“Leveraging a BIM Strategy to Improve Construction Project Delivery”

Presented by:

Seiler Instrument
Meridian Systems
Byrne Software Technologies, Inc.
What is BIM?

Definition:

"BIM is the *virtual representation* of the physical and functional characteristics of a facility from inception onward. As such, it serves as a *shared information repository* for collaboration throughout a facility's lifecycle."

- Patrick Suermann, PE.
National BIM Standard Testing Team Leader
Process improvements impacted by BIM provide real cost benefit

Integrated project delivery promotes greater collaboration earlier in the project lifecycle

Stakeholders who agree to collaborate using BIM tools receive the most benefit

Emergence of BIM technology is further promoting this shift as collaborative modeling tools become available
Where is BIM Today?

Expectations of the groups involved:

• Owners expectations
  • Desire to visualize the project
  • FM Database usage
  • Building performance
  • Cost assurance

• Architects expectations
  • Better more complete design
  • More complete and coordinated documents
  • Environmentally responsible design

• General Contractors expectations
  • Conflict analysis
  • Constructability studies
Analysis Dependant on Model

Green Building Initiatives
- Carbon Neutral Building Requirement
- LEED Certification

Whole Building Analysis
- Autodesk Ecotect
- Green Build Studio
- Others using gbXML

Autodesk Ecotect Tools
- Thermal Analysis
- Right to Light
- Ventilation and Airflow
- Lighting Design
- Solar & Shading Analysis
Project Delivery Methods

Design Build and IPD

• Communication
  – Design Intent
  – Owners Needs
  – Site/Design Specific Conditions

• Accuracy
  – Bid Accuracy
  – 4D Delivery Accuracy
  – Phasing Accuracy
  – CD Accuracy

These methods of project delivery set an expectation that all parties will perform and coordinate throughout the design and construction cycle.
BIM for Coordination

Virtual Coordination and Constructability

• Each subcontractor is responsible for individual trade specific 3D models
• Model to field install accuracy becomes the responsibility of the subcontractors
• Coordination meetings become digital
  – Coordination meetings held online
  – Subs are emailed html documents illustrating conflicts
  – Changes in the model are tracked
  – RFIs are addressed prior to construction (phase)
Leveraging BIM to Support Project Controls

- Bi-directional knowledge management for design review
- Design information transfer to Build phase without drop-off
- Project Management system serves best as central repository for data
- Provides version control and tracking history
- Automated costing from BIM to Project Management
- Models become accessible to Construction team for faster decision-making
- Workflow for Field Engineering communication
- Knowledge transferred to Owner on close-out
BIM for Bidding and Winning Work

Models for Estimating

• Leverage the complete building model to quantify components in the building
• Ability to link BIM models into estimating software
• Departure from hand counts and spreadsheets

Models for Scheduling

• Coordinate trades via 4D Gantt chart links to model
• Confirm construction sequencing via 3D visualization
• Use as a sales tool – what shows your client preparation better than a video of their building being virtually constructed?
How Has Field Delivery Changed

Field Layout

• Architectural and Structural designs becoming more complex
• Tighter deadlines and budgets require advanced layout techniques
• Leverage BIM investment from design/coordination into field devices
• Layout utilizing highly accurate and coordinated models
• Field staking reports relayed back to office
• RFIs/Issues collected via digital images are e-transmitted
In the Field...

- The paper plans come out
  - Leaving the 3D Model in the office
- Traditional manual methods are often used for layout
  - Manually scaling distances and calculating angles from plans
  - Turning angles with theodolites and pulling tapes to measure distance
Trimble and BIM Improve Layout By:

- Putting paper plans away
- Accurate Model Data
- Used Directly in the Field
Trimble and BIM Improve Layout By:

Collect As-built Data

Update the Model
The Future of Technology
Agenda

– The “Bottom Line” Challenge
– Coordination Best Practices
– The True IPD Solution
– The Business Value
– Roundtable Q&A Session
The “Bottom Line” Challenge

Reaping Higher Returns During Lean Times

Even as the design and construction industry confronts a down economy, most BIM users are seeing positive payback from their use of the technology, according to McGraw-Hill Construction research. Users gain bankable benefits that enhance productivity, improve their ability to integrate teams and give them an edge on the competition. The value from BIM grows as users gain experience, offering them an opportunity to reap greater returns even during an economic recession.

Key Findings

- Two-thirds of BIM users say they see positive ROI on their overall investment in BIM.
- 87% of expert users are experiencing positive ROI with BIM.
- 93% of BIM users believe there is potential to gain more value from BIM in the future.
The “Bottom Line” Challenge

- Adoption of BIM across organizations
- Requires coordination among design disciplines
- Communication of the design to field
- Quality of BIM content
- Interoperability of BIM content
- Incorporating business rules into BIM content
- Integrating BIM with traditional specifications
- Evaluating return on investment (ROI)
Coordination Best Practices

- Financials
- Microsoft Office Desktop
- Design Apps - BIM
- Corporate Portal
- Estimating
- Online Project Plans & Specs
- Supply Chain Collaboration
- Mobile & Field Solutions
- Document Management
- Scheduling
- Mapping Applications

Portfolio Project Management
Owners inability to capture information during the planning and building phases of new projects

<table>
<thead>
<tr>
<th>Stakeholder Group</th>
<th>Planning, Engineering and Design Phase ($Millions)</th>
<th>Construction Phase ($Millions)</th>
<th>Operations and Maintenance Phase ($Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architects and Engineers</td>
<td>1,007.2</td>
<td>147.0</td>
<td>15.7</td>
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<tr>
<td>General Contractors</td>
<td>485.9</td>
<td>1,265.3</td>
<td>50.4</td>
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<td>Specialty Fabricators and Suppliers</td>
<td>442.2</td>
<td>1,762.2</td>
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<tr>
<td>Owners and Operators</td>
<td>722.8</td>
<td>898.0</td>
<td>9,027.2</td>
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<tr>
<td>Total</td>
<td>2,658.3</td>
<td>4,072.4</td>
<td>9,093.3</td>
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</tbody>
</table>

Source: NIST GCR 04-887, August 2004
IPD Components

**Market Demands**
- Improved Performance
- Reimbursement Changes
- Capital Constraints
- Continued Margin Compression

**Project Goals**
- Renewed Scrutiny on Cost & Schedule
- Integrated Process Planning
- Inefficiencies in Project Delivery Process

**Industry**
- Better Working Relationships
- Collaboration / Teamwork
- Desire for Greater Transparency
- Risk Shifting

**Technology(Process**
- Building Information Modeling (BIM)
- Lean Principles Applied to Operations, Design & Construction
- Consensus Project Management Software
Coordination Best Practices

- **Marketability** and higher level of service
- Establish **Owner Value Propositions** for projects
- Have a **Central repository** for data – “Single Source of Truth”
- Effectively **share knowledge** through the project lifecycle
- **Alignment** of disciplines (Owner/A/E/C/Consultants/Real Estate)
- Define how team members participate in using technology
- **Compliance** and cost avoidance
- **Velocity** across the project portfolio
- Standardize on efficient team-operating processes
- Positively impacts **bottom line** costs
Marketing Your Services

Virtual Design & Construction

Virtual Design and Construction (VDC) encompasses the organizational improvements and processes necessary for planning, simulation, construction and operation of a building (product) with the help of multi-dimensional computer models. These digital models encompass the entire life cycle of the building, thus providing for greater control, collaboration and understanding of complex project delivery processes.

From our perspective, VDC is a comprehensive use of BIM methodology and the enabling software platforms; it is a way to integrate everything we believe in: excellence in design and construction, lean project delivery within the context of IIPD, integration of sustainable principles, and delivering a product that is uncompromisingly aligned with our clients’ current and future needs.

Virtual Design and Construction (VDC), embodies the very essence of the Clayco brand: The Art and Science of Building.
The True IPD Solution
It’s About User Options

- Project Exec: MS Outlook
- Contractor/Sub Contractor: MS Excel
- A/E, Vendor or Sub: Web UI
- Project Admin: Prolog Desktop UI
- Field Supv.: Tablet Form
Integration Options

It’s all about user choice!

PROLOG

Financial Systems
- Cost information
- Actuals / AP / AR

Design BIM
- RFI / Submittals
- Buyout items

Estimating
- Preliminary budget details

Document Management
- Integrated bidding print distribution

Other Systems
- “there’s an APP for that”

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Combined Project and Process Models

1. Design
2. Pre-Construction
3. Construction
4. Commissioning & Handover
5. Facility Management

Project Solutions

BIM Models

- Structural Models
- MEP Models
- Other Models

Geometry & Properties

Documents (Links), Properties & Data

Integrations with Other Information & Systems (BIM and Non-BIM)
Achieving a True IPD Model

- Improve **Quality**
- Improve **Sequencing** (BIM)
- Improve **Time to Market**
- Improve **Budget Management** (PPM)
Why Integrate BIM to Project Controls

• Clash-derived RFIs no longer managed off-line, with snapshots or in spreadsheets --- They are dynamic and connected
• Ability to leverage Project Management solution within BIM solution
• Analyze and understand how RFIs are affecting project progress in real time
• Focus on your strengths, BIM, PM, Estimating, Scheduling, etc.
• Reduce data entry, eliminate errors and quickly disseminate information
• Take advantage of a project controls system for workflow and security
Benefits of Cloud based BIM

• Real-time 2D & 3D design review
• Interoperability
• Live conflict resolution
• Secure, centralized user and project management
• Automated version control
• Notifications
Coordination Fundamentals

• Procurement

• Interoperability Issues

• Model Coordination

• Model Management

  • Example at right>>> Items that need to be virtually coordinated aren’t necessarily tied to the sequence in the procurement schedule
Model Coordination & Model Management

Tracking down current file revisions and exchanging data from one network to another is a challenge.
Cloud BIM + PM

- Operates in your browser
- Direct link between objects and line items
- Field Coordination
- Desktop Modeling Tool
  - AutoCAD, RealWorks, Archicad, etc.
  - Glue buttons for managing RFI’s, submittals, quantities and coordination.
- Project/Facilities Management
Review Process

Responder receives an auto email notice from Prolog Converge with a hyperlink. Clicking the link directs the user directly to the RFI where it can then be answered.
ROI for RFI’s

BIM to Operations

Design/Fabrication

Design/Trade
Coordination Team

30 minutes spent to duplicate data entry per RFI

Operations

Project Team

Prolog

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Cost of RFI Duplicate data entry

- Project Size: $25M
- Pre-construction RFI’s: 250
- Time per RFI: 30 minutes
- Total Time Spent: 124 hours
- Cost Per Project: $4,400
- $500M in annual revenue: $89,423
True Value is Visibility

Issue RFI & send to Prolog

Cost Change

Design Change Notice
### Track in weekly report log

<table>
<thead>
<tr>
<th>RFI #</th>
<th>Subject</th>
<th>Author Company</th>
<th>Answer Company</th>
<th>Date Created</th>
<th>Date Req'd</th>
<th>Date Resp</th>
<th>Cost Impact</th>
<th>Amt</th>
<th>Sched Impact</th>
<th>Days</th>
<th>Dwg Impact</th>
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<td>The Design House</td>
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<td>7/21/2008</td>
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<td>Meridian Project Systems CM</td>
<td>CRN Property Management Inc.</td>
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**Total Number of RFIs for this project:** 49

**Final Totals for this project:** $7,000.00 2
BIM to Operations

STEP 1
Resolve All Conflicts

1. Design/Fabrication
   - Resolve All Conflicts

2. Design/Trade Coordination
   - Issue RFI or design review task item, send to Prolog

3. Operations
   - Issuing RFI or review task item kick of secondary process
   - Cost Change (PCO)
   - Design Change Notice (DCN)

4. All issues in Prolog are resolved and closed

5. Information is passed back to coordination team
BIM to Layout and Quality Control

Design/Trade Coordination

As-Built Quality Check

Pass points to Trimble Robot for layout*

Pass As-Built layout info back to Prolog to run reports for quality assurance

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Mobile Solutions

Combine Trimble **YUMA** device with Prolog Office Applications

Field workers can access Prolog on the jobsite
Capture accurate data at the source
Eliminate hours of data entry time back at the office
Leveraging the Investment
Leveraging The Investment

Seeing the True Value in Your Technology Investments

- Marketing services to new clients
- Avoid rework/changes
- Reduce cycle time of workflows
- Increase productivity/efficiency
- Fewer claims/litigation

Leveraging the Investment

Increased Financial Control – Façade Allocation Analysis
 Result – 10% Savings to Owner in façade costs

Reduction in Change Orders – Building Walk-through Virtualization
 Result – $30,000 Savings in potential change orders

RFI Coordination - Reduction in Duplicate Data Entry
 Result – $89,423 Savings in $500M annual revenue

Field Engineering – 16 Weeks of Coordination with Integrated Solution
 Result – $42,120 Savings in potential change orders

Faster Decision Making – Façade Installation
 Result – $400,000 Savings in Schedule Savings
## Customer Profile

### Implementation Highlights

- Business Process Review and Workflow Analysis
- Executive Sponsorship
- Adoption of Web Based Solutions/platform
- Interoperability of Critical Project Data between Finance and Operations
- Measured ROI through improved Budget Forecasting Toolset

### Business Results

- Centralized system for better cost control
- Standardized Business Processes
- Real-time collaboration for project stakeholders
- Executive visibility over the entire program
- Eliminate data silos with document mgmt storage

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Complimentary Webinar Event
How Clayco Improved Cost Management with Integrated Financials and Prolog Construction Project Management

Clayco, Inc. is one of the nation's largest privately owned real estate, architecture and engineering, design/build and construction firms with a national reputation for excellence that has been earned through achievements in safety management, fast track schedules and technology and design innovation.

Having used Prolog construction project management software for 13 years, Clayco sought to further improve project controls by integrating the solution with their newly implemented financial system, Oracle's JD Edwards.

Join us for this 1-hour Webinar where a Clayco Sr. Project Manager will discuss how Prolog provides critical business value. Then, the Clayco CIO will review how the financial integration strategy resulted in significant additional improvements in project controls including:

- Increased quality and accuracy of budget forecasting—in less time
- Elimination of redundant data entry
- Standardized processes across the organization
- Better executive oversight
- Improved collaboration between systems and internal resources

Cost: No Cost
Date: Thursday, May 19
Time: 10:00am Pacific
1:00pm Eastern

REGISTER NOW

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Leveraging The Investment

**Business Challenges**
- Technology, communication and transparency barriers
- Lack collaboration capabilities to successfully deliver IPD
- Jointly developed project goals and execution
- Managing Time, Quality and Budget for projects
- Adopting BIM and Project Management standards across organization

**Business Drivers for Collaboration and Interoperability**
- Greater need for collaboration in lean economy
- Redundancies and conflicts in data and flow amongst stakeholders
- Projects require executive visibility and reporting

**Benefits of Adopting Integrated Solution**
- Improvement in Project Controls with centralized data storage
- Standardization of discipline practices across organization
- More timely and accurate communication and reporting
- Increased staff productivity
- ROI and benchmarks measureable
BIM and Project Management Software are not solutions in themselves, but rather effective tools in the hands of a collaborative project delivery team.