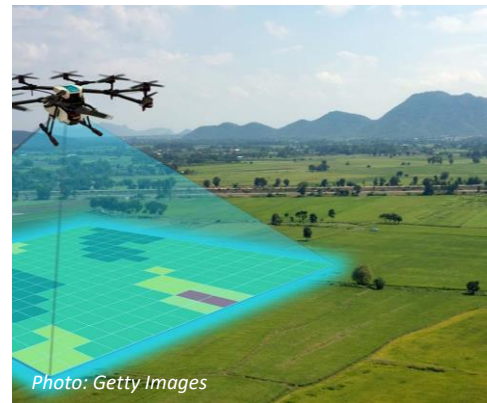




U.S. Department of Transportation
Federal Highway Administration



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

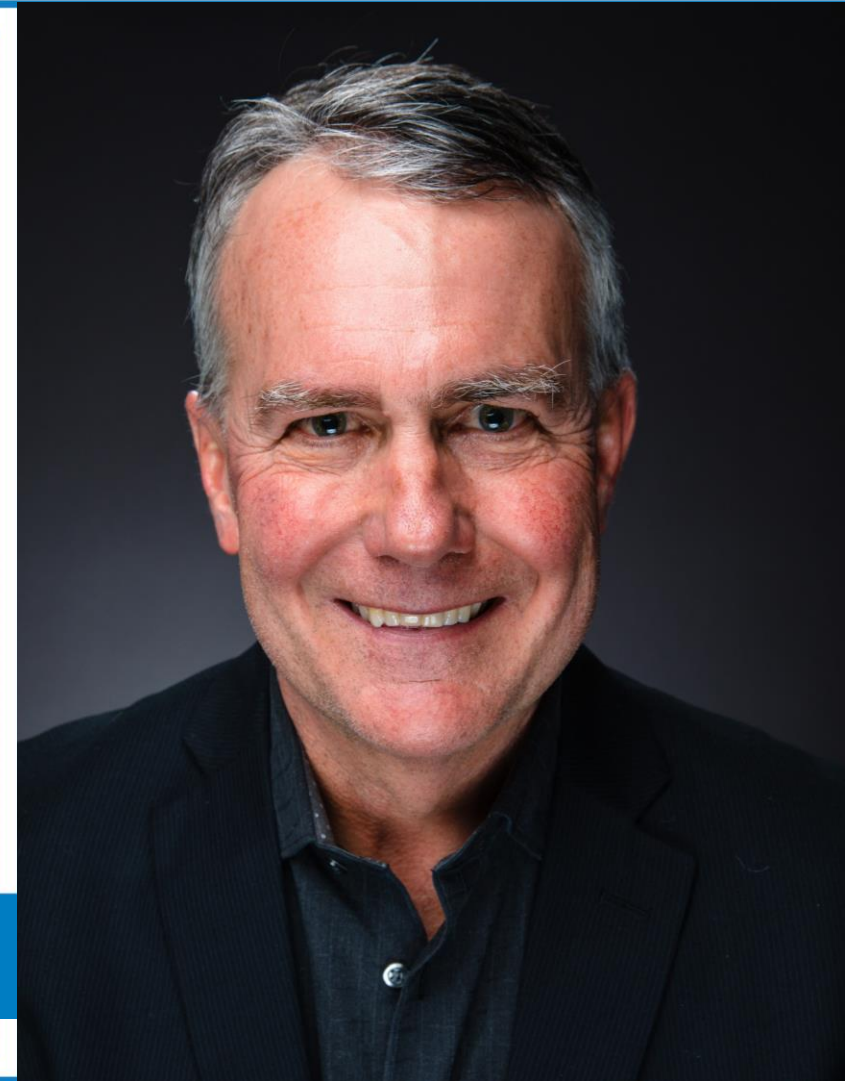
Research and Innovation Program Manager

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



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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



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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

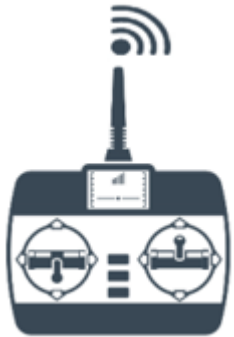


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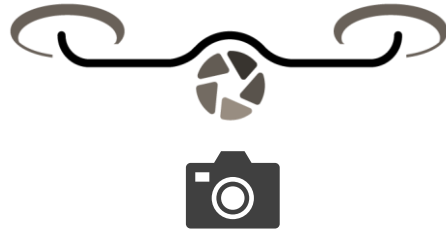
UAS Technology Overview



Navigation Systems



Ground Control Station



Unmanned Aircraft (UA) + Payload



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.

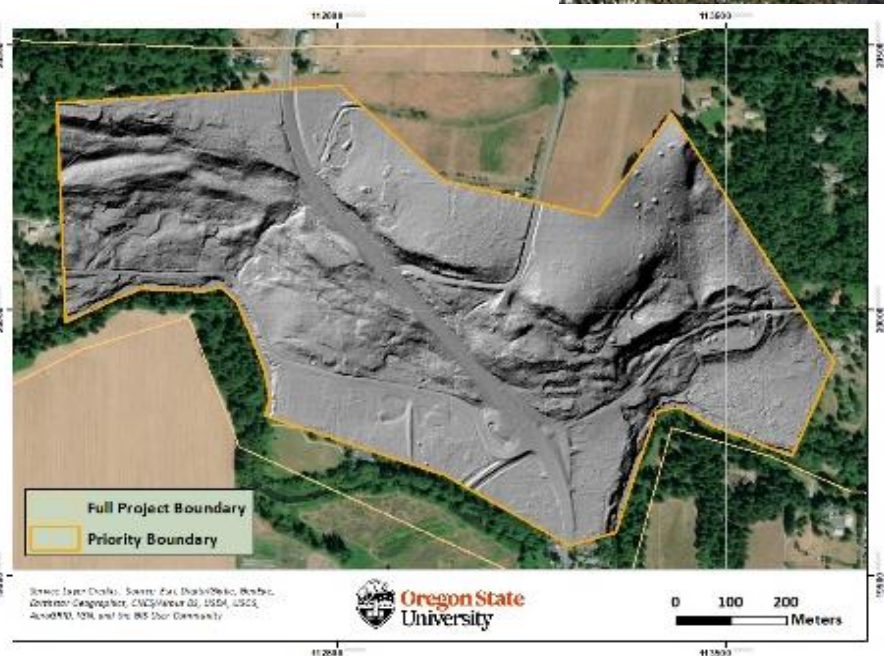
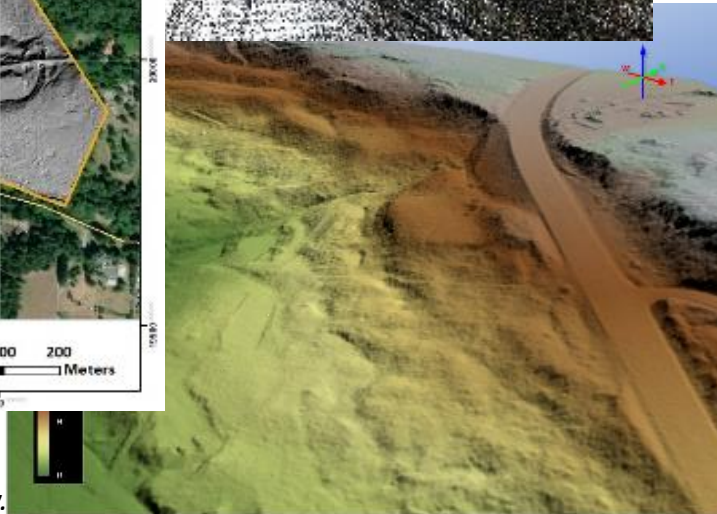


Image Credit: Oregon State Univ.



UAS Opportunities

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

...Anything with spatial coordinates.



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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

Data Collection
8 Hours

2 Persons

Manual Inspection
\$4,600

Drone Pilot

Data Collection
1 Hour

2 Persons

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

Traditional Methods
\$12,900

Drone Pilot

Data Collection
25 minutes

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



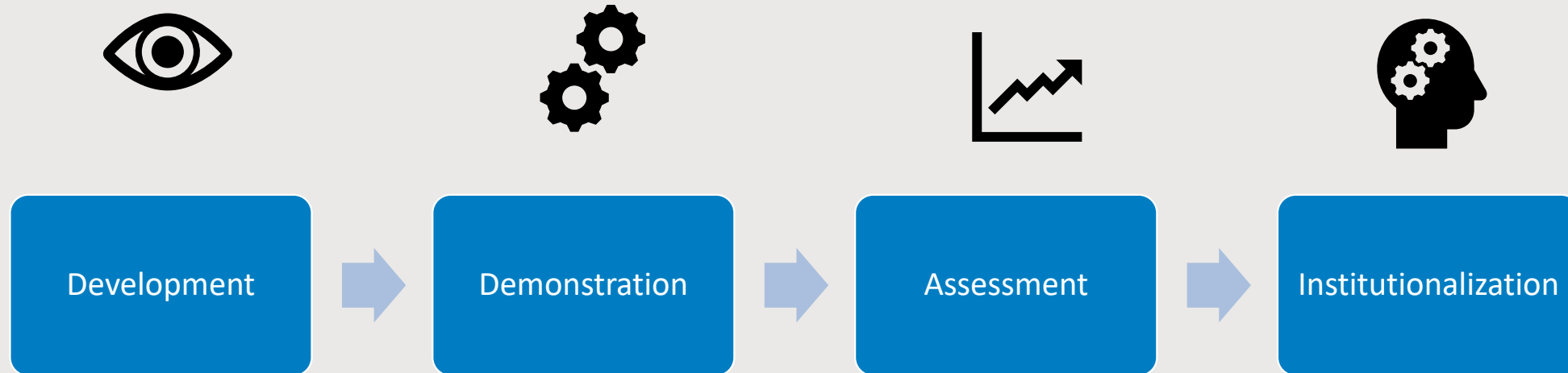
Peer
Exchanges



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

Diverse engagements to meet the needs and capabilities of agencies.

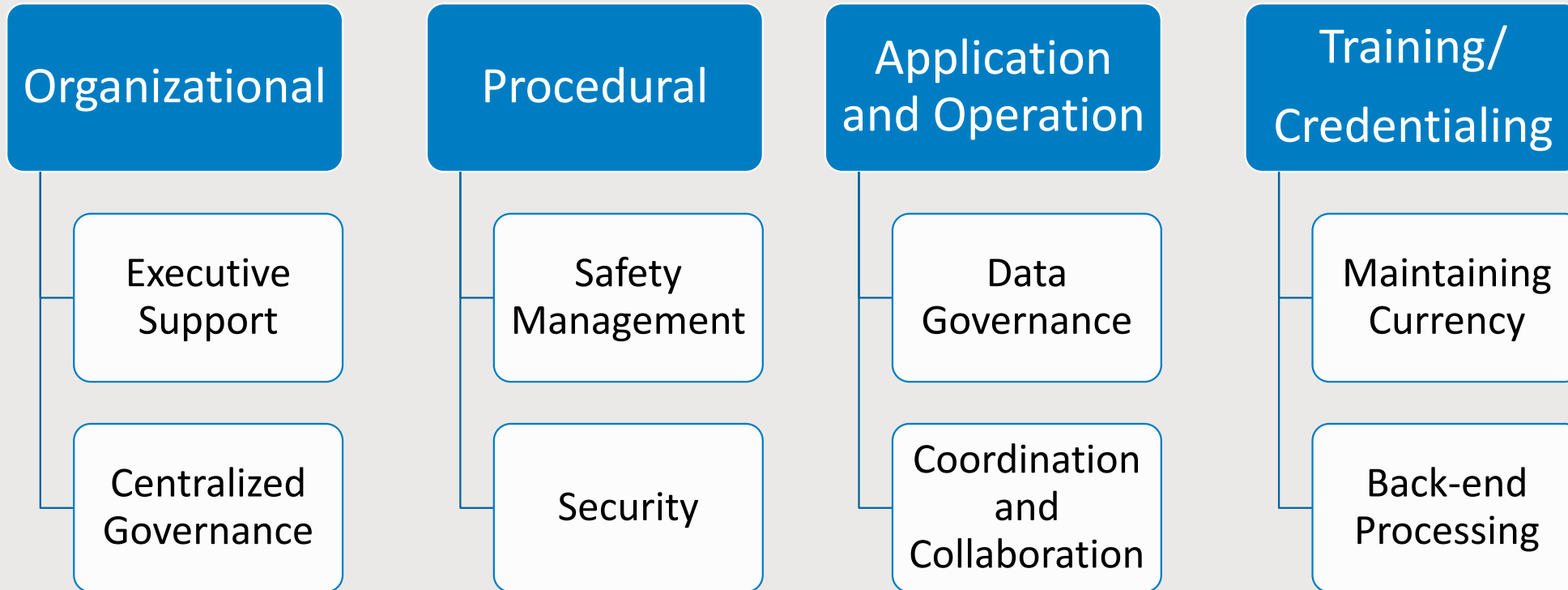
Integration of UAS – a Multi-phase Process



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



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FHWA UAS Program Resources

✓ Technical Briefs

✓ Webinars


✓ Peer Exchanges

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

DECEMBER 2019

FHWA-HIF-20-026

Tech Brief
**UNMANNED AERIAL SYSTEMS PEER EXCHANGE,
GRAND FORKS, NORTH DAKOTA**

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Unmanned Aerial Systems
Library **Webinars** Peer Exchanges
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Webinars

Date	Presenter	Organization	Topics/Link of recording
2/7/2017	Jennifer Wells	MnDOT	Review current bridge inspection practices and discuss how UAS can be incorporated as another tool for bridge engineers and inspectors. Review the scope and results of MnDOT's Phase I and Phase II Utilizing UAS for Bridge Inspection Research Projects
	Barrett Lovelace	Collins Engineering	Recording: https://connectdot.connectsolutions.com/p43i0qpfqst/
3/3/2017	Dave May	FAA	Certificate of Waiver/Authorization (COA) approval for unmanned Aircraft Systems by Federal, State, County, and City law enforcement/Fire and First Responder agencies and the coordination of air traffic requirements for manufactures applying for Special Airworthiness. UAS

Email Notification

- [Subscribe to UAS notifications](#)

More Information

- [Drones for Humanitarian and Environmental Applications](#)
- [FAA Low Altitude Authorization and Notification Capability \(LAANC\) Program](#)
- [FAA Unmanned Aerial Systems Site](#)
- [FHWA Center for Accelerating Innovation](#)
- [FHWA Office of Infrastructure](#)

Contact

