Advanced Model-based Estimating

Using BIMForum LoD
Introduction

The software agnostic presentation will promote the advancement of model-based estimating practices in today’s industry from seasoned design builder’s perspective. The presentation will share data from recent projects employing 5D practices in order to demonstrate how small-scale successes can be achieved and repeated.

The discussion will also use current studies to bring attention to the challenges requiring broader-scale industry (practitioners) and applications (software vendors) collaboration in order to successfully scale up these practices. For owners, the presentation will identify the initial steps project teams must perform during the planning and kick-off phases of a project and the elements required in the creation of a Project BIM Execution Plan.

For construction and design professionals, the discussion will demonstrate how the BIMForum Level of Development standard provides useful guidance for project setup.

Brent Pilgrim, Beck Group

Brent Pilgrim works with The Beck Group as the DESTINI Applications Director for their preconstruction team. He has 18 years of experience with Beck, a leading national design build firm focused on integrated project delivery. Brent’s career stems from a cross disciplinary education in Environmental Design & Construction Management.

Michael Ruiz, Beam

Michael Ruiz has focused on harnessing the power of relationships and collaboration within dynamic teams to optimize large and complex and integrated VDC projects. He has successfully facilitated teams and led focus groups to establish the means and methods of using technology, lean, and sustainable principles in design, construction, and operations.
Learning Objective 1:
● Define basic best practices for successful model-based estimating.

Learning Objective 2:
● Define how Model Element Level of Development (LOD) correlates to estimating best practices.

Learning Objective 3:
● Understand how the LOD Specification can be used with design and construction teams to lower risk, increase collaborative exchanges, and improve transparency.

Learning Objective 4:
● Discuss what next steps the industry can do to help advance model-based estimating practices.
Importance of Model-Based Estimating

- Incremental process improvement
- Critical to advancing true “5D”
- Facilitates cost awareness
- Ties cost to model progression
- Provides owner validation of
  - Scope
  - Schedule
  - Cost
Significance of 5D

- Enforces Standardization
- Enables Machine Learning
- Invites Automation
5D is Not...
- Only Model-Based quantity takeoff
- A reaction to model iterations
- Ad-hoc snapshots of the model
5 Essentials of 5D:
- Intentional
- Quantifiable/Qualifiable – LoI
- Integrated
- Standardized - LoD
- Automated

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Factors Preventing Adoption of 5D:

- Lack of experience & proficiency
- Lack of rigor and standards
- Software platform limitations
Is it possible?
- Experience says YES
- Understand the knowns and unknowns
- Learn from prior successes
  - Higher education
  - Pharmaceutical
5D Example...by the Definition!

- Intentional
- Quantifiable/Qualifiable
- Integrated
- Standardized
- Automated
Georgia Tech Campus Center

Virtual Planning, Design and Construction (VPDC)

Overview of the Project

Owner wanted a virtual planning, design and construction (VPDC) approach to validate program, cost and schedule on a large campus project.

What we Did

Facilitated project execution planning, developed the project’s data dictionary, Reported on BIM & VDC, programmatic costing, cost analysis, and schedule validation. Achieved consensus on the approach for VPDC.

Our Role

Guide a large group of consultants on VDC best practices for producing early design data. Consolidation of tools for producing interoperable information sharing for project validation.

What we Learned

Scaling a VPDC approach on a large-scale project requires holistic buy-in. Project team and management team must be on same page regarding expectations on business process.
Driven by passion to provide the world with life saving innovations, the owner has begun a journey ion data driven design to exploit speed to market initiatives.

Overview of the Project

Owner wants to experience a data driven cost model on all projects to support the corporate real estate strategy, pipeline and speed to market.

What we Did

Prepared data dictionaries for design, construction and facilities team. Schedule of values and procurement strategies based on costs of spaces, components, and systems.

Our Role

Facilitate project execution planning, LoD and LoI exchanges between parties, develop cost models for CRE and users. Provide audit and reporting strategies. Provide cost analysis, cost segregation and critical asset management.

What we Learned

To be fully integrated on projects, project teams must be allowed to innovate and prepare models earlier for cost analysis. Traditional project trajectory does not fit well on data driven projects.
Lessons Learned & Best Practices

At Early Design Stages:

- **Programmatic MBE**
  - Owners Project Requirements
  - Omniclass Table 13/14
    - “Spaces by Function”
    - “Spaces by Form”

- **Concept Design MBE**
  - Owners Project Requirements
  - BIM Execution Planning
  - Omniclass Table 13/14, and...
  - Uniformat/Omniclass Table 21
    - \textit{A10 – Foundations}
    - \textit{B10 – Superstructure}

- **Schematic Design MBE**
  - Same but greater LOD
Lessons Learned & Best Practices

As the Project Progresses:

- Definitions (white list) for cost estimation tasks
  - Move from vague conceptions into precise descriptions
  - Prescribe the state of development
Lessons Learned & Best Practices

Staging prescribed BIM deliverables for cost estimation

- Considerations for model data as an extension of required geometry
- Assist principal designers in communicating to their teams what geometry and information is relevant for consumption by cost estimation team by stage per PxP
- Increase cost estimation reliance on models
### Realization and Reference of LoD and LoI - Impact on Project Planning

- Considerations for model data as an extension of required geometry
- Consider mapping required levels of information to inform team of what’s required
- Anticipated and planned information across time
Lessons Learned & Best Practices

Define how LoD correlates to estimating best practices

- Use of classification systems
- Element definitions and creation of a Data Dictionary
  - Attribute tables
    - System component elements
    - System distribution elements
    - Global attributes
    - Item-Specific attributes
- Understanding design and preconstruction progress within the LoD system
Lessons Learned & Best Practices

Keys to Lowering Risk:

- Increase collaborative exchanges
- Improve transparency
- Agreement on Source of Truth
  - Spatial data was source of truth at beginning
  - **OPR at Beginning Phases**
  - **Uniformat in Later Phases**
- Use of the data dictionary and common language
- Development and standardization of contracted data exchanges
Advancing MBE Practices:

- Define estimating standards for major SOW
  - Inferred or Parametric Qty’s
  - Quantification method
- Define and associate LoI
- Correlate to, and overlay with, LOD
Advancing MBE Practices:

- Scaling across the project team
- Implementing model component type classifications during design phases
  - *Space*
  - *Components*
  - *Systems*
- Getting manufacturing and supply chain BIM ready in support of unit costs to inform team
Call to Action:

- Imagine if estimators were experts in statistical analysis and masters of risk model simulation.

- What if models were built for quantification with such intentionality and accuracy that we didn't question the content or the resulting quantities?

- What if estimating was refined to the point of a universally accepted standard?

- What if cost was automatically linked to model data, based on intelligent tagging and automated mapping features in the software?
2019/2020 TASK FORCE: Estimating with BIM

**Focus:**
Qualify short-term behavioral, workflow, and functional challenges to model-based quantity take-off and identify long-term strategies and best practice solutions that enable and support scalable, 5D practices in the AEC industry.

**Key Issues:**
- Identify Model Related Impediments
- Identify Workflow Related Issues
- Define & Document Estimating Standards
- Identify Technology Related Impediments/Vendor Relationship Opportunities

**Join Us Now:**
Brent Pilgrim
Ben Crosby
You!