IFC4 COORDINATION VIEW

Definition of the project scope
driven by identified process scenarios

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Objectives of the „IFC4 Coordination View“ Project

Content

- Definition of the successor of the very successful IFC2x3 Coordination View
- Taking into account past experiences (positive / negative)
- Be more specific to the support the BIM processes and requirements

Technical

- Definition as formal, computer interpretable mvdXML specification
- Publication as separate online documentation (view-specific)
- Publication as partial EXPRESS and XSD schema

Duration : 01.01.2014 – 31.06.2014

Project sponsor: DIBK - Norwegian Building Authority

Note:
- only MVD is funded
- IDM unfunded
- Certification rules unfunded

These parts are currently not in scope of the project

Experiences with the IFC2x3 Coordination View 2.0

A common "meeting point" of the various interests and parties

- positive :
  - great response (number of supporting software)
  - consistent certification and marketing
- challenging :
  - no differentiation between different workflows
  - expressiveness of certification for different workflows (particular on import)

Need for a general understanding

- what works / what does not work?
- which workflows are supported by the software / by certification?

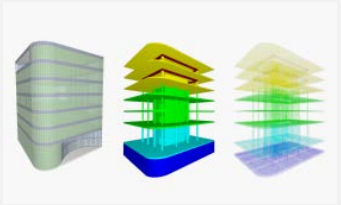
Two main requirements – reference and handover

Analysis of today's established BIM / IFC workflows

- Workflow A-1
  - Coordination planning / clash detection
  - Import of the domain specific models in a coordination model

Source : AEC3

- Workflow A-2
  - Referencing of domain specific models
  - Each discipline builds its one model - as a reference other domain specific models are linked in the background



Source : IFC2x3 CV2.0 Certification

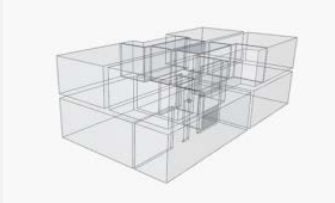
- Workflow A-3
  - Presentation – referencing in the city model / visualization

Source : Statsbygg Oslo

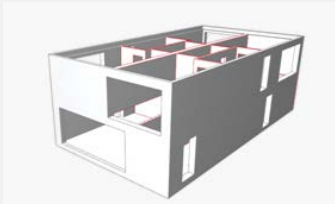
Two main requirements – reference and handover

Analysis of today's established BIM / IFC workflows

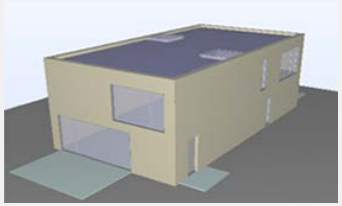
- Workflow B-1
  - Partial native import – shared working on one partial model, e.g. the architect and the MEP engineer working on the space model



- Workflow B-2
  - Load bearing elements of the architectural model are taken over parametrically and refined from the structural application



- Workflow B-3
  - Handover of the parametric BIM model due to change of designer team or of chosen software in projects

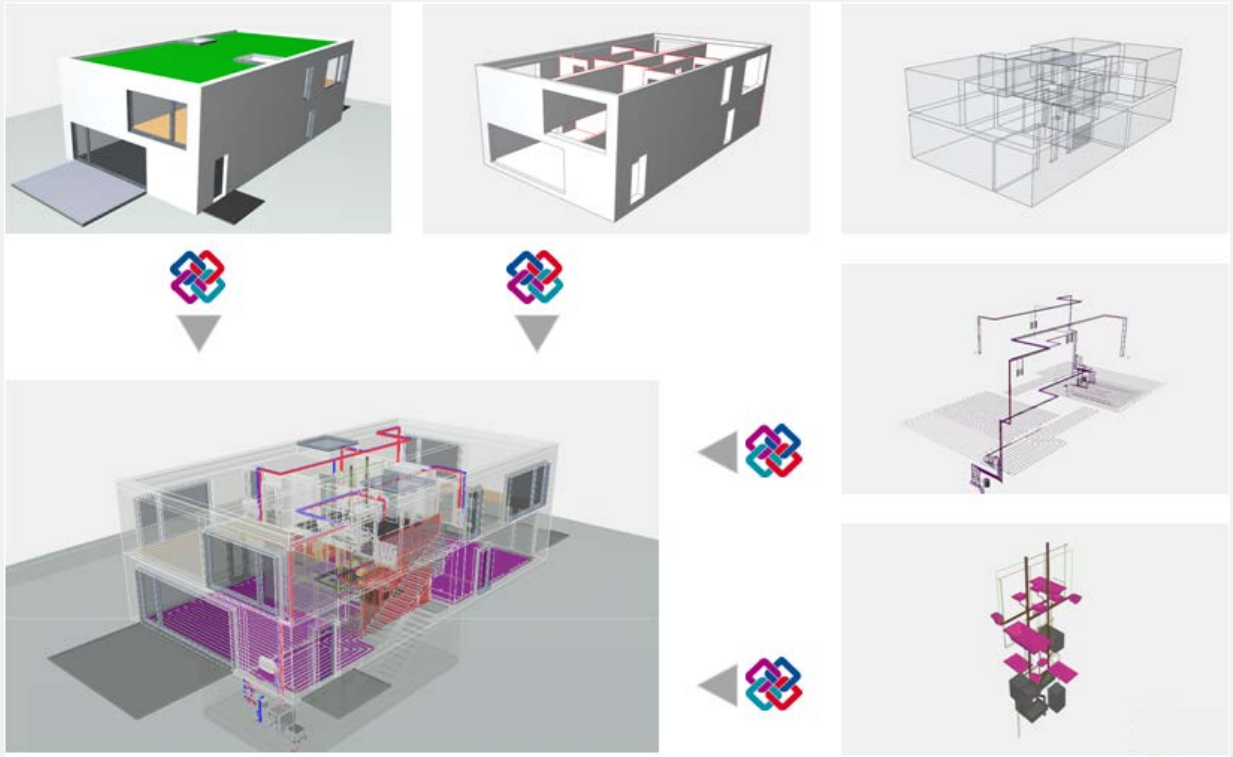


Source : all AEC3

One of the most important workflows today

Coordination planning / clash detection **:**

- Import of the IFC domain specific models in a coordination model
- Linking / merging in the coordination model, no re-export



Source : AEC3

Reference View Requirements for IFC4 CV

IMPORTANT :

- 100% correct explicit geometry
- 100% correct attributes / properties / spatial structures
- Workflow often occurs in the project process - rework can not be tolerated
- Rapid export and import times

>>> separate scenario : domain specific model referencing

Experiences with the IFC2x3 Coordination View 2.0

- Many demands (local coordinate system, Boolean operations, complex geometries) are required, but not used when referencing ("shoots beyond the mark")
- as a consequence strong computation necessaries and long loading times during export and import
- as a consequence possibilities of errors during the geometry transfer (especially on CSG geometry)

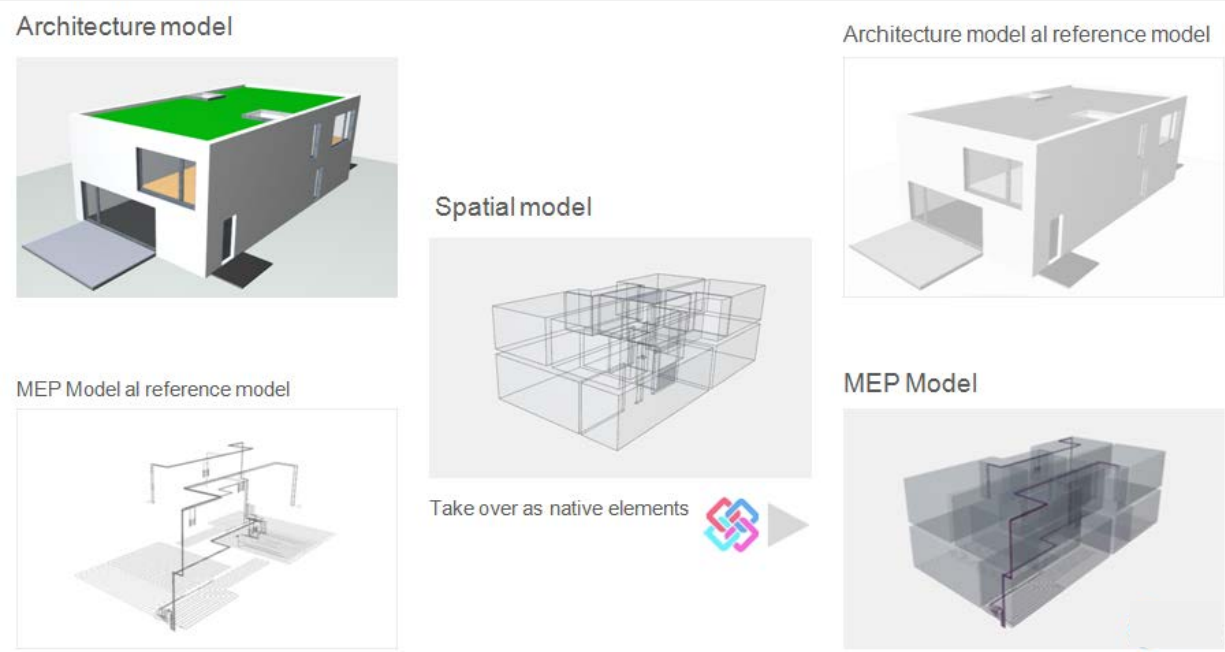
Solution : separate „IFC4 Reference View“

Another important workflow – (partial) handover

Handover of the parameterized BIM model for continuation and editing

- e.g. Handover of the spaces from the architectural model into the MEP model
- e.g. Handover of the load bearing elements from the architectural model into the structural model

Handover to be imported into the native models of the application is necessary (parametric)



Source : AEC3

Handover View Requirements for IFC4 CV

IMPORTANT :

- parametric geometry for the important model elements (edit ability)
- correct attributes / properties
- seldom in the workflow (often onetime adoption - change management via reference workflow)
- some rework tolerable - clear definition necessary of what is (not) parametrically transferable

>>> separate scenario : domain specific model handover (edit ability)

Experiences with the IFC2x3 Coordination View 2.0

- unclear, what can be transferred parametrically and what not
- many restrictions on the parametrics
- risk of geometry errors during import
- unclear definition for the certification, especially for import certification (native or by reference)

Solution : separate „Design Transfer View“

Summary -1-

IFC4 Reference View

- goal
  - satisfy the referencing work flow, i.e. the result of the import is a “read-only” (not modifiable)
- scenario include
  - “background” reference
  - clash detection
  - any viewer based work flow
- expected user experience
  - ownership remains with the sender
  - frequent updates
  - fast export / import times
  - 100% validity, no rework expected

IFC4 Design Transfer View

- goal
  - satisfy the handover work flow, i.e. import for further editing (import into native elements)
- scenario include
  - takeover architecture in structural
  - import spaces into MEP
  - takeover a previous design
- expected user experience
  - ownership handed over to receiver
  - low frequency, sometimes “one of”
  - longer export / import time tolerable
  - some rework accepted, if limitations are well known

Summary -2-

IFC4 Reference & Transfer Views IN SCOPE

- for reference view
  - precise geometric representation
  - no simple parametrics (other then for file size and accuracy requirements)
  - support of mapped representations
- for handover view
  - simple parametric representation for standard case elements
  - based on profile and sweeping operation, combined with material layer or profile sets and CSG based features
  - occurrence and type pairs with shared geometry, attributes and materials

IFC4 Reference & Transfer Views OUT OF SCOPE

- for both
  - no round-trip support
- for handover view
  - no complete parametric exchange, support of parametrics bound to “standard case” element definitions
  - one-time parametric exchange within these boundaries (for intelligent native import into target application)
  - specific use cases, such as thermal calculations, or structural analysis require additional add-on view support

Split Coordination View into two separate views

IFC4 Design Transfer View is superset of IFC2x3 Coordination View

- upward compatible (IFC2x3 CV2.0 files can be read by IFC4 Design Transfer View importer)

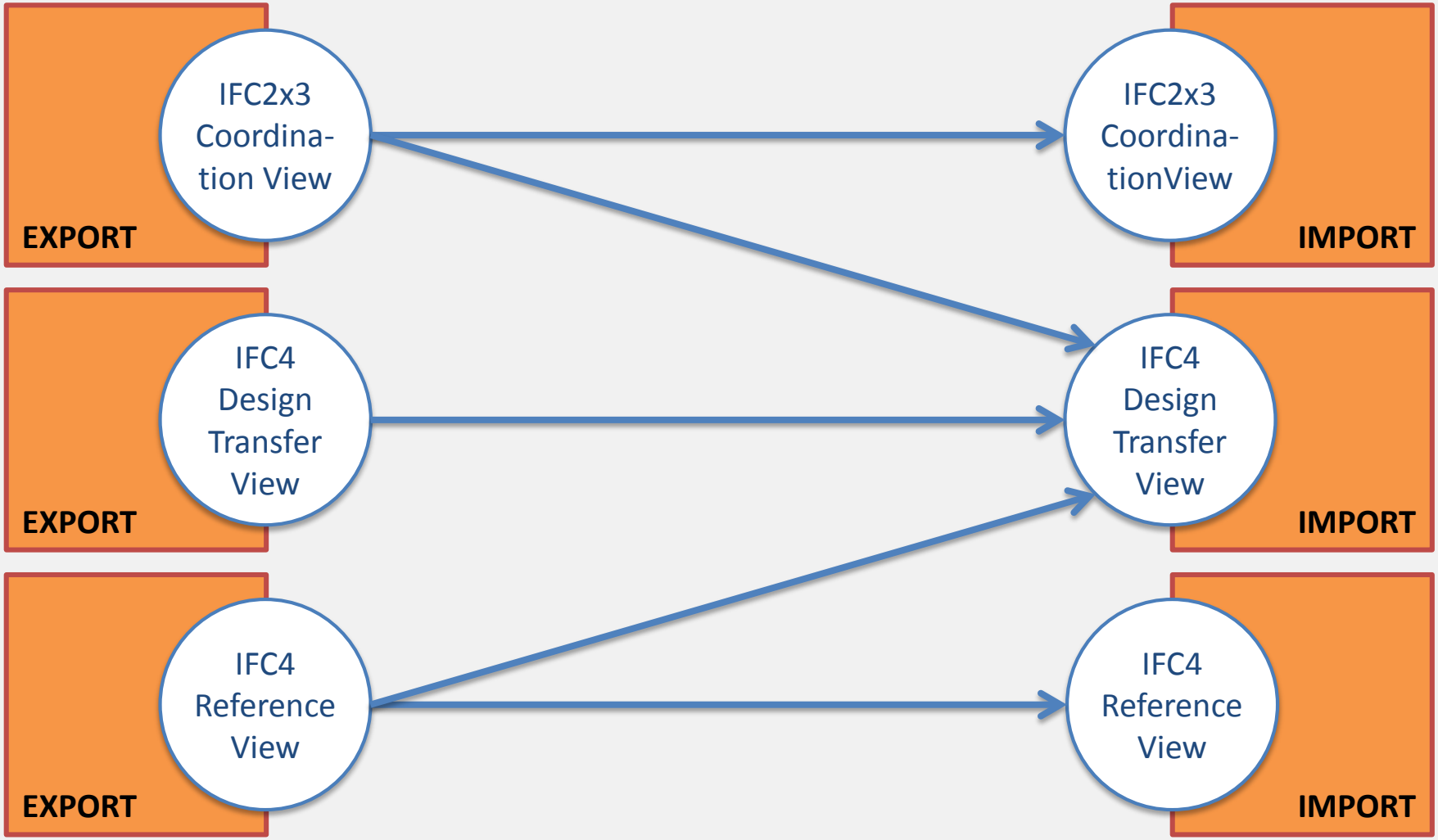
IFC4 Design Transfer View is superset of IFC4 Reference View

- compatible (IFC4 reference view files can be read by IFC4 Design Transfer View importer)

IFC4 Reference View is subset of IFC4 Design Transfer View

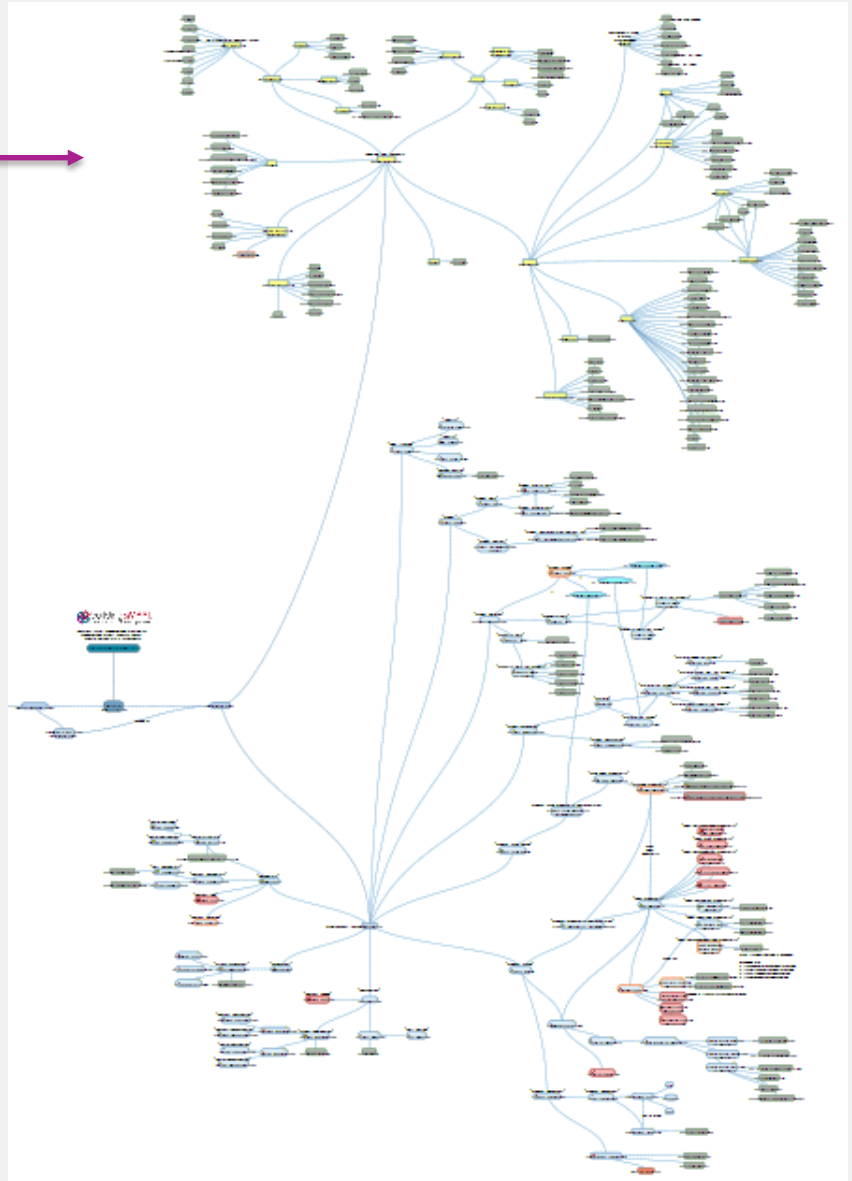
- not (upward) compatible, IFC4 Reference View importer can not read IFC4 Design Transfer View or IFC2x3 CV files – need to be clearly communication by User Interface

IFC2x3 CV and IFC4 export / import compatibility



Process of development

1. **Define scope**
2. **Develop MVD concepts**
3. **Develop MVD**
4. **Generate draft specification**
5. **Create unit tests**
6. **Validate unit tests**
7. **Revise MVD**
8. **Finalize specification**



Ongoing

- Domain user panel
- Software expert panel

Consequences for IFC4 certification process

Today for IFC2x3 CV2.0

- Database GTDS
  - Full certification workflow support
- Export certification
  - 50 well-defined test instructions (30 Architecture, 5 HVAC, 15 Structural)
  - Validation rules and checker rules based on Excel definitions
- Import certification
  - 500 well-test calibration files (about 300 Arch, 50 HVAC, 150 Structural)

Needed for IFC4

- Database GTDS
  - Improvements (loading times, UI, …)
- Export certification
  - Improvements for test instructions (more balanced, more special, cases)
  - Rework of checker for mvdXML use develop mvdXML for IFC4 views
- Import certification
  - Needs to be redone based on new IFC export files and checking

Conclusions

IFC4 Coordination View Successor project develops

- the IFC4 Reference View
- the IFC4 Design Transfer View

For more information, see

- http://www.buildingsmart-tech.org/specifications/ifc-view-definition/ifc4-coordination-views
- https://github.com/buildingSMART/IFC4-CV