NCHRP 20-68A
“US Domestic Scan Program”
Domestic Scan 17-01

“Successful Approaches for the Use of Unmanned Aerial Systems (UAS) by Surface Transportation Agencies”

Findings, Conclusions and Recommendations
Anticipated Objective

“The scan focus and objectives shall provide a better understanding of the proactive use of this technology as well as the return on investment and its benefits to the surface transportation community. This scan will assist the accelerated national deployment of the technology by providing “Getting Started” guidance and case studies of successful applications of UAS. The scan will also provide valuable information concerning where additional development and research might be needed to support the increased use of this technology.”
NCHRP UAS Domestic Scan 17-01: Successful Approaches for the Use of Unmanned Aerial Systems by Surface Transportation Agencies

- This scan was conducted as a part of NCHRP Project 20-68A, the U.S. Domestic Scan program.
- The program was requested by AASHTO with funding provided by NCHRP.
- First meeting in Washington DC
  - Develop a work plan
  - Develop amplifying questions for selected state DOT participants
- Interview and Scan Location: San Diego, CA, April 8-14, 2018
<table>
<thead>
<tr>
<th>Team Members</th>
<th>Institution</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emanuel Banks</td>
<td>Arkansas Department of Transportation</td>
<td>(AASHTO Chair)</td>
</tr>
<tr>
<td>James Gray</td>
<td>Federal Highway Administration</td>
<td></td>
</tr>
<tr>
<td>Jeffery Milton</td>
<td>Virginia Department of Transportation</td>
<td></td>
</tr>
<tr>
<td>Amy Tootle</td>
<td>Florida Department of Transportation</td>
<td></td>
</tr>
<tr>
<td>Gregg Fredrick</td>
<td>Wyoming Department of Transportation</td>
<td></td>
</tr>
<tr>
<td>Troy Larue</td>
<td>Alaska Department of Transportation</td>
<td></td>
</tr>
<tr>
<td>Steve Cook</td>
<td>Michigan Department of Transportation</td>
<td></td>
</tr>
<tr>
<td>Stephen Smith</td>
<td>Vermont Department of Transportation</td>
<td></td>
</tr>
<tr>
<td>Paul Wheeler</td>
<td>Utah Department of Transportation</td>
<td></td>
</tr>
<tr>
<td>Paul Snyder</td>
<td>Dubuque-Snyder Aviation Consulting</td>
<td>(Subject Matter Expert)</td>
</tr>
<tr>
<td>Zachary Waller</td>
<td>Dubuque-Snyder Aviation Consulting</td>
<td>(Subject Matter Expert)</td>
</tr>
<tr>
<td>Shayne Gill</td>
<td>American Association of State Highway and Transportation Officials</td>
<td>(AASHTO Liaison)</td>
</tr>
</tbody>
</table>
General Guidance to Scan Team

Information to be gathered would include but not be limited to:

- Why, how, and where are they are using this technology for inspection, inventory, survey, etc.
- How the data is being stored and used
- What control method is being used (remote control or autonomous)
- What attached devices are being used (i.e. HD cameras, video cameras, Infrared, LiDAR, etc.)
- How is agency organized to manage the use of UAS
- Who is the Owner/Operator of the UAS: (agencies, Contractors, Consultants, and/or Universities)
- Costs and realized Benefits
- Barriers, obstacles and opportunities experienced in deployment
Summary of Initial Findings

• Findings presented here were gleaned from four days of presentations, group discussions and participant notes.

• The scan team settled on the seven themes below for “Getting Started with UAS”
  1) Executive Support
  2) Organizational Structure
  3) Policy and Regulation
  4) Safety and Risk Management
  5) Training and Crew Qualifications
  6) Public Relations
  7) Application and Operation
Finding 1 - Executive Support Conclusions

Successful programs:

• Have executive support

• Recognize the importance of planning both the initial purchase but also operations and maintenance

• Agree that UAS save resources, increase efficiency, and improves safety

• Emphasize the benefits of UAS, but understand negative connotations related to the technology
Finding 2 - Organizational Structure Conclusions

Successful programs:

• Have a centralized authority and top-down support
• Leveraged existing aviation experience in their state
• Utilized a variety of funding models but had a dedicated source
• Recognized that a relationship with - and understanding of - the FAA is critical
• Dedicated personnel to understanding and keeping up with federal, state and local regulations
• Transferred knowledge across departments and encouraged transparency through relationships
• Increased efficiency through fleet management and resource sharing
Finding 3 - Policy and Regulation Conclusions

Successful programs:

• Align their policies and procedures to be consistent with federal and state regulations
• Have expertise in UAS regulations and the ability to keep up with changes
• Understand how to obtain airspace authorization and work with local airports
• Promoted existing regulation within the state to prevent unneeded regulations on a state or local level
• Developed or adopted a policy and procedures manual for UAS operations
Finding 4 - Safety and Risk Management Conclusions

Successful programs:

• Have a system to manage safety, which includes Emergency Response Plans (ERP) and safety policy
• Have proper personnel and equipment for each mission
• Have flight risk assessment tools and risk acceptance procedures
• Have adopted and promote an aviation safety culture
• Assure adequate insurance
Finding 5 - Training and Crew Qualifications Conclusions

Successful programs:
- Establish and maintain initial and recurrent training needs for proficiency
- Tailored training needs to the varied applications of UAS
- Identified expectations of UAS operations with management
- Use training to educate users on Alternate Methods of Compliance (AMOC) for UAS operations such as night operations, flight over people, or complex airspace
- Recognized meeting Part 107 minimum requirements is not a guarantee of the UAS expertise needed in surface transportation UAS applications
Finding 6 - Public Relations Conclusions

Successful programs

• Have a plan that identifies and addresses target audiences
  ✓ Internal (legislators, executive & technical staff, state employees)
  ✓ External (federal, local, university, vendors, public, and airports)
• Identify existing regulations, rules, and policies and positive use of social media, videos, and outreach to educate UAS users (Commercial use and Hobbyists)
• Include media into worksite set up addressing privacy, safety, notice for operation, on-site interaction during UAS flight
• Include communication office in their Emergency Response Plan (ERP)
Finding 7 - Application and Operation Conclusions

Successful programs:

• Start small and grow with success
• Did not require a large investment to get started
• Justified UAS use with increase safety, reducing liability, saving money, greater productivity, better end product, protected environment, and reduced impact on public
• Followed standard operating procedures
• Leveraged UAS across disciplines and shared UAS assets throughout state
• Had workflow processes for data collection, storage, usage, application development, and repurposed use of data collected
Final Conclusions

• Invited and host state transportation agencies have collectively developed significant use cases for UAS which supplement their surface transportation efforts

• Future UAS programs among state transportation agencies should...
  ✓ Consider further validation of these applications with rigorous benefit-cost analysis as well as
  ✓ Investigate whether UAS data can be integrated into agencies existing programs/methods and if it’s suitable for meeting industry standards
Schedule Moving Forward

• Final draft report submitted to NCHRP for review September, 2018

• Final NCHRP Report January, 2019 (available on-line)

• Various dissemination activities will be undertaken by the scan team over the next several months
Questions?

AASHTO / NCHRP
U.S. Domestic Scan Program