IAI and IFC
State-of-the-art

Arto Kiviniemi
Chief Research Scientist
Chairman of the IAI International Council
and Executive Committee

IAI Vision: Integrated Project Model

- Goal: Continuous maintenance of project data through to building management
- Way: Building information rather than drawing data to integrate disciplines

Now

With IFC
Many activities in the construction industry and FM need the same basic data. IFC does not standardize data structures in individual tasks, only the shared information. Coverage of the IFC Model includes:

- Facility Management
- Equipment Maintenance
- Building Services
- HVAC Design
- Structural Design
- Architectural Design
- Repair and Renovation
- Property Management
- Sale and rental activities
- Marketing
- 3D Modeling
- Visualization
IFC Release 1.0

- Final Release 1.0 was published in January 1997
- Very limited scope
  - 5 processes for architectural design
  - 2 for HVAC design
  - 2 for construction management
  - 1 for facilities management
- Main results
  - experiences for further IFC development
  - pilot implementations for demonstration from 17 companies

IFC Release 1.5

- Final Release 1.5 was published in November 1997
- Scope
  - feedback from the implementers
  - model architecture improvement
  - plug-in extensions
  - improved development tools
IFC R1.0 and R1.5 Architecture

IFC R1.0 and R1.5 Architecture

- Domain Extension Modules
  - Product Extension
  - Process Extension
  - Control Extension
  - Aid Extension

- Core Modules
  - Kernel

- Geometry Resources
  - Explicit Geometry
  - Implicit Geometry
  - Units and Measures
  - Actor
  - Other utilities

- Independent Resources

- Core Layer
- Interop Layer
- Interop Adapter
- Domain Models
- Interop Modules
- Core Extensions
- Kernel
- Independent Resources

IFC R1.5

IFC Release 1.5.1

- Need for some corrections after demo implementations of IFC R1.5
  - Development parallel with IFC R2.0 work
- Final R1.5.1 model was published in September 1998 and documentation in December 1998
- The first commercial products with IFC support are based on R1.5.1
IFC Release 2.0

- Scope
  - Architecture extensions
  - HVAC systems
  - Code checking
  - Cost estimating
  - FM - Occupant move management, property management
  - General purpose networks
  - External document references
- IFC R2.0 was published in April 1999

IFC R2.0 Team

- Technical Director: Richard See
- Yoshinobu Adachi
- Robin Drogemuller
- Jim Forester
- Jiri Hietanen
- Juha Hyvärinen
- Kari Karstila
- Thomas Liebich
- Jeffrey Wix
- Kevin Yu
Expected Products - R1.5.1

- Expected products with IFC 1.5.1 support
- Vendors shipping products with IFC 1.5.1 interface:
  - acadGraph - Alberti for spatial design
  - Autodesk - IFC extension to AutoCAD Architectural Desktop downloadable from web
  - NEC - NcadArc, architectural CAD
  - Nemetschek - IFC interface in Allplan FT
  - Olof Granlund - IFC interface to SMOG and Riuska (thermal performance simulation)
- Vendors announced IFC 1.5.1 products early 1999:
  - AIO Group - IFC interface to PointARXi
  - Fujitsu, architectural CAD
  - Graphisoft - IFC extension to ArchiCAD 6.0
  - M&M - RoCAD, HVAC engineering
  - MB Software - low-cost architectural CAD
  - Sofistik - SofiCAD, structural engineering

Expected Products - R2

- Vendors who have announced IFC 2 support
  - AIO Group - PointARXi, architectural CAD
  - Autodesk - Architectural Desktop 3.0 and CAD platform
  - Bentley - MicroStation and CAD platform
  - DOE-PNNL - energy code checking
  - Graphisoft - ArchiCAD
  - LBNL - visualization
  - NEC - NcadArc, architectural CAD
  - Nemetschek - CAD for architects, CAD and FEM for structural engineers, CAD for contractors and FM software
  - Olof Granlund - SMOG and Riuska (thermal performance simulation)
  - Progman - MagiCAD, HVAC CAD
  - Timberline - cost estimation
  - Visio - 2D-CAD
  - YIT - COVE, process management for contractor
IFC Toolboxes and platforms

- Concord: C++ library for read/write IFC files
- CSTB: SDAI platform
  - a generic STEP platform for any EXPRESS schema (late binding)
  - a dedicated IFC toolbox with the IFC schema (early binding)
- MUIGG: Active-IFC
  - Active-X control to retrieve IFC-files
- Nemetschek: late binding data sharing platform (middleware) called o/p/e/n®
- CSIRO: Product modelling tools
- VTT: Promote - IFC browser
  - generates Java classes from any EXPRESS schema and VRML from geometry
  - supports access to distributed models in client/server mode over the Internet

Relation with ISO/STEP

- Liaison status 1997
- MoU in June 1998
- Agreed action items:
  - Joint IAI ITM/STEP meetings
  - Develop links between IFC and Part 225
  - Develop links between IFC and Part 230
  - Joint trial interpretation of elements of IFC Core (as part 106)
  - Collaborate on the CDS and DXF2 drawing exchange developments
  - Review EXPRESS 2 specification
  - Investigate the most appropriate approach to standardisation of IFC
  - IAI documents are publicly available for STEP members
## IAI membership

- Currently 9 Chapters
- More than 600 member organisations in 19 countries

![Map showing membership areas](image)

## Current IAI Organisation

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Responsibilities</th>
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<tbody>
<tr>
<td>International Council / Executive Committee</td>
<td>Arto Kiviniemi</td>
<td>Chair (2/Chapter)</td>
</tr>
<tr>
<td>International Technical Management</td>
<td>Takayori Takamoto</td>
<td>Temporary Chair</td>
</tr>
<tr>
<td>ISG Implementation Support Group</td>
<td>Rasso Steinmann</td>
<td>QA, Certification, Consensus, Prototype, Demonstrations</td>
</tr>
<tr>
<td>ISG Model Support Group</td>
<td>Thomas Liebich</td>
<td>Architecture, Integration, Issues, Doc support, Hotline</td>
</tr>
<tr>
<td>ISG User Support Group</td>
<td>Robin Drogemuller</td>
<td>Methodology, Info to users, Technical marketing</td>
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<td>MSG Implementation Support Group</td>
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<td>TAG Technical Advisory Group</td>
<td>Vladimir Bazjanak</td>
<td>External Review, Liaison, Academic Development, Roadmap</td>
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<td>PM</td>
<td>Jeffrey Wix</td>
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![Organisation chart](image)
IFC Release R2.x and R3.0

- IFC R2.x
  - model improvements based on early implementation
  - core stabilization
  - up- and downward compatibility
  - no new functionalities
  - available in December 1999 or March 2000

- IFC R3.0
  - domain project work is continuing
  - modelling starts in the beginning of 2000
  - available in the end of 2000

Current Problems

- Main problem is the lack of funding and resources
- Most of the resources available for 1999 were spent in IFC R2.0
- Some different views on R2.x
  - extent
  - scope
  - schedule
## Evidence of Success

- 3 major & 1 minor releases in 3.5 years
- IFC R2.0 on schedule & under budget
- Integrated AEC/FM information model
  - vocabulary of 400 object types
- Requirements of 16 IFC R3.0 domain projects nearly complete with improved quality
- On-going implementation efforts:
  - 33 vendors have demonstrated software
  - 5 software vendors have R1.5.1 products or extension modules available, 6 more will ship later this year
  - 13 software vendors have announced R2 support
  - 6 toolboxes available
- Increasing visibility on many levels:
  - press, research conferences and papers
  - AEC/FM industry customer awareness

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**Thank you!**