

# IFC Solutions Factory

## Model View/SW Implementation Portion of IFC Technology Session

9-Dec-08 – AEC-ST/EcoBuild Conference – Washington, DC



### IFC Solutions Factory

## Model View Definition (MVD)

Richard See  
 Leader – NBIMS Models and Implementation Guidance Committee  
 MVD Lead – buildingSMART Alliance Technical Committee  
 Managing Director – Digital Alchemy

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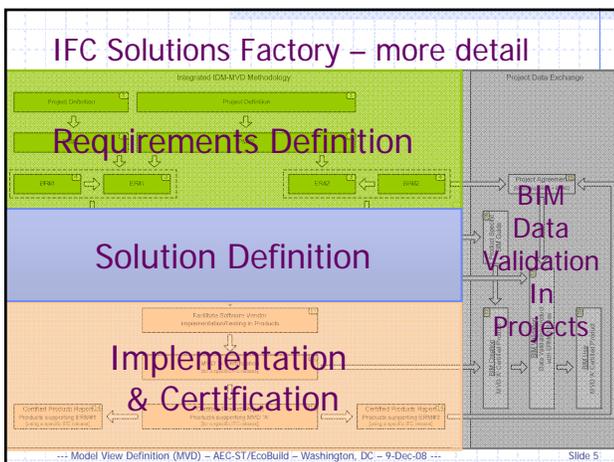
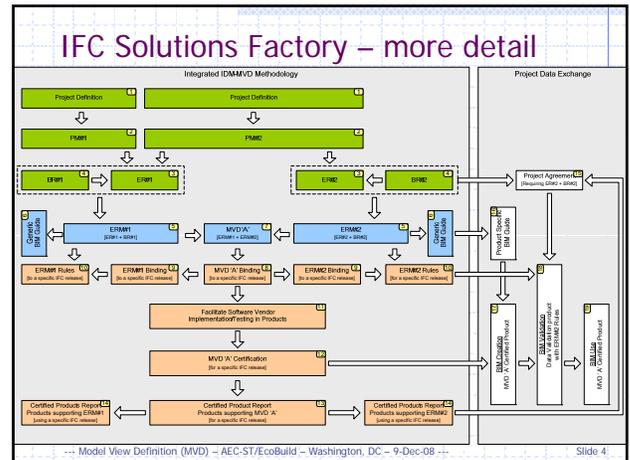
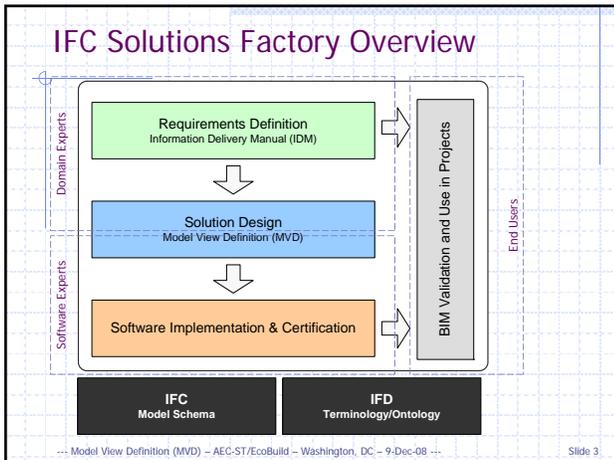
Slide 1

### Outline

- ◆ Motivations for MVD
- ◆ Background/Overview
- ◆ Generic Model Views – Format, Tools, and Templates
- ◆ Implementable Model Views – Format, Tools, Templates
- ◆ Certification Test Reporting
- ◆ MVDs Developed & Implemented to Date
- ◆ Future Plans

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### Motivations for MVD



- ◆ Improve the 'interoperability experience' in using IFC BIMs
- ◆ Dramatically increase confidence in using IFC BIMs
- ◆ Integrate partial, complimentary methods and tools to form one framework supported by all stakeholders
- ◆ Enable IFC BIM validation in building projects such that contractual requirements can be verified
- ◆ Improve implementation testing (certification, regression, etc.)
- ◆ Improve reporting of test results (so end users can interpret them)

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### Background

- ◆ Early Model View History
  - Concept introduced by BLIS in 2000
  - Introduced the notion of 'concept blocks'
  - 6 use cases & 4 Model Views implemented/tested in ~60 applications between 2000 and 2003
  - see [www.blis-project.org](http://www.blis-project.org) for much more information
- ◆ MVD History
  - Developed/introduced to IAI in 2005 by Jiri Hietanen
  - Adopted as IAI standard methodology in early 2006
  - see [http://www.iai-international.org/software/MVD\\_060424/IAI\\_IFCModelViewDefinitionFormat.pdf](http://www.iai-international.org/software/MVD_060424/IAI_IFCModelViewDefinitionFormat.pdf)
  - Revised for 'IFC Solution Factory' (v2) in late 2007



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### Overview of MVD Elements

- ◆ Concepts
  - MVD Building blocks
- ◆ Generic MVD Diagrams & Definitions
  - Collection of generic data concepts
  - Blue Visio Diagrams and MS Word Templates
- ◆ IFC Binding Diagrams & Definitions
  - IFC schema specific reps for each generic concept
  - Orange Visio Diagrams
  - MS Word Template for implementer agmts & guidance

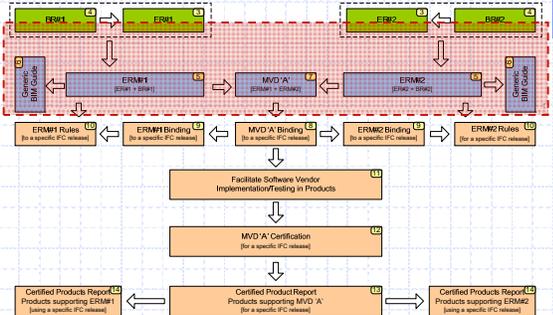
Reference	Name
1	VBL_359 1st Level Space Boundary
2	VBL_370 2nd Level Space Boundary
3	VBL_321 Applied Load
4	VBL_355 Arbitrary Curved Edge Profile Cross Section and Name
5	VBL_347 Arbitrary Straight Edge Profile Cross Section and Name
6	VBL_344 Assigned Action
7	VBL_328 Connections
8	VBL_334 Curved Edge Representation
9	VBL_148 Curved Edge Representation
10	VBL_143 Eccentric Curve Connection



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### Generic MVD – IFC Solutions Factory Process Check

- ◆ Where are we in the overall process?



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### Generic Model Views - Diagrams

- ◆ Notation

IFC Release Independent Concepts	
<b>Variable Concept</b> 	The same variable concepts can be used in different MVDs, but their content may vary. Hence the variable concept must be configured separately for each MVD. This configuration is done by creating a diagram in which other concepts (group and static) are attached to the variable concept. Examples: space in quantity take-off, wall in HVAC design
<b>Group Concept</b> 	Group concepts provide structure for the concept diagrams by grouping together static concepts and/or other group concepts. Examples: space properties, wall geometry
<b>Static Concept</b> 	Static concepts remain the same in all scenarios in which they are used. They can be re-used without modification because they don't contain any options. Examples : space number, bounding box geometry

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### Generic Model Views – View Definition

**Generic AEC/FM BIM View Specification**  
**GSA Concept Design View (2006)**

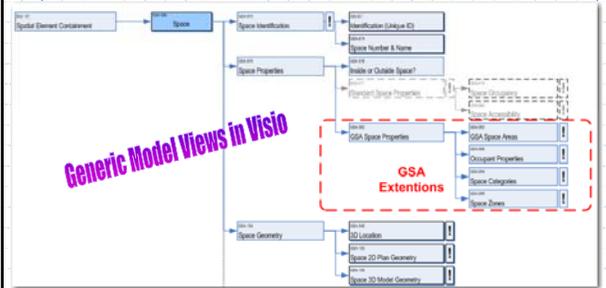
Reference	000	Version	1.0	Status	Final
<b>History</b>	Document created 1-Mar-06; v1.0 5 – 1-Jun-06; v1.0.9 – 1-Sep-06; v1.0 – 1-Nov-06				
<b>Authors</b>	Richard See (Digital Alchemy)				
<b>Document Owner</b>	GSA Public Building Service				
<b>Description</b>	Only part of information which is created by architects is needed for GSA's internal analyses of Conceptual Design Submissions. This Building Information Model (BIM) View Definition specifies the subset of the architect's BIM that must be submitted to GSA at Concept Design Submission milestones. This primary audience for this specification is software vendors creating BIM authoring applications that will be used to create such BIMs. Architects and Engineers (A-Es) creating such models are encouraged to review the GSA BIM Guide for end user instructions on how to create such models and what objects and information is expected.  BIM models conforming to this view will generally be created by design architects using architectural BIM authoring applications. Models will be submitted as IFC model files structured according to the industry standard IFC 2x or 2x2 schema (see <a href="http://www.iai-international.org">www.iai-international.org</a> ). These models will be uploaded to the GSA Project Information Portal at <a href="http://BIM-Submission.GSA.gov">http://BIM-Submission.GSA.gov</a> . GSA project managers will then load the models into various internal software applications to perform design analyses.				

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### Generic Model Views - Diagrams

- ◆ Example from GSA Concept Design View 2006



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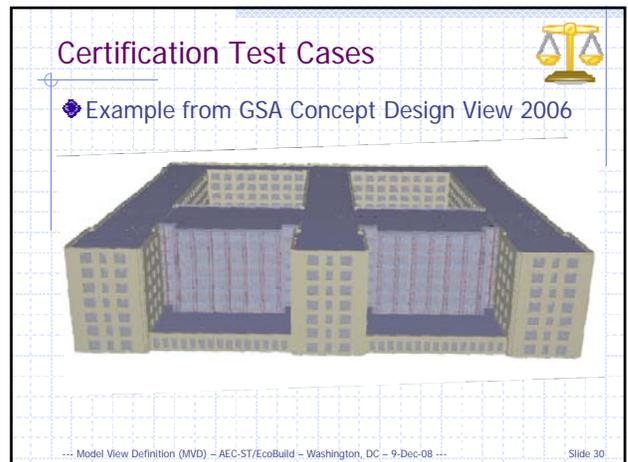
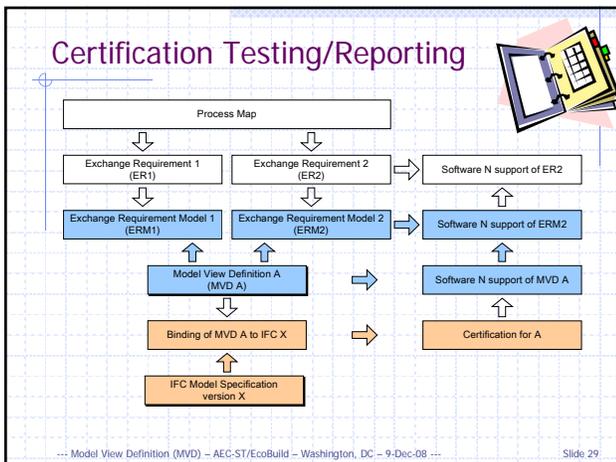
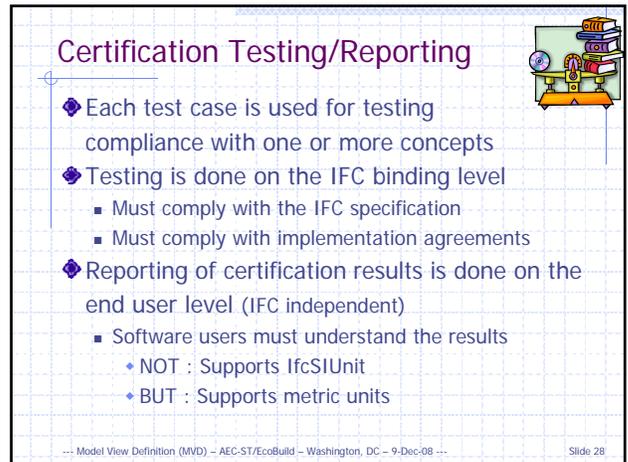
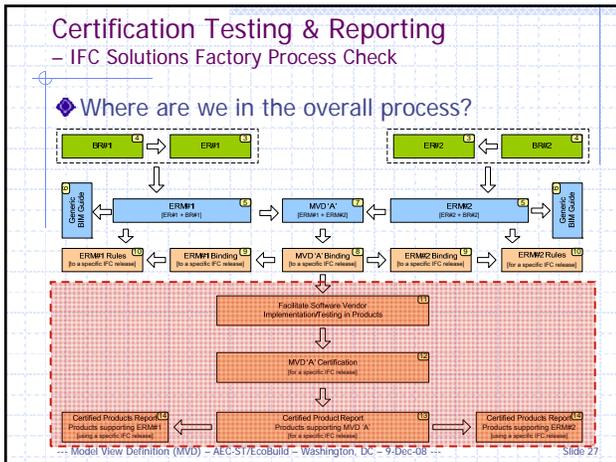
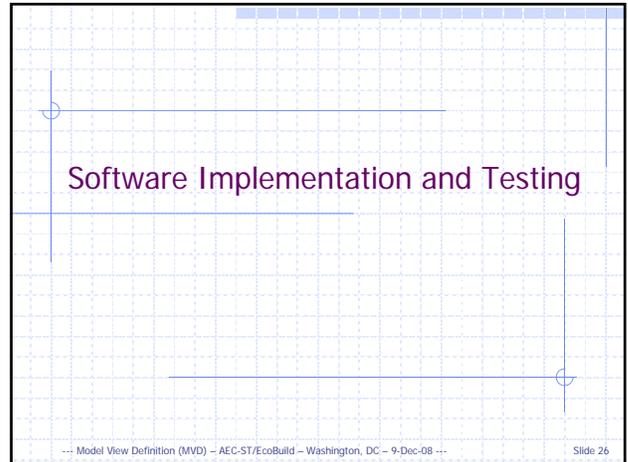
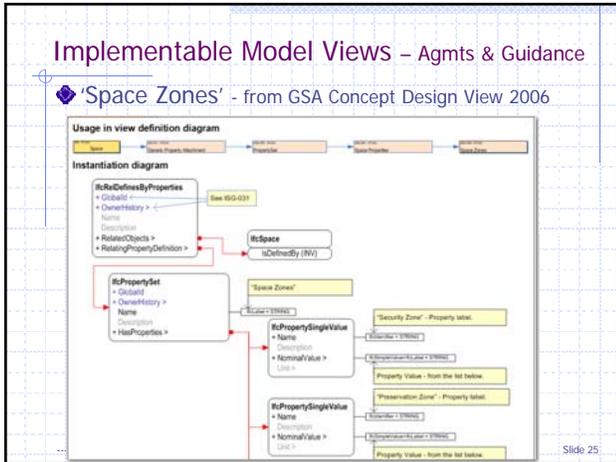




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### Certification Testing Process



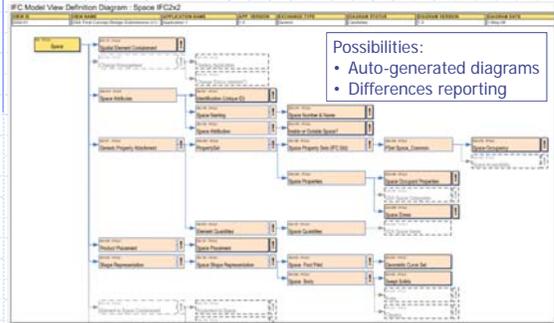
- ◆ MVD is published for Review
- ◆ Review comments addressed – Final Published
- ◆ Facilitated implementation begins (3-9 mo)
- ◆ Certification Test Event – Product 'A' certified-1
- ◆ Product 'A' product pilots begin (6 mo)
- ◆ Product 'A' user issues addressed
- ◆ Certification Test Event – Product 'A' certified-2
- ◆ Report Product 'A' certification test results
- ◆ Product 'A' – certified version released

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### Certification Test Reporting

- ◆ Hypothetical Example from GSA Concept Design View 2006



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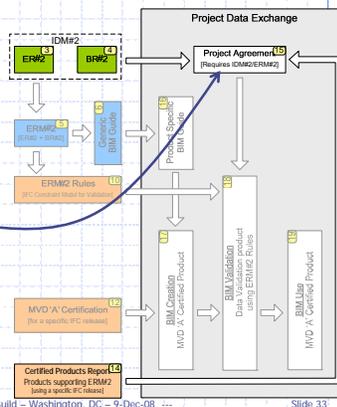
### Certification Test Reporting

– Why is this important?

- ◆ Owner wants to use exchange defined in IDM#2

- ◆ So the owner can require use of this process/exchange in project agreements

- ◆ Certified Product Reports tell him this is possible



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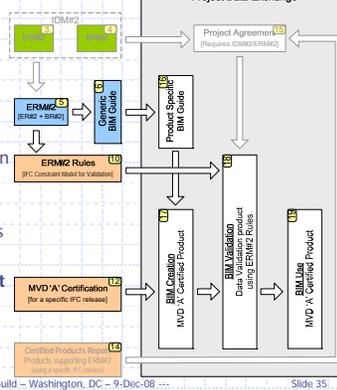
### Industry Deployment using BIM Data Validation Tools

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### BIM Data Validation

- ◆ BIM Guides for users
- ◆ Business Rules captured in IFC constraint model
- ◆ BIM Data Validation Tools
- ◆ Verification of contract requirements is possible!



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### SW Certification/BIM Validation



- ◆ SW Product Certification --- verifies:
  - It is possible 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)

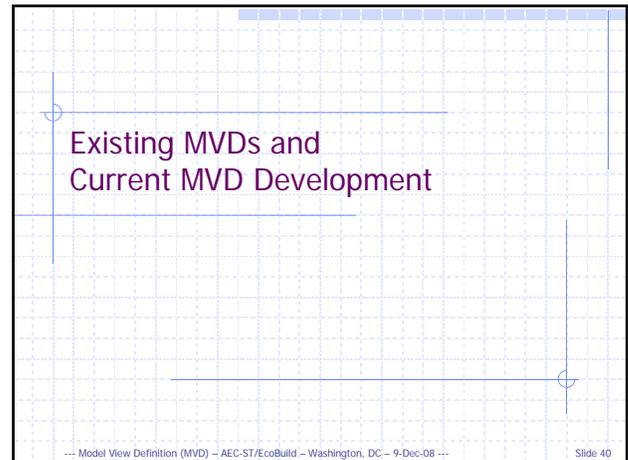
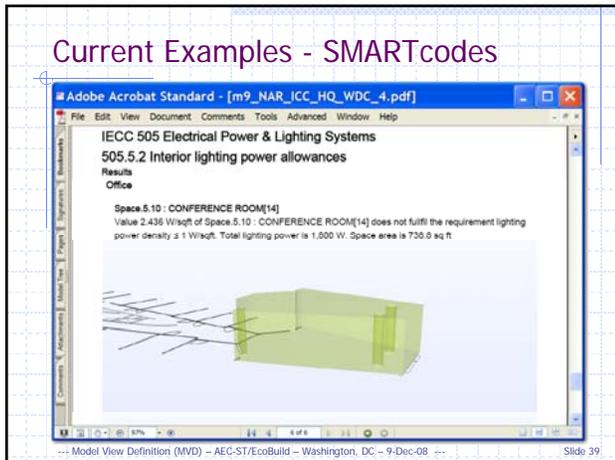
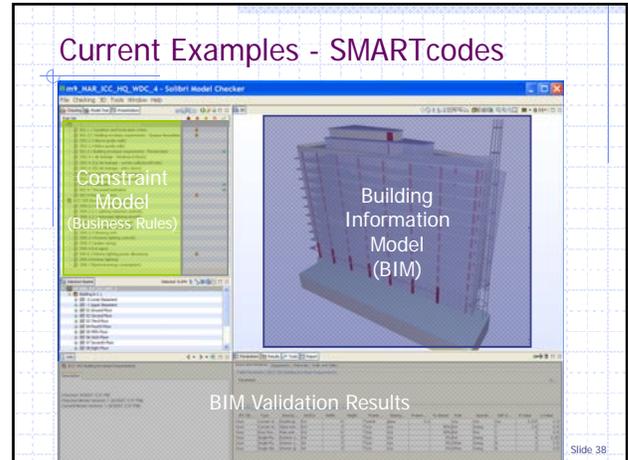
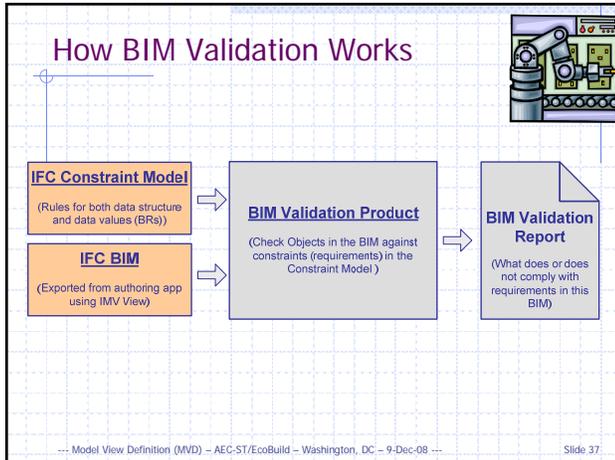
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- ### Existing MVDs & Supporting Products
- ◆ BLIS Views
    - By: Building Lifecycle Interoperable Software
    - 60 products by 35 vendors – see [www.blis-project.org](http://www.blis-project.org)
  - ◆ Coordination View
    - By: IAI Implementer Support Group (ISG)
    - Many Products by several Vendors – see [www.iai.fhm.edu/](http://www.iai.fhm.edu/)
  - ◆ Singapore Code Checking View
    - By: Singapore Building Construction Authority
    - ADT, ArchiCAD, Revit
  - ◆ GSA Concept Design View 2006
    - By: US Government Services Administration
    - ADT, ArchiCAD, Bentley Arch, Onuma Planning System, Revit
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- ### Existing MVDs & Supporting Products (2)
- ◆ ICC Code Checking View 2008
    - By: International Code Council
    - Planned: Revit, Bentley Arch, ArchiCAD, VectorWorks
  - ◆ COBIE
    - US Army Corps
    - Revit, Bentley Arch, ArchiCAD, Onuma
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### MVDs in Development (→target completion)



- ◆ Concept Design View 2009
  - By: GSA, Statsbygg, Senate → early 2009
  - Planned: Autodesk, Bentley, Graphisoft
- ◆ Facility Management Inventory Data Take-over
  - By: Regional gov't agencies in Germany → early 2009
  - Vendors to be announced
- ◆ Qty Takeoff and Estimating - Electrical Systems
  - Norwegian buildingSMART Aquarium → early 2009
  - Several regional vendors
- ◆ Arch Programming to Early Design
  - By: HOK, buildingSMART International → Mid-2009

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### Planned Improvements for MVD



- ◆ Web site improvements
  - To support many developers
  - Improved MVD Coordination tools
- ◆ Integration with Certification Testing
  - Unit tests at the Concept level
  - Visual Studio test packages downloadable by vendors
  - Certification test suite development & mgmt tools
- ◆ Product Certification Information
  - Web site for certification test reporting
  - Flexible search tools – e.g. by 'exchange'

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## Model View Definition (MVD)

### Questions?

Richard See

Leader – NBIMS Models and Implementation Guidance Committee

MVD Lead – buildingSMART Alliance Technical Committee

Managing Director – Digital Alchemy

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