IFC Solutions Factory
MVD/Software Implementation/BIM Data Validation
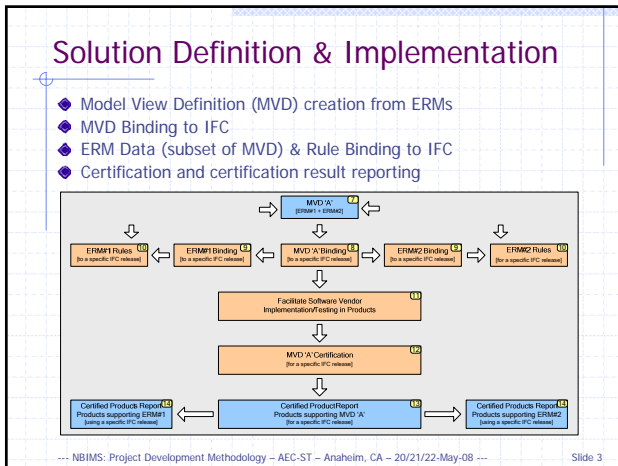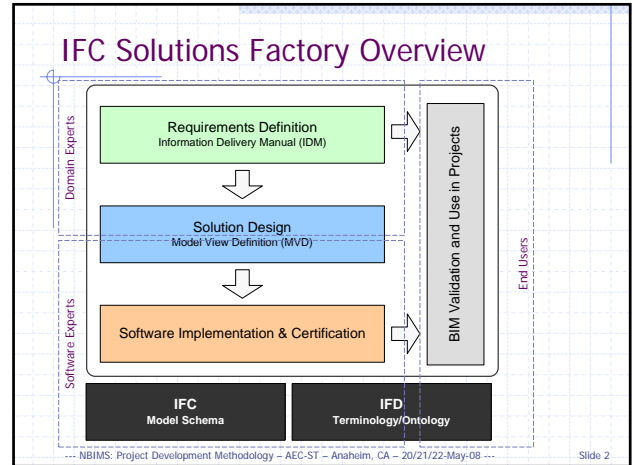AEC-ST --- Anaheim, CA --- 21-May-08

Slide 1

buildingSMART Project Delivery Methodology

- Model View Definition (MVD)
- Software Implementation/Certification
- BIM Data Validation

Richard See

Leader – NBIMS Models and Implementation Guidance Committee

Member – buildingSMART Alliance Technical Committee

Slide 2 — IFC Solutions Factory Overview

Slide 3 — Solution Definition & Implementation

- Model View Definition (MVD) creation from ERMs
- MVD Binding to IFC
- ERM Data (subset of MVD) & Rule Binding to IFC
- Certification and certification result reporting

Slide 4 — MVD Creation from ERMs

- Scope
  - An ERM has the scope "between actors in a process at a given stage"
  - An MVD has the scope "between typical application types"
- Relationship
  - One MVD typically satisfies the requirements of multiple ERMs
    - This is logical because the same software products are used in multiple processes
  - (There may be cases where one ERM is satisfied by multiple MVDs)
- Process
  - An ERM contains both concepts and business rules.
  - Concepts are captured/required in the MVD
  - Business rules are captured/required in the BIM Guide (& constraint model)
- Result
  - The MVD satisfies the data requirements of all related ERMs
  - Each relating ERM is a configuration (or subset) of the MVD
  - Business rule conformance is verified at the project level (later)

Slide 5 — MVD Binding to IFC

- The binding defines how the IFC model is used to satisfy the requirements of the MVD
- The MVD binding is done separately for each supported IFC release
- The MVD binding defines requirements beyond the IFC model schema – called implementer agreements

Implementer Agreements:
- Define the requirements for how IFC must be applied in a specific case
- Must be coordinated, so that there are no conflicting rules in different cases
- Should always define 'one way for doing one thing'

Slide 6 — MVD Coordination Web

Business Rule Binding to IFC

- ◈ Uses the same system as concept bindings, but binding is done to the IFC constraint model
- ◈ Whereas Support for a 'Certification MVD' is implemented in BIM authoring and downstream BIM software ...
- ◈ Support for a 'Validation MVD' is implemented in model validation software

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Software Implementation and Testing

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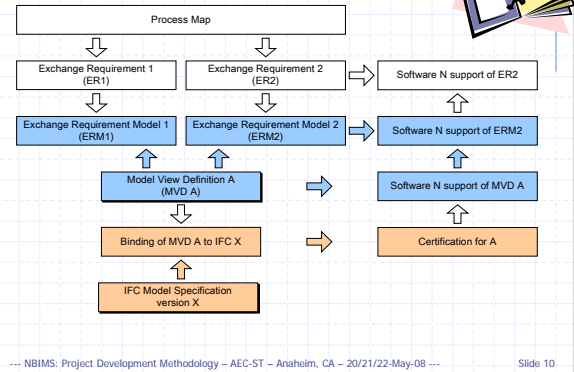

Certification Testing/Reporting

- ◈ Each test case is used for testing compliance with one or more concepts
- ◈ Testing is done on the IFC binding level
  - ▪ Must comply with the IFC specification
  - ▪ Must comply with implementation agreements
- ◈ Reporting of certification results is done on the end user level (IFC independent)
  - ▪ Software users must understand the results
    - ◆ NOT : Supports IfcSIUnit
    - ◆ BUT : Supports metric units

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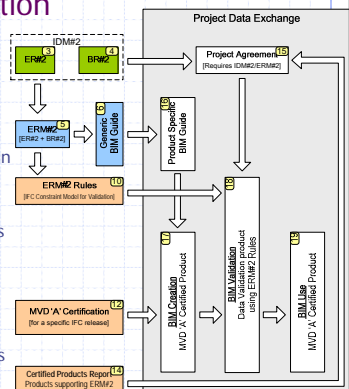## Certification Testing/Reporting

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Industry Deployment using
BIM Data Validation Tools

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BIM Data Validation

- ◈ Making 'Contracted Data Exchange' enforceable
- ◈ BIM Guides for users
- ◈ Business Rules captured in IFC constraint model
- ◈ BIM Data Validation Tools
- ◈ Verification of contract requirements is possible
- ◈ Project agreements mandate use of ERs/ BRs, certified apps, BIM guides in project

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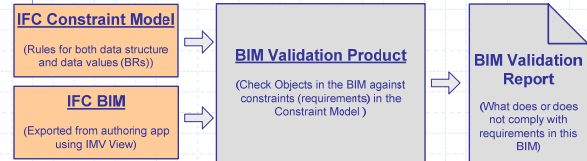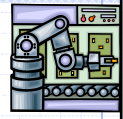
SW Certification/BIM Validation

- ◆ SW Product Certification --- verifies:
  - It is <u>possible</u> to create BIMs that meet specified data requirements using the product (but not assured!)
- ◆ BIM Data Validation --- verifies:
  - BIM data meets ERM requirements
  - BIM author has correctly applied BIM Guide requirements, including the business rules
- ◆ Possibilities for End User Certification
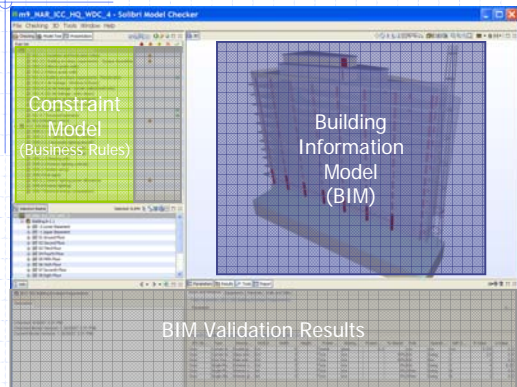 - Analogous to any professional certification (e.g. LEED design certification in the US)

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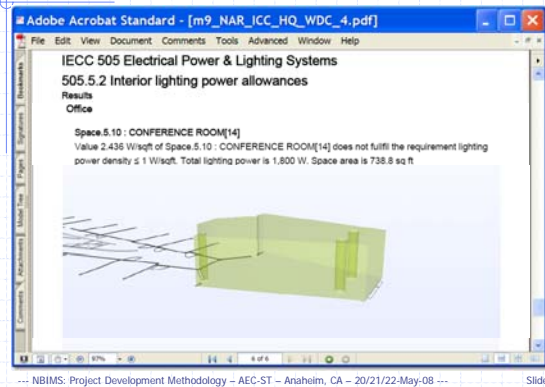
How BIM Validation Works

IFC Constraint Model
(Rules for both data structure and data values (BRs))

IFC BIM
(Exported from authoring app using IMV View)

⇒ **BIM Validation Product**
(Check Objects in the BIM against constraints (requirements) in the Constraint Model)

⇒ **BIM Validation Report**
(What does or does not comply with requirements in this BIM)

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Current Examples - SMARTcodes

Constraint Model (Business Rules)

Building Information Model (BIM)

BIM Validation Results

Slide 15

Current Examples - SMARTcodes

IECC 505 Electrical Power & Lighting Systems
505.5.2 Interior lighting power allowances
Results
Office

Space.5.10 : CONFERENCE ROOM[14]
Value 2.436 W/sqft of Space.5.10 : CONFERENCE ROOM[14] does not fulfil the requirement lighting power density ≤ 1 W/sqft. Total lighting power is 1,800 W. Space area is 738.8 sq ft

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Test-Bed Projects

- ◆ SMARTcodes – USA
- ◆ Quantity Takeoff for Building Systems – Norway
- ◆ Concept Design Analysis – USA, (Norway, Finland)
- ◆ COBIE – USA
- ◆ National BIM Standard – USA

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QUESTIONS?

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Member – buildingSMART Alliance Technical Committee
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