U.S. Department of Transportation
Federal Highway Administration


Photo: Getty Images


Photo: Getty Images


Photo: Getty Images

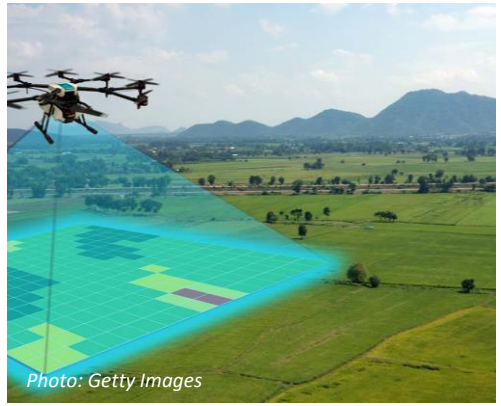


Photo: Getty Images


Photo: Getty Images

OUTREACH FOR

Unmanned Aerial Systems (UAS)

FHWA – EDC-5
Webinar No. 1 – May 21, 2020

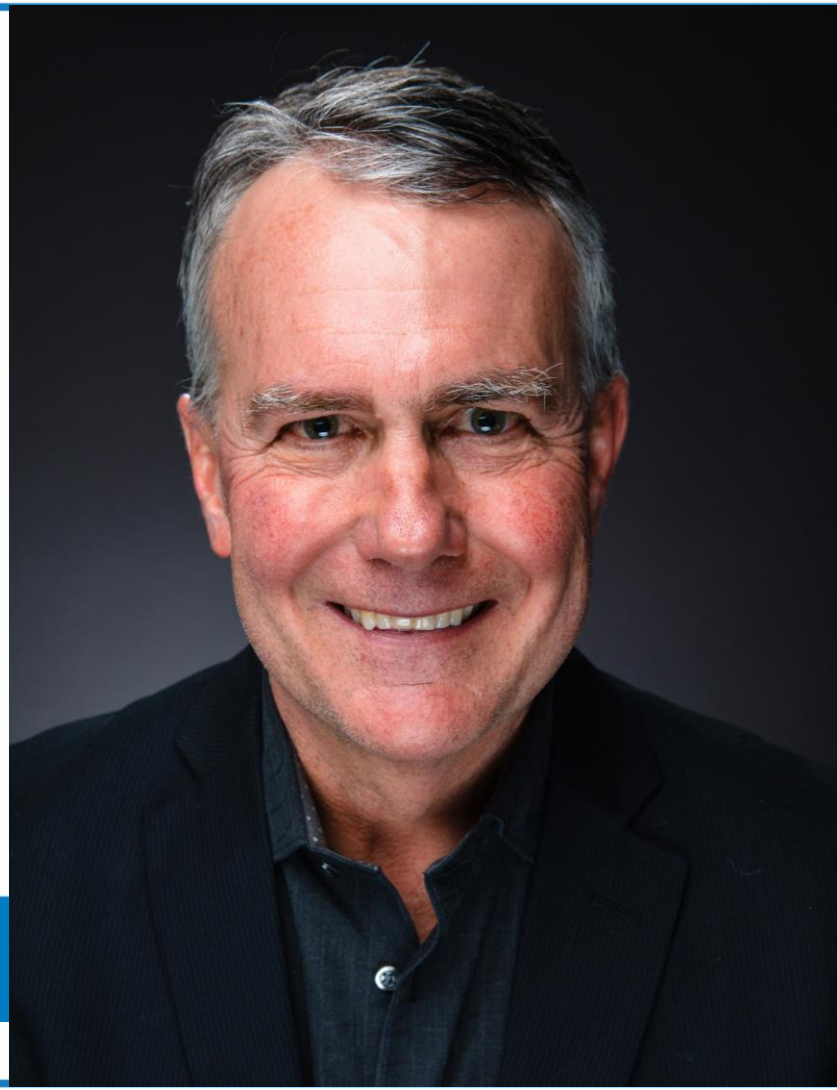
Agenda

- Background on UAS in Surface Transportation
- UAS in Surface Transportation: State of Practice
- UAS Technology Overview
- Traditional Inspection versus UAS Inspection: Structural Inspection, Construction Inspection, Emergency Response
- Every Day Counts 5 (EDC-5) Program Overview
- State of Practice: Implementation Progress at State DOTs
- Successful Practices for UAS Implementation
- Choctaw Nation - UAS Program Overview
- Utah Department of Transportation – UAS Program Overview
- Panel Style Q&A with Presenters

John Haynes

EDC-5 UAS DEPLOYMENT CO-LEAD
Research and Innovation Program Manager
FHWA Utah Division
(801) 955-3526
john.haynes@dot.gov

Program Resources: www.fhwa.dot.gov/uas



U.S. Department of Transportation
Federal Highway Administration

UAS in Surface Transportation Programs

Traditional Aerial Surveys

DOT Experimentation with UAS

Wide-scale Deployment

2000 ……|……2010……|……2020…….

Can we use a drone to give us a better perspective?

Photo: Getty Images

U.S. Department of Transportation
Federal Highway Administration

UAS in Surface Transportation Programs

2.7 million UAS in commercial market

42% of commercial applications are Industrial Inspections

40% - 70% potential savings

- By 2023 the market is projected to triple

worker safety and accuracy

New and innovative opportunities

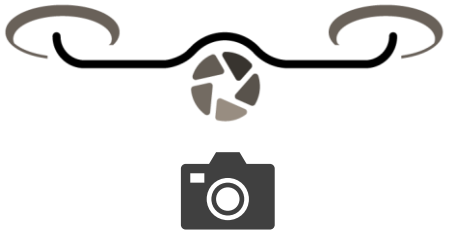
UDOT reports a 10-fold productivity increase with UAS and sign inspections (2019)

Photo: Getty Images

U.S. Department of Transportation
Federal Highway Administration

UAS Technology Overview

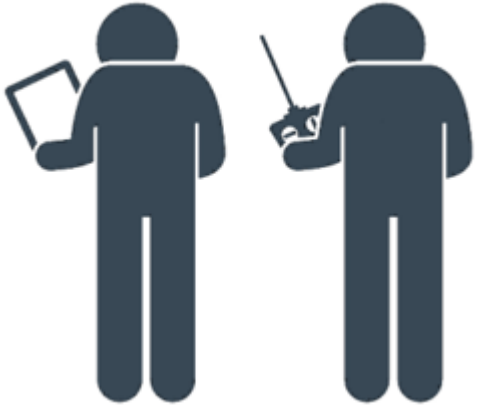
Navigation Systems



Unmanned Aircraft (UA) + Payload

Ground Control Station

Data Link



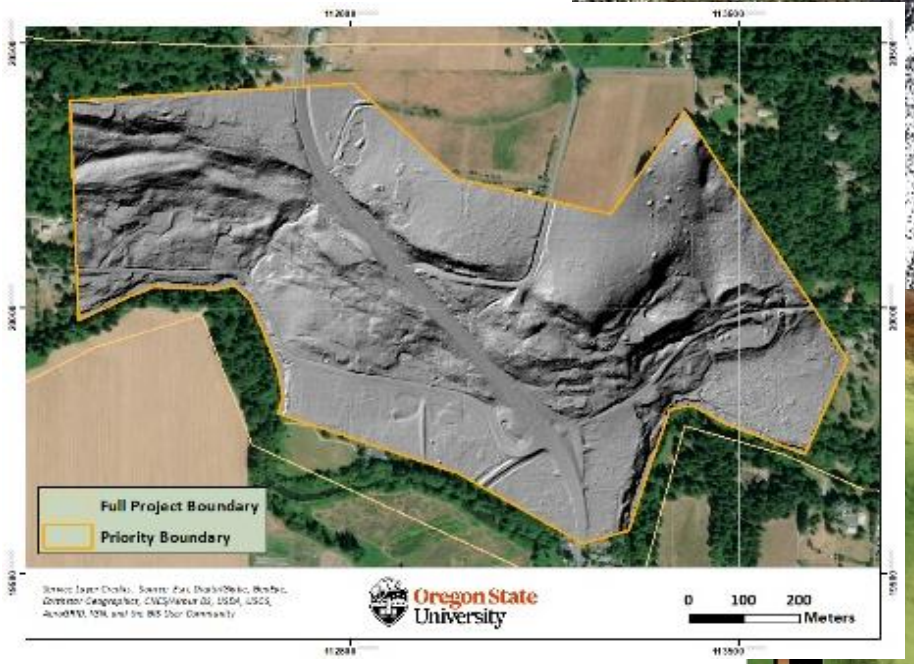
Human Operators

Increasing Task-level Efficiency and Safety in Data Collection

Delivering Dynamic Data Products

Image Credit: Oregon State Univ.

Image Credit: Oregon State Univ.



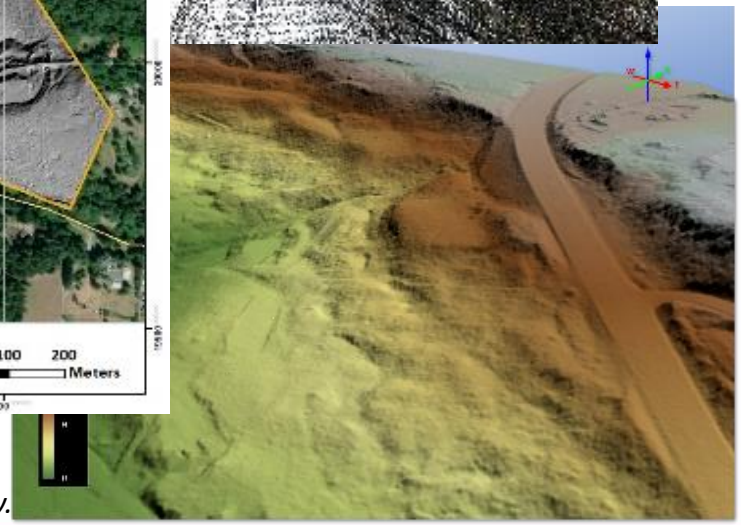


Image Credit: Oregon State Univ.

UAS Opportunities

- Point Clouds
- Orthomosaics
- DEMs
- Contours
- GIS Features
- 3D Models
- Video/Images

…Anything with spatial coordinates.

Traditional Inspections vs. UAS Inspections
Structural Inspections

Enhancing safety, improving outcomes.

Image Credit: Utah DOT

UAS Opportunities

- Delamination (thermal)
- Mapping
- Inspection
- Increased Frequency
- Improved Documentation
- Supplement Traditional Methods

Traditional Inspections vs. UAS Inspections
Structural Inspections

Michigan DOT - Examining effectiveness of drones for bridge safety inspections

Bridge Inspection	**Drone Pilot**
Data Collection 8 Hours	Data Collection 1 Hour
2 Persons	2 Persons
Manual Inspection $4,600	**UAS $1,200**

✓ **74% Cost Savings**

Traditional Inspections vs. UAS Inspections
Construction Inspection

Tracking progress, communicating effectively.

Image Credit: Utah DOT

UAS Opportunities

- Estimates and Bidding
- Progress Documentation
- High ROI on $ and Labor
- Cheaper than Manned Aircraft
- Periodic Flights
- New Vantage Points
- Intelligent and Consistent Data
- Reduce Redundancy
- Stockpiles and Quantities
- Surveying and Site Analysis

Traditional Inspections vs. UAS Inspections
Construction Inspection

UDOT - UAS for Site Analysis

Video Credit: Utah DOT

Traditional Response vs. UAS Response
Emergency Response/Incident Management

Improving access to information, enhancing situational awareness.

Video Credit: North Carolina DOT

UAS Opportunities

- Reduce Hazard Exposure
- Efficient and Detailed Site Investigations
- Replace Manual Sketching
- Viewpoints of Obstructed Areas
- Efficient Post-Damage Assessment
- Visual Communications and Live Streaming
- Reduced Lane Closures/Disruption to Operations
- Evidence Recording

Traditional Response vs. UAS Response
Emergency Response/Incident Management

NCDOT - NC Highway Safety Patrol controlled head-on crash simulation

HSP's Collision Reconstruction Unit

Data Collection
2 hours

Drone Pilot

Data Collection
25 minutes

Traditional Methods
$12,900

UAS
$3,600

✓ **72% Cost Savings**

Every Day Counts (5) – Unmanned Aerial Systems

Construction Inspection

- Surveying
- Routine Inspection
- Construction Quantities
- Pre-Construction Quantities
- Work Zone Traffic Monitoring

Structural Inspection

- Supplementing Bridge Inspection
- High Mast Lighting
- Confined Space
- Retaining Walls
- Tunnels

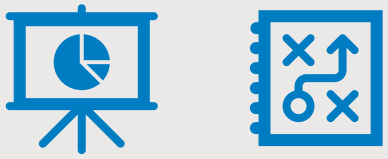
Emergency Response

- Flooding Events
- Wind Events
- Landslides/Mudslides
- Fire Events
- Earthquakes

- ✓ Identify Mature Use Cases
- ✓ Facilitate Peer-to-Peer Learning
- ✓ Technology Exchange
- ✓ Disseminate Best Practices

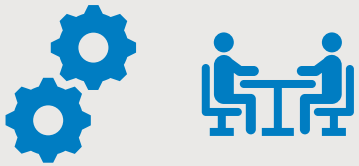
Every Day Counts (5) – Events and Engagements

Webinars & Technical Briefs



Local & Regional Workshops

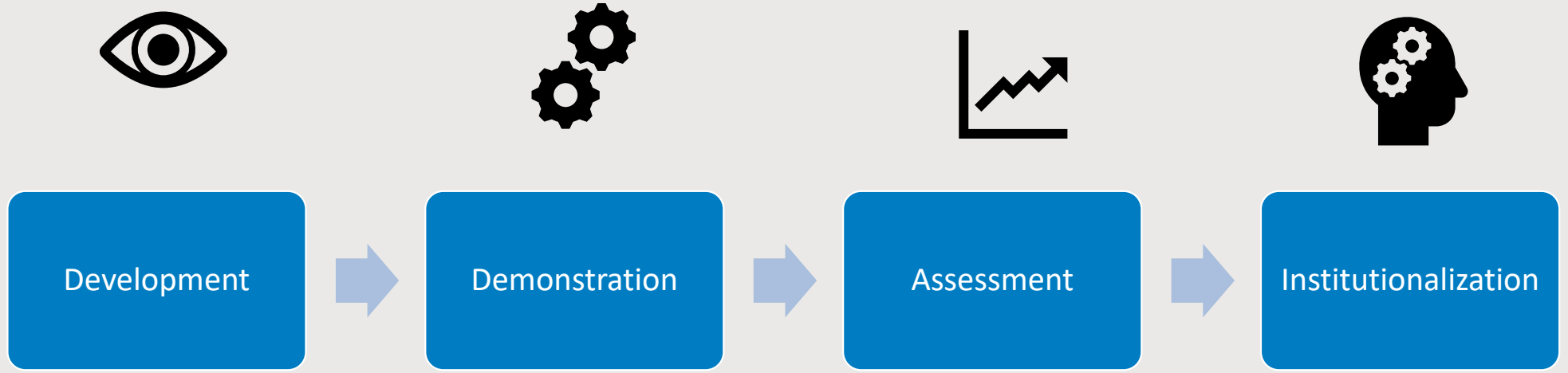
Peer Exchanges



- ✓ Identify Mature Use Cases
- ✓ Facilitate Peer-to-Peer Learning
- ✓ Technology Exchange
- ✓ Disseminate Best Practices

Diverse engagements to meet the needs and capabilities of agencies.

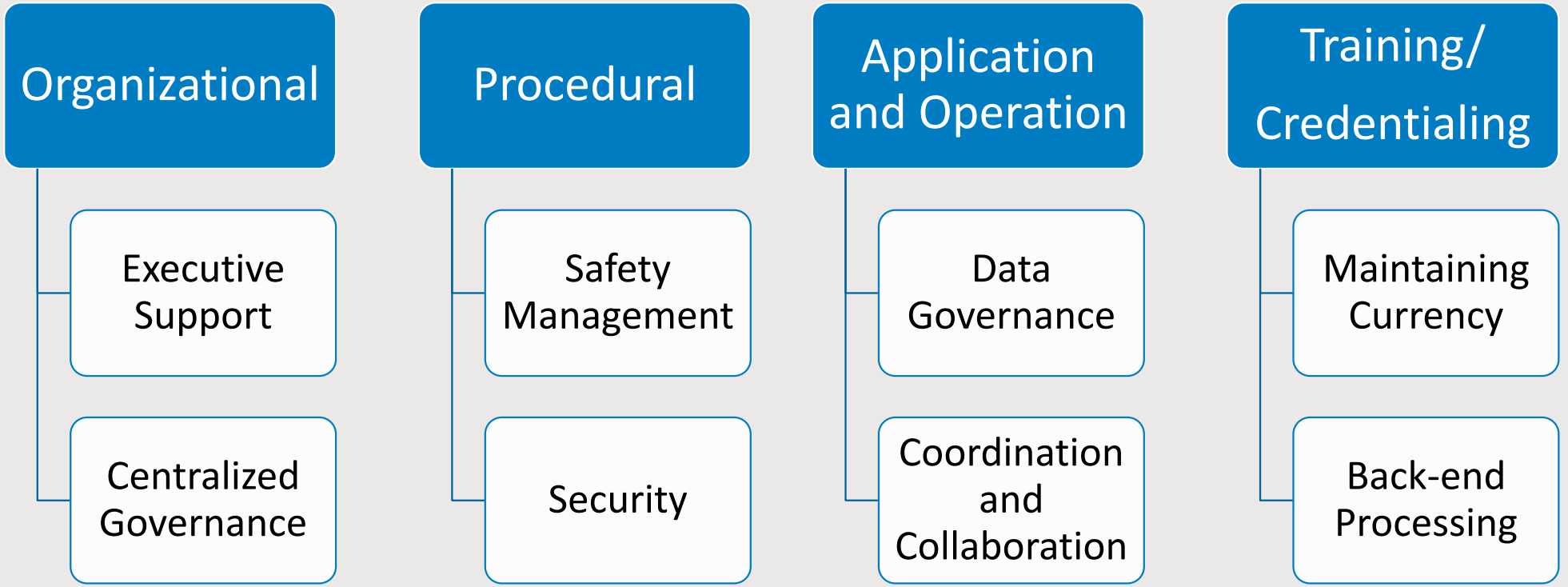
Integration of UAS – a Multi-phase Process



100% of U.S. State DOTs self reported using UAS.

UAS is adding *value* to a broad range of stakeholders in *surface transportation*.

Successful Practices at State DOTs



Findings from NCHRP 20-69: US Domestic Scan Program (Project 17-01)

"Successful Approaches for the Use of UAS by Surface Transportation Agencies".

EDC-5 Webinar Series

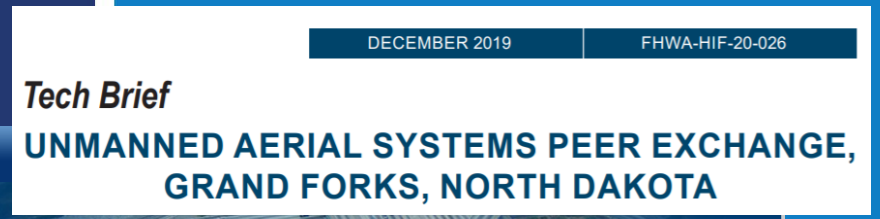
Topic	Date
Multi-stakeholder Coordination for UAS Deployment in Emergency Response Environments	Thursday, October 1
Advancing UAS for Structural Inspections	Thursday, November 5
Traffic Monitoring Applications	Thursday, December 3

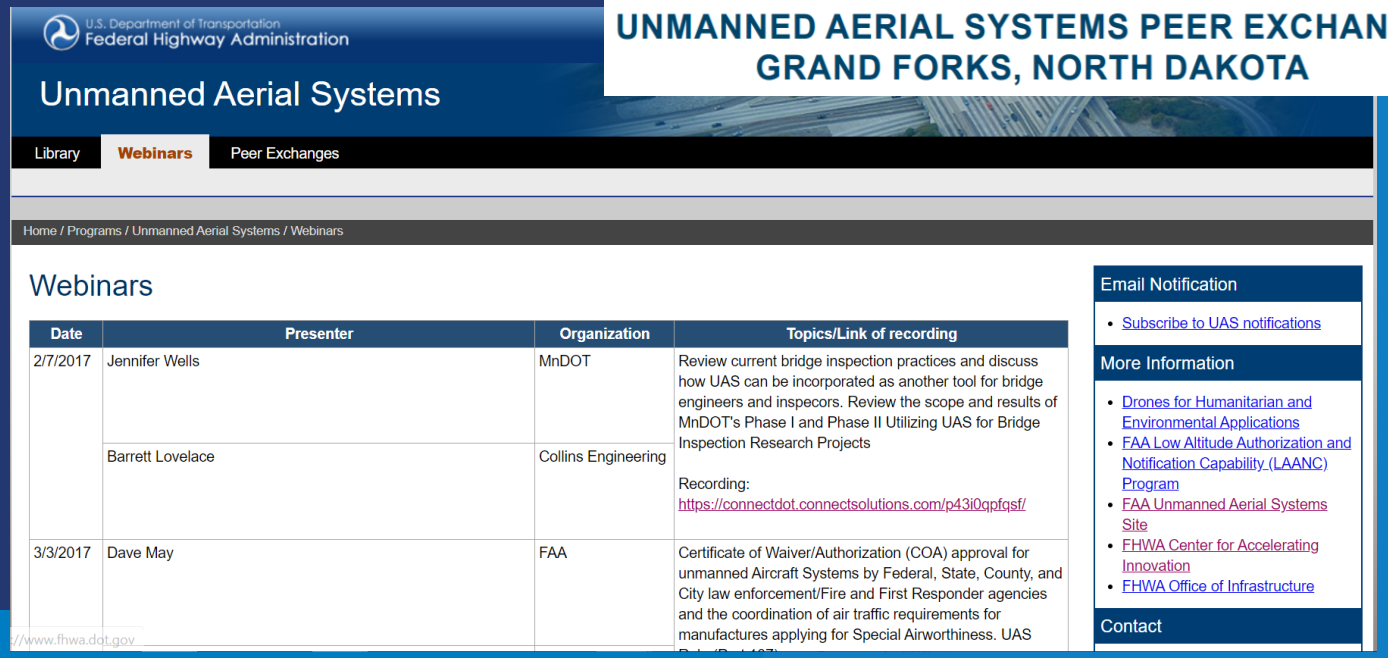
Register Now for the October Webinar:
collaboration.fhwa.dot.gov/dot/fhwa/WC/Lists/Seminars/DispForm.aspx?ID=2489

U.S. Department of Transportation
Federal Highway Administration

FHWA UAS Program Resources

- ✓Technical Briefs
- ✓Webinars
- ✓Peer Exchanges





Program Resources: www.fhwa.dot.gov/uas

U.S. Department of Transportation
Federal Highway Administration