Don’t Get Left Behind
Future Trends and Emerging Technologies in Construction Technology

Jeff Sample
eSUB Construction Software
Defending Skilled Trades for 25 Years
Wendy Rogers
President / CEO, eSUB Construction Software

• 25+ years construction experience
• Passionate champion of the skilled trades
• Founded eSUB, a field-first, cloud-based platform
• Transforming the reactive claim process to proactive front-end documentation best practices
The construction industry has to “build 1,000 buildings a day for the next 31 years, so that by 2050 we can accommodate the world’s population of 10 billion people.” In total, McKinsey estimates that over $57 trillion will need to be spent by 2030 to finance this construction boom.

Autodesk CEO Andrew Anagnost
Constructing the Foundation

- The Reality of DISRUPTION
- LEADERSHIP
- DATA THE DIGITAL CURRENCY
- THE PEOPLE
“Disruption is a business model change where segments of an industry cannot adapt.”

Brett Young
IN THE LAST 15 YEARS, 52% OF THE FORTUNE 500 COMPANIES HAVE DISAPPEARED

1955 vs. 2015
Average life expectancy 75 years vs. Average life expectancy 15 years
Leadership
The digital currency of the future
BIM & VDC

Concrete Foundation for the Technology Ecosystem
Communication, Collaboration, & Planning
Construct-able BIM
Prefabrication and Modular Construction
Safety
Design Consultant
BIM
• Project virga – side by side images
Generative Design

Generative Design:
- Goals & Constraints
- Form Synthesis
- Optimization
Virtual, Augmented, & Mixed Reality
Virtual Reality Use Cases

- Design and Visualization of space
- 50% of people cannot visualize 2D plans in 3D without assistance
- More iteration in design translates to less rework in the field
- Less Man Hours = Safer Site
- HAPPY CUSTOMERS

- Training and Simulation
- Hours on the tools with less waste and risk to train
- Creates physical Muscle memory
- Simulate difficult or risky procedures
- Simulate Jobsite conditions and create collaboration with team members
Augmented Reality Use Cases

- Verification
- Documentation
- Collaboration
- Visualization
Reality Capture

1. Upload Your Design File

2. Scan & Upload

3. See The Result
WHEN IT ALL COMES TOGETHER
BIM is Still Not a Priority

- 28% We do NOT bid on projects involving BIM
- 24% We have a BIM department
- 22% We have employees on staff that can work within BIM
- 36% Number of active projects that involve BIM

Source: 2018 JBKnowledge ConTech Report
Evolving Applications

The first step to transforming your company
Manual Process Are Still Prevalent

- Nearly half of all contractors surveyed still process daily reports manually (46%).
- More than half of all contractors still process time cards manually (53%).

Source: 2018 JBKnowledge ConTech Report
Mobile devices used daily

- Smartphone: 93%
- Laptop: 80%
- Tablet: 62%
- Smartwatch: 10%

Source: 2018 JBKnowledge ConTech Report
Workflows using mobile apps

Source: 2018 JBKnowledge ConTech Report
THEN

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It’s All About the Data
## Two Types of Data

<table>
<thead>
<tr>
<th>Unstructured Data</th>
<th>Structured Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-d Plans</td>
<td>Numbers / Dates / Strings</td>
</tr>
<tr>
<td>Tasks</td>
<td>Time / Hours / Days</td>
</tr>
<tr>
<td>PDF documents</td>
<td>Costs</td>
</tr>
<tr>
<td>Emails</td>
<td>Production</td>
</tr>
<tr>
<td>Photos/videos</td>
<td>Highly Organized</td>
</tr>
<tr>
<td></td>
<td>Relational Databases</td>
</tr>
<tr>
<td>Most data is unstructured</td>
<td>Input, Search, and Manipulate Data</td>
</tr>
</tbody>
</table>
Benefits of Structured Data

- 57% Want **consistent, up-to-date** project and financial information
- 48% Want to be **warned** when specific situations occur
- 41% Want **forecasting**, allowing them to prepare for best and worst case building events
- 14% Want **online analytics** to see precisely which factors are affecting profitability and by how much.

**Companies with the Right Data will see $430B in Productivity Gains by 2020**

Source: Sage Construction Survey
## Structured Data and Labor Efficiency

<table>
<thead>
<tr>
<th>Cost Code</th>
<th>Cost Code Description</th>
<th>Est Cost</th>
<th>Act Cost</th>
<th>Orig Budgeted Hours</th>
<th>COR Budgeted Hours</th>
<th>Total Budgeted Hours</th>
<th>Used Hours</th>
<th>% Used Hours</th>
<th>Rem Hours</th>
<th>% Complete</th>
<th>Proj Used Hours</th>
<th>Proj Rem Hours</th>
<th>% Off Eff</th>
</tr>
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<tbody>
<tr>
<td>01-120</td>
<td>Rough-Branch</td>
<td>$160,000.00</td>
<td>$48,000.00</td>
<td>2,000.00</td>
<td>0.00</td>
<td>2,000.00</td>
<td>800.00</td>
<td>40.0%</td>
<td>1,200.00</td>
<td>30%</td>
<td>2,666.67</td>
<td>1,866.67</td>
<td>75.0%</td>
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<tr>
<td>01-130</td>
<td>Rough-Feeder</td>
<td>$64,000.00</td>
<td>$16,320.00</td>
<td>800.00</td>
<td>0.00</td>
<td>800.00</td>
<td>280.00</td>
<td>36.0%</td>
<td>512.00</td>
<td>40%</td>
<td>720.00</td>
<td>432.00</td>
<td>111.1%</td>
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<tr>
<td>01-230</td>
<td>Wire Pull-Feeder</td>
<td>$15,000.00</td>
<td>$0.00</td>
<td>200.00</td>
<td>0.00</td>
<td>200.00</td>
<td>0.00</td>
<td>0.0%</td>
<td>200.00</td>
<td>0%</td>
<td>200.00</td>
<td>200.00</td>
<td>0.0%</td>
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<tr>
<td>01-320</td>
<td>Distribution</td>
<td>$22,500.00</td>
<td>$0.00</td>
<td>300.00</td>
<td>0.00</td>
<td>300.00</td>
<td>0.00</td>
<td>0.0%</td>
<td>300.00</td>
<td>0%</td>
<td>300.00</td>
<td>300.00</td>
<td>0.0%</td>
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<tr>
<td>Totals</td>
<td></td>
<td>$261,500.00</td>
<td>$64,320.00</td>
<td>3,300.00</td>
<td>0.00</td>
<td>3,300.00</td>
<td>1,088.00</td>
<td>33.0%</td>
<td>2,212.00</td>
<td>28%</td>
<td>3,886.67</td>
<td>2,798.67</td>
<td>42.8%</td>
</tr>
</tbody>
</table>

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**Percent Of Efficiency**

- **Budgeted Hours**
- **Actual Hours**
- **% Hours Used**
- **% Complete**
- **Projected Completion**
- **% of Efficiency**
### Structured Data and Labor Efficiency

- **Projected Costs to Completion**
- **Projections on Remaining Costs**
- **Costs to Date**
- **Original Budgets including Change Orders**

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<tbody>
<tr>
<td>Labor Hours</td>
<td>7,500.00</td>
<td>0.00</td>
<td>7,500.00</td>
<td>0.00</td>
<td>7,500.00</td>
<td>7,500.00</td>
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<td>Labor Rate/Hour</td>
<td>100.00</td>
<td>0.00</td>
<td>100.00</td>
<td>0.00</td>
<td>0.00</td>
<td>94.57</td>
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<tr>
<td>Labor Costs</td>
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<td>750,000.00</td>
<td>710,000.00</td>
<td>0.00</td>
<td>710,000.00</td>
<td>40,000.00</td>
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<tr>
<td>Equipment Costs</td>
<td>15,000.00</td>
<td>0.00</td>
<td>15,000.00</td>
<td>17,000.00</td>
<td>1,500.00</td>
<td>18,500.00</td>
<td>-3,500.00</td>
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<tr>
<td>Material Costs</td>
<td>297,500.00</td>
<td>0.00</td>
<td>297,500.00</td>
<td>221,000.00</td>
<td>20,000.00</td>
<td>250,000.00</td>
<td>41,500.00</td>
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<tr>
<td>Subcontractor Costs</td>
<td>25,000.00</td>
<td>0.00</td>
<td>25,000.00</td>
<td>15,000.00</td>
<td>10,000.00</td>
<td>25,000.00</td>
<td>0.00</td>
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<tr>
<td>Overhead Costs</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>Other Job Costs</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>Total Job Costs</td>
<td>1,117,500.00</td>
<td>0.00</td>
<td>1,117,500.00</td>
<td>1,062,000.00</td>
<td>49,500.00</td>
<td>1,119,500.00</td>
<td>78,000.00</td>
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<tr>
<td>Earned Revenue</td>
<td>1,250,000.00</td>
<td>0.00</td>
<td>1,250,000.00</td>
<td>1,116,120.00</td>
<td>123,880.00</td>
<td>1,250,000.00</td>
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<tr>
<td>Gross Margin - $</td>
<td>62,500.00</td>
<td>0.00</td>
<td>62,500.00</td>
<td>53,120.00</td>
<td>87,300.00</td>
<td>140,500.00</td>
<td>78,000.00</td>
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<tr>
<td>Gross Margin - %</td>
<td>5.00%</td>
<td>0.00%</td>
<td>5.00%</td>
<td>4.76%</td>
<td>65.26%</td>
<td>11.28%</td>
<td>6.24%</td>
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## Structured Data and Logs

### Request For Information Log

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<tr>
<th>ACTION</th>
<th>RFI Number</th>
<th>GC/CM No</th>
<th>GC File No</th>
<th>Owner No</th>
<th>RFI Date</th>
<th>Return By</th>
<th>Date RFI Returned</th>
<th>Status</th>
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<tbody>
<tr>
<td></td>
<td>54</td>
<td></td>
<td></td>
<td></td>
<td>2/20/2018</td>
<td>2/28/2018</td>
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<tr>
<td></td>
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<td></td>
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<td></td>
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<td>4 Days Left</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>53</td>
<td></td>
<td></td>
<td></td>
<td>2/12/2018</td>
<td>2/17/2018</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td>7 Days Late</td>
<td>Pending</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>52</td>
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<td></td>
<td></td>
<td>2/8/2018</td>
<td>2/13/2018</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11 Days Late</td>
<td>Pending</td>
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</tr>
<tr>
<td></td>
<td>51</td>
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<td></td>
<td></td>
<td>1/30/2018</td>
<td>2/4/2018</td>
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<tr>
<td></td>
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<td></td>
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<td></td>
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<td>20 Days Late</td>
<td>Pending</td>
</tr>
</tbody>
</table>

- Flood damage to main electrical room
- Need clarification regarding Switchboard AA metering
- Clarification of Exit light in rm 101
- Damage to equipment
Data Silos Create Inefficiency

- $15.8B: Costs of Interoperability
- 29.1%: Solutions that don’t integrate
- 51.8%: Manually transfer data
- 55%: Claims due to inaccurate data
Data Integrations
Current State

Linear Integration

Source: Construction Progress Coalition
Future State
Common Data Environment

Source: Construction Progress Coalition
Real-time, data-driven predictive modeling

Reduce costs by 18%

Cut projected completion by 12 weeks

Reduce Waste

Break down silos
ILD-Convergence of Forces for The Perfect Storm

Declining Labor Productivity

Quality

DFMA

Cost

Function

Time to Market

Cost of Changes

Constructability Experts
Integrated labor delivery

Aligning Owners / Architects / Engineers / GCs / Skilled Trades

Labor Begins at Design
Big data
bigger opportunities
#POWER TO THE TRADES

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