BIM Won’t Work as a Deliverable, Will It?

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Learning Objectives

1. Gain *clarity, alignment, and engagement* regarding using BIM as a Deliverable with Right of Reliance

2. Identify *critical success factors*, or "what must go right," to successfully use BIM as a Deliverable with Right of Reliance

3. Identify *barriers* to using BIM as a Deliverable with Right of Reliance

4. Generate *strategies* to control the critical success factors and overcome the barriers
Agenda

- Introduction
- Panelist’s Position Statements
- Directed Questions
- Open Discussion
Definitions

Deliverable:
- A product as a result of a process that is…
  (vs. milestone)
- Required by the contract
  (vs. instrument of service)
- Ready to dispatch to the site or Client
- May require submission, approval, or acceptance
  (vs. project record or artifact)

Right of Reliance:
- Claim to consider information that is…
- Dependable or trustworthy
- Accurate
- Sealed
- Takes precedence over conflicting information elsewhere
  (vs. for reference only)
Precedent: VRML Construction Documents

- Feature stairs in laboratory project, 1997
- Proof of Concept:
  - Stairs modeled in ACAD & VRML
  - Hyperlinked 2D & 3D details
  - Roll-over dims & notes
  - Links to specs
- Tested by steel fabricator
- Internationally published and awarded

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Precedent: ConsensusDocs

- ConsensusDocs “301 BIM Addendum”
  - 4 BIM Execution Plan
    - 4.3.11 Contributor’s Dimensional Accuracy Representation

- Each Contributor represents that the dimensions in its Contribution to a Model are **accurate and take precedence** over the dimensions called out in the Drawings or inferred from the drawings. Details and components that are not represented in a Contribution to a Model must be retrieved from the drawings.

- Each Contributor represents that the dimensions in its Contribution to a Model are **accurate to the extent that the BIM Execution Plan specifies** dimensions to be accurate, and all other dimensions must be retrieved from the Drawings.

- Contributors make no representation with respect to the dimensional accuracy of the Contributor’s Contribution to a Model. A model can be used for **reference only** and all other dimensions must be retrieved from the Drawings.
Precedent: IPD Project

- Integrated Project Delivery for laboratory T.I., 2011
- Project “BIM Execution Plan” collaboratively authored by CM and A/E during basis-of-design
- Reliance vs. Reference defined as follows:

  The architect and design consultants will **model objects** listed in the “Information Exchange Worksheet” in a manner considered **accurate and reliable for dimensioning or construction layout**. Therefore, the GC and subcontractors will have the right to rely on the scope, size, location, and quantity of these objects in the model for construction layout and installation. This representation of dimensional accuracy is subject to the following conditions:

  A. Dimensional **accuracy** is anticipated to be as **effective as comparable 2-D design documents** would be at the time of their publication.
  B. Any **2-D drawings** and details which are derivative from the 3-D source model may contain a greater level of detail than the source model, but **should not vary in terms of the SCOPE, SIZE, LOCATION, and QUANTITY** of objects represented.
  C. The **location of objects in the model will take precedence** over explicit or inferred dimensions in derivative 2-D drawings.
  D. The GC and its subcontractors **will be responsible for noting any discrepancies** discovered between 3-D models and derivative 2-D drawings. The architect, consultants, and design-assist trade contractors **will be responsible for reconciling** such discrepancies.
  E. Any **items in the model which are not listed** in the “Information Exchange Worksheet” are **FOR REFERENCE ONLY**, and not represented as dimensionally accurate.
An architect, a contractor, and a lawyer walk into a bar…
Panelists

Josh Emig, AIA, LEED AP
- Director of Digital Practice, Perkins+Will
- “The architect”

Ricardo Khan
- National Director of Integrated Construction, Mortenson
- “The contractor”

Lindsey Pflugrath
- Partner, Skellenger Bender
- “The lawyer”

Dace Campbell
- Customer Success Manager, Autodesk
- “The instigator”
Panelist’s Position Statements
So, what would you say ... you do here?
The Digital Practice Group works across Perkins + Will’s projects and practices to enable a high-performing, interdisciplinary design organization through the intelligent application of technology.

We work with people to align work process with existing technologies, and we develop new technology capabilities that advance our work process.
DIGITAL OR ANALOG?
DIGITAL OR DIGITAL?

FILLING THE GAPS

§ 3.1.1 Building Information Modeling is a process of creating a Building Information Model, which is a digital representation of physical and functional aspects of the project. These models are usually created using CAD or BIM software and consist of a number of interrelated files and databases.

3.2 As soon as practical following execution of the Agreement, the Parties shall provide Digital Data, and establish necessary protocols governing the transmission of such Digital Data in consultation with the other Project Participants that are expected to receive it. The Digital Data shall be reviewed, revised, and validated by the other Project Participants.

3.2.1 Unless another Project Participant is identified below, the other Project Participants shall review, revise, and validate the Digital Data before it is shared with others. Such Digital Data shall conform to the agreed-upon Digital Data protocols for review, revision, and validation.

3.2.2 The agreed-upon Digital Data protocols shall be set forth in writing and shall include the following:

- Owner
- Architect
- Contractor
- Subcontractor
- Engineer
- Inspector

3.2.3 The Parties, together with the other Project Participants, shall memorialize their agreement in writing to such effect.

Element modeling to include:

- Overall size, thickness and geometry of the slab
- Slab depressions
- Edge turn downs
- Material strength
- All sloping surfaces included in model element with exception of elements affected by manufacturer selection.

Required non-graphic information associated with model elements includes:

- Moisture retarder
- Air entrainment

Element modeling to include:

- Sleeve penetrations
- Pour joints
- Control joints
- Expansion joints
- Water stops
- Rebar and any embedded elements modeled at congested areas where specified by project BIM XP which is typically with in a set distance from the area of congestion.
- Void boxes
- Anchor rods
- Rebar cut and paste elements
FILLING THE GAPS

Information contained in the model has to be accessible and extractable into clear information streams that match the needs of the inputs of the next process downstream.
Customer Defined Value

http://www.mortenson.com/COAA2014
OWNER PRIORITIES: PROJECT DELIVERY, BIM / VDC

As expected, successfully executing projects is the top priority for most owners. Increasingly, owners are looking to BIM and VDC to help ensure project success. Strong interest in increasing their knowledge of BIM reflects their desire to improve information and documentation throughout building operations.

DESCRIBE THE AREA YOU ARE MOST INTERESTED IN NETWORKING WITH PEERS.
(Engaged participants only)

WHAT ARE YOUR TOP TWO FACILITIES-RELATED PRIORITIES?

THE AREAS I’D MOST LIKE TO NETWORK WITH MY PEERS ABOUT ARE...

** ...BIM integration with regards to remodeling and project additions.**

** ...BIM to FM consumption as well as contract language.**

** ...Information systems and information transitioning, delivery methods and lean design and construction methodologies.**

** ...Project closeout and turnover to operations, and developing highly collaborative teams.**

CONSTRUCTION OWNERS’ PERSPECTIVES 2014

A GROWING DEMAND FOR BIM & VDC

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Contractor Perspective:
How do we leverage the BIM Deliverable to Optimize Construction?
Contractor Questions with respect to Risk:

What is on the Critical Path?
What scopes drive the most impact?
What can we do to minimize Risk?

Foundations, Structure, Enclosure, etc...

Strategies:
- Design to Fabrication
- Prefabrication
- Virtual Design & Construction

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Contractor’s Perspective: Right of Reliance of BIM

Is it important? YES, but...

Right of Reliance

LIMIT TO SCOPES THAT DRIVE DOWNSTREAM FABRICATION

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Purpose: Optimize Construction

2010 DESIGN TO FABRICATION RESEARCH STUDY – COLORADO STATE UNIVERSITY

TRADITIONAL

Design

Step 1: develop structural drawings

Step 2: review BIM/drawings, 1 wk

Step 3: review shop drawings, 1 wk

Step 4: revise structural/generated placement drawings, 1-2 wks

Optimized WITH RoR

Review

Step 1: develop struct/shop drawings

Step 2: review BIM/drawings, 1 wk

Step 3: review shop drawings, 1 wk

Step 5: fabricate from placement drawings, 1 wk

Step 6: construct from placement drawings, 3 wks

Fabricate and Install

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Design to Fabrication

Our flight of Reliance and BIM approach to steel modeling accelerated and simplified the traditional submittal process. The structural engineer created the Tekla fabrication steel model that was used to procure the materials five weeks early and then, pursuant to the project BIM Execution Plan, delivered the model to the steel detailer to generate shop drawings.

$100K in savings

5 weeks saved in the project schedule
RoR – CONTRACTOR BIM DELIVERABLE CONCERNS

Reality in 2015:

- BIM is not yet the standard of practice in the AEC Industry
- LOD is a good idea, but it is extremely difficult to manage accountability
- Without Downstream Value, why bother with Right of Reliance
- THIS IS NOT A BIM CHALLENGE, IT’S ABOUT PEOPLE AND PROCESS

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State of the (BIM) Union

Tenet 1: You Cannot Stop Technology
State of the (BIM) Union

Tenet 2: Everyone Must Buy In
State of the (BIM) Union

Tenet 3: Only You Can Save Yourself
(a.k.a. You Must Track the Model)
State of the (BIM) Union

Tenet 4: We Are Not There Yet
(We are somewhere between Distraction and Leadership)
Directed Questions

- People vs. process vs. tools
- Critical Success Factors
- Barriers
- Legal & risk management obstacles
- Importance of partners
- Most to gain, lose, change
- When dominant/expected?
- Apply first to small vs. large projects
- Fee structure alterations
- How to get started
Open Discussion

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THANK YOU!

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