Digital Project Management:
Lean Integrated Project Delivery Process

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BIM Manager Gresham Smith |@RavClarenceWood

Rina Sahay
Architectural BIM Manager Fishbeck | @rinasahay
About the speaker

Ravi Wood

- Collaborator and Innovator.
- BIM Manager, Gresham Smith
- Top Rated class for BIM Management: AU 2019.
- Speaker at RICS IFMA Sweden 2016.
- Top Rated Speaker at Hong Kong BIM HKIBIM 2016.
- Speaker at AEC Next, NY Design Expo.
I guess I am a Geek...

VOLUNTEER AND GIVE BACK TO SOCIETY

- HABITAT FOR HUMANITY
- KNIGHTS OF COLUMBUS
- CHURCH
- UNITED WAY
- NIH
- ST. JUDE CHILDREN’S
About the speaker

Rina Sahay

- Architectural BIM Manager, Fishbeck
- Autodesk Expert Elite, Revit Certified Professional, Revit Subject Matter Expert.
- Mentor - Autodesk Revit Forum and Directly.com
- AKA The Destructor and The Ice Queen
I am also known as

Grandma

Mom
They gave us The Bark Of Approval!!

JUGNU  the “Firefly”

ROSCOE
Alternatives to Handshakes, Hugs, High Fives and Hongi

The Wave
The Hand On Heart
Namaste
NZSL: How Are You?
The 'Hi-Brows'
The 'All Good' Nod
The 'East Coast Wave'
The 'What a World Eh?'
CLASS OBJECTIVES
DIGITAL PROJECT MANAGEMENT  4 PHASES

Initiating  Planning  Execution and control  Closing
INITIATE
Development of Digital Execution Plan based on AIA & UK Level 2.

PLAN
Strategic planning during design development or concept design phase.

EXECUTE
Implementation of BEP during CD and CA phase of project.

CLOSE
Guidelines for LOD 500 Level BIM data at project handover.
LEAN INTEGRATED PROJECT DELIVERY
STAY TUNED!

We will then relate these objectives to two real life Case Studies from our experience

PROJECT “ROSCEO THE GERMAN SHEPHERD”

PROJECT “JUGNU THE FIREFLY”
Objective 1: Initiate Development of Digital Execution Plan based on AIA & UK Level 2
WHO
PROJECT STAKEHOLDERS

OWNER

ENGINEERS

CONSULTANTS

ARCHITECTS

CONTRACTORS

CONSTRUCTION MGR
WHY
DISORGANIZED

CONFUSED

CHAOTIC
A BIM EXECUTION PLAN SAVES THE DAY!
WHEN
START THE BEP WITH THE END RESULT IN MIND
START THE BEP WITH THE END RESULT IN MIND

THE PATHWAY TOWARDS THE END RESULT
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<tr>
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<td><a href="https://bim.natspec.org/">https://bim.natspec.org/</a></td>
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WHAT
RELEVANCE OF DIGITAL EXECUTION PLAN

BIM STANDARDS

IMPORTANCE OF LOD.

BIM TECHNOLOGY REQUIREMENTS (PROJECT BASED)

BIM BRIEFINGS

THE IMPORTANCE OF AN E.I.R.

SOURCE: https://www.bim.psu.edu/owners_guide/
COMPONENTS OF BIM EXECUTION PLAN

SOURCE: https://www.bim.psu.edu/owners_guide/
BENEFITS OF A BIM EXECUTION PLAN

- Stronger Execution
- Sharing Data
- Saving Time
- Communication
- Collaboration

Source: https://lupiter.co.in/contact-us
7 DIMENSIONS OF BIM EXECUTION PLAN

3D SCHEDULING

4D

5D ESTIMATING

6D SUSTAINABILITY

7D FACILITY MANAGEMENT
How
SCOPE NATIONAL BIM STANDARD-UNITED STATES
UK PILLARS FOR BIM

SOURCE: https://www.nibs.org/page/nbgo
Objective 2: Plan

Strategic Planning During Design Development or Concept Design Phase
EFFECTIVE COMMUNICATION
BIM ORGANIZATION PLANNING PROCEDURE

SOURCE: https://www.bim.psu.edu/owners_guide/
FILE PLANNING: SPLITTING OF FILES
BIM: Level Of Detail (LOD)

- LOD 100: Pre-Design
- LOD 200: Schematic Design
- LOD 300: Design Development
- LOD 350: Construction Documentation
- LOD 400: Construction Stage
- LOD 500: As Built

Architecture
Engineering
Construction
Owner
<table>
<thead>
<tr>
<th></th>
<th>Upper Range (Imperial)</th>
<th>Lower Range (Imperial)</th>
<th>Upper Range (Metric)</th>
<th>Lower Range (Metric)</th>
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<tr>
<td></td>
<td>2&quot;</td>
<td>5/8&quot;</td>
<td>1/4&quot;</td>
<td>1/16&quot;</td>
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<td>1/4&quot;</td>
<td>1/16&quot;</td>
</tr>
<tr>
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<td>-</td>
<td>5cm</td>
<td>15mm</td>
<td>5mm</td>
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<tr>
<td></td>
<td>5cm</td>
<td>15mm</td>
<td>5mm</td>
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<td></td>
<td>LOA10</td>
<td>LOA20</td>
<td>LOA30</td>
<td>LOA40</td>
</tr>
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</table>

TEAM TASKS ACCOUNTABILITY ASSIGNMENT
ACCOUNTABILITY TRACKING AND MONITORING
COST VS ENERGY OPTIMIZATION: COVETOOL
Selecting Cheapest Option for Energy Code Compliance

SOURCE: https://www.cove.tools/

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**COST PREMIUM**: $91,875.00

**ENERGY SAVINGS**: 10%

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<thead>
<tr>
<th>DAYLIGHT</th>
<th>GLASS</th>
<th>PV</th>
<th>ROOF</th>
<th>SET POINT</th>
<th>SHADING</th>
<th>SOLAR HOT WATER</th>
<th>SYSTEM</th>
<th>WALL</th>
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<td>None</td>
<td>R-18</td>
<td>Baseline</td>
<td>None</td>
<td>None</td>
<td>1</td>
<td>R-11</td>
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<tr>
<td>None</td>
<td>VUEI 50</td>
<td>None</td>
<td>R-18</td>
<td>Baseline</td>
<td>None</td>
<td>None</td>
<td>1</td>
<td>R-11</td>
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</table>
1. Daylight
2. Low Visual Distraction
3. Views to Outside
4. Adjacency Preference
5. Circulation
6. Work Styles
7. Low Acoustic Distraction
8. Low Density

GENERATIVE DESIGN

Source: Autodesk https://www.autodesk.com/solutions/generative-design/architecture-engineering-construction
Objective 3: Execute
Implementation of BEP During CD and CA Phase of Project
<table>
<thead>
<tr>
<th>Document Management</th>
<th>Design Collaboration</th>
<th>Model Coordination</th>
<th>Project Management</th>
<th>Field Management</th>
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<td>FOLDERS</td>
<td>BIM 360</td>
<td>MODEL CLASH DETECTION</td>
<td>RFI’s</td>
<td>CHECKLISTS</td>
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<td>CLOUD SHARING</td>
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<td>ISSUES</td>
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</table>

BIM CLASH COORDINATION
BIM CLASH CHECKS

- Interoperable files
- Model compare
- Clash generation
- Generate reports/Logs
- Visual checks
- Team meetings/Coordination
- Save views/Add comments
- Automate check and evaluate results
Planning & Documentation
Collaboration Strategy

FORTNIGHTLY COORDINATE CYCLE

- MONDAY
  - CLIENT MEETING
- TUESDAY
- THURSDAY
  - BIM MEETING
- FRIDAY
- MONDAY
- THURSDAY
- FRIDAY

DTM
ALL CONSULTANTS ISSUE MODELS AT 6PM TO PTP SITE

COLLABORATION TIMELINE
<table>
<thead>
<tr>
<th>Level / Location</th>
<th>Submit Equipment Submittal Days</th>
<th>Start</th>
<th>Finish</th>
<th>Days</th>
<th>Model Upload Days</th>
<th>Coordination Start Days</th>
<th>Coordination Finish Days</th>
<th>Days</th>
<th>Model Sign-off Days</th>
<th>Shop Dwg Start Days</th>
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<td>2/2/2018</td>
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</table>

**TIMELINE MANAGEMENT**
### Preconstruction services timeline

#### Planning
- Project Start-up
- Scoping & budget
- Conceptual design and estimate

#### Programming and Preliminary Design
- Feasibility study
- Funding approval
- NEPA evaluation
- Environmental clearance

#### Final Design
- Detailed design and approval
- Engineer’s estimate
- Final plan package
- Request for proposals

#### Advertise And Award
- Advertise for bids
- Evaluate bids
- Award contract

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**PRECONSTRUCTION DIGITAL MANAGEMENT**
BIM ERP MANAGEMENT

BIM LOGISTICS MANAGEMENT
Objective 4: Close
Guidelines for LOD 500 Level BIM
Data at Project Handover
BIM IN FACILITY MANAGEMENT

ASSET INFORMATION MANAGEMENT

BIM MODELS

FLOOR PLANS

SQL DATABASE

ASSET MANAGEMENT

SPACE MANAGEMENT

WEB LINKAGE TO FACILITY MANAGEMENT FMMS SOFTWARE

ASSET INFORMATION MANAGEMENT
How Should Facility Managers use Revit BIM?

- Documentation and Record Keeping
- Management of Spatial Requirements
- Preventive Maintenance Modelling
- Asset Management
- Energy Efficiency Analysis
- Disaster Planning And Management

IMPROVED SPACE MANAGEMENT
STREAMLINED MAINTENANCE
SUSTAINABLE BUILDINGS

Source: https://www.aceee.org/grid-interactive-efficient-buildings-gebs
ENERGY EFFICIENCY

Source: https://www.aceee.org/grid-interactive-efficient-buildings-gebs
DIGITAL TWIN

CONSTRUCTION DATA

SENSOR DATA

LEARN FROM BEHAVIOR AND HISTORY

CONNECTION DATA

AS BUILT DATA

CONNECT PHYSICAL AND DIGITAL

INSIGHTS PREDICTIVE ANALYSIS

Toolbox For Success
TOOLS FOR COLLABORATION AND COORDINATION

- Model Authoring
- Coordination and Clash Resolution
- Communication
- Model Review
- Cloud Based Collaboration
- Model Data Exchange
Cove.tool helps achieve higher productivity and reduces construction cost.

01 Automation
Reduces errors and dramatically increases the number of professionals able to use the software.

02 Speed
Most design decisions need to happen concurrently and in real time. Consultants take weeks to answer questions.

03 Data Driven Design
Data collection increases predictive and generative abilities of the platform.

04 Cost Optimization
Linking all decisions back to a common metric (cost) links together design, construction, and manufacturers.

SOURCE: https://www.cove.tools/
Save 80 Hours with cove.tool

Compare the time saved and savings earned to generate the results yourself with cove.tool!

Collect climate information: 1 hour
Benchmarks & geometry import: 3 hours
create conceptual energy model: 5 hours
parametric runs of a set number of options: 10 hours
Create a report and conclusions: 4 hours

Daylight Analysis: 15 hours
Glare Analysis: 15 hours
Shadow Studies: 15 hours
Indoor and Outdoor Water Studies: 10 hours
Site and Location Studies: 5 hours

Average Billable Rate
$200/Hour
$16000/Report/Project

SOURCE: https://www.cove.tools/
Testfit: Great Resource to Iterate faster designs.
CASE STUDIES
In this Case Study, we shall

• Examine the salient points of the BIM Execution Plan
• Summarize the workflow engaged in this IPD project
• Describe any challenges
• Summarize lessons learned.
The Story……Why IPD?

- Approximately 95,000 SF addition to the Business School complex
  - Classrooms
  - Advising
  - Administration

A large team made out of other teams…..

- Core Group
- Design Team
- Design Assist Trade Partners
Background Documents

● **Contract Type - Integrated Project Delivery**
  - Pre-Construction
  - Construction
  - Post-Construction / Operation

● **Digital Project Information Exchange Agreement**
  - BIM Execution Plan
  - Building Information Model
  - Construction Documents
  - Digital Project Information
Challenges

- Size of the Project
- Amount of communication required
- Size of the deliverable
- Size of the team
  - geographic locations
  - team members on different software
What Worked for us?

• Donor Funded Project
  ○ Formal Target Budget was established at the beginning
What worked for us?

- Collaborative approach
  - Extensive Communication
  - Collaboration via Autodesk A360
  - Allocation of responsibilities
What worked for us?

- Established Protocol
  - Technology resources / Infrastructure
  - BIM Uses
  - Model data exchange
  - Model Quality Control
    - Model Accuracy
    - Clash Detection
    - Compliance with BIM Standards
  - File naming conventions
  - Frequency of model updates
  - Assigned responsibility for tasks
Lessons Learned.....

• Exceptionally Rewarding - but not the easy way
• Very collaborative - requires more engagement and time than conventional methods
• Best strategy to deliver large Projects
  ■ Quickly
  ■ With best value
• Team members
  ■ Should be on the same software
CASE STUDY

“JUGNU”

THE FIREFLY
The Biggest Lesson We Learned.....

IPD is intrinsically lean...... and collaborative to the core......
What was your biggest takeaway from this presentation?

Please leave a response in the Comments section for this class!
Acknowledgements

Thank you for your contributions -
Chris Kretovic, Cliff Baker, and Dan Laustein (Fishbeck)
Manoj Gunasekaran

Thank you “Deepak Maini” for outstanding Mentorship!

Thank you to “Autodesk University” Team & “Janice Miller Kellerman” for shepherding us.

Thank you to our families, colleagues and everyone part of this class for this opportunity to present our humble presentation.
Please reach us through comments if we can be of help or assistance.

Contact:

1. Ravi Wood
1. Rina Sahay
Sources:

2. **Penn State BIM Guide:** https://www.bim.psu.edu/owners_guide/
3. **Penn State BIM Guide** https://www.bim.psu.edu/owners_guide/
4. Jupiter: https://lupiter.co.in/contact-us
5. **NIBS National Institute of Building Science** https://www.nibs.org/page/nbgo
6. https://geospatial.blogs.com/a/6a00d83476d35153ef01b8d08ebfa5970c-popup
17. Autodesk A 360.
18. Testfit.