and business intelligence.

This best practice scan offers a baseline perspective of progress being made in the innovation movement. It also shows that gaps exist between what innovation can offer our industry as a whole, and the progress that individual organizations are making.

Both public and private sector employees attend conferences, make presentations, serve on panels and in working groups, etc., and it is in these venues that they learn about new opportunities, emerging technologies and deployment initiatives, demonstration projects, and special interests of public agencies. Furthermore, outside of professional organization events, outreach and formal working groups, peer-to-peer conversations often occur based on preexisting personal relationships. Relationships are also the most common way private sector learns about needs with public agencies. This norm limits the amount of information sharing going on to formal groups and people who know each other. During the course of this assessment, discussions arose across both public and private sector organizations about the lack of, need for, and value of establishing a central repository or digital communications exchange venue that builds awareness of which agencies are working on what and on advancements in emerging technologies.

## Recommendations

Given the trends and observations resulting from this scan, the following recommendations are offered for consideration by IBTTA and organizations.

1. **Annual survey and report** on the state of practice of IBTTA membership and related industries to identify current and planned practices/systems and best practices for:
  - Innovation capacity within organizations.
  - Emerging technology and utilization.
  - Data and analytics (i.e. architecture and staffing/resources).
2. **Facilitate information sharing and best practices** using:
  - Develop a system or expand the capabilities of IBTTA's "The Exchange" and TOLLMINER™ to enable a digital forum (e.g., see SAE Forum) for innovation, emerging technology, demonstration, and testing projects. This might be accomplished through IBTTA and/or a sponsor organization to incorporate an interactive "Innovation and Technology Map" like Figure 3 in this paper.
  - Establish a peer exchange for innovation and emerging technology (modeled after AASHTO: <https://research.transportation.org/peer-exchange-program/>). This

might be accomplished through IBTTA's "Peer Exchange" and/or in partnership with an organization.

Dedicated resources will be needed to keep project and contact information current and accurate.

### 3. Potential topics for 2021

- Customer Service Modernization. Conduct a survey of toll agencies and retail centric third-party providers and other industries outside of the toll industry and identify best practices and gaps in practice. The specific area of interest is how organizations and companies are interacting with their customers (i.e. website, social media, call center support).
- Impact of the COVID-19 Pandemic on Building Innovation Capacity.
- Flexible procurement processes.
- Tools and resources to support Innovation, technology, demonstration, and pilot programs.

## APPENDIX A: Quick Reference Brief | Strategy for Innovation and Technology

This quick reference brief outlines guidance provided in the 2019 white paper on two broad strategies for effectively meeting the transformational emerging technology challenges ahead while engaging and being relevant in our rapidly evolving mobility ecosystem: **building innovation capacity and advancing regional collaboration / interoperability.**

### **Building Innovation Capacity**

To achieve an integrated mobility ecosystem, organizations will need to invest in building organizational capacity for innovation.

- Leadership committing to innovation
- Establishing dedicated innovation team or department
- Developing an organization, staffing, and resource plan
- Delivering innovation using an agile program / project management process
- Developing a future-focused technology plan
- Considering iterative, flexible procurement and contracting approaches involving the private sector
- Implementing a Data Platform / Data Sharing Hub

### **Advancing regional collaboration / interoperability**

The new integrated mobility ecosystem will require a stronger focus on regional collaboration in the planning and deployment of new transportation services. Institutional silos must be overcome, and organizations must seek out opportunities to learn and collaborate with their regional partners and stakeholders.

- Committing to advancing regional collaboration and interoperability
- Participating in a Transportation Innovation Council or Task Force
- Participating in, support, champion, or lead in TSMO

## APPENDIX B: Innovation Capacity Survey Findings

In August 2020, an online survey was distributed to members of the IBTTA ETC to explore the extent in which they were (or were not) making progress in advancing their capacity to lead enterprise-scale innovation efforts. The survey results are presented here; they reflect responses from 30 unique peer organizations who are leading the way in innovation within the tolling industry.

These results can be used to gauge overall industry progress related to innovation, but also as a reference guide for agencies looking to build a culture of innovation. The information should enable organizations to evaluate their unique circumstances and identify evolutionary organizational changes that may be essential to remain competitive and relevant in the rapidly changing transportation ecosystem.

The results are organized into two sections:

- **Error! Reference source not found.**
- 
- Resourcing and Funding Innovation

Each section presents the data findings along with *Highlights of Practice* that showcase illustrative examples by peer organizations.

### 1

## Leadership Commitment to Innovation

94%

**of respondents say their organization's leadership demonstrates a commitment to innovation.**

6% say their leadership is planning on it. Commitments to innovation can take many forms from inclusion in strategic plans, organizational vision to assigning resources (including staff and budget) teams.

### Highlights of Practice

- Innovation is a focus of the **Ohio Turnpike's** Strategic Annual Retreat and progress is reported in quarterly meetings of their management team. The agency relies on its centralized data warehouse and reporting system, "gtmhub," to monitor progress (see <https://gtmhub.com/>)
- **RS&H** has enhanced their Emerging Technologies Group with a strategic plan for working with agency partners, technology providers, and OEMs in response to industry evolution with regard to innovation and emerging technology.
- **SRTA** shares that innovation is part of our strategic planning process and innovations are driven by our CIO and Director of Transportation Performance and Innovation. Often, Engineering and Operations push new ideas as well."
- **Beijing Jiaotong University** cites its strategic plan as the commitment source.

2

**Establishing a dedicated team or department**

69%

**of respondents say they have staff and/or departments designated to innovation.**

27% say they have no plans to do this. Among those that do have designated staff or departments shared they have dedicated an executive or senior manager at this position; several are creating innovation teams.

The majority but not all of peer organization leaders are backing up their commitment to innovation by dedicating an individual, or building teams, to enable innovation.

**Highlights of Practice**

- **THEA** has a Director of Planning and Innovation.
- **I-77** shared they have innovation staff at the corporate level, but not at the concession level. However, there are data analytics at both corporate and concession levels.
- The **E-470** Public Highway Authority created an innovation team in Spring 2020 that initiated an innovation idea intake form and meets whenever they receive a new submission from a vendor.
- Innovation at the **Miami-Dade Expressway Authority (MDX)**, which has 32 employees, is led by the Executive Director and leadership team. Using consultants to fill the role of subject matter experts “works very well.”

3

**Developing a staffing resource plan that reflects innovation-oriented skill sets**

53%

**of respondents reported they are currently developing staffing and resource plans.**

31% have no plans to do it or are not sure.

As an organization’s innovation focus matures and initiatives develop, their staffing and internal resources should be regularly assessed for congruence with strategic priorities and innovation investments and skill set needs.

**Highlights of Practice**

- As a consultant to **Georgia Department of Transportation (GDOT)**, Atkins is hiring two FTEs for innovation and is working closely with GDOT to determine the best skill set
- THEA shared that with ACES (Automated, Connected, Electric and Shared) and Connected Vehicles (CV) as components of their Strategic Plan and with several significant capital projects underway, they are procuring consultant contracts to facilitate these efforts and provide the requisite skill sets.

**4 Delivering innovation using an ad hoc or formally defined process (such as waterfall, agile)**

**69%**

**of peer organizations are adopting agile type of frameworks.**

Many are starting out with ad hoc processes but are working towards a formally defined process.

The ability to move quickly and adopt a fast moving and iterative version of “plan, test, execute and measure” works well with delivering innovation.

**Highlights of Practice**

- Among the organizations reporting they are adopting agile frameworks are **Glovalbia**, **Douglas Stuart**, **I-77** to support Concession level, **SR&H Inc.**, and **E470**.
- **E-470** shared they “transitioned to a more agile approach with better sprint planning and CAB meetings to approach projects more efficiently.”
- **Illinois Tollway** is developing an ePMO for innovation.
- **CTRMA** follows an innovation funnel approach to innovation: “Discover, Develop, Deploy.”

**5 A continuous improvement process method or tool (e.g., Six Sigma, TQM)**

**53%**

**of respondents said they are currently doing it or planning on it.**

However, the method most are applying are not formal processes or tools, but ad hoc applications.

**25%** do not have plans to do it. One organization shared, “We don’t use the formal methods/tools listed but it has always been ingrained in our culture and performance goals.”

The use of a continuous improvement process method or tool was not raised as a strategy in the 2019 white paper on innovation. However, during the planning of this survey, it arose as tool to support process-driven innovation among workgroup members, so it was included in the survey.

**Highlights of Practice**

- **Globalvia** cited the use of Quality management based in ISO 9001.
- **Illinois Tollway** shared they have no formal structure but are moving toward using improved tools for visualizing improvement trends.
- **Douglas Stuart** shared “We just follow the Japanese philosophy of Kaizen. We seek a 1% improvement in all of our processes. It’s on our website in our marketing materials and is part of every internal/external meeting. We are always asking, “is there a better way?”

**6 Developing and implementing a future-focused technology plan**

53%

**An overwhelming majority of respondents shared their organizations are in the progress of either developing or carrying out a technology plan.**

12% shared they either had no plans to do this or weren't sure. One private sector organization opined "Technology is always changing. What's good today may not be the best solution 12 months from now."

A cornerstone of organization's maturing innovation programs is a future-oriented technology plan or roadmap that aligns with business priorities and infrastructure modernization needs.

**Highlights of Practice**

I-77 partners shared their ITS team is constantly looking into new technologies and do a good job of looking for technology that benefits the business.

- **RS&H** shared it was included within their Strategic Plan.
- **CTMA** recently completed a roadway technology plan and is working on a process to regularly update it with public and private partner input and collaboration.
- **MDX** shared they have an ITS Master Plan that leverages technology to provide safety and efficiency innovations.

**7 Using iterative, flexible procurement and contracting approaches involving the private sector**

78%

**A majority of respondents shared they are currently using or exploring flexible procurement and contract arrangements.**

Nevertheless, a few opined that procurement policy within a government agency "hinders our ability to be flexible"

Organizations with innovation as a focus and an eye on emerging technologies quickly discover the challenge associated with maintaining knowledge and awareness of the available range of options. There is a trend to move away from specifications-based purchasing methodologies to a needs-based phased collaborative unsolicited proposal or Request for Information process. This pairs well with the designation of toll roads as test bed environments (a growing practice) as technology providers are increasingly seeking real-world testing to progress proof of concepts and ideas to on-road testing of technology solutions.

**Highlights of Practice**

- Bay Area Toll Authority/Metropolitan Transportation Commission (BATA/MTC) shared they participate in a Start Up Residency program.
- **Ohio Turnpike** shares they are engaging in strategic partnerships with private sectors, non-profits, and universities.
- The **Colorado High Performance Transportation Enterprise**, as a business enterprise owned by Colorado DOT, they are able to use a flexible procurement and contracting approach, similar to an unsolicited proposal process.
- **Penn Turnpike** shares they are able to secure demonstration projects within a budget cap.
- **THEA** has specific policies regarding procurement of "experimental leading edge" services and products

**8 Using a Data Platform (e.g., enterprise wide data warehouse or repository)**

**63%**

**of respondents are currently working on building and using a data platform.**

**25%** are planning on it. Clearly, the benefits of centralized data platforms are recognized by peer organizations.

Data and innovation go hand-in-hand – data is the fuel to empower better decisions, set proper metrics, and track performance. Organizations are increasingly pursuing consolidation of internal sources of data to one centralized location to have data readily available for business intelligence and operation performance tracking and decision-making.

**Highlights of Practice**

- **CTRMA** is working towards a centralized data platform, has designed the architecture, and is planning on moving forward with a competitive procurement for implementation in the coming year.
- **MDX** shared that “data validation is usually the long pole in the tent. Once resolved over time, the outcomes are rewarding.”
- **Illinois Tollway** is evolving ERP applications but are not fully BI (Business Intelligence) operating yet.
- **Colorado High Performance Transportation Enterprise** is currently in the due diligence phase to discover their options.
- **BATA/MTC** says this is a work in progress and it is “very slow going” and shares they are not resourced “to do this in a deliberate and focused manner.

**9 Planning or implementing a data sharing hub (for external data sharing and other organizations)**

**44%**

**of respondents are currently doing this.**

**34%** see it as a future priority.

While organizations see the benefit of data sharing hubs, their adoption is delayed until after a centralized data platform is up and running. As one organization shared, “As we continue to collaborate with other entities, this will be implemented.”

**Highlights of Practice**

- Within the State of Florida, **MDX** shared “we do this daily with our sister agencies. At one point we were involved with comparing and contrasting with two other states, but not recently. Would like to see this come back soon.”
- **Illinois Tollway** is in the very early stages of development.
- The **Ministry of Transportation of Ontario** shared a major challenge was with gaining confidence in the quality and accuracy of the data.
- **THEA** shared that their Connected Vehicle pilot “does exactly this.”
- **Ohio Turnpike** is working with ODOT on leveraging their platform.

10

## Advancing Regional Collaboration and Interoperability

69%

**said they were actively working on advancing regional collaboration nearly an equal number engaging in regional innovation councils or Transportation Systems Management and Operations (TSMO).**

Clearly, peer organizations recognize the benefits of collaborating with regional agencies on transportation initiatives.

### Highlights of Practice

- **THEA** shared the following resources for additional information related to regional collaboration associated with their CV Pilot: <https://www.tampa-xway.com/wp-content/uploads/2019/01/THEA-Driving-Innovation.pdf> and <https://theacvpilot.com/>
- **Ohio Turnpike** referenced their regional partnerships with the Drive Ohio and Smart Belt Coalitions; they don't have plans for TSMO in the near future.

### Resourcing and Funding Innovation

This section of the survey sought to provide insights on how organizations are enabling innovation administratively with program set up and structure and resource allocations (staff, skill building and budget).

#### Describe your innovation process

When asked to describe their innovation process, about 69% respondents shared their process was active and either a formal or ad hoc process. About 12% shared they were exploring their options or were in the process of developing one.

Those with formal processes described a specific, tangible approach for managing innovation (such as stage-gate, waterfall, Innovation Funnel or Lifecycle, or an idea intake process such as unsolicited proposals).

#### Do you Budget for Innovation?

Nearly two-thirds of respondents (72%) budget for innovation. However, when pressed for details on their budgeting approach, it became clear it varies by organization. The range of options included:

- Line-item budgets for innovation under Research, Technology, Applications and Staff (FTE)
- Board approval is required for innovative solutions and a budget is part of the approval process.
- Work Programs fund ongoing efforts to pursue new opportunities
- Innovation is included within departmental budgets and capital improvement plan/project

Does your organization have one or more of the following Executive Level positions associated with Innovation?

By far, as shown below, most organizations cited having a Chief Information Officer (40%) followed by a Chief Technology Officer (30%) and least likely to have a Chief Innovation Officer (23%).

Other positions cited included:

- Departmental Directors report to the Executive Director
- Director of Transportation Performance and Innovation
- Chief Operating Officer
- Assistant Executive Director/Deputy

## APPENDIX C: Detailed Case Studies

This appendix contains detailed case study examples of a variety of organizations' progress in building organizational capacity for innovation and advancing regional collaboration.

1. ASFINAG
2. Central Texas Regional Mobility Authority (Mobility Authority)
3. E-470 Public Highway Authority
4. I-77 Mobility Partners
5. Maryland Transportation Authority
6. North Texas Tollway Authority
7. Ohio Turnpike and Infrastructure Commission (OTIC)
8. Pennsylvania Turnpike Commission
9. State Road and Tollway Authority (SRTA)
10. Tampa-Hillsborough County Expressway Authority
11. Transurban

## 1. ASFINAG

*Innovation Focus: Innovation Process*

*Organization Type: Operator*

*Year Established: 1982*

*Employees: 2900*

*Location: Austria*

### Organization Background

While ASFINAG is an Austrian Federal Agency responsible for over 1300 miles of roadways, it has a deep seeded mission around partnerships both internally and externally. A serious commitment to customers, employees, and partners is what makes their organization stand out as a leader in transportation innovation. ASFINAG has strategies in place around finances, customers and employees, and guiding principles that shape how they go about doing business.

### Approach to Innovation

With Innovation as one of the nine core strategies at ASFINAG, it is clear that the organization is making it a priority. They have identified five fields of action to drive how they address innovation and utilize the “3 horizons model” as a means to think outside of the box in order to classify (prioritize and plan) innovation efforts. The model has three levels: Horizon one - “Act” (trends with the highest level of priority and are ready to implement in a near-term window of one to three years), Horizon two - “Think” (trends that are gaining steam and may have promise in next three to five year timeframe) and Horizon three -- “Watch” (trends that are maturing and are worth watching into the future). Employees are encouraged to share ideas to management, and ASFINAG makes this process easy for staff to do so. They have several ongoing projects and research topics that adhere to the horizon strategy, which also helps create the innovation culture throughout the organization needed to progress innovative work. To ASFINAG, innovation is about addressing what the customer needs as opposed to what is considered innovative.

### Innovation Initiative(s)

ASFINAG has a number of ongoing projects and research topics that are grounded by established guiding principles. These include using drones, a Hackathon with a space agency using satellites, autonomous vehicles and autonomous mulching, truck platooning, photovoltaic systems (solar) “carport motorway,” salt and fuel storage management, and a smart tunnel fire simulator.

ASFINAG defines innovation by thinking outside of the box, and that is showcased through all of their project’s information exchange efforts, and “ASFINAG TV”. Their “Corona Challenge” was an attempt to “hack the crisis” where they shared a two-minute video via social media outlets highlighting successful projects and their implementation to seek public input. As a result, ASFINAG received 200 new ideas while showcasing their company as an attractive employer.

## 2. Central Texas Regional Mobility Authority (Mobility Authority)

*Innovation Focus: Technology-Driven Innovation*

*Organization Type: Operator*

*Year Established: 2002*

*Employees: 30*

*Location: Austin, TX*

### Overview

Since its founding in 2002 as an independent government agency in Central Texas, the Mobility Authority has been a leader in new technology deployment since its founding in 2002 as an independent government agency located in the Austin, TX region. It was among the first toll agencies in the country to deploy all-electronic cashless tolling and has been a leader in adopting license plate-based tolling payment programs. It has tested innovative ridesharing technologies and been at the forefront of the variable pricing movement.

### Approach to Innovation

The Mobility Authority's mission, "implement innovative, multimodal transportation solutions that reduce congestion and create transportation choices that enhance quality of life and economic vitality," is reflected in the core values of their 2016 Strategic Plan. In 2018, the Mobility Authority formed an innovation team dedicated to discovering opportunities to move the agency toward its forward-thinking mobility vision. The team is building internal capacity and processes to support a three phased continuous approach or lifecycle to innovation "Discover, Develop, and Deploy." To further expand its reach, the Mobility authority also maintains partnerships with other agencies in the region to ensure collaboration of the transportation network that serves the surrounding communities

### Initiative Highlights

The Mobility Authority is evaluating and implementing innovative technologies and connected vehicle systems to benefit customer benefits and prepare roadways for the future. Current demonstration initiatives include:

- Wrong way driving detection technology—the 45SW Toll Road is the first in Central Texas to feature Wrong-way driving detection technology to reduce the incidence of wrong-way crashes. The intelligent warning system actively monitors and detects wrong-way entrants, deploys countermeasures, and sends alerts to drivers, first responders, and the Mobility Authority's Traffic & Incident Management (TIM) Center.
- Advanced Transportation Reporting and Incident Management System—In partnership with WayCare Technologies Inc., the agency is implementing an advanced transportation and incident management and prediction system with the objective of reducing incidents detection and response time. The system collects data from roadway sensors, connected vehicles and smartphone applications and combines it with artificial intelligence to predict areas prone to congestion, identify locations where accidents have occurred or are likely; and alert emergency responders.
- Next Generation Toll Demonstration—The agency is partnering with Kapsch TrafficCom and Ford Motor Company on a demonstration to develop capabilities for connected vehicles to provide real-time toll rates, confirm toll payment and offer a wider range of payment options.

### 3. E-470 Public Highway Authority

*Innovation Focus: Innovation Process/Regional Collaboration*

*Organization Type: Operator*

*Year Established: 1987*

*Employees: Approx. 60*

*Location: Denver, Co*

#### Overview

The E-470 Public Highway Authority was established in 1987 after the Colorado State Legislature passed the Public Highway Authority Act which granted E-470 the power to plan, design, build, finance, and operate the toll highway. As a subdivision of the State of Colorado, E-470 relies on toll revenue, vehicle registration fees, investments, and other non-toll revenues to support operations and maintenance.

#### Approach to Innovation

When Executive Director, Tim Stewart, joined E-470 in 2016, he had a vision. Out of that vision, he created a strategic plan with core values that could support innovation within the organization. The current E-470 Workplan was established based upon the strategic goals and priorities laid out in the plan. By 2019, E-470 began to really address innovation through the development of an Enterprise Project Management Office (ePMO). This top down approach supports a culture and creates a structure for innovation across the organization. The ePMO creates a landing spot for innovative projects and ideas, so the agency can stay on top of what is happening in the industry. Initially, ideas would come to the agency in a way that was overwhelming. As a result, a review committee was established by the end of 2019, and a formal prioritization process for innovation was launched.

#### Initiative Highlights

As E-470 established the ePMO, key staff were identified to lead the innovation effort. The team created an online innovation idea intake form that is accessible to anyone on their website. Companies can submit their ideas via that form, which is then sent to a dedicated inbox that is maintained by internal staff. Key staff set up a review committee made up of leadership staff from various departments to ensure involvement across the organization. This review committee meets monthly to discuss the proposals and determine viability.

In May of 2020, E-470 contracted with Electronic Transaction Consultants (ETC) to create tolling solution that would support the use of current infrastructure through the use of ETC's next generation riteSuite™ tolling and mobility management products. The contract is set for 5 years, and will include enhanced vehicle detection, separation, and classification, multi-protocol systems, redundant toll equipment, wrong-way detection and law enforcement support, and upgraded digital video audit system.

E-470 started the initial planning process to rewrite their back-office system. The work on this project is directly tied to their innovation environment, and staff from the ePMO are actively involved. They are utilizing the Agile approach to identify project needs and compile a list of priorities to consider to future proof the system. Sprint meetings are held weekly for the teams of developers to help itemized what is best and determine priorities. This concept promotes completion of smaller deliverables for the project at a faster pace.

#### 4. I-77 Mobility Partners

*Innovation Focus: Innovation Challenge & Ideation*

*Organization Type: Concessionaire*

*Year Established: 2014*

*Employees: 60*

*Location: Charlotte, NC*

##### Overview

I-77 Mobility Partners was formed as a limited liability corporation in June of 2014 by Cintra as a public private partnership (P3) with the North Carolina Department of Transportation (NCDOT). This was the first P3 agreement for North Carolina to design, build, finance, operate, and maintain highway infrastructure.

##### Approach to Innovation

Innovation is mostly conducted internally, and Cintra has a more formal process for this whereas I-77 has not developed a formal process yet. As an example, Cintra recently developed a team in Austin, TX using AI to evaluate traffic patterns and predict trends. This team is made up of 3-4 data scientists and 3-4 analysts, which helps support the team at I-77 where things are built more simply. However, the I-77 team is growing as data analytics becomes more relevant, and projects continue to be added.

I-77 Mobility Partner maintains a focus on occupancy tied to revenue. Their new established data team is made up of 2 people who are skilled in machine learning, mapping, and GIS. They utilize the SCRUM method to move projects forward, and lean on the Austin, TX team for data analytics on traffic patterns and trend prediction. The data captured also helps identify roadway violators based on usage patterns, which is shared with law enforcement.

##### Initiative Highlights

I-77 is divided by delineators and cleaning them is a big challenge. Staff started to address this challenge internally via a few meetings, but none of the solutions were viable. As a result, they hired a contractor to conduct a crowd sourcing contest for staff. Ferrovial is Cintra's parent company with around 60,000 employees, so this truly was a crowd sourcing effort to solve this delineator cleaning challenge. The project was a low-cost, high-value effort to create an innovative solution to a tolling project challenge that was successful.

## 5. Maryland Transportation Authority

*Innovation Focus: Innovation Process & Regional Collaboration*

*Organization Type: Operator*

*Year Established: 1971*

*Employees: 1,700*

*Location: Maryland*

### Overview

The Maryland Transportation Authority (MDTA) has owned, constructed, and operated the State of Maryland's toll facilities since 1971. These toll facilities include two turnpikes, two tunnels, and four bridges. Projects and services are funded by toll revenue.

### Approach to Innovation

Participating in professional organizations like IBTTA, ITS Maryland, ITS America, ITS World, and AASHTO helps MDTA as they track emerging technologies. Staff members attend trade conferences, participate in formalized technology working groups, and subscribe to publications to learn about trends.

MDTA also collaborates regionally with the Maryland Department of Transportation (MDOT), the Maryland Transit Administration (MTA), and the MDOT State Highway Administration (SHA). The regional traffic and incident management system, CHART, is a tangible result of regional collaboration. Having a regional system like CHART enables transportation agencies to manage incident and minimize traffic impacts on a large scale by directing drivers to alternate routes before they approach the incident site. Tabletop incident management training exercises help to build personal relationships across agencies to encourage collaboration and information sharing for improved incident management.

Previously, MDTA had a Next Generation (NG) Team that was a technology incubator with a focus on toll technologies. The current iteration of the team is known as 3G, which refers to MDTA's third generation toll system.

### Initiative Highlights

MDTA is currently planning to establish an Office of Innovation, which will include staff members and outside consultants who are currently part of the 3G team. There will be a Director of Innovation and a small number of support staff. The team will report directly to the COO, with dotted lines on the organizational chart to other divisions (such as IT, EZ-Pass, Operations, Maintenance, ITS, Traffic Management, and Toll System Improvement) for collaboration. Reporting to the executive level will help the Office of Innovation access the resources it needs to successfully roll out new technologies.

Because field staff can sometimes be reluctant to adopt new technologies that may bring integration challenges, it is important to focus on collaborating across departments to increase engagement and develop workable solutions.

One focus of the Office of Innovation will be to streamline data into a single dashboard so that generating a report with multiple data sources does not require input from 6-7 people.

## 6. North Texas Tollway Authority

*Innovation Focus: Decentralized Innovation Process*

*Organization Type: Operator*

*Year Established: 1997*

*Employees: 700+*

*Location: Dallas/Fort Worth, Tx*

### Overview

The North Texas Tollway Authority (NTTA) is an organization sanctioned by the State of Texas to develop and maintain roadways in the north Texas region. NTTA's mission is to: Provide a safe and reliable toll road system; Increase value and mobility options for customers; Operate the Authority in a businesslike manner; Protect our bondholders; and Partner to meet our region's growing need for transportation infrastructure. The strategic plan for the 2021-2025 horizon also outlines 5 overarching goals and Departmental objectives align to these goals. Investments in intelligent transportation systems (ITS) and other technological innovations are mainly addressed through coordination with the organization's Information Technology Department.

### Approach to Innovation

NTTA previously had a formal innovation program, however, that program is no longer in place. Innovation within the organization was found to be more organic within each area, and the centralization of innovation as a function created more bureaucracy than required. Instead, the organization now embeds innovation within the core business functions of each individual business area.

NTTA encourages all departments to innovate, and to find ways to improve all aspects of their everyday work. Each department is responsible for coming up with, tracking, and funding initiatives. Initiatives are only elevated to a higher level of corporate decision-making where necessary, such as where there is a need for further collaboration and funding. In essence, the innovation process is tailored by each department for each department to match specific needs.

Where possible, NTTA has also strived to frame innovation in more approachable ways for staff across the organization. Rather than focus on innovation, they prioritize improving work processes. This has been helpful in keeping staff at all levels engaged, including those who may not perceive innovation as their strength. Management within NTTA also communicate with staff consistently to seek input and identify opportunities for improvement.

The lack of a formal innovation evaluation process also ensures that no idea is left unheard. Their approach encourages the submittal and consideration of ideas, rather than setting procedural hoops for employees to jump through. Instead of paperwork and procedure, NTTA has opted for frequent communication between staff and leadership. With over 700 staff across the organization, their moderate size has afforded them the flexibility to be nimble and respond quickly to evolving needs within the organization. This focus on mission and goals has also helped NTTA avoid pursuing technologically advanced projects that provide limited benefit to the organization's core purpose.

### Initiative Highlights

- Data and Analytics. NTTA operates a mature business intelligence program that is focused on revenue assurance and business operations improvements. NTTA's program is supported by a team of dedicated analysts and an agency managed data platform with a level of access to the data. There are currently no plans to establish a regional data sharing system that shares traffic and other information.
- Unsolicited Proposals. In addressing pressures for innovation from external sources, such as vendors and business partners who present NTTA with unsolicited proposals, NTTA has adopted a similar approach. The organization's core mission and goals remain the ultimate test for whether an idea should be pursued. For example, in considering emerging vehicle technologies, such as connected and automated vehicles (CAVs), NTTA does not strive to be the first to allow vehicles to operate automated vehicles on their facilities, but rather seeks to explore connected capabilities further as it aligns with their core mission for ensuring safety on their facilities. Though they do not reject unsolicited proposals, they do provide suggestions to external vendors and business partners on how to adapt concepts to better serve NTTA's needs and meet its core mission.

## 7. Ohio Turnpike and Infrastructure Commission (OTIC)

*Innovation Focus: Innovation Program and Processes*

*Organization Type: Operator*

*Year Established: 1848*

*Employees: 903*

*Location: Ohio*

### Overview

Under the Ohio Turnpike Act, OTIC is authorized and empowered to construct, maintain, repair, and operate the Turnpike System at locations approved by the Governor of the State of Ohio. OTIC's mission is "to be the industry leader in providing safe and efficient transportation services to our customers, communities and partners." Internally, they established a set of 5 objectives: Improve safety (of employees and customers); Improve work life (of employees); Improve customer experience; Maintain excellent system conditions (pavement, bridge, culverts, fleet, technology, buildings); and Maintain strong financial leadership.

### Approach to Innovation

The innovation program within OTIC is relatively new, having been started in 2019. Three task teams were formed to address three areas of innovation:

- Internal technology task team focused on business technologies that would help improve the efficiency and effectiveness of OTIC's internal functions. Recently, the internal technology task team helped OTIC move towards electronic signatures, which enabled the organization to continue functioning even during the COVID-19 outbreak.
- External technology task team focused on technology that would help to improve the quality of OTIC's services on the roads under their management. Initiatives they are investigating include looking at new cameras at service plazas and the administration buildings.
- People task team focused on the people culture within the organization and the needs of the employees. This includes looking at how to boost morale and how to improve employee engagement across the organization, such as through recognition, and events.

Each of the task teams have a steering committee made up of 2-3 Directors, and 1 or 2 coordinators. The task teams bring together people across the organization to identify problems and issues, and to put forward strategies that could be implemented to address them rapidly. Decision-making related to small scale innovations that come out of each of the task teams are typically made through the task teams. While there is no formal evaluation process, each task team considers the initiatives they come up with against the Strategic Directives, objectives, and key results set out for the organization, and also consider the return on investment for each initiative through research. Issues that cannot be addressed through the task teams are elevated to the Executive Directors for further consideration.

As the innovation program is still in its first year, funding was not set aside specifically for the initiatives set out this year. However, beginning with OTIC's 2020 budget is expected to include resourcing for task team initiatives. An additional amount of contingency funding will also be set

aside to account for unexpected initiatives that arise beyond what is accounted for within the task teams.

Outside of the organization, OTIC also relies heavily on collaboration with key partners, such as the Ohio Department of Transportation (ODOT). In addition to partnership with ODOT on the Drive Ohio initiative, a “smart mobility test bed program”, OTIC also leverages its relationship with ODOT to bring efficiency to its internal business solutions, such as by sharing training platforms. OTIC is an active member of IBTTA and collaborates in innovation groups with other toll agencies such as PTC and the Indiana Toll Road (ITR).

### Initiative Highlights

- OTIC’s Strategic Planning Group have made use of a technology platform called Gtmhub to help the organization track their progress across identified objectives and key results (OKRs). The combination of task teams and tracking of Strategic Directives on the Gtmhub cloud-based platform has enabled broader participation from staff across the organization, and given opportunity for some staff to step up in ways that their day-to-day roles may not have otherwise allowed them to.
- Staff who invest additional time on innovation above and beyond their standard 40-hour work week are given the opportunity to bank that time for future use through OTIC’s flex time program. Despite not having any specific recognition programs related to the innovation task teams, OTIC has found that staff are generally motivated to engage and collaborate.
- Technology initiatives include a DSRC Connected Vehicle Test with Ford and Pavement Electronic Vehicle Charging.

## 8. Pennsylvania Turnpike Commission

*Innovation Focus: Innovation Process*

*Organization Type: Operator*

*Year Established: 1937*

*Employees: 2029*

*Location: Pennsylvania*

### Overview

PTC has a vision for “Driving the standard for safety, customer service and mobility” and their mission is to “operate a safe, reliable, customer valued toll road system that supports national mobility and commerce.” The agency’s strategic plan goals include: “maintain [their] sound financial position; strengthen [their] culture of internal customer service and accountability; and develop and empower an inclusive and innovative workforce.” Their vision, mission, goals, objectives, and values serve as the guiding framework for everything that PTC does.

PTC was awarded the 2019 Toll Excellence Award for Technology by the International Bridge, Tunnel and Turnpike Association (IBTTA) for the development of a suite of web-based applications that allow duty officers to respond proactively to situations that arise, and to help maintain traffic flow more effectively across the turnpike facilities.

### Approach to Innovation

PTC does not have a formal innovation program, but innovation is one of the core tenets that underpin their strategic plan and values. The organization considers innovation a part of every individual’s role, and a fundamental part of the agency’s culture. Innovation is focused from the top down, through the CEO, and permeates across the organization through inclusive initiatives such as their Innovation Council.

The Innovation Council was created through formal policy. Established approximately 6 years ago, it now follows a regular cadence, and is refreshed with a new internal chairperson every 2 years. Originally developed as a venue to invite external business partners to come in and share new innovations, the Council now has a much broader mandate, bringing together about 40 people from across the organization on a regular basis to learn about and discuss innovative initiatives. The CEO is a major champion of the Innovation Council and makes an effort to attend each one and join in on the discussion. External vendors, business partners, and stakeholders are often invited to join council meetings as well. The Innovation Council is the key mechanism for external vendors and business partners to present on new technologies and products.

PTC has also been working to expand the inclusivity and accessibility of these meetings so that more people across the organization can participate. Outside of the Innovation Council, staff are invited to submit ideas through a form on their intranet site. All ideas submitted through this mechanism are reviewed by the CEO, and then redistributed to others in the organization for review and response. While there is no formal evaluation framework, proposals are evaluated against the organization’s strategic plan. Similarly, proposals from external vendors and business partners that are brought in through the Innovation Council are assessed according to their business and financial case, as well as alignment with the agency’s core values.

### Initiative Highlights

PTC has been working to expand the inclusivity and accessibility of the council meetings so that more people across the organization can participate. In fact, as one way to evolve the council to promote innovation in all aspects of their culture is to provide an open invitation to all staff to attend apportion of the Council meetings. In 2021, they intend to expand the brainstorming component of the council meeting to include ad hoc open meetings to provide anyone in the organization the opportunity to provide input on initiatives.

In addition to the council meetings, a presentation series called “Turnpike Talks Live” was conducted in the Spring of 2020 and “Ted Talk” style presentations about various innovation related topics are conducted regularly. These talks are recorded and edited professionally for broad distribution. The agency also recently planned an Innovation Week event, which was hosted digitally due to COVID-19 limitations but resulted in more participants than had originally been anticipated for the in-person event.

## 9. State Road and Tollway Authority (SRTA)

*Innovation Focus: Innovation Process/Culture and Regional Collaboration*

*Organization Type: Operator*

*Year Established: 1953*

*Employees: 51*

*Location: Atlanta, GA*

### Overview

As an independent state-level agency, SRTA acts as Georgia's transportation financing arm, which includes several mobility connections and future electronic toll lanes. In partnership with the Georgia Regional Transportation Authority (GRTA), they manage commuter services and programs to improve accessibility to and from employment. SRTA also manages toll collection for Georgia's Express Lanes System via their all-electronic tolling technology called Peach Pass.

### Approach to Innovation

SRTA has an established culture that supports innovation throughout the organization. They have established 5 core values; Customer Focus, Integrity, Collaboration, Innovation, and Diversity. By being one of its core values, innovation is incorporated within its strategic plan, and while they have a Director of Innovation and Performance, innovation is led by all leaders and supported by their staff at SRTA.

After SRTA merged with GRTA, the Atlanta Region Transit Link Authority (ATL) was formed, essentially creating three authorities within one agency. While the agency shares one mission, vision, and strategic plan, they each have a different area of focus. SRTA's area of focus is broader than tolling, and more targeted on mobility. They have strategic measures of performance around transit, transportation, and transportation finance, all of which help drive innovation in the region. Leadership incorporates best practices at all levels to encourage and support the innovation culture within the organization.

### Initiative Highlights

SRTA has an innovative team supported by executive level managers within the organization who have developed strategies around data housed in their engineering department. These strategies maintain focus on the best path forward and help address challenges that can create hurdles for innovation. These strategies include a web-based database as an upgrade to their intranet for employees to understand recurring data needs. This database ensures easy access for all staff to locate data necessary to conduct business and includes integration between SharePoint and Tableau.

To ensure the agency is protected, SRTA has established a cybersecurity program for training and to maintain security measures. This effort is managed by their IT department.

SRTA hired a contractor to evaluate and identify their data needs and create a strategic plan around data. This process helped establish an enterprise data business plan for evaluation of data needs and manage all the initiatives. While the process is complex and takes time, they find value in it, and have completed the first phase.

## 10. Tampa-Hillsborough County Expressway Authority

*Innovation Focus: Connected Vehicle Pilot (FHWA Grant)*

*Organization Type: Operator*

*Year Established: 1963*

*Employees: 25*

*Location: Tampa, FL*

### Overview

The Tampa-Hillsborough County Expressway Authority (THEA) is an independent agency of the state of Florida. The agency was put in place to bring roadway infrastructure projects online more quickly through the use of tolling. It currently owns, maintains, and operates four facilities within Hillsborough County: The Lee Roy Selmon Expressway, Brandon Parkway, Meridian Avenue, and the Selmon Greenway. The Selmon Expressway is the only tolled facility out of the four and includes the award-winning Reversible Express Lanes (REL).

In addition to tolling, the agency also plays a role in driving innovation and improving mobility across the Tampa Bay Region. THEA has partnered with other organizations on community enhancement projects, including lighting bridges on the Hillsborough River and public art in Tampa and Brandon. In addition, THEA constructed the Selmon Greenway, a 1.7-mile multi-use trail that runs east-west under the Selmon Expressway through downtown Tampa that connects with the City's Riverwalk and Meridian Trail.

### Approach to Innovation

THEA is guided by a strategic blueprint with the "mission to provide safe, reliable, and financially-sustainable transportation services to the Tampa Bay region while reinvesting customer-based revenues back into the community." Their vision is to "lead, partner, and implement safe, economically-sound, and innovative multi-modal transportation solutions for [the] Tampa Bay community." Seven values guide the work that THEA does: People, Safety & Service, Community Focus, Regional Leadership, Efficiency, Economic Development, Local and Resource. Innovation is highlighted in at least two of these values: "Regional Leadership", and "Efficiency".

THEA does not have a formal program or process for innovation. However, the agency has benefitted from its participation in the United States Department of Transportation (USDOT) Connected Vehicle Pilot Deployment Program, which has afforded them the resources to invest in installation of supporting infrastructure within their facilities.

### Initiative Highlights

The agency has been involved in the testing and deployment of connected vehicle technology since 2015, and has published a brochure titled "Driving innovation and implementing change", which markets the agency's REL on the Selmon Expressway as an opportunity to test automated and connected vehicle technology. The brochure also highlights THEA's partnerships with the Center for Urban Transportation Research (CUTR) at the University of South Florida (USF), the City of Tampa, the Hillsborough Area Transit Authority (HART), the Florida Department of Transportation (FDOT) and private businesses. In particular, the brochure highlights the creative partnership between THEA and CUTR, describing THEA as a small, nimble, and responsive organization with a track record for innovation (e.g. being the first expressway to convert to all electronic tolling), and the CUTR as an internationally recognized multidisciplinary research institute providing specialized research into automated vehicles.

## 11. Transurban

*Innovation Focus: Innovation Process*

*Organization Type: Concessionaire*

*Year Established: 1999*

*Employees: 3000*

*Location: Australia, United States, and Canada*

### Overview

Transurban is a tolling and technology company based in Australia with a nine-member Board of Directors and a six-member Executive Committee. As a leader in the tolling industry, they established high performance metrics for research and innovation within the tolling and technology industry. Not only do they design and build new roads for today, they are considering ways to support future technology in transportation.

### Approach to Innovation

Transurban sees innovation as a means of looking toward the future as an organization. As such, they have a dedicated team that marries its mission and vision around that idea. The innovation team established six key objectives that map out their process throughout the organization. This creates linkages between ideas and shifting them into action.

It is evident that Transurban supports growth of their innovation as the team continues to develop value for the core business strategies. By dedicating an innovation team, it recognizes the need to evaluate new technologies as a prioritization strategy for emerging solutions that can future-proof the organization as a whole. Transurban's strategy team is continuously engaged to ensure resources are available for successful project completion and justification for funding.

The innovation team is made up of members of the operations team as their "boots on the ground" approach to reduce the risk of failure and to ensure long-term opportunities. In order to lower risk of short-term opportunities, public affairs is a part of the innovation team as well. Transurban understands that collaboration is the foundation to support innovation, and that flexibility is often needed to launch new initiatives. By identifying other business units as stakeholders on new initiatives, the innovation team can make sure they have the right staff working together on specific projects while setting up the best performance metrics to support the work.

### Initiative Highlights

- Opportunity/Problem Focus – providing a focus on driving safer operations and improved customer experience. Ideas are thoughts on particular problems that exist, and opportunities are solutions for the problems identified with support from validated data.
- Design Thinking Approach – effective non-linear process for innovation
- Design Thinking Application – iterative process for project launch
- Empathize, Define, Ideate, Prototype, Test, Implement
- Feedback throughout each step from external and internal stakeholders
- Foster Innovation Culture – builds momentum
- Development of a centralized innovation portfolio
- Internal engagement to expand new initiatives
- Business unit workshops