e-CONSTRUCTION

Julia Simo
e-Construction is the collection, review, approval, and distribution of highway construction contract documents in a paperless environment.

- FHWA
e-Construction
e-Construction
Construction Industry

Exhibit 3: The construction industry is among the least digitized.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Assets</th>
<th>Usage</th>
<th>Labor</th>
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<tbody>
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<td>ICT</td>
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<td>Media</td>
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<td>Wholesale trade</td>
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<td>Transportation and warehousing</td>
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<td>Retail trade</td>
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<td>Entertainment and recreation</td>
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<td>Personal and local services</td>
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<td>Government</td>
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<td>Hospitality</td>
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<td>Construction</td>
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<tr>
<td>Agriculture and hunting</td>
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Overall digitization
Digital spending
Digital asset stock

Based on a set of metrics to assess digitization of assets (9 metrics), usage (11 metrics), and labor (8 metrics).

Information and communications technology.

Source: Appture; Bluesky; Computer Economics; eMarketer; Gartner; IDC Research; LiveChat; US Bureau of Economic Analysis; US Bureau of Labor Statistics; US Census Bureau; McKinsey Global Institute analysis.
Construction Digitization

Five trends will shape construction and capital projects.

1. Higher-definition surveying and geolocation
   Rapid digital mapping and estimating

2. Next-generation 5-D building information modeling
   Design platform for the future

3. Digital Collaboration and Mobility
   Developing next generation of digital-native leaders to deliver projects of the future

4. The Internet of Things and advanced analytics
   Intelligent asset management and decision making

5. Future-proof design & Construction
   Designing with materials and methods of the future

Digitization Trends

1. Digital Mapping & Estimating
2. Civil/Building Information Modeling (3D, 4D...nD)
3. Digital Collaboration and Mobility
4. Advanced Analytics
5. Future-proof design & Construction
Use Cases:
• Design Management
• Scheduling
• Materials Management
• Crew Tracking
• Quality Control
• Contract Management
• Performance Management
• Document management
Digital Collaboration & Mobility

Seamless, Real-Time Experience

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Benefits

Cost & Time Savings

Reduced Cost & Schedule Overruns

Increased Operating Margins

Boosted Productivity

Gained Insights
VDOT’s e-Construction

3D/4D
• 3-Dimensional modeling linked to project schedule (4D)
• Unmanned Aerial Systems (UAS)
• Automated Machine Guidance (AMG)

Tablet Based Inspection
• PlanGrid Pilot
• PlanGrid Implementation
• HeadLight Pilot
• Other Application Evaluations
• E-Ticketing
• Radio Frequency Identification (RFID)

DMS & Submittals
• Document Management System (DMS)
• Submittals

Other Technologies
• Evaluation of Current Systems
• Post-implementation O&M
• Other Research and Development
What is PlanGrid?
Software Application accessible on all platforms

- Easy to use
- Built for the field
- Real-time collaboration
- Cloud-based
PlanGrid Pilot

50 Projects
75 Participants
8 Districts
PlanGrid Pilot Success

94%
Users say PlanGrid makes them more efficient

87%
Users view plans more frequently because of PlanGrid
PlanGrid Pilot Success

3.6
Average Total hours/wk saved

4.2
Additional hours/wk spent on jobsite by inspectors

16
Additional photos taken per week per inspector
Benefits of Participating in PlanGrid

3D/4D

Tablet Based Inspection

Submittals & DMS

Developing Technologies

Improved Collaboration

• Less changes and rework
• On-time project delivery
• Projects that stay on budget
• Quality improvement
• Less wasted materials, money and manpower
• Better brand reputation
How to Participate as a Contractor?
• PlanGrid can be accessed via Desktop and Mobile Device
• Licenses managed through your organization’s Admin Console

If your Project is part of the VDOT PlanGrid Pilot:
• Request to get access to the project
• Determine if the use of workspaces should be leveraged

If your Project is not part of the VDOT PlanGrid Pilot:
• Request VDOT Central Office create a project
Statewide Roll-out

- Purchase Hardware: data enabled tablets
- Procure Software (contingent upon IT)
- Field Staff Training
- All Projects Loaded into PlanGrid

Goal: March 2020
Questions

Julia Simo
Dakota Clifford
Current Initiatives

3D/4D
- 3-Dimensional modeling linked to project schedule (4D)
- Unmanned Aerial Systems (UAS)
- Automated Machine Guidance (AMG)

Tablet Based Inspection
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DMS & Submittals
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- Submittals

Other Technologies
- Evaluation of Current Systems
- Post-implementation O&M
- Other Research and Development

3D

PlanGrid

HeadLight

VDOT Virginia Department of Transportation
Appendix

Julia Simo
Dakota Clifford
Program Goals

- e-Construction
  - Paperless project delivery
  - Smart Data
  - Seamless Integration
  - Improve Collaboration
  - Simple Process
Four major focus areas of e-Construction:

Project planning and visualization
- Reduces plan conflicts
- Promotes accurate baseline schedule
- Reduces exposure to claim

Field Inspection and Testing
- Digital Plans & Documents
- Progress Photos
- Digital Punchlist
- Electronic data capture

Project Construction Management
- Streamlined document review & approval
- Secure document management

Post Construction
- Document management
- Division reporting tool
- Program Level Analytics
Strategic Development

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## Strategic Development

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Executive Support

**e-Construction** is supported by:

- VDOT’s commitment to innovation and improvement
- VDOT’s Business Plan
- FHWA’s Every Day Counts initiatives
- Governor's Executive Order – Cloud Computing
What is Headlight?

Cloud-based Reporting Tool

- Used to collect data in field

Data First Reporting

- Starts with Data, populates reports as needed
What is Headlight?

- Work is performed
- Observation is made
- Picture is taken
- Notes are recorded
- Material test is recorded
- Pay item quantity is input

Compiled into Daily Work Report

Feeds into applicable systems.
Headlight Pilot Program

Field Data Capture

Materials Testing
Data First

Process Improvement

Common Sense Approach

Integration

SiteManager
PlanGrid

VDOT Virginia Department of Transportation
Headlight Pilot Program

Phase 1: Materials Division Only

Phase 2: E-Construction Field Data Capture

Phase 3: E-Construction Data Automation

Implementation March 2021
<table>
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<th>ProjectWise – Project Development</th>
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<tbody>
<tr>
<td>Preconstruction Documents</td>
</tr>
<tr>
<td>Construction Plans and Contract Documents</td>
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<tr>
<td>Post Construction Documentation</td>
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</tbody>
</table>

- Digital
- Manual & Digital
- Digital
Project Delivery Process – Long-Term

ProjectWise – Project Development

Preconstruction Documents

PlanGrid
- Digital Plans & Documents
- Punchlist
- Progress Photos
- As-Builts

HeadLight
- Field Data Capture
- Materials Testing
- Daily Reports

SiteManager – Contract Management

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3D & 4D Engineered Models

Julia Simo
Dakota Clifford
### Special Provision:
- 3D Engineered Model linked to the schedule (4D)
- Post-award requirement
- Included on HRBT Expansion Project and identifying additional Projects

| Promotes accurate baseline schedule | Aids in constructability reviews | Minimizes change order work | Reduces likelihood of claims |
3D and 4D Engineered Models

3D/4D

Tablet Based Inspection

Submittals & DMS

Other Technologies

6/9/2015
Baseline Schedule

Legend
- Deck Fill
- Concrete - Cure
- Excavate
- Install
- Remove
Unmanned Aerial Systems (UAS)

Construction Division commitment to test drones to improve:

- Construction Monitoring
- Estimate the extent of sediment runoff after large storm events
- Document as-built conditions

Evaluating current drone usage in construction:

Identifying additional projects to test drones:

Coordinating with other divisions to develop: