



CENTRAL TEXAS REGIONAL  
**MOBILITY AUTHORITY**

**INNOVATION TEAM**  
**WHITE PAPER**

# TECHNOLOGY EVALUATION RESEARCH INDUSTRY INNOVATION SCAN

October 2020

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for CTRMA



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The Mobility Authority established the Innovation Team in Fall 2018 to stay informed on emerging mobility and transportation technology and introduce opportunities for these emergent technologies and ideas through projects, programs, partnerships and policies. The purpose of these white papers is to provide a high-level of examination into emerging technologies and their case studies to support decision-making for solutions to the problems we face today and tomorrow.

# Introduction

The opportunities for agencies to innovate are immense but pose unique challenges. Innovation can be stymied in the face of institutional inertia or a lack of resources, skills and knowledge sets to implement and operate new technologies. A lack of strategic vision and planning can result in new but expensive technology innovations that are not flexible to change over time or fail to fulfill agency goals and objectives. To help address these challenges, the Central Texas Regional Mobility Authority (CTRMA) commissioned this report to gather input from others in the transportation sector and provide insight on developing and advancing innovations within organizations that can be sustained over time.

Research was coordinated in parallel with other CTRMA sponsored research conducted by the Texas A&M Transportation Institute (TTI) to develop an innovative technology corridor within the Austin area. The objectives of the effort presented in this white paper were to:

- Identify public sector best practices in the evaluation of emerging technology solutions;
- Identify technologies and innovative business processes for future consideration by the CTRMA; and
- Establish initial strategies for CTRMA to use in identifying, tracking, and evaluating new and innovative technology solutions.

To achieve these objectives, the project team conducted research using: publicly available documents, reports from various public sector agencies, internal project reviews and targeted interviews. This report summarizes research findings and provides recommendations for CTRMA in the following aspects of innovation:

- **Ideation:** How are projects brought about? Are innovations the result of internal need, external forces, or some combination of the two?
- **Institutional Alignment:** How are innovative projects aligned with agency vision, mission, and goals?
- **External Collaboration:** What partners are needed and how do agencies interact with them?
- **Funding:** How are innovative projects funded?
- **Procurement:** What sort of new procurement approaches are agencies using to support innovation?
- **Operations:** How are innovative projects run on a day-to-day basis?
- **Evaluation:** How are projects evaluated in terms of success and how is accountability for achieving successful outcomes maintained?

The remainder of this white paper is structured as follows:

1. **Existing Conditions:** A brief overview of CTRMA's role in Central Texas and strategic plan.
2. **Literature Review and Industry Scan:** A list of agencies that have successfully deployed innovative initiatives and subsequent agency case studies covering innovation structures and processes.
3. **Observations, Findings and Recommendations:** A list of recommendations on how CTRMA can advance innovative initiatives based on lessons learned from the case studies.

## Existing Conditions

CTRMA is an independent government agency created in 2002 whose role is to improve the transportation system in the Williamson and Travis counties. The agency's mission is to implement innovative, multimodal transportation solutions that contribute to reducing congestion and creating transportation choices that enhance quality of life and economic vitality.

CTRMA has traditionally fulfilled this mission by developing and operating toll roads and most recently express lanes. Several transportation agencies operate roadways in Texas and, in Central Texas, the Texas

Department of Transportation (TxDOT) and CTRMA both operate toll roads. In spite of this traditional focus on toll roads, CTRMA is empowered under Chapter 370 of the Texas Transportation Code to implement and operate a range of transportation systems including roadways, airports, seaports, and transit services.

[CTRMA's 2018 Strategic Plan](#) outlines the agency's goals and strategies, including:

- Deliver multi-faceted mobility solutions
- Employ a collaborative approach to implementing mobility solutions
- Invest in efforts that extend beyond roadways
- Explore and Invest in Transformative Technology and Adopt Industry Best Practices
- Deliver Responsible Mobility solutions that respect the communities we serve
- Invest in Initiatives that Protect our Environment
- Deliver on Commitments to our Customers and Our Investors

The strategic plan also outlines challenges, risks, and opportunities within Central Texas including growing distance between affordable housing, employment centers, and healthcare; freight rail traffic density; environmental regulations; shifting political priorities; technology advancement; and traffic demand management. Any number of these challenges may be met with the implementation of new and innovation transportation services that leverage emerging technologies.

Although CTRMA is funded with fees from system users and is not taxpayer funded, it is still a governmental agency with responsibility to act as a good steward of available funding. Technology implementation carries significant risk, particularly given the importance of regional transportation to the economy and the need to provide safe travel options. Agencies such as CTRMA are not in a position to freely experiment with emerging technologies and must therefore carefully and methodically assess new innovations before investment and implementation. This challenge is complicated by the number of technology providers and other vendors with solutions to offer.

Currently, CTRMA has no “end-to-end” process for receiving, evaluating, selecting, operating and evaluating innovative project ideas that fall outside of traditional business lines. Furthermore, CTRMA has no tool or resources in place to support such a process. This research effort and associated white paper are intended to inform the subsequent development of strategic innovation processes and the identification of necessary resources.

## Literature Review and Industry Scan

### Purpose and Methodology

A literature review and industry scan were performed to gather insights from transportation agencies implementing innovative technology solutions. Tolling agencies were interviewed while other transportation agencies were assessed through a literature review of available planning documents, research reports, and similar publicly available resources. Specifically, the literature review and industry scan focused on:

- Processes used by agencies to identify and track emerging technologies that may impact their service delivery model including discrete phases and benchmarks/decision points for advancement within the implementation process;
- Methods for assessing potential technology impacts, assessing technology risks, identifying costs and benefits, and prioritizing emerging technologies for future consideration/implementation;
- Institutional challenges to emerging technology evaluation and implementation and strategies for overcoming those challenges;
- Resource demands (staffing and monetary) for technology evaluation and implementation processes;
- Information technology, software, and other tools used by agencies for these activities;

- Technology innovations currently under consideration or in active implementation by transportation and tolling agencies and the results of those initiatives;
- Insights, lessons learned, and best practices in process that inform decision making including evaluation of innovative technology solutions in a public-sector setting;
- Classifying processes for technology innovation and implementation based on whether they are ad hoc or formalized;
- Implications for CTRMA the agency and its peer agencies in exploring emerging technology implementation in Central Texas.

The review and scan were performed in the following steps to create case studies on each agency:

1. Develop a list of governmental agencies implementing innovative technology solutions as part of long-term agency-wide strategy categorized by industry, agency type and innovation(s)
2. Profile agencies through secondary industry research
3. Supplement tolling industry profiles with interviews of agency staff

## Agencies Studied and Staff Interviewed

Table 1 shows the list of agencies that were used to create case studies, categorized by type, along with staff interviewed at each agency. Agency types include:

- **Agencies with Toll Responsibilities:** Agencies with responsibilities over tolling that have led or participated in activities related to emerging technologies.
- **Agencies with innovative Approaches:** Agencies that do not have direct responsibilities over tolling but are broadly recognized for their innovative approaches and activities related to emerging technologies.
- **Innovation Hubs:** Accelerators, incubators, and agency collaborations that have helped to advance activities related to emerging technologies.

**Table 1 - List of Agencies Researched**

Agency Type	Agency Name	Staff Interviewed
Agencies with Toll Responsibilities	North Texas Tollway Authority	Elizabeth Mow, Assistant Executive Director of Infrastructure
	Tampa-Hillsborough Expressway Authority	Bob Frey, Director of Planning and Innovation
	Pennsylvania Turnpike Commission	Robert Taylor, Chief Technology Officer Kathryn Hartzel, Director of Technology and Innovation
	Ohio Turnpike Commission	Brian Kelley, Chief Technology Officer
Agencies with Innovative Approaches	LA Metro, Office of Extraordinary Information	Colin Peppard, Senior Direct Public Private Partnerships
	San Francisco County Transportation Authority	Warren Logan, Senior Transportation Planner (Former)
Innovation Hub	NYC MTA Transit Partnership	Not interviewed. Research team gathered information from publicly available documents.

# Agencies with Toll Responsibilities

## North Texas Tollway Authority

The North Texas Tollway Authority (NTTA) develops and maintains toll roads, bridges, and tunnels in the North Texas region including the metropolitan centers of Dallas and Fort Worth. The agency'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 bondholders; and
- Partner to meet our region's growing need for transportation infrastructure.

The organization was originally created in 1997 to finance, construct, and oversee turnpike projects in north Texas that were transferred from the former Texas Turnpike Authority. NTTA is headquartered in Plano, Texas, and covers the counties of Collin, Dallas, Denton, Tarrant, and Johnson.

As a political subdivision of the state of Texas, NTTA is authorized to acquire, construct, maintain, repair and operate turnpike projects across the north Texas region. NTTA is not a part of TxDOT, and therefore does not receive funding from gas taxes, vehicle registration fees, and other funds that support TxDOT. Instead, NTTA, like CTRMA, funds its projects largely through the sale of bonds, which are repaid through the collection of toll revenues.

The NTTA does not make decisions about when and where to construct new roads. Rather, the Texas Legislature and regional transportation officials make those decisions. However, NTTA has the first option (primacy) to develop new roads as toll projects. If a proposed facility cannot be supported by tolling, NTTA may choose to waive its primacy. Actual planning and construction of new roadway facilities involves partnerships with other parties including city, county, state, and federal officials.

The NTTA strategic plan for the 2021-2025 horizon outlines five overarching goals:

1. Customer driven Organization;
2. Financially Sound & Vibrant Organization;
3. Delivering Transportation Solutions;
4. Respected Leader and Partner; and
5. Highly Qualified, Energized & Engaged Team. Departmental objectives align to these goals.

### Innovation Program and Process

NTTA previously implemented an innovation program but it is no longer in place. The organization found that innovation needs to be more organic within each area of its business, and centralizing innovation created more bureaucracy than required. NTTA now embeds innovation within the core business functions of each individual business area and encourages all departments to innovate in terms of identifying ways to improve all aspects of everyday work. Each department is responsible for identifying innovative initiatives and the subsequently funding and tracking them. Initiatives are only elevated to a higher level of executive decision-making when necessary, such as when 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.

NTTA's core mission and goals serve as guiding principles for assessing opportunities for innovation and are the basis by which each group considers and prioritizes new initiatives. By design, the organization does not have an evaluation framework specific to innovation as evaluation criteria are assumed to be different for each part of the organization. The agency mission and associated goals thus serve as the guideposts for individual departments to evaluate the suitability of proposed initiatives. Even at the corporate level, projects are selected with NTTA's core mission in mind and then prioritized through negotiation across departmental leaders rather than through a formal prioritization framework. 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.

For example, information technology (IT) is an area of business operations that often encounters competing needs across departments. To address this, NTTA set up an IT counsel to serve as a venue for prioritizing IT needs across multiple departments within the organization. Needs focused on the agency's core mission and goals are prioritized with all other IT needs being negotiated and distributed in turn to avoid some departments getting perceived preferential treatment at the expense of others.

Whenever possible, NTTA has 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.

The lack of a formal innovation evaluation process also ensures that no idea is left unheard. This maintains a relatively low bar for consideration of ideas rather than setting procedural hoops for employees to jump through. Instead of paperwork and procedure, management within NTTA consistently communicates with staff to seek input and identify opportunities for improvement. The agency's moderate size of just over 800 staff affords them the flexibility to be nimble and respond quickly to evolving needs within the organization.

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 informal approach. The organization's core mission and goals remain the ultimate test for whether or not an idea should be pursued. For example, in considering emerging vehicle technologies, such as connected and automated vehicles (CAVs), NTTA is not striving to be an early implementer and allow automated vehicle operation on their facilities. Rather, the agency seeks to further explore connected capabilities in alignment with their core mission for ensuring safety on 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.

### Key Success Factors

- **Innovation grounded on core mission and goals (ideation, institutional alignment):** NTTA does not innovate for innovation's sake. All implemented innovation initiatives are done to address elements of the agency's core mission and goals. Ideas and products that are deemed inconsistent with the mission and associated goals are either rejected or adapted to meet core needs.
- **Innovation as a core competency at all levels (institutional alignment, operations):** Innovation is a core competency that NTTA strives for at all levels of the organization. Leaders at the highest level are expected to be champions of innovation within all business areas and innovation is a trait that they seek out in staff hired at all levels. This includes departments not traditionally considered to have a role in innovation like maintenance.
- **Right-sized approaches tailored for each part of the organization (institutional alignment):** Rather than a formal centralized approach to innovation, NTTA leaves responsibility for innovating to each department since needs and assessment of return on investment (ROI) are different within each department. As such, each department has their own approach and process for innovating.
- **Inclusive consideration of innovation across departments (ideation, institutional alignment):** NTTA recognizes that innovation takes many forms and can be different depending on the department. Rather than asking staff to innovate, staff are asked for their perspectives on how improvements can be made within their work area to ensure that no good ideas are missed.
- **Consistent communication that reaches staff where they are (operations):** NTTA has a workforce that possesses diverse skillsets. While some work on a daily basis in front of a computer, others rarely come across one in their day-to-day work. To ensure that innovation permeates throughout the organization, NTTA brings communication to where staff are in their jobs. Rather than relying on email, which is particularly challenging for operations staff, management communicates with staff face-to-face where possible.

### Tampa-Hillsborough Expressway Authority

The Tampa-Hillsborough Expressway Authority (THEA) was established by the Florida legislature in 1963 as an independent agency of the State of Florida to bring roadway infrastructure projects online more quickly

through the use of tolling. Subsequent legislation passed in 2014 provided THEA the ability to offer services beyond Hillsborough County to surrounding counties including Hardee, Manatee, Pasco, Pinellas, and Polk. THEA currently owns, maintains, and operates four facilities: The Lee Roy Selmon Expressway, the Brandon Parkway, Meridian Avenue, and the Selmon Greenway. The Selmon Expressway is the only tolled facility out of the four and features a segment with Reversible Express Lanes (RELS).

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

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** – Focus on customers, and attract, develop, and nurture talent within the organization and support the diversity of employee skills and strengths
- **Safety & Service** – Serve as a collaborative partner and provider of safe, reliable, and financially sustainable transportation services to customers and the community
- **Community Focus** – Committed to ensuring the money and investment earned from our assets goes back into the communities served
- **Regional Leadership** – Dedicated to being a leader in advancing mobility in the region and implementing innovative and practical solutions to transportation challenges
- **Efficiency** – Be a versatile and agile organization that proactively solves issues, pursues opportunities, and embraces innovation
- **Economic Development** – Commit to supporting economic development in the Tampa Bay region through services and products
- **Local Resource** – Engage partners and stakeholders with our unique perspective and expertise

Innovation is highlighted in at least two of these values: "Regional Leadership", and "Efficiency". Innovation can also support other focus areas such as "People", "Safety & Service", "Community Focus", "Efficiency", and "Economic Development". The value of "Local Resource" is focused on the relationships between THEA and its regional partners, which has helped to contribute to the advancement of collaborative projects.

### Innovation Program and Process

THEA does not have a formal program or process for innovation. Rather, 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 the installation of innovative infrastructure within their facilities. The agency has been testing and deploying connected vehicle technologies since 2015 and has published a brochure titled "Driving innovation and implementing change", which markets the agency's Selmon Expressway REL 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. THEA's creative partnership with CUTR is a good illustration of how a small, nimble, and responsive organization with a track record for innovation (e.g. being the first expressway to convert to all electronic tolling) can partner with an internationally recognized multidisciplinary research institute providing specialized research into automated vehicles.

### Key Success Factors

- **Leveraging grant opportunities (funding, procurement):** Receipt of the USDOT grant for the Connected Vehicle Pilot Deployment program served as a catalyst for many of THEA's current innovation initiatives. Not only did it provide the agency with the resources required to invest in technology upgrades, it also provided national and international exposure to THEA.

- **Setting the ground for innovation to occur (institutional alignment, external collaboration, procurement):** Setting the groundwork for the testing of innovative technologies within their facilities has enabled THEA to extend an invitation more broadly to other potential vendors and business partners to test their technologies in the future.
- **Collaboration with regional partners (external collaboration):** THEA has partnered with CUTR, an internationally recognized multidisciplinary research institute, to support and expand its capacity for innovation. This has enabled the agency to innovate beyond the limits of its own workforce and leverage the expertise that CUTR as a research institute has on specific subject matter, such as CAVs.

## Pennsylvania Turnpike

The Pennsylvania Turnpike Commission (PTC) was created in 1937 to construct, finance, operate, and maintain the Pennsylvania Turnpike. The turnpike is a 630-mile long, cashless tolling facility that uses a combination of E-Z Pass and automatic license plate recognition (ALPR) technologies. Signed into existence by the governor at the time, PTC is not an agency of Pennsylvania Department of Transportation (PennDOT) but works closely with PennDot. PTC is part of a collaborative research program known as PennSTART, conducted in partnership with PennDOT and Penn State University (PSU). The program is focused on the testing of advanced Intelligent Transportation Systems including CAVs.

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 has set out three key goals:

- Maintain sound financial position;
- Strengthen culture of internal customer service and accountability; and
- Develop and empower an inclusive and innovative workforce.

In addition to its strategic plan, the PTC has a long-range plan that sets out its strategic investments through 2035. The current document, titled “The Bridge to Zero Fatalities,” highlights the agency’s dedication to safety as one of its core values. Other documents stress the value of open communications, being customer driven, being responsible, and teamwork. Taken together, these vision documents and associated goals, objectives, and values serve as the guiding framework for everything that PTC does.

### Innovation Program and Process

PTC does not have a formal innovation program, but innovation is a core tenet that underpins their strategic plan and organizational values. PTC 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 established through agency policy approximately 6 years ago and now follows a regular cadence with a new internal chairperson being appointed every 2 years. Originally developed as a venue to invite external business partners to 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 tries to attend each one and join the discussion. External vendors, business partners, and stakeholders are often invited to participate in 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. In addition to the meetings, a presentation series called “Turnpike Talks Live” is regularly held to provide “Ted Talk” style presentations about various innovation related topics. These talks are recorded and edited professionally for broad distribution. The agency 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.

Inclusivity across the organization has been important for PTC. 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.

PTC was recently 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.

### Key Success Factors

- **Strong commitment from Executive champions (ideation, institutional alignment, operations):** Leadership at the Executive level are committed to championing the cause for innovation across the organization. This support is evidenced through the CEO's participation in the Innovation Counsel, engagement with staff, and the internal process for reviewing new ideas.
- **Nurture of internal innovative culture (ideation, institutional alignment, operations):** PTC has invested time and resources to nurture an innovative culture across the organization. In addition to providing avenues for staff across the organization to share their ideas openly, the "TurnPike Talks Live" series and other organized programming help to inspire staff to think of new ways of doing their work.
- **Inclusive approach to seeking out innovation (ideation):** Inclusivity is a consistent theme across the different mechanisms in which innovation is cultivated within the PTC. There is recognition that innovative ideas can come from anywhere within the organization; not just those whose titles and job descriptions suggest that they be innovative.

## Ohio Turnpike and Infrastructure Commission

The Ohio Turnpike and Infrastructure Commission (OTIC) is a body of the State of Ohio, created in 1949 through the Ohio Turnpike Act.<sup>1</sup> OTIC operates the Ohio Turnpike, a 241-mile long limited-access toll highway in Ohio that provides east-west connectivity across the northern part of the state and serves as a primary corridor between Chicago in the Mid-West and Pittsburgh in the East. OTIC operates 14 service plazas along the length of the Turnpike, located approximately every 30 to 50 miles. The service plazas provide customers a place to rest and act as service points for customers to purchase toll passes and access support resources.

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. The Commission is also authorized and empowered to issue Turnpike Revenue Bonds of the State of Ohio, payable solely from Turnpike revenues. Tolls on the Turnpike are currently assessed by gross-weight, number of axles, and distance travelled. Vehicles are weighed as they enter the turnpike (through scales located at the entrance lanes of each toll plaza) and classified according to seven different vehicle classifications. Under the current Toll Collection System (TCS), which was installed in 2009, customers have the option of paying through either an electronic toll-tag, *E-ZPass*, or by cash. Users of the *E-ZPass* have the benefit of a lower toll charge, as well as shorter wait times. There are currently plans to modernize the toll system, which will enable *E-ZPass* users to be charged at highway speeds.

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:

1. Improve safety (of employees and customers)
2. Improve work life (of employees)

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<sup>1</sup> [https://www.ohioturnpike.org/docs/default-source/annual-report-files/cafr-2019-final.pdf?sfvrsn=d361ebc4\\_2](https://www.ohioturnpike.org/docs/default-source/annual-report-files/cafr-2019-final.pdf?sfvrsn=d361ebc4_2)

3. Improve customer experience
4. Maintain excellent system conditions (pavement, bridge, culverts, fleet, technology, buildings)
5. Maintain strong financial leadership

### Innovation Program and Process

The innovation program within OTIC is relatively new, having been started only about a year ago. Three task teams were formed to address three areas of innovation for the organization:

- **Internal technology task team:** Focused on business technologies that would 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. Current initiatives include evaluating new cameras at service plazas.
- **People task team:** Focused on culture within the organization and the needs of agency employees. This includes looking at how to increase morale and improve employee engagement across the organization through recognition, events and similar activities.

Each of the task teams have a steering committee made up of two to three directors and one or two coordinators. The task teams gather employees from across the organization to identify problems and issues and forward strategies that could be implemented to address these problems rapidly. The task teams were created with the intent of making it easier for initiatives to be implemented. Rather than focusing on large multi-year projects, these task teams strive to find innovations that could be "quick wins" for the organization.

Separately, OTIC has also set up a Strategic Planning Group made up of agency Directors. The group has developed a set of Strategic Directives for the organization, making use of a technology platform called Gtmhub to help track 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 provided staff the opportunity to engage in ways that their day-to-day roles may not have otherwise allowed. While OTIC does not conduct formal performance evaluations for most staff within the organization, 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 as it may not be something they typically do in their normal roles.

Decision-making on small scale innovations from the task teams is typically made through the task teams themselves. While there is no formal evaluation process, each task team considers their initiatives against the Strategic Directives, objectives, and key results set out for the organization. Task teams 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.

The innovation program is still in its first year and funding is not set aside specifically for initiatives set out this year. However, beginning 2020 the OTIC 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 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).

## Key Success Factors

- **Set up opportunities for internal collaboration (ideation, institutional alignment, operations):** The OTIC approach to innovation, which involved setting up internal task teams, has provided an opportunity for internal collaboration across departments. This has enabled people from across the organization to share their ideas and work together to co-create solutions that work for the various departments.
- **Rely on tracking of strategic directions and objectives to guide innovation (institutional alignment, evaluation):** Rather than rely on a static evaluation framework, OTIC has chosen to leverage a dynamic tracking system to track the organization's progress against key objectives. The platform provides transparency to the entire organization on what innovative initiatives are intended to achieve, and also provides a way for staff across different departments to center their ideas and proposals around.
- **Share experience and practices broadly with industry partners (external collaboration):** In addition to looking internally, OTIC also reaches out to peer agencies on a regular basis to share emerging practices and experiences. This outreach has helped OTIC to keep abreast of emerging trends and innovations that could be used to support the organization's mission.

## San Francisco County Transportation Authority

The San Francisco County Transportation Authority (SFCTA) is the transportation planning and congestion management agency for the San Francisco County Area. The agency is governed by a board of 11 members of the San Francisco Board of Advisors who serve as the sitting Transportation Authority board members. Though not officially a tolling agency, pricing is considered within the tools that SFCTA uses to manage traffic congestion. SFCTA plays a key role in funding and overseeing project implementation with their partner agencies, including the San Francisco Municipal Transportation Agency (SFMTA), San Francisco Public Works, and BART. They also lead the development of major capital projects in and around the county.

### Innovation Program and Process

As SFCTA operates in an environment where many new transportation technologies have emerged over the last few years, the agency is in a position to adapt quickly to the evolving conditions. A recent issue for SFCTA was that many emerging technology companies were interested in testing their technologies on streets across San Francisco County. However, SFCTA had no way of determining the actual impact and benefit of these technologies on current and historical issues of importance to the agency and the region.

To address this need, SFCTA commissioned the development of an Emerging Mobility Evaluation Report, which provides a policy framework and approach to evaluating emerging mobility options. A total of ten guiding principles, aligned to municipal and county goals, were developed. Principles included: Safety, Congestion, Transit, Accountability, Equitable Access, Labor, Disabled Access, Financial Impact, Sustainability, and Collaboration. Each principle is associated with a set of outcome metrics with policy and design features guiding the various service elements of each emerging mobility service. This evaluation framework provided SFCTA with the ability to more clearly articulate their needs to the industry, be selective in the way that they choose to engage with industry on pilot projects, and advance pilots towards adoption and implementation when appropriate.

From a funding standpoint, SFCTA has the ability to allocate a minor amount of discretionary funds towards special projects that are deemed worthwhile. However, determining what projects and pilots are worthwhile has been an ongoing challenge. A critical issue for SFCTA was to ensure they were not doing pilots for the sake of doing pilots, but rather addressing needs and solving problems. In addition to direct funding or partnerships, SFCTA is able to provide in-kind support to emerging initiatives by issuing temporary permits. While funding is helpful, SFCTA has found that because so many external vendors and potential business partners in this space are backed by venture capital, funding is not typically a critical need.

Internal culture was key to the reason that SFCTA took on the task of leading the development of the evaluation framework. While in many other parts of the country, municipalities are leading the planning of innovative mobility services, institutional dynamics lent itself to SFCTA taking on this task rather than the area municipalities.

### Key Success Factors

- **Ground evaluation in core values, goals, and needs (ideation, institutional alignment, external collaboration, evaluation):** The evaluation framework was developed with the values, goals and needs of the agency in mind. It has enabled the agency to provide transparency in their evaluation and treatment of different mobility options.
- **Be clear on expectations to the industry (external collaboration, evaluation):** The evaluation framework approach has enabled SFCTA to communicate to the industry more clearly on their specific expectations and allowed the industry to adapt accordingly. While not all private sector providers will adapt, the framework provides the guidance needed to identify where there is misalignment.
- **Pilot with a purpose in mind (institutional alignment):** There are many initiatives being tested across the agency, and limited resources to allocate in funding and managing these initiatives.

SFCTA's approach emphasizes the need to pilot with specific purpose in mind, and the evaluation framework provides an effective structure for ensuring that pilots are conducted with the intent of evaluating specific impacts.

## Los Angeles Metropolitan Transportation Authority

Los Angeles Metropolitan Transportation Authority (LA Metro) is the regional public transportation authority for the Los Angeles metropolitan area. The agency covers a broad range of roles for the region, serving as transportation planner, coordinator, designer, builder, and operator for one of the country's largest and most populated counties.

### Innovation Program and Process

The innovation program within LA Metro originally began as a way for the agency to handle unsolicited proposals. While the initial focus of this process was to facilitate the review of unsolicited infrastructure projects, emerging mobility providers eventually used it to bring their ideas before the agency. Though the process does not focus exclusively on innovation, it is a key tool in the innovation process within Metro.

Unsolicited proposals enter LA Metro through a simple two-part process with step one being a conceptual proposal, and step two being a more detailed proposal. LA Metro wanted to first create a low bar for submissions to ensure that anyone, including individuals, would be able to submit ideas for review. Submissions need to include only as much information as needed to articulate the idea to LA Metro staff. Internally, diverse teams comprised of experts and potential stakeholders across the organization are assembled to conduct an initial review focused on potential value to Metro and clarifying questions for the proposer. In the second step, additional details are requested for ideas considered to be of potential value to Metro. A Request for Detail Proposal is issued, which asks the proposer questions that can be quantitatively and qualitatively analyzed to determine whether the project could actually be implemented. While LA Metro has a broad set of questions available for reviewers to ask, each individual process differs.

This approach to reviewing unsolicited proposals required a culture shift within LA Metro. The CEO is a champion and has made clear to staff that review incoming proposals that the process is part of their job. Staff are required to understand there is not to focus solely on figuring out whether incoming ideas would work or not, but to also consider if ideas should be implemented if they could work. The philosophy is that initiatives that are worth implementing should be pursued and made to work through problem solving.

LA Metro has been able to capitalize on diverse media outlets to garner attention from a broader base of potential proposers and idea proponents. This includes talking with media companies that are typically more focused on technology outside of the transportation industry. However, one challenge that LA Metro has faced with this approach to unsolicited proposals is inefficiency. As the bar for submission is low, LA Metro gets numerous proposals. Staff often have to navigate through many ideas before they come across some that are worthwhile.

### Key Success Factors

- **Create space for flexibility and adaptability (ideation, external collaboration):** The process that LA Metro has created is built on flexibility and adaptability. It meets the needs of each separate idea that comes through their process and allows the agency to scale responses according to what is required.
- **Executive support towards the innovative culture (institutional alignment):** The cultural shift within the agency was key to the success of their program and associated processes. Without executive direction from the CEO that the reviews process be a key component of each employee's role, initiatives would not be successfully implemented.
- **Question the status quo and historical approaches (operations):** The program required many across the organization to change the way they approached problem solving. In some cases, this pushed staff to dig deeper into the actual underlying reasons for why the agency did things in certain ways. Staff had to identify historical inefficiencies that were not related to policy but more related to historical limitations of the past and could be solved today.

## New York City Transit Innovation Partnership: Transit Tech Lab

In 2018, the New York City Metropolitan Transportation Authority (NYC MTA) and the Partnership for New York City created the Transit Innovation Partnership (TIP).<sup>2</sup> The TIP's purpose is to position NYC as a global public transit leader through projects that improve transit performance. To realize this goal, the TIP launched their first initiative: The Transit Tech Lab.

The Transit Tech Lab (Lab) is an annual program that provides an opportunity for public agencies to partner with startup companies and deploy technology solutions focused on solving agency problems. Startups benefit from exposure to customers while agencies benefit from the ability to determine how well each technology solves problems in a real-world application. Each year, the Lab defines program focus areas and startup companies apply to be part of the annual cohort. For 2020, the Lab defined the following focus areas:

- **Accessibility:** Improve accessibility for NYC customers with auditory, visual, mobility and mental impairments, the elderly, and childcare givers
- **Curb Coordination:** Streamline curb activity among passenger cars, for-hire vehicles public buses, commercial trucks, commuter vans, tour buses, bicycles, and pedestrians
- **Revenue:** Diversify and increase recurring revenue for transit agencies
- **Signaling:** Modernize the subway signaling system faster and at a lower cost

Companies selected include: Acoustic Protocol, Navilens, Okeenea, knaq, Allvision IO, Carmera, Curbflow, Numina, and Miles. Partner organizations include the New York City Transit, NJ Transit, and the Port Authority of New York and New Jersey.

2019 challenges included the broader categories of bus and subway. The subway category included companies Axon, Vibe and Veovo while the bus category included Pallisade Labs, PIPS Technology, Preteckt, and Remix.

### Structure

The TIP is structured as a public-private partnership overseen by an advisory board of professionals from business, government, civic and academic institutions. The TIP's board is headed by a chair while the TIP itself is led by an executive director with the Lab being led by the director. Funding and staffing for the program are provided by the Partnership Fund for New York City. Although the TIP does not have explicit power over other groups, it fosters collaboration by providing influence and value to those who participate as follows:

- Public agencies participate because it solves their problems with limited time funding
- Private sector participates because it helps them evaluate if a startup should receive their investment
- Startups participate because it provides them time with customers to improve their products and services, showcase credibility through participating and the potential for a future contract

### Process

The Lab uses four phases to evaluate technologies: the application phase, the accelerator phase, the pilot phase and the post-pilot phase.<sup>2</sup>

During the application phase, startups are evaluated based on the following:

- Early- to growth-stage company with innovative solution to one of the selected challenge areas
- Company has at least a working beta version of their technology and a proven track record of successfully delivering to customers
- A corporation, joint venture, partnership, or LLC as defined by law

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<sup>2</sup> <https://transitinnovation.org/>

- Companies based in New York state or that are expanding into New York state
- Company is independently owned and operated
- Company employs 200 or fewer persons
- Company is not a subsidiary of a larger entity
- Company representatives are available to be onsite in person on January 14, 2020 and for duration of trial and pilot
- Registered to do business in New York<sup>3</sup>

Agencies passing this initial screening are invited to apply through F6S.com. Following the online application, semi-finalists are selected to interview with finalists being selected from the interview pool. If selected to participate in the cohort, the company moves into the accelerator phase.

During the accelerator phase, all participants define goals for the eight-week program that will inform the decision on whether to move forward with a pilot between the public agency and the startup. The accelerator phase includes activities such as agency tours and meeting with agency executives and companies are provided co-working space if necessary. At the end of the 8-weeks, the agency and startups decide whether or not to continue with a pilot.

If partners choose to pursue a pilot, they enter the pilot phase and negotiate implementation terms. Although pilots are not paid, there is some grant funding available from NYSERDA for the startups.<sup>4</sup>

At the end of the up to year-long pilot demonstration the program moves into the post-pilot phase. In the post-pilot phase, the public agency evaluates whether or to continue funding the solution through a competitive RFP or another procurement mechanism such as a sole-source contract.

Opportunities and challenges associated with implementing this type of program include:

Opportunities	Challenges
Collaborate with multiple public and private stakeholders	Need staff hours to create and manage the program
Shorter time to pilot for technologies	Requires buy-in from diverse stakeholders external to the organization
Action focused program provides real-world results	Must provide significant value to all stakeholders to create buy in
Flexible year-by-year program that can adapt to address problems year-by-year	Participating agencies must identify potential budget to allocate for post-pilot procurements to ensure pilots have the potential to live beyond one-off demonstrations if desired by both parties. Without the potential for funding the incentive for startups to participate decreases.

<sup>3</sup> <https://transitinnovation.org/faq>

<sup>4</sup> <https://www.nyserda.ny.gov/>

# Observations, Findings, and Recommendations

Transportation agencies are increasingly under pressure from internal and external forces to innovate. This can be a significant challenge to agencies and staff that lack: the necessary expertise to evaluate, procurement mechanisms to implement, and resources to operate innovative technologies. This research effort has shown that a formal program is not necessary for innovation, but an organizational culture of innovation is required. For example, the Tampa Hillsborough Expressway Authority has been a leader in testing connected vehicles technologies in a tolling environment but does not have a formal innovation program in terms of dedicated innovation staff. In fact, the tolling organizations interviewed for this effort generally do not have formal programs but rather stress the need for innovation at all levels of the organization and in all business lines and create internal organizational structures to support that culture.

The following are observations, finding and recommendations related to key success factors for innovation:

- Ideation
- Institutional Alignment
- External Collaboration
- Funding
- Procurement
- Operations
- Evaluation

## Ideation

In most cases, while innovative ideation can result from external forces it is first driven by internal forces. Successful innovation within the tolling agencies interviewed for this effort starts with internal recognition among executive leadership that innovation is needed, and a culture of innovation is subsequently facilitated throughout the organization. Innovation should not be the job of any one particular business line, even though innovation processes may be coordinated by an innovation officer or one particular business line's director (such as operations or information technology). Employees at all levels should be empowered to innovate as a means of improving day-to-day operations, meaning that roles not traditionally associated with innovation, such as administration and maintenance, should be included in innovation activities.

Facilitating recurring meetings or innovation councils provides a mechanism to facilitate internal innovation as well as respond to external innovation forces. Such councils should include membership from across all business lines and may serve as a means of prioritizing needs and "negotiating" on innovations that require tradeoffs between departments. Meetings can also serve as a means of hearing from those outside the agency, such as vendors or universities, who have creative ideas for the agency to consider.

The Pennsylvania Turnpike's Innovation Council brings together staff from all departments and business lines to coordinate innovation initiatives and learn about new opportunities. Both CTRMA and the Pennsylvania Turnpike have a diverse workforce with expertise spanning maintenance and operations to strategy and executive management. Both organizations have a strong commitment towards innovation from the highest levels of leadership, and lessons from Penn Turnpike's experience in nurturing an innovative culture across the organization can help CTRMA understand how to create a similar environment.

## Recommendations

- Develop opportunities for agency staff at all levels to submit innovative ideas that would that would improve their day-to-day work.
- Facilitate periodic communications among all departments and business lines that stresses the need for innovation and holds them accountable for innovation as part of their routine responsibilities.
- Empower business lines to make their own decisions on what innovations to pursue, reserving decisions by executive leadership to those with a high dollar value or for which tradeoffs between different lines are required.

## Institutional Alignment

As noted earlier, internal institutional alignment starts with executive leadership and empowerment of employees to pursue innovation that meets their day-to-day needs. Innovation becomes embedded in core functions across departments and business lines. Although innovation may look different in different areas of the agency, it must all be carried out with a focus on meeting the agency's strategic goals. This establishes a consistent and easily communicated framework for prioritizing investment and evaluating tradeoffs between competing proposals. NTTA's culture of innovation is unwavering in its alignment to the agency's core mission and values. Creating this culture of innovation within NTTA required executive commitment at the highest levels, not only from the CEO, but also in the management of each department. Innovation embedded into the skills examined during the hiring process has also been key to creating change from the bottom up.

Engagement and communication throughout the organization helps maintain this commitment to innovation. The Pennsylvania Turnpike's Innovation Council keeps agency staff involved in the innovation process and serves as a platform for learning about innovation from external sources as well as maintain accountability for internal innovation.

### Recommendations

- Ensure that agency staff are knowledgeable with the vision, strategic plan, and goals of the agency. They should be revisited during any and all conversations about pursuing new innovations.
- Find channels for communicating with staff at all levels and business lines about how the agency is innovating and how such innovation helps achieve strategic goals and objectives.

## External Collaboration

Strong executive leadership, an empowered staff, unified commitment to innovation, and routine communications enable agencies to address external innovation forces and collaborate with partners. Agencies should not feel that they need to be on the cutting edge of innovation. As a public agency, they are subject to constraints and responsible to constituencies not experienced by the private sector or university partners. Leveraging these partners, as THEA has done with CUTR, enables agencies to innovate beyond the limits of their staff and can be a force multiplier for innovation.

Working with external proposers to identify and refine proposals so they better meet agency goals should be encouraged. However, agencies should be conscientious of staff time and resources. This suggests the need for initial intake processes that allow for the quick and efficient vetting of proposals and prioritizing those that are most likely to support agency goals and objectives. However, the initial vetting process should not be so rigorous as to discourage submittals. Partners with unsuccessful proposals should be provided feedback on how their ideas may be improved by better aligning them with the agency's strategic goals.

### Recommendations

- Continue to work closely with university partners such as the University of Texas' Center for Transportation Research (CTR) and the Texas A&M Transportation Institute.
- Establish processes for receiving and vetting unsolicited external proposals that is not overly onerous to the proposer but allows staff to identify those that are most likely to help the agency meet strategic goals.

## Funding

Interviews revealed that innovative tolling agencies generally do not have a dedicated innovation budget. However, agencies recognize that funding is needed to explore and develop potential innovations. Most allow flexibility in departmental budgets that allow each to pursue innovations that improve their day-to-day work. Different departments and business lines should not have to worry about sacrificing innovation in order to fulfill their basic responsibilities, so additional funding is available for innovative projects that help the agency meet strategic objectives.

Agencies should be cognizant of external funding opportunities and be ready to leverage them when they become available. THEA operates in a similar capacity to CTRMA and has leveraged federal grant opportunities to catalyze innovation and establish itself as a leader in the tolling industry. Outside of grant opportunities, CTRMA could also invest strategically in basic technology infrastructure to facilitate future opportunities for innovation. Locally, CTRMA has partnerships with research institutions, which it can rely on to further its capacity to pursue innovation.

### Recommendations

- Empower business lines to fund innovation as needed and provide additional funding for those initiatives that help the agency meet strategic goals and objectives.
- Track potential state and funding opportunities and marshal internal resources and external partnerships when they become available.

## Procurement

Interviews did not reveal any particularly innovative approaches to procurement among the tolling agencies. Most appear to be exploring and implementing innovative approaches within their existing processes. LA Metro, which is responsible for a number of mobility services outside of tolling, does use a unique two step approach for reviewing and refining unsolicited proposals. Initial proposals are generally conceptual with the proposer working with a team of experts and agency staff to refine it and ultimately develop a detailed proposal that can be qualitatively and quantitatively evaluated for future procurement. However, the process can be onerous given the number of proposals received and can require a significant amount of staff time. Given the narrower range of services offered by CTRMA it is possible a similar approach could be developed and implemented. Agency staff would likely have to rely on the expertise of contractors as well as external partners such as universities to properly develop and vet candidate proposals.

### Recommendations

- Continue to explore alternative procurement approaches and assess limitations and challenges associated with their adoption within the agency's unique institutional setting.

## Operations

As noted throughout this report, much of the innovation that occurs within tolling industry leaders is done through the day-to-day operation of departments and business lines. These efforts may be coordinated through specialized task forces or councils, but the departments are ultimately responsible for identifying and implementing new innovations. Very few tools were identified in the interviews for supporting innovation programs. Gtmhub, a cloud-based platform, was identified as one tool that provides transparency to the entire organization on what innovative initiatives are intended to achieve and provides a platform around which staff across different departments can center their ideas and proposals.

- Continue to evaluate potential platforms for coordinating innovative initiatives with a focus on ensuring alignment with strategic agency goals and objectives.

## Evaluation

Interviews did not reveal the presence of strong, formalized evaluation programs in terms of performance measures and reporting. However, innovative initiatives are generally evaluated in terms of how they help agencies achieve strategic goals. To the extent that more formal approaches are used, they are more likely to be tailored to the business line or department. The Ohio Turnpike, for example, devolves decision making to its task teams while NTTA empowers business lines to make decisions on innovative pursuits. This is an important consideration for CTRMA as different business lines help the agency succeed in different ways.

### Recommendations

- Align proposal evaluation processes with agency goals and objectives. The agency's mission and associated goals should serve as guideposts for individual departments to evaluate the suitability of proposed initiatives. Innovations should be pursued if they:
  - Help the agency deliver multi-faceted mobility solutions;
  - Facilitate collaborative approaches to implementing mobility solutions;

- Result in investments extending beyond roadways;
- Relate to transformative technologies
- Involve the adoption of industry best practices
- Involve responsible mobility solutions that respect the communities CTRMA serves
- Help protect the environment
- Deliver on other commitments to customers and investors
- Establish basic metrics to qualitatively (or quantitatively) assess how proposals meet the above objectives.
- Maintain flexibility in the evaluation process so each department or business line can tailor innovation to their unique needs.