IFC Solutions Factory
MVD/ Software Implementation/ BIM Data Validation
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buildingSMART Project Delivery Methodology
- Model View Definition (MVD)
- Software Implementation/Certification
- BIM Data Validation

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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

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)

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’

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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**Industry Deployment using BIM Data Validation Tools**

- 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 ER#s, BRs, certified apps, BIM guides in project.

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**BIM Data Validation**

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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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**How BIM Validation Works**

1. **IFC Constraint Model**
   - Rules for both data structure and data values (BIM)
2. **BIM Validation Product**
   - Checks objects in the BIM against constraints (requirement) in the Constraint Model
3. **BIM Validation Report**
   - What does or does not comply with requirements in the BIM

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**Current Examples - SMARTcodes**

- **Constraint Model**
- **Building Information Model (BIM)**
- **BIM Validation Results**

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**Current Examples - SMARTcodes**

- **IEC 605 Electrical Power & Lighting Systems**
- **SOLAR 5 DJ Interior lighting power allowances**
- **Results**
- **Office**

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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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