WSDOT Construction

The Headlight Inspection Tool Pilot Project

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About WSDOT

- Total lane miles: 18,689 (state-owned)
- Bridges: 3,765
- Ferries: 22 vessels on 10 routes (carried 22.8 million passengers last year)
- Passenger rail: 11 Amtrak Cascades trains daily, approx. 780,000 riders
- New $16B funding package
Our Mission

The Washington State Department of Transportation provides and supports safe, reliable and cost-effective transportation options to improve livable communities and economic vitality for people and businesses.
Delivering Projects

As a public agency delivering transportation projects, WSDOT has a business need to properly inspect, observe and document the activities on our construction project sites.
Why do we inspect?

We do this to fulfill our own contract management purposes, as well to as to fulfill our obligations to our funding partners, other regulatory agencies and to the taxpayers.
WSDOT Inspection Needs

- Verify quality
- Confirm proper location and installation
- Measure product for timely payment to contractors
- Fulfill other legal obligations, DBE, Apprenticeship, Environmental Permit compliance

- Document project incidents for legal purposes (traffic control, work zones, incidents, etc.)
- Preserve our permanent records for up to 75 years
Old School Tool of Choice?

- Paper forms and documents
  - Inspectors Daily Reports
  - Field Note Records
  - Traffic Control Reports
  - Materials documentation
  - On and on…….
Challenges exist...

- Requires multiple entries of the same data in multiple locations
- Forms can’t share data
- Opportunity for error
- Usually filled out at the end of shift = time away from the field (or overtime?)
Challenges exist...

• Only hand searchable
• Requires physical storage, security and archiving
• Requires the paper document to physically change locations as it moves through the process
Other current practices...

- Cell phones, lap tops and smart phones are already in use and familiar
- Some offices already using electronic forms, but printing and storage still needed
- Digital photographs in use, but no way to link or tag them
- Electronic forms that can’t share data or aren’t searchable is not enough
WSDOT Goals

• Move to a paperless office – electronic forms instead of paper and carbons and boxes of records

• Data resides in a searchable location, where data is shared and tagged

• “Collect once, use many”
  – Reuse the data to populate many forms
WSDOT Goals

• Data is easily collected by inspectors and easily used by office personnel
• Provide field access to project documents
• Use latest wireless and cellular technology to help our inspectors
Research

• The WSDOT Research Office began investigating opportunities for new inspection technologies

• WSDOT led a research project with two other state transportation agencies (Minnesota and Texas) to explore the use of wireless devices to increase productivity, data quality and data availability
TRANSPORTATION INFRASTRUCTURE IS FUNDAMENTAL TO OUR WAY OF LIFE.

Why we do what we do...
To transform the capabilities of organizations in the transportation industry through the practical use of remarkable technologies.
TECHNOLOGY IS MAKING US MORE EFFICIENT!

Imagine if someone took away your navigation systems and left you with only a paper map...
Opportunities to evolve
Headlight System Overview

1. iOS Client
2. Web Service
3. Web Client
4. Interface

WSDOT Data Management System
Headlight Inspection Units
PILOT SYSTEM - HEADLIGHT
PILOT SYSTEM – FIELD NOTEBOOK
PILOT SYSTEM – FIELD NOTEBOOK

- Photo
- Video
- Audio
- Text
- Density Readings
- Equipment
- Personnel
- QR Codes (material tracking)
- Mat or Temperature Reading
- Weather
- Crew Start/Stop
- Material Quantity
PILOT SYSTEM – FIELD NOTEBOOK
PILOT SYSTEM – FIELD NOTEBOOK
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PILOT SYSTEM – FIELD NOTEBOOK
PILOT SYSTEM – FIELD NOTEBOOK
PILOT SYSTEM – OFFICE VIEW
PILOT SYSTEM – DOCUMENTATION
PILOT SYSTEM – DOCUMENTATION
PILOT SYSTEM - REFERENCES
REAL WORLD PROJECTS

Used on 31 projects totaling approximately $800,000,000

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<tr>
<th>AGENCY</th>
<th>PROJECT COUNT</th>
<th>PROJECT BUDGETS</th>
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Pilot Results

Pilot showed that mobile devices with corresponding software makes inspectors more efficient and their jobs easier

• Average time savings of 1.78 hours
• Inspectors collected 275 % more data
• On time document submission increased by 51%
A more effective workforce

**WSDOT**
- Current inspector workforce: 397
- Effective Workforce: 518

**MnDOT**
- Current inspector workforce: 250
- Effective Workforce: 311

**TxDOT**
- Current inspector workforce: 1,092
- Effective Workforce: 1,350
ANALYTICS

Project Activity
28 projects have been active between October 2nd and October 9th. There were 73 users participating in the creation of 3,882 observations.

Observation Volume

Active Users

Observation Activity
3,882 observations were captured last week on 28 active projects. 1,270 photos and videos were uploaded.

Document Activity
246 documents were submitted on 29 projects out of 29 active projects. 128 of these documents have been approved. There were 67 users who submitted documents out of 73 users who took observations.
PLAN LOCATION

Tap on the map to choose the location.

Station
Offset

CANCEL
SAVE

Tap to add notes to this observation. Tap on the information above to edit the metadata. Tap the title to give your observation a custom title.
Platform approach

- Telemetry
- Aerial
- Tablet
- Raspberry Pi
- HeadLight
Current deployment...

- Approximately 100 different Headlight units deployed in 18 different project offices across the state for one year
- A variety of different project types, sizes and locations
- A second phase of research is funding further development of broader functions (more inspection forms)
Obstacles we are tackling…

• Change – it comes easier for some
• Familiarity with the old ways
• Attempting to duplicate the flow of documents through our system as much as possible
  – Same review process
  – Opportunity to correct, comment & approve
• Maintain data security (WSDOT firewall)
Obstacles we are tackling…

• Tagging and metadata to enable best possible searching
• Adapting to field inspectors preferences
• Creating use and application guides for how the device is used in each office and statewide
• Determining what type of connectivity is needed
To achieve the mission
Questions?

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