United States Department of Transportation

Innovation in Project Delivery

May 2024

Drones are replaceable, you are not!

Per the Bureau of Labor and Statistics, in 2022 there were 1,069 fatal work injuries, by private industry, in the construction industry. Followed by 1,053 fatal work injuries, by private industry, in the transportation and warehousing industry. The Texas Department of Transportation (TxDOT) is committed to the safety of their approximately 13,000 employees and industry partners.

Elimination of a hazard is the most effective control in promoting the safety of workers, per NIOSH Hierarchy of Controls. For TxDOT, drones are physically removing people from hazardous situations and making highway workers safer. A drone for TxDOT is an unmanned aerial system (UAS) operated without direct human intervention from within or on the aircraft. TxDOT uses UAS for data collection, infrastructure inspection, mapping, and modeling. The UAS typically caries a high-resolution imagers and other data collection sensors.

TxDOT is using UAS to assist in many different aspects of transportation. The following are some examples:

- Bridge inspections,
- Survey (LIDAR and Photogrammetry),
- Natural disasters, and
- High mast inspection.

Figure 1: Bridge inspection, high mast inspection, natural disaster, and survey
Source: TxDOT

TxDOT's UAS Flight Operations Manual supports the safe operations of UAS at the agency. The manual describes a comprehensive safety management system (SMS) that promotes safe, efficient and effective UAS operations. The manual also provides instructions for ground and air operations, with flight plan development and a pre-approval process.

Through the safe operations and data collection of the UAS innovation, TxDOT is able to use Bentley iTwin Capture Modeler and ESRI ArcGIS to create 3D digital models of transportation facilities, with enhanced data characteristics. One of TxDOT's goals is to integrate Business Information Modeling (BIM) practices into daily work and use the resulting digital twins to increase safety and efficiency.

One of TxDOT's first tests with this process was with a widening project on FM 1977. Using Industry Foundation Classes, TxDOT was able to convert 2D CAD models to 3D models for use in ArcGIS Pro. The ARCGIS Pro environment also allowed multiple other data sets to be integrated into a single experience, so that 3D CAD models, UAS captured 3D reality models, terrestrial LIDAR point clouds and aerial imagery could all be utilized simultaneously. This allows the comparison between design intentions, and construction reality. The goal is to visualize a change and what it will look like before the work is done, then do updates as construction progresses to insure reality matches design intent.

To learn more about TxDOT advancement in UAS for safety and its support toward a digital twin, please contact Mr. Sergio Roman, UAS Coordinator/UAS Pilot or Mr. Travis Scruggs, GIS Analyst/UAS Pilot, TxDOT. To learn more about FHWA support in the advancement of UAS or digital twin, please contact Mr. Bryan Cawley, Highway Engineer, FHWA.

Navigating the future of transportation: Digital Delivery Transformation in Oklahoma

In an era defined by technological innovation, the Oklahoma Department of Transportation is embracing the challenge of establishing a more efficient and digitally-driven project lifecycle.

The ODOT Digital Delivery program started as a pilot cross-functional design team in January 2022, and quickly evolved into a permanent, dedicated digital delivery team as the advantages of data enhanced 3D models became apparent.

One of the key benefits of Digital Delivery is its ability to enhance collaboration and communication among project stakeholders. ODOT started training all of the design engineers and technicians in Open Roads Designer (ORD) and Open Bridge Modeler (OBM) in 2020. New modeling practices are helping engineers optimize resource allocation and improve cost-effectiveness. By simulating various design scenarios in 3D models, ODOT can identify potential risks and opportunities early in the project lifecycle, minimizing costly rework and delays down the line. Through its Digital Delivery initiative, ODOT is revolutionizing the way projects are planned, designed and executed in Oklahoma, paving the way for a smarter and more interconnected Department of Transportation.

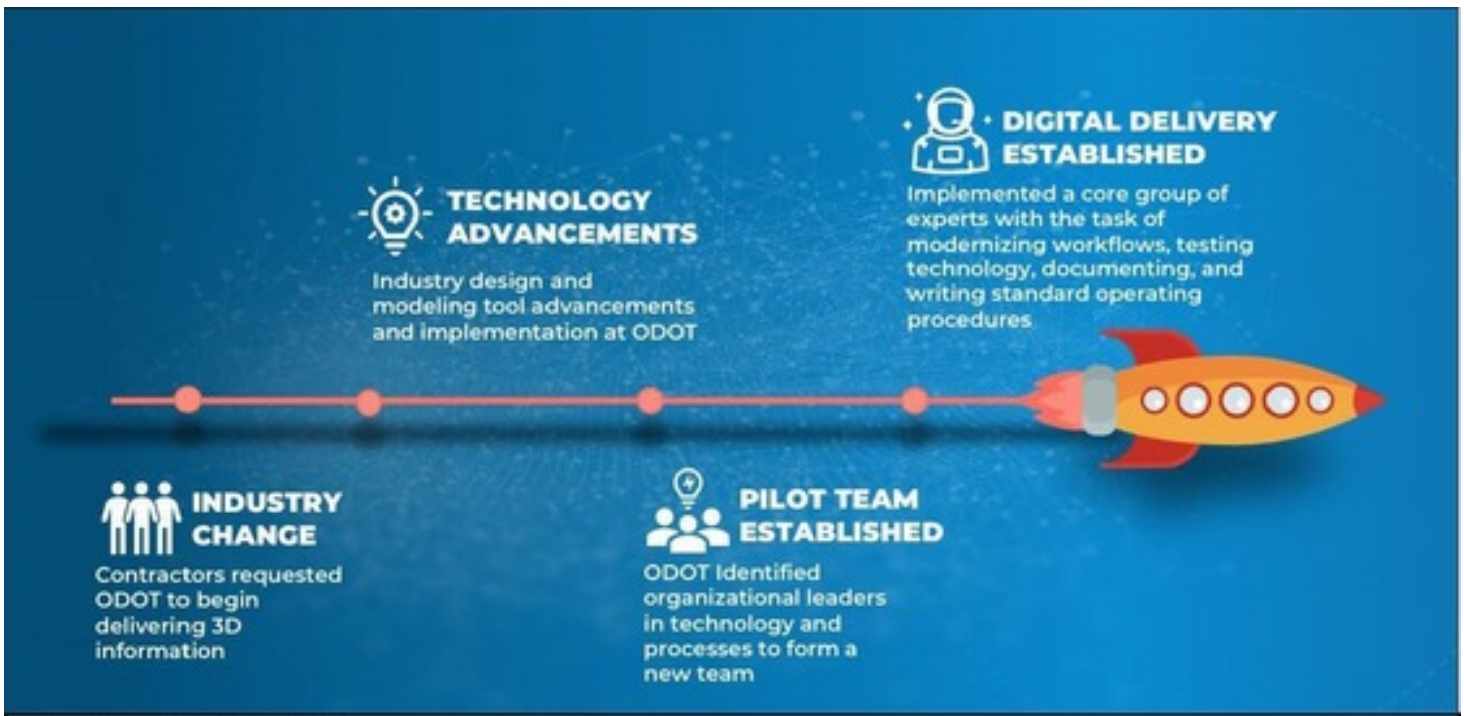

Figure 1: ODOT digital delivery
Source: ODOT

ODOT recently completed a gap assessment to review current processes and determine the baseline digital delivery maturity level. Development of a strategic plan will help identify the steps needed to achieve the design to construction handoff over the next four years.

ODOT was awarded an Advancing Digital Construction Management Systems (ADCMS) grant in November 2023. The grant is a comprehensive program to accelerate the adoption of BIM for Infrastructure in Oklahoma. Program areas include design implementation; construction and inspection implementation; work force development and K-college STEM outreach, all leading to a digitally mature transportation industry in Oklahoma.

The success of ODOT digital delivery development can be attributed to support from executive leadership through their interest in encouraging innovation, breaking down silos, and participation in peer exchanges with other states. They encouraged the establishment of a cross discipline technical committee comprised of design and construction staff, contractors, consultants, and municipal representatives, as well as early engagement with contractors, and support for the in-house digital delivery team from a group of design consultants. This has resulted in an industry wide team in Oklahoma, all pulling in the same direction.

Looking ahead, ODOT remains committed to pushing the boundaries of innovation and embracing technologies to further advance its Digital Delivery capabilities. ODOT is continuously exploring new opportunities to enhance mobility, safety and resilience across the state. ODOT participates in the BIM for Bridges and the BIM for Infrastructure Transportation Pooled Funds and continues to seek ways to engage with the larger engineering community on digital delivery topics.

In conclusion, ODOT's Digital Delivery initiative represents a bold vision for the future of transportation engineering and construction in Oklahoma. By harnessing the power of digital technologies, data-driven insights and collaborative partnerships, ODOT is laying the foundation for a more efficient system that will benefit generations to come.

If you would like to learn more about ODOT's Digital Project Delivery you may contact Ms. Katie Brown, P.E., S.E., ODOT Transportation Quality Digital Delivery Engineer and PW Administration or Mr. Michael Pearson, ODOT Digital Delivery Manager. If you would like to learn more about FHWA efforts regarding Digital Project Delivery you may contact Mr. Bryan Cawley, P.E., Highway Engineer, FHWA.

Technical Resources

e-Ticketing and e-Construction Contact Ms. Kathryn (Kat) Weisner or phone: 202-823-2267	**Innovation in Project Delivery: Value Engineering with TXDOT, May 20 @ 3:30-4:30 pm ET** Registration
Leadership Skills for Project Management Contact Mr. Bryan Dillon or phone: 202-875-4155	**Building Information Modeling (BIM) or Digital Project Delivery** Contact Mr. Bryan Cawley or phone: 307-631-7424
Probabilistic Risk-Based Cost Estimation Training Contact Ms. Megan Hall or phone: 202-923-5282	**Value Engineering (VE) and Value Engineering Change Proposals (VECP)** Contact Mr. Jose Granado or phone: 804-682-0072
Critical Thinking Skills for Managing Contract Changes, Workshop Contact Mr. Roy Siegel or phone: 404-764-6053	**Construction Worker Safety** Contact Mr. Wilfred (Wil) Hernandez or phone: 774-991-9045

Other Resources

Federal Highway Administration (FHWA) Construction

https://www.fhwa.dot.gov/construction/

FHWA Resource Center Construction and Project Management

https://www.fhwa.dot.gov/resourcecenter/teams/construction/

FHWA's Federal-aid Essentials for Local Public Agencies

https://www.fhwa.dot.gov/federal-aidessentials/

Stay Connected

Subscribe to Innovation in Project Delivery e-news!

If you are not already a subscriber, please click on the button above to subscribe to the Innovation in Project Delivery e-news mailing list.

Subscribe to other EDC Innovation e-news!

If you are not already a subscriber, the Center for Accelerating Innovation invites you to subscribe to EDC News and Innovator. These newsletters showcase successful deployments of EDC initiatives and other innovative topics in the highway industry.
