IT in Collaborative Design and Construction Process

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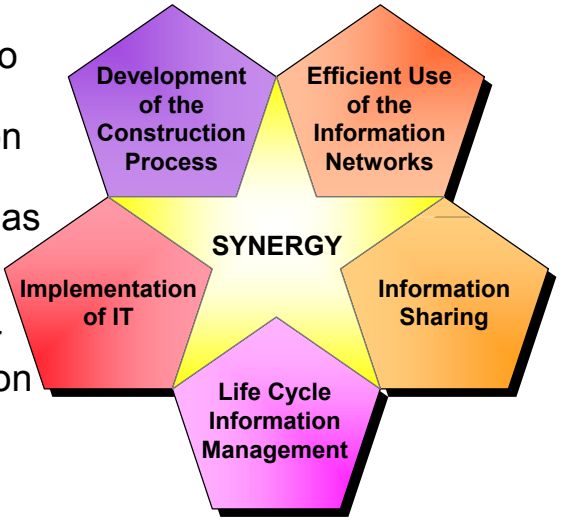
Vera A National R&D Program

The target is to promote the implementation and use of IT and networks as the enabling technologies to re-engineer the construction process



Vera Program Volume

- Schedule - six years; 1997 - 2002
- Volume

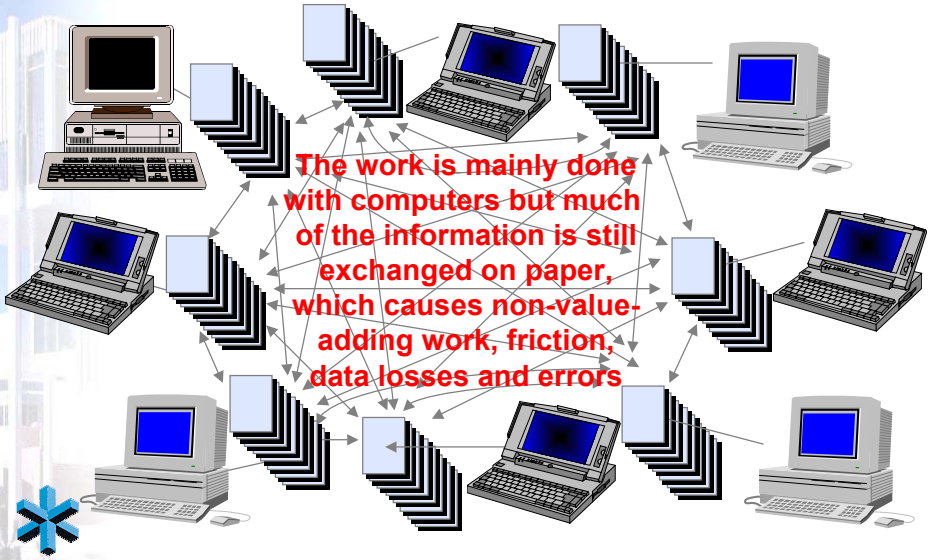
Original budget	*170 million FIM*	*(28.5 million €)*
Current budget	250 million FIM	(42.0 million €)
45 % by Tekes	115 million FIM	(19.3 million €)
55 % by the industry	135 million FIM	(22.7 million €)

- Current project allocation

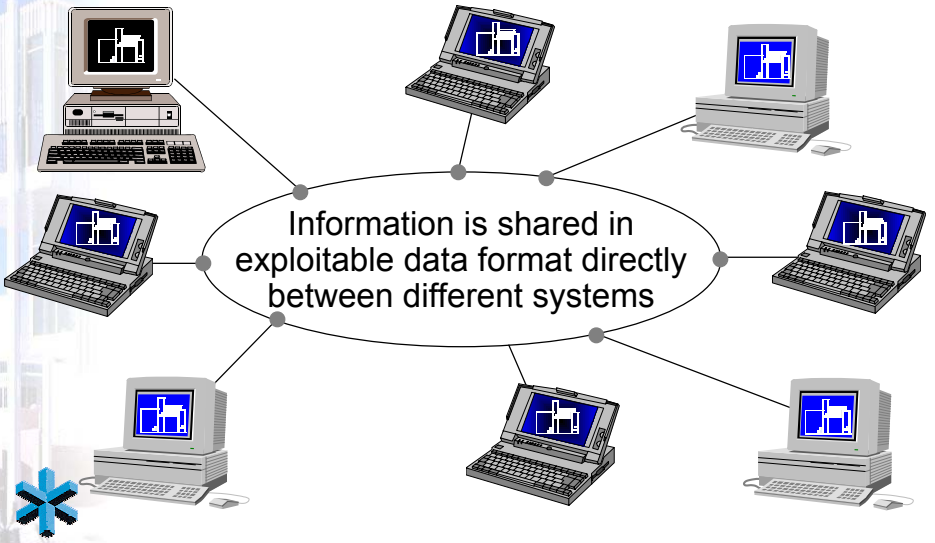
Research projects:	35 / 20 million FIM	(3.4 million €)
Industrial projects:	87 / 162 million FIM	(27.2 million €)
Total:	122 projects / 182 million FIM	(30.6 million €)

- Short project presentations in the web
  http://cic.vtt.fi/vera/english.htm

Vera Current Problem



Vera Goal in the Future



Vera Requirements for Networking

- Infrastructure
  - high-capacity networks
- Common information language
  - standardized/agreed data structures
  - software support for data sharing
- Tools and processes
  - computers connected to the networks
  - software support for collaboration
- Culture
  - will to collaborate
  - sufficient IT (ICT) know-how

IFC -
The Common Information Language

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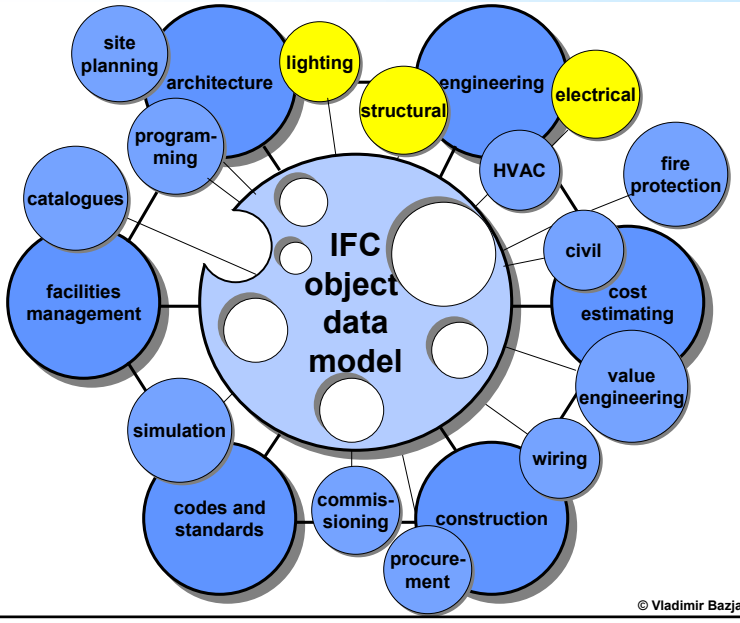
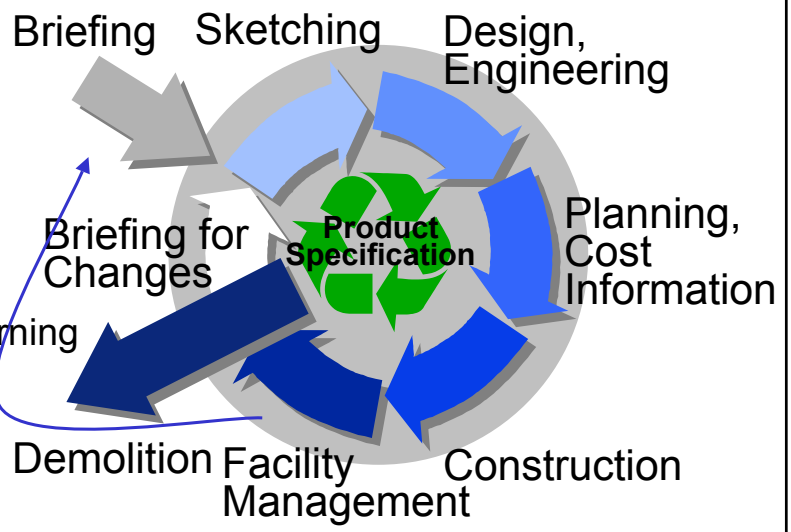
Current Status of IFCs



Lifecycle Information



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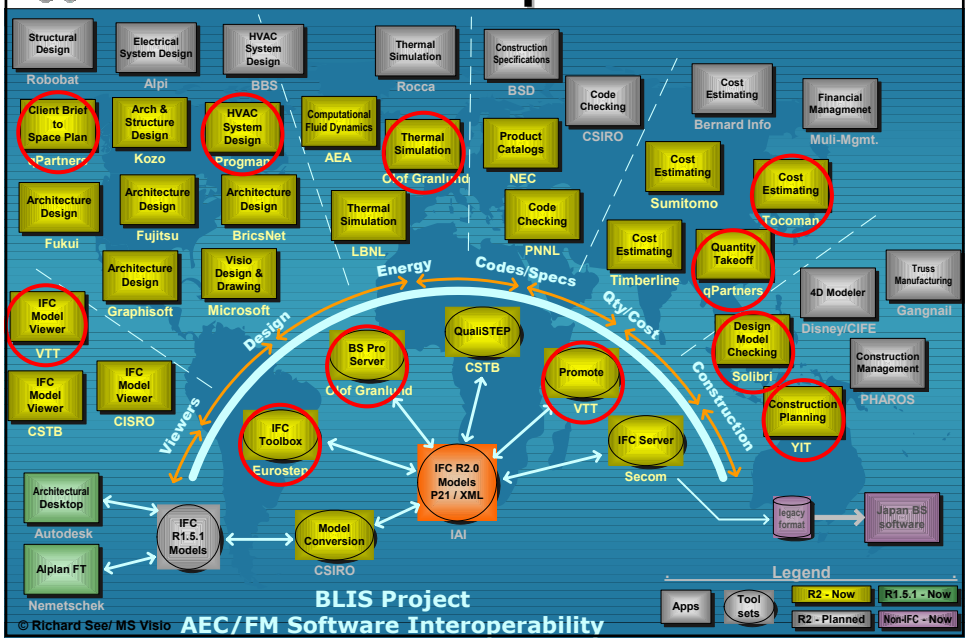
Current IFC Implementations



Tools and Processes

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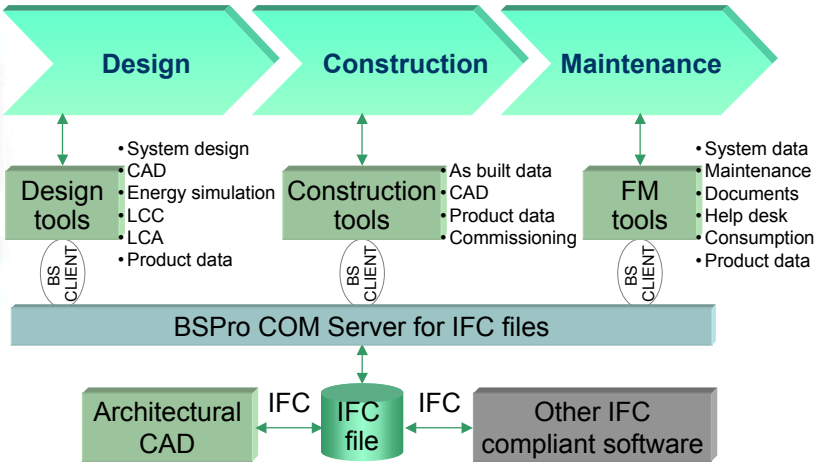
Design and Engineering Processes

- Shared models can contain complex rules for behavior and relations between objects
  - easy and cost efficient evaluation and simulation at any project stage
    - thermal, lighting and performance simulation
    - more accurate cost estimation
    - environmental evaluation…
  - (semi)automated design integration and code checking
- New service areas for designers/engineers
  - LCA/LCC services
  - information maintenance
  - FM services...

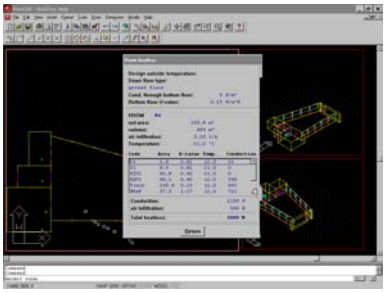
BSPro COM Server / Olof Granlund

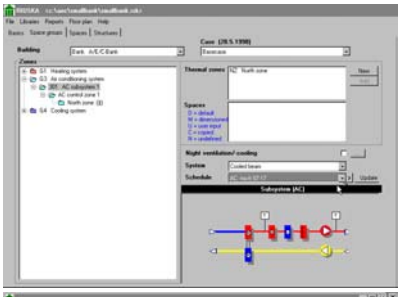


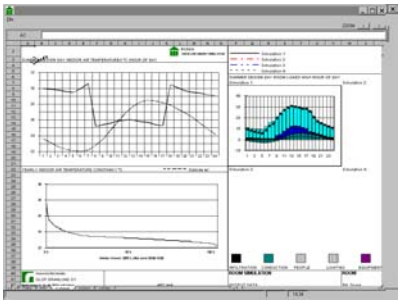
Life cycle data repository for building services

DOE (US Department of Energy) has taken BSPro Server as the middleware to import building geometry into the "next generation" energy simulation software EnergyPlus published in April 2001

Thermal Simulation / Olof Granlund







RIUSKA

- uses IFC building objects
- based on the DOE simulation engine
- Supports both IFC 1.5.1 and R2.0 through the BSPro IFC/COM Server

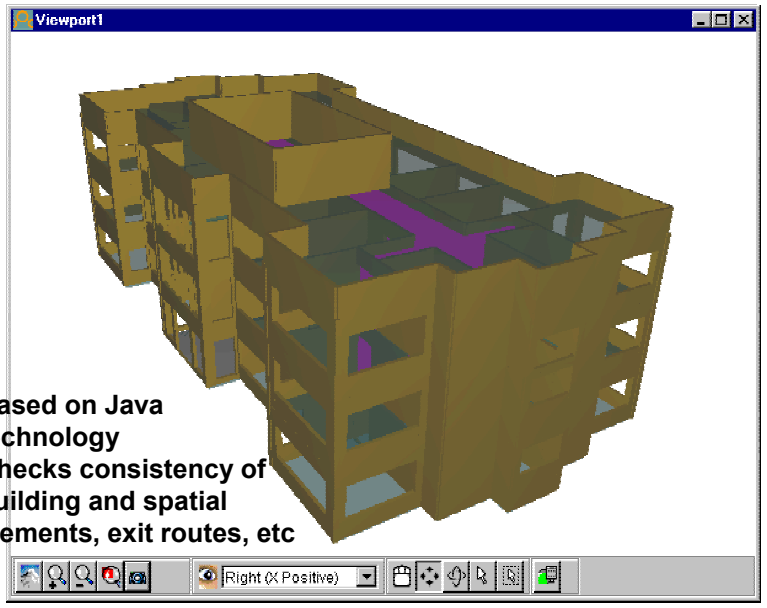
In the Sanomatalo building project advanced IT applications of Olof Granlund were used in the comfort and energy consumption simulations already in early design stages.

Sanomatalo
Sarc Oy, Antti-Matti Siikala

Construction Process

- Wide utilization of design data
- Information as a part of the product:
  - building maintenance database based on as-built information will be delivered as a part of the production
  - eCommerce is not just procurement and transactions; product information must be a part of the eCommerce
    - electronic product libraries with direct interface to design and procurement software and building data models ⇨ IFC compliant XML
- Change requires:
  - process and tool development
    - Project management tools
    - 4D CAD: Time schedule combined to 3D…

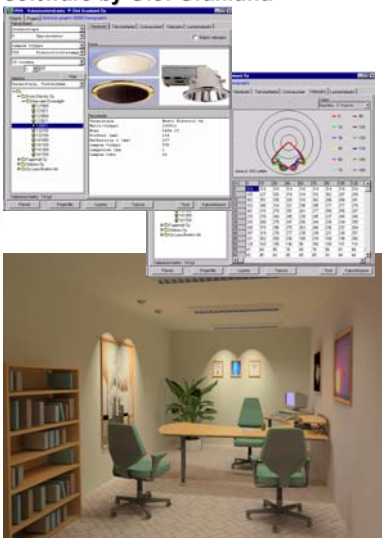
Design Model Checker / Solibri



- Based on Java technology
- Checks consistency of building and spatial elements, exit routes, etc

Examples of Product Libraries

Viva - lighting design and simulation software by Olof Granlund

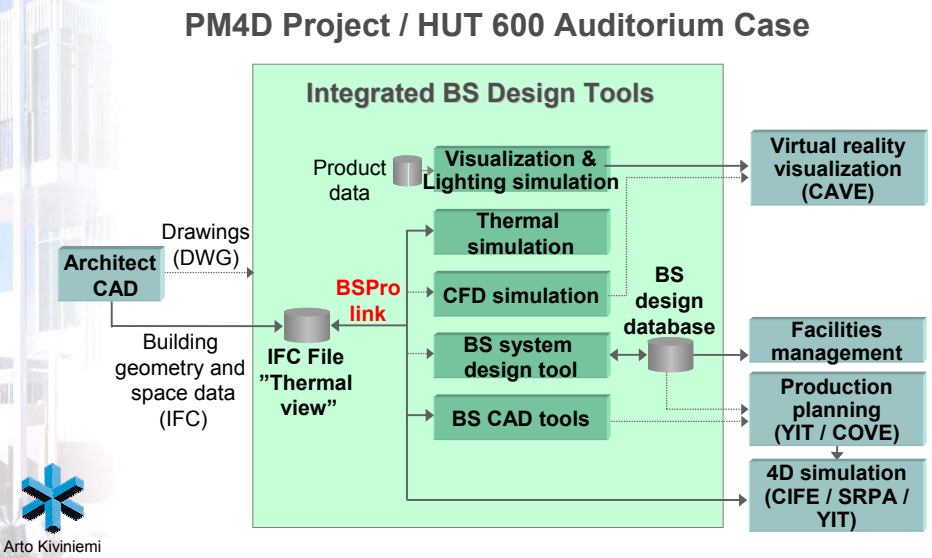


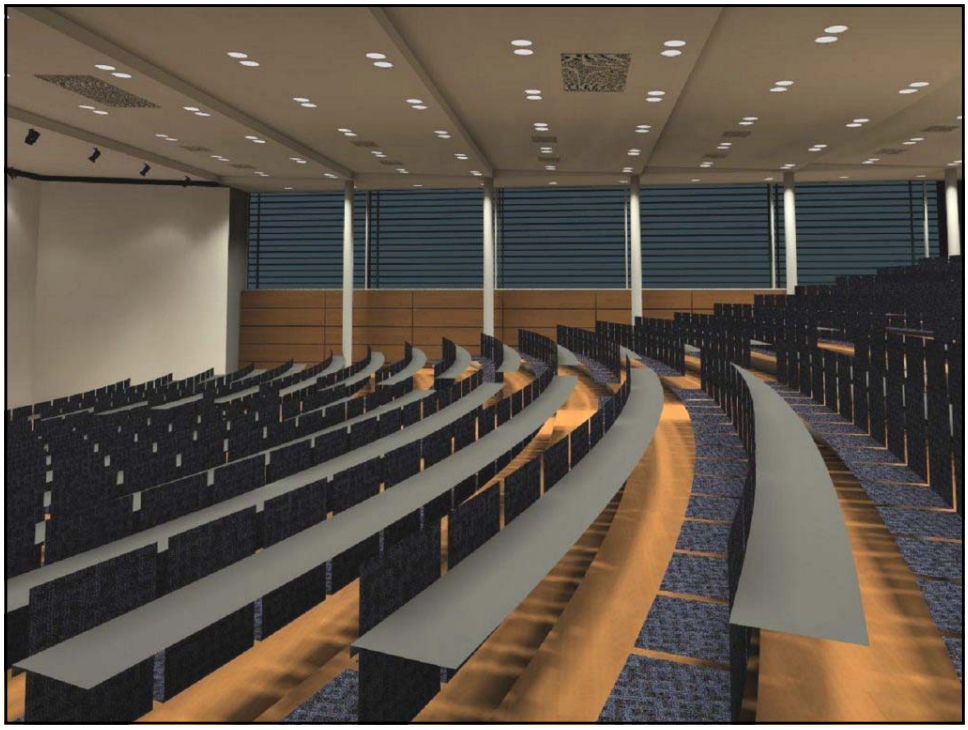
GDL Object Explorer by GDL Technology

Lifecycle Management

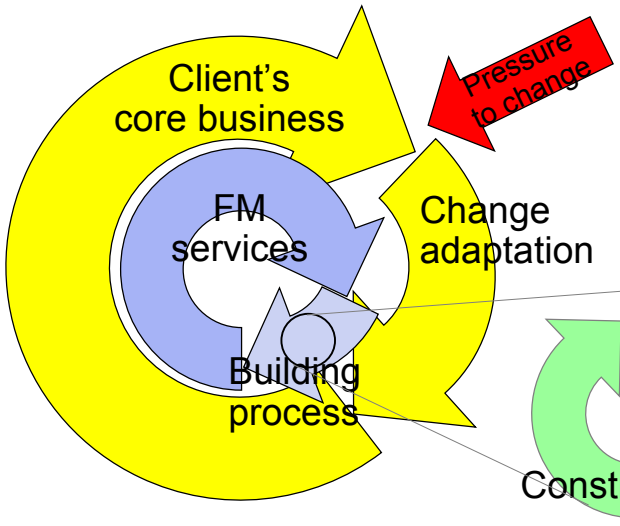
- Key people are the clients; building owners and facility managers.
  - they will have the most benefits
  - they can set the requirements
- Better tools for early decision making
  - LCA and LCC tools
  - maintenance simulations
- Better tools for FM/PM
  - better budgeting tools
  - better utilization of resources
  - better management for preventive maintenance
  - lower costs for maintenance

Real Pilot Project Using IFCs





Real Life Cycle View ?



Where are the real benefits of information sharing and eBusiness?

Culture

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Barriers to the Change

- The change to data sharing is not only technical - it is much more cultural
  - new processes and tools supporting them
  - real partnering and sharing the benefits through the whole AEC/FM industry
    - investments and benefits do not always meet
  - sufficient IT skills
    - a pre-study for the Vera program in 1996-1997 showed that the lack of IT skills and know-how is the main barrier to the wider implementation of IT in the AEC/FM industry

New Business Concepts

- ”Drafting" ⇨ information management
  - paper document ⇨ digital information
  - traditional documents ⇨ product models
  - “document” ⇨ a view of the model from a specified angle at a specified moment
  - technical and juridical problems
- Environmental issues are coming more and more important
- Information will be produced for:
  - decision making and production
  - **use and maintenance of buildings**
- Minimizing the cost ⇨ maximizing the added value through the whole building life cycle

Thank you for your interest