



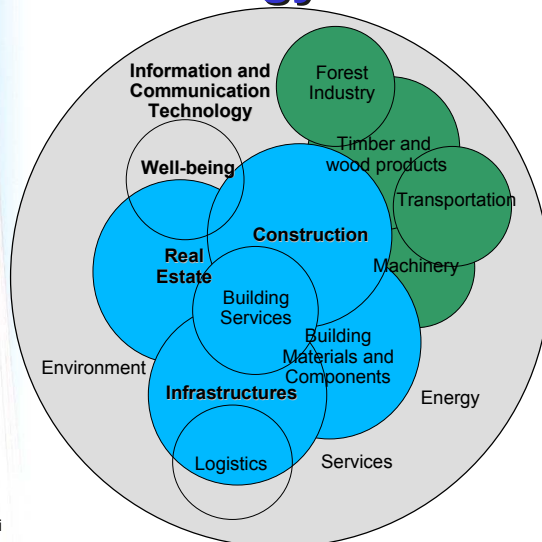
New Business Models for the Building Industry: Pockets of Innovation



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Tekes: Construction and Wood Technology Cluster



Tekes mission:
R&D must become a constant part of the normal business also in the AEC/FM industry

Change in the basic philosophy:
We must move from minimizing the costs to maximizing the added value



Technology Programs

- Extensive programs initiated by Tekes and consisting of numerous projects
- Focused on a key technology sector ⇒ pro-active tool influencing the focus of R&D and creating the critical mass
- Implemented in co-operation by companies and research units
- Projects and results are partially public, but the results of industrial projects are proprietary



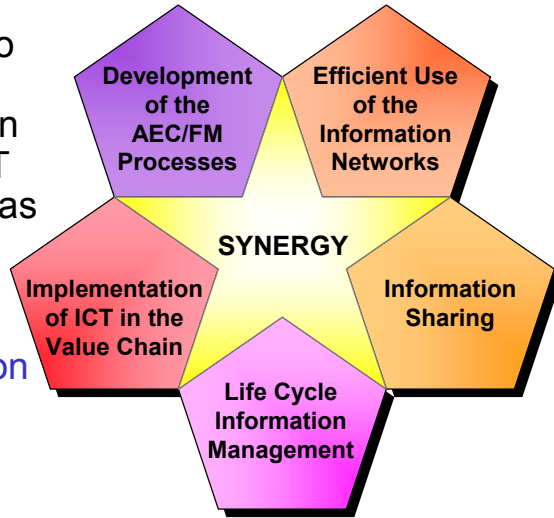
Vera Technology Program

- Information Networking in the Construction Process
- Schedule - six years; 1997 - 2002
- Total volume
 - ~45 % by Tekes 120 million FIM (~USD 18 million)
 - ~55 % by the industry 140 million FIM (~USD 22 million)
 - Total budget 260 million FIM (~USD 40 million)**
- Allocation January 1997...August 2001
 - Research projects: 35 / 26 million FIM (~USD 4 million)
 - Industrial projects: 90 / 174 million FIM (~USD 27 million)
 - **Total: 125 / 200 million FIM (~USD 31 million)**
- URL: <http://www.tekes.fi/vera/>

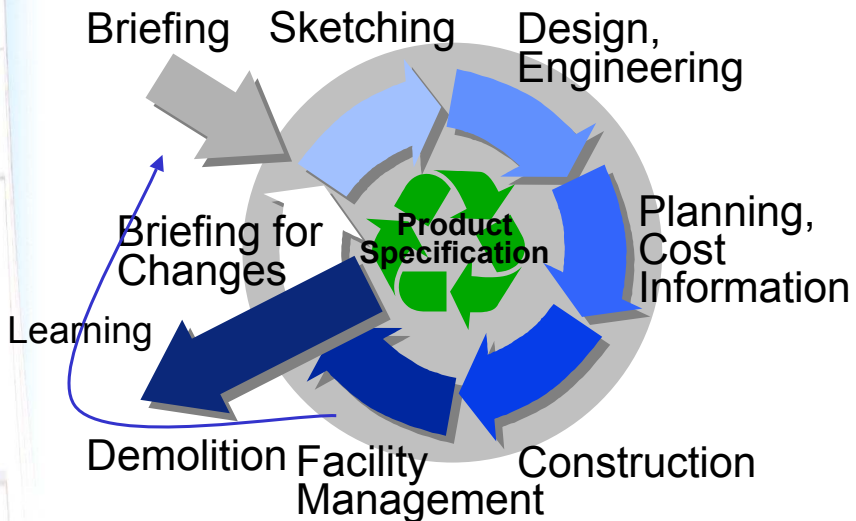


Target

The target is to promote the implementation and use of ICT and networks as the enabling technologies to re-engineer the construction and FM processes

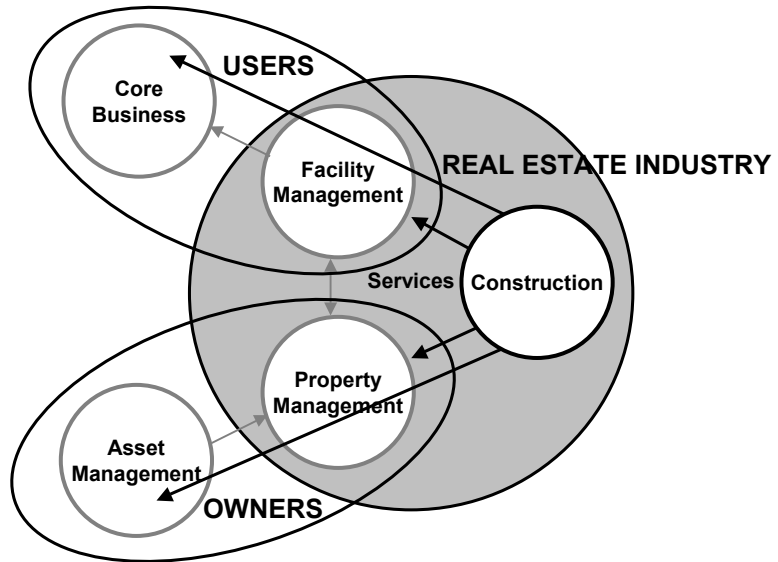


Information Lifecycle - Project View

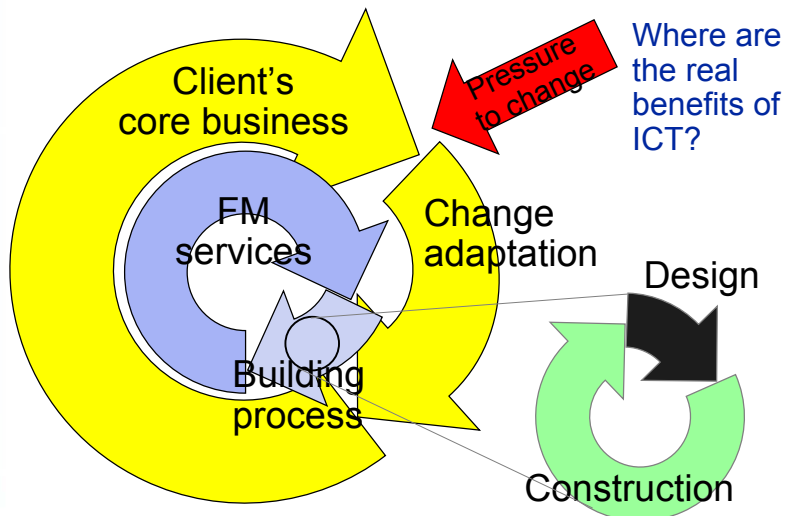




New View to the AEC/FM Industry



Real Life Cycle View ?



Helsinki University of Technology (HUT-600)



*A case study in the application of:
Industry Foundation Classes & 3D/4D Models*

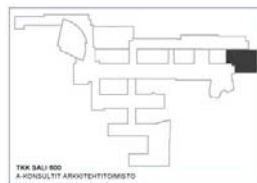
Calvin Kam and Martin Fischer

CIFE Summer Program 2001, Stanford University

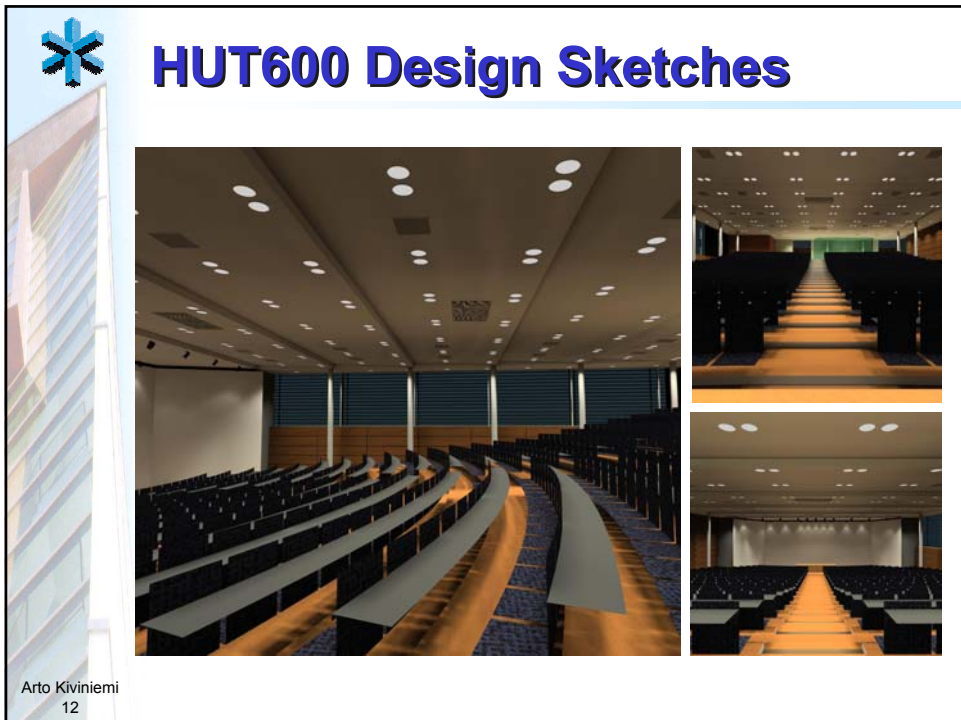
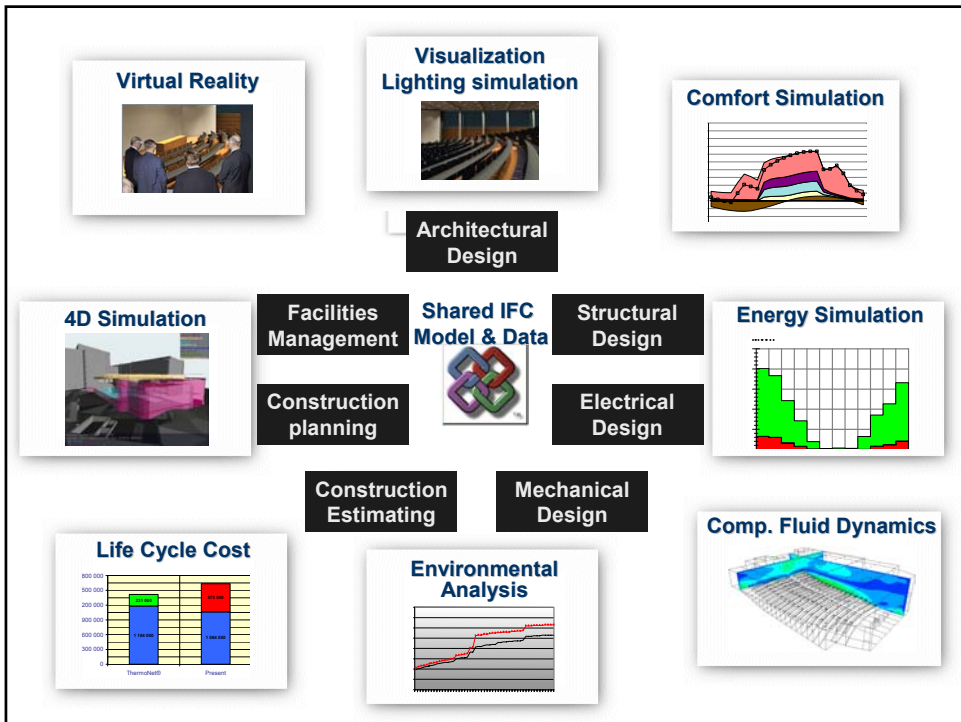


Project Highlights

- The new auditorium complex is an addition to the main building (1969) designed by architect Alvar Aalto



- This research focuses on exchanging IFC product model data and on leveraging 3D models for various simulations and 4D modeling
- Model and data sharing allows the project team to study more design alternatives, complete thorough analyses of life cycle costs and environmental impacts, produce virtual reality models for decision making support, and study the construction sequences through 4D visualization

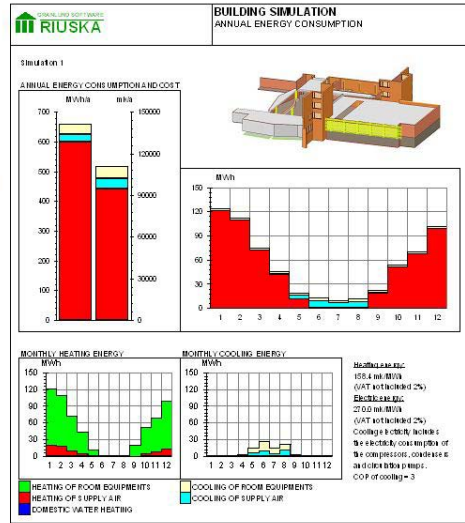




Energy Simulation



- Thermal simulation tool for entire building life cycle
- Currently based on DOE 2.1E
- Developed in collaboration with LBNL
- IFC compliant by [BSPro link](#)



WebShow_PM4D.ppt / MJo

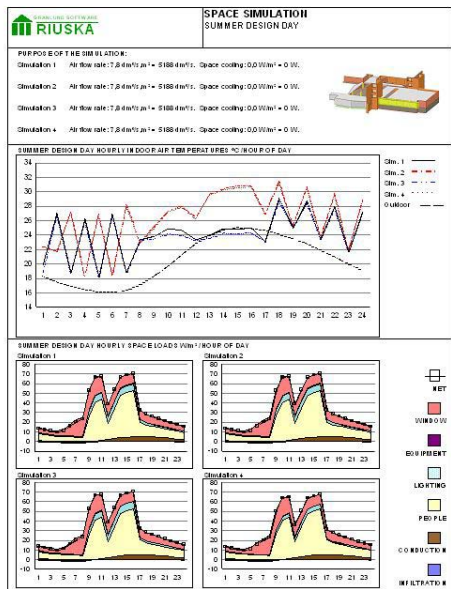
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Comfort Simulation



- Thermal simulation tool for entire building life cycle
- Currently based on DOE 2.1E
- Developed in collaboration with LBNL
- IFC compliant by [BSPro link](#)



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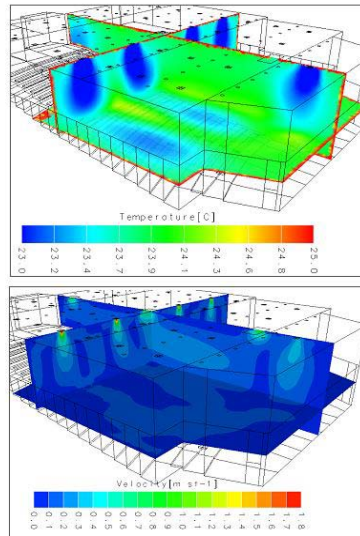
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CFD Simulation

CFD = Computational Fluid Dynamics



- CFX tool by AEA Technology
- Simulation of temperature stratification and air velocities
- Especially for high spaces with high cooling loads
- IFC compliant by [BSPro link](#)



HVAC Design

MagiCAD

Progman Oy

- 3D CAD tool for HVAC design
- Manufacturers' product data
- Links to electronic catalogues

MagiCAD - Diagram

SV-2-200-100+TG-200-100-A

DBase - E:\DBASE\VENTX.DPA

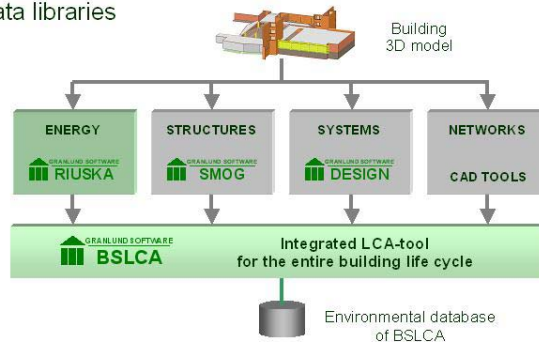
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ID	ABC-025-60	NextObj
Name	ABC-25-60	NoneObj
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appCurves	1 20.0 100.0 66.0	InObj
	2 0.0 200.0 40.0	DelObj
OverPipePoints	1 101.0 46.8 31 35 30 26 26	NoneObj
	2 120.0 66.0 36 40 35 31 31	DelObj
	3 120.0 39.6 31 35 30 26 26	DelObj

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Environmental Analysis (LCA)



- Integrated tool for ecological design
- Buildings, technical systems, equipment
- Throughout the design process
- Granlund's LCA data libraries

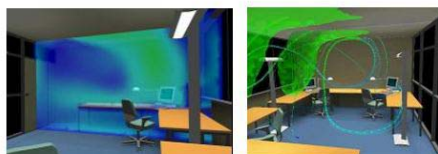


Virtual Reality in EVE

- Helsinki University of Technology, HUT
- Visualisation of a modelled space
- A full size virtual environmental room with three walls
- Data link from 3D visualization and lighting simulation

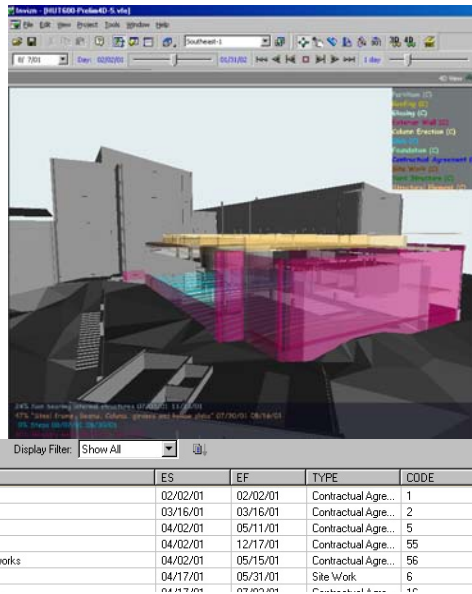


Future:
Visualisation of thermal conditions

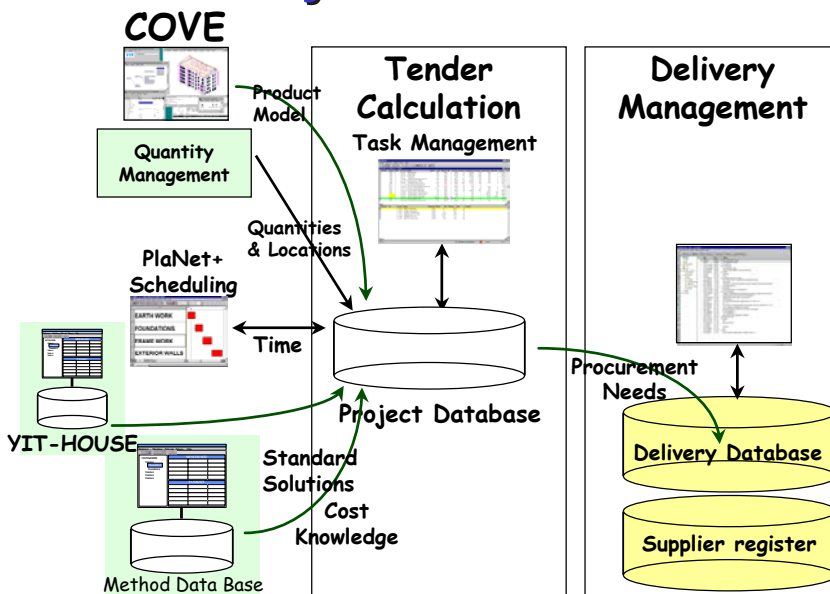


Construction Planning

- Experiment with IFC import of 3D building geometry
- 4D model integrated with the construction schedule of YIT
- Align 4D view with view from the web camera
- 4D case study in HVAC system with Granlund designers
- During this Fall, there will be case studies in space and facility management

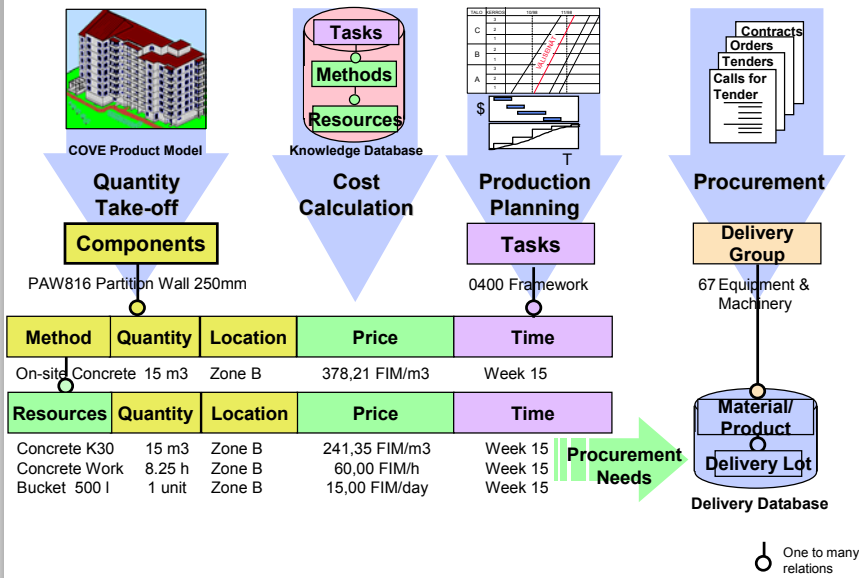


Current System Status at YIT



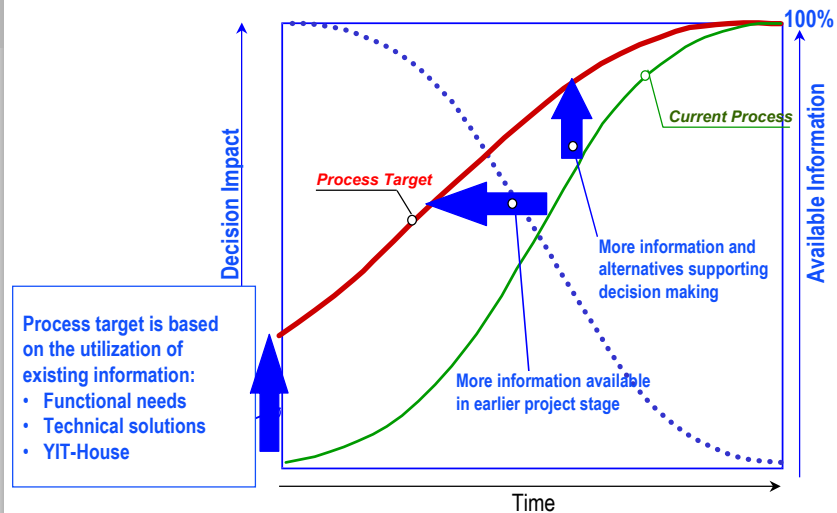
Utilization of Product Model

YIT



Improved Decision Support

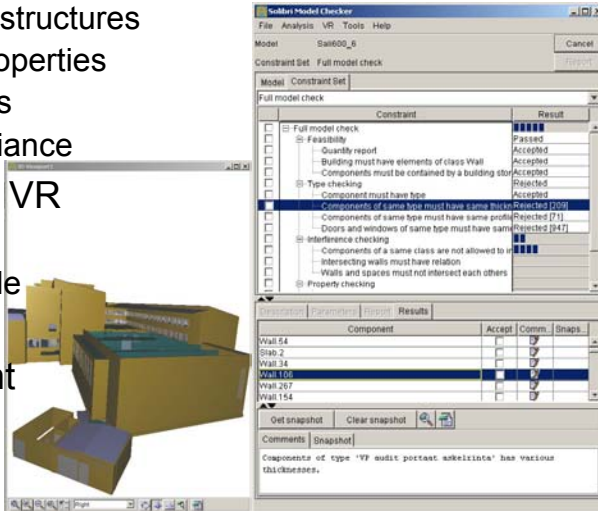
YIT



Solibri Model Checker



- Performs "Design Spell Checking"
 - Key ratio calculations / efficiency
 - Component structures
 - Required properties
 - Interferences
 - Code compliance
- 3D analysis / VR
 - Alternatives
 - 4D / schedule
 - Logistics
- IFC compliant



Implementation of technological leaps

