Building Information Modeling and Management Services, BIMS supporting Green Building Intelligence and Solutions

Risto Vahanen, CEO

Vahanen Group

Finland

Vahanen International Oy

Vahanen Oy

Vahanen Environment Oy

Vahanen Tampere Oy

Fundatec Oy

Innovarch Architects Oy

Instakon Oy

Planekar Oy

Abroad

Estonia: EKK Ltd.

Romania: Instakon Ltd

Russia:

St.Petersburg:

Ficote Consulting Ltd

Moscow and Sochi:

Ficote Engineering Ltd

Key Figures

Founded 1955

Personnel 400

Turn over 30 milj €

Expertise Services

Geotechnics

Architectrure

Structural design, construction physics

Building Services

Environment

Green building

Program management

VAHANEN

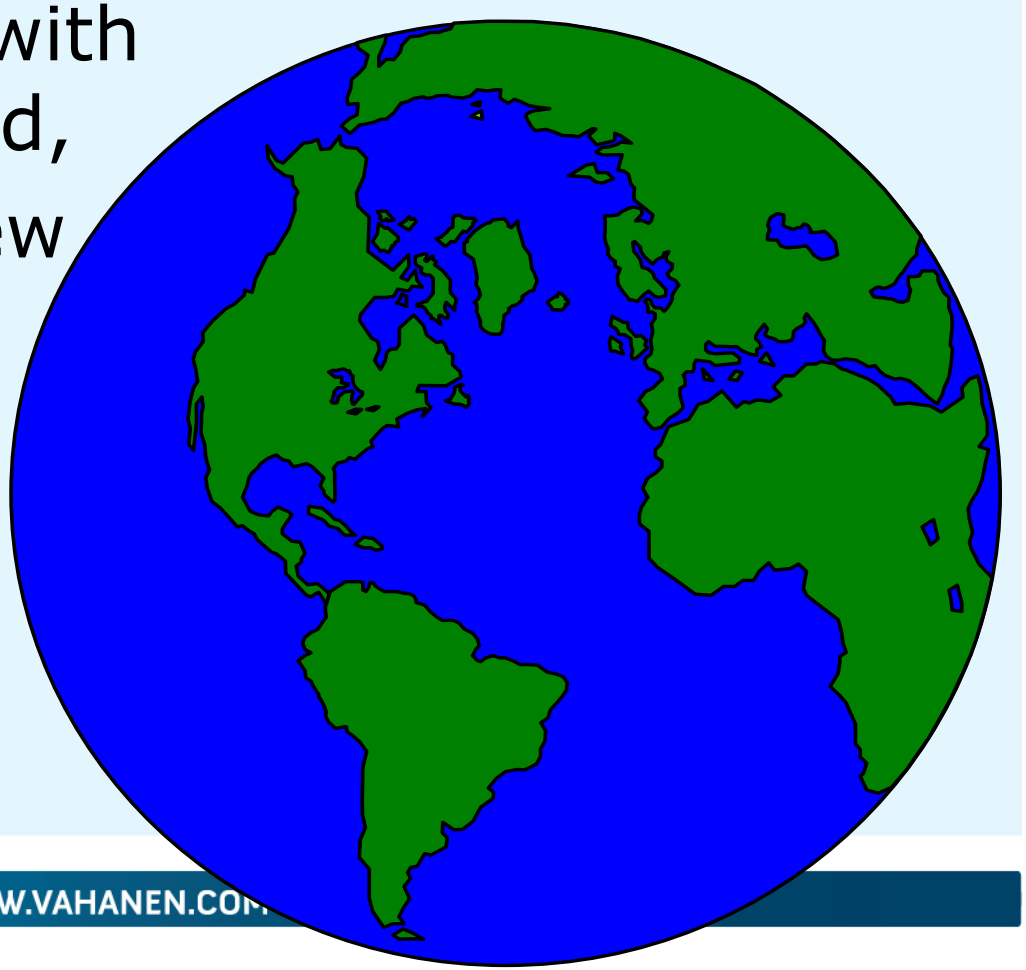

СТОКМАНН

VAHANEN

If we consume the natural resources with the present speed,

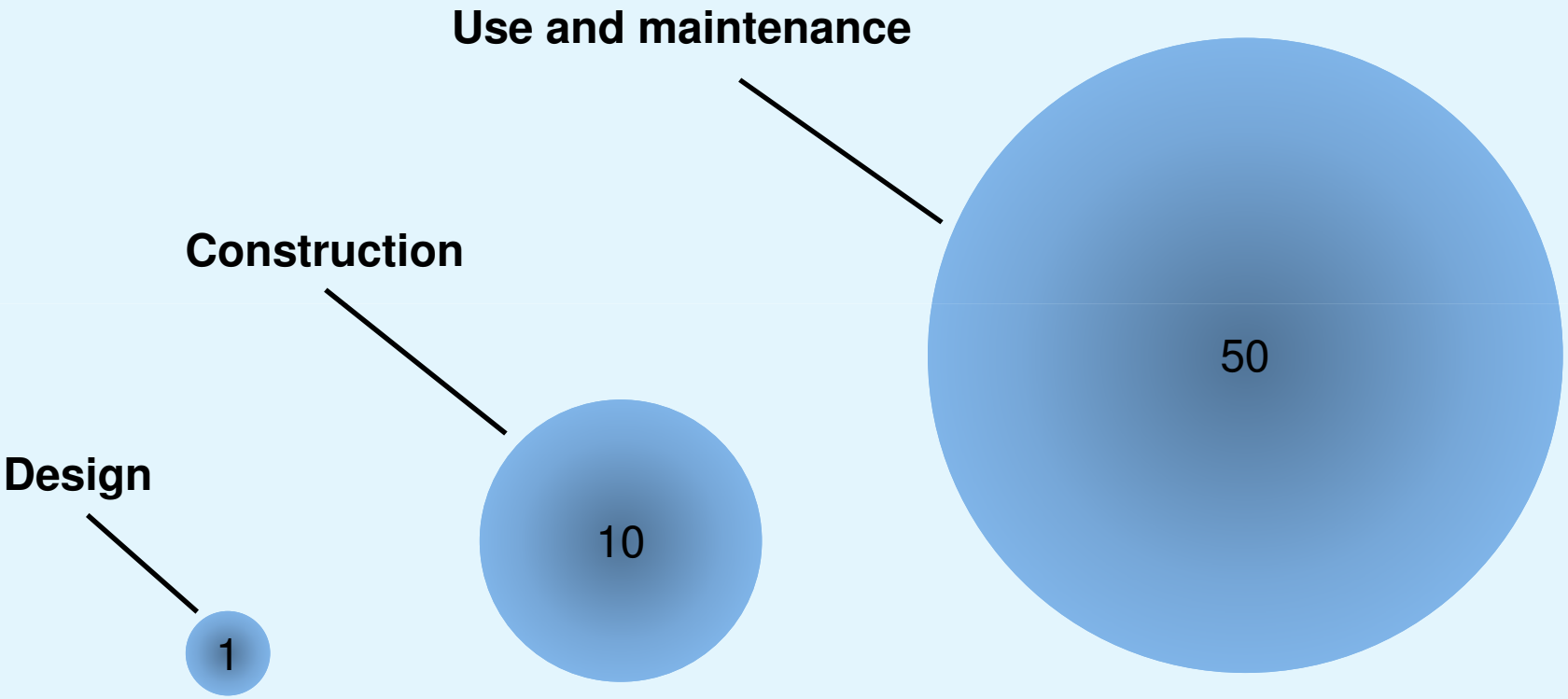
we shall need a new globe within

30 years

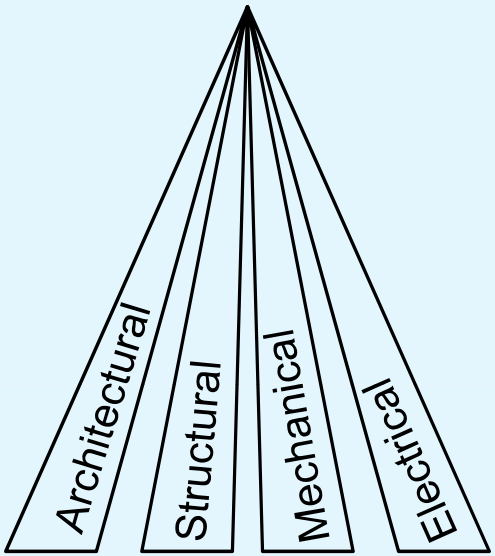


VAHANEN

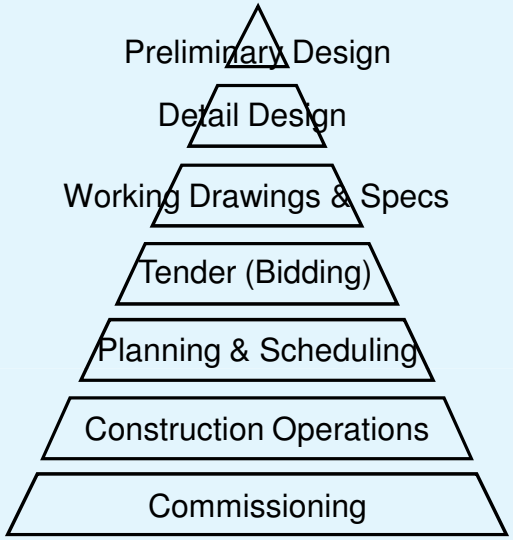
The Real Estate Cash Flow – 25 years



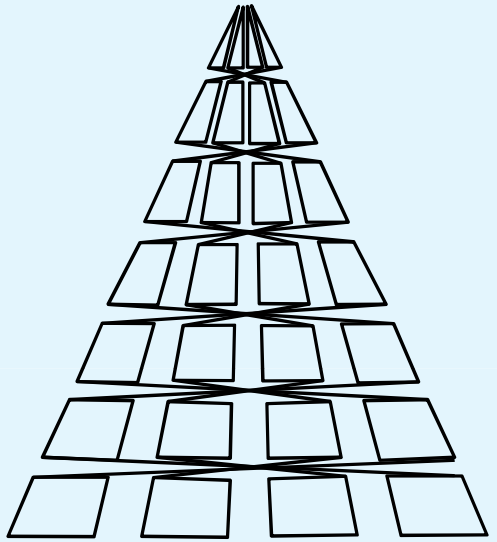
Fragmentation in building delivery process



+



=

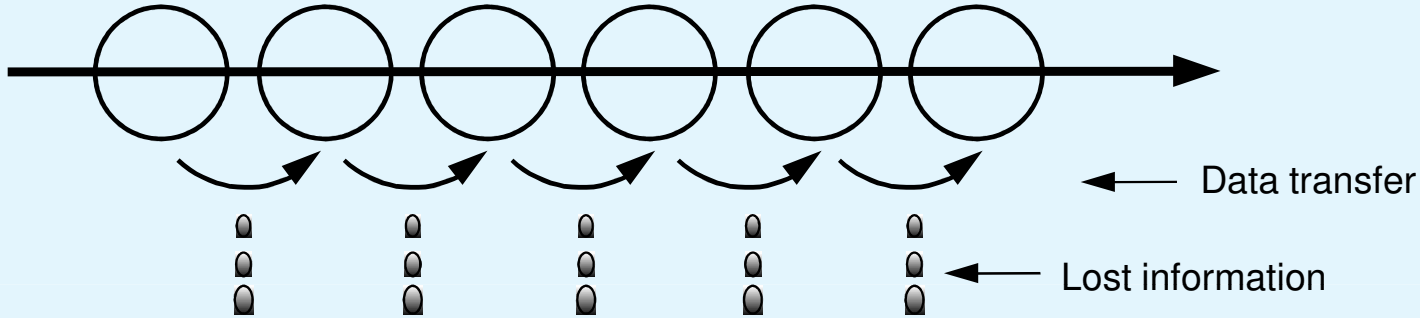


Professional and trade responsibilities (Funcitional Gaps)	Building delivery process (Management discontinuities)	Operational islands (Ineffective coordination; poor communication)

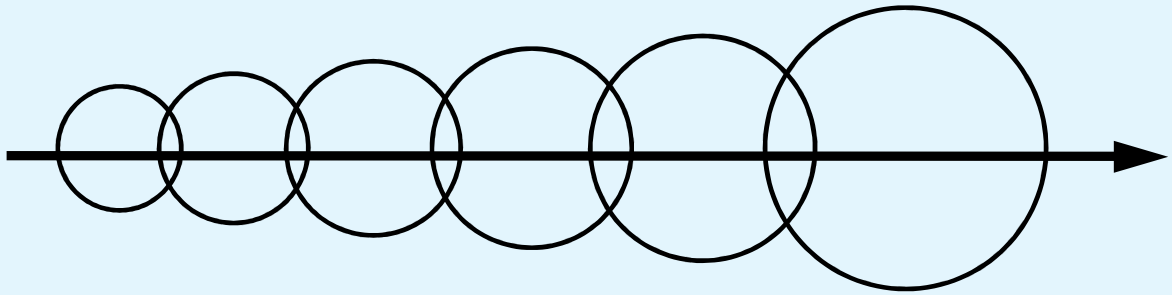
Source: National University of Singapore (Professor Lee Siew Eang)

Principles of business process development – viewpoint of information management

Old way = current way in construction industry

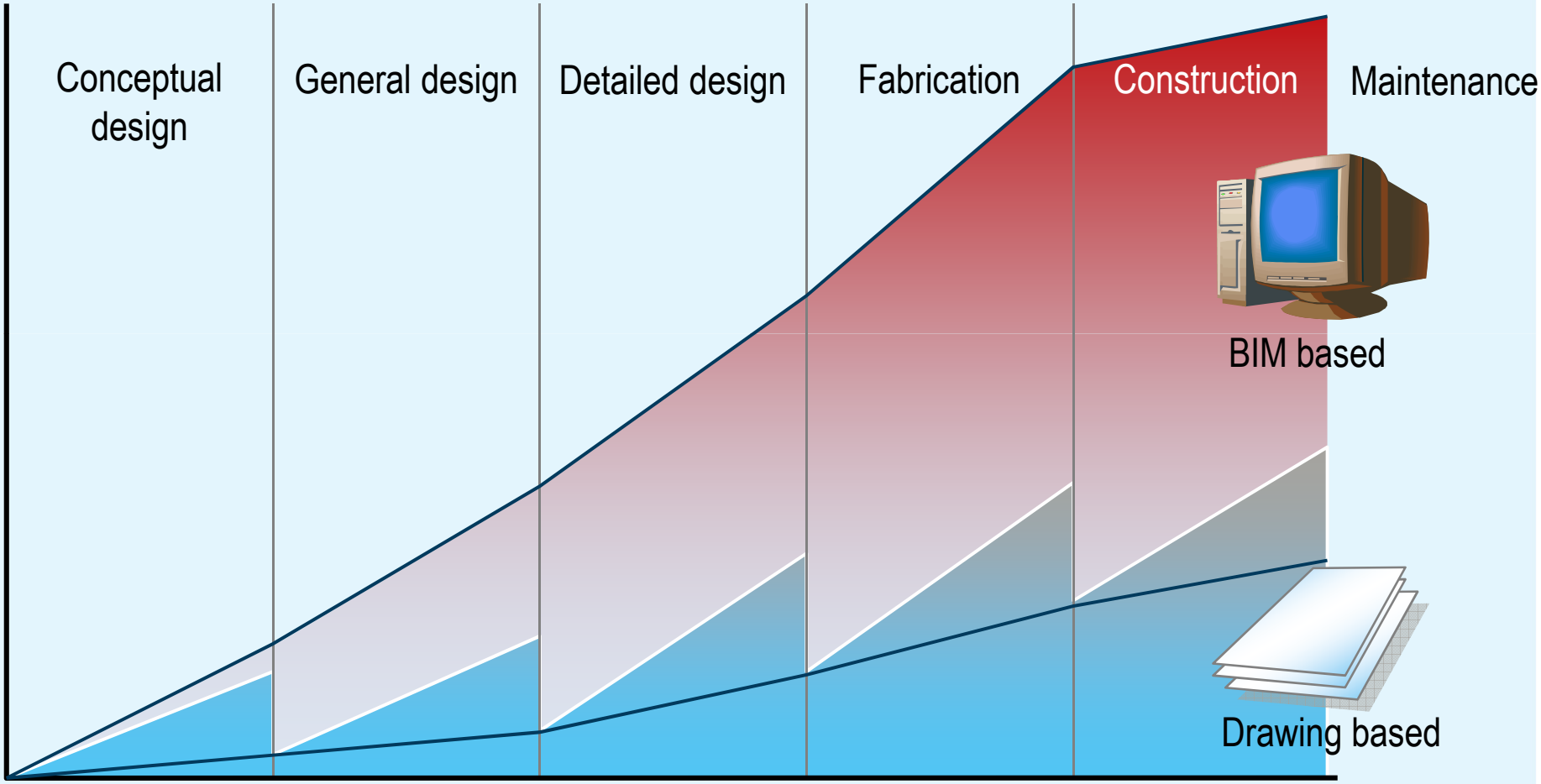


Old new way = compatible software programs



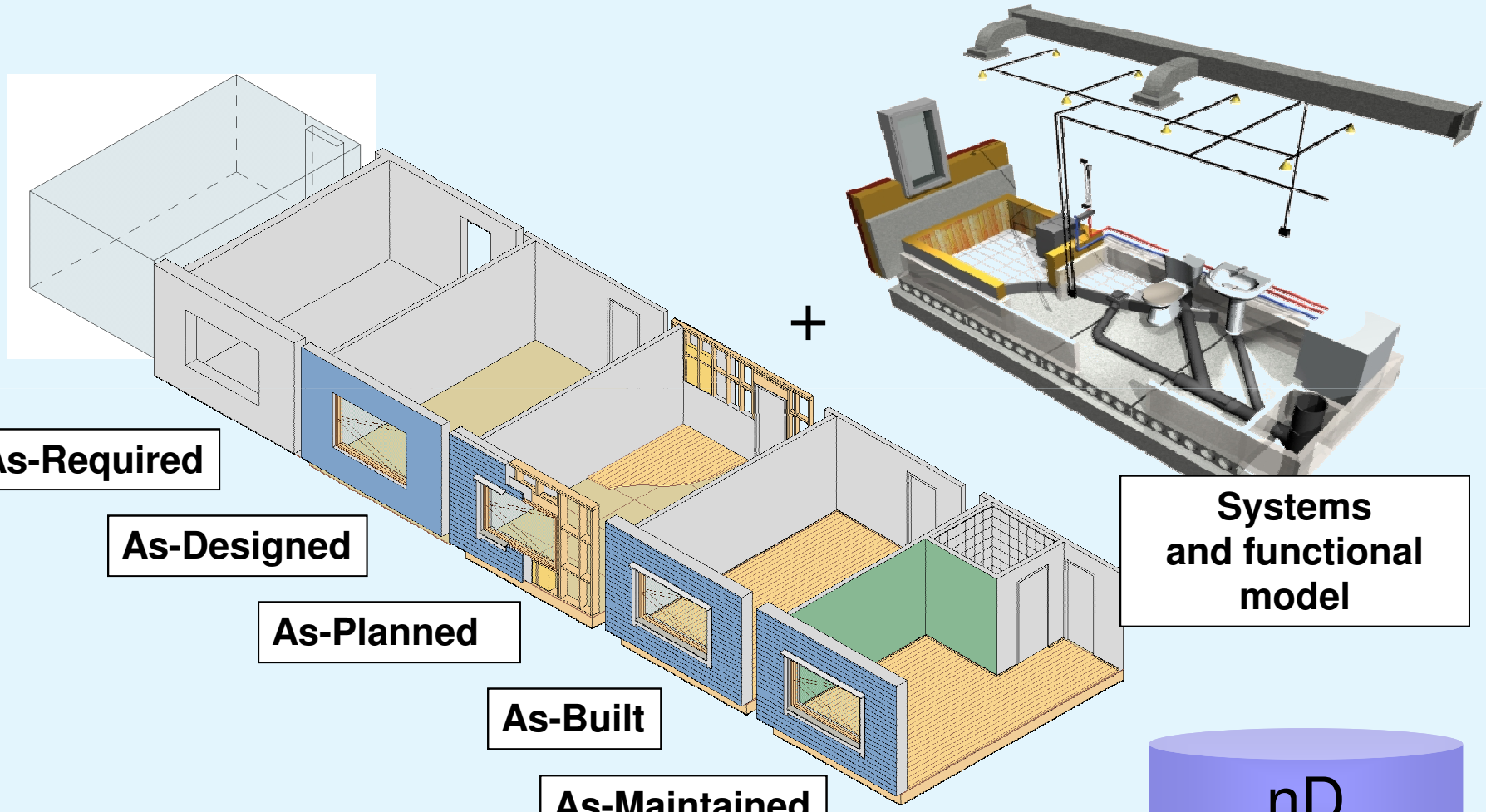
Project / Draft / Design / Cost calculations / Constructing / Facility Management

Target: Common platform with Cumulation of information

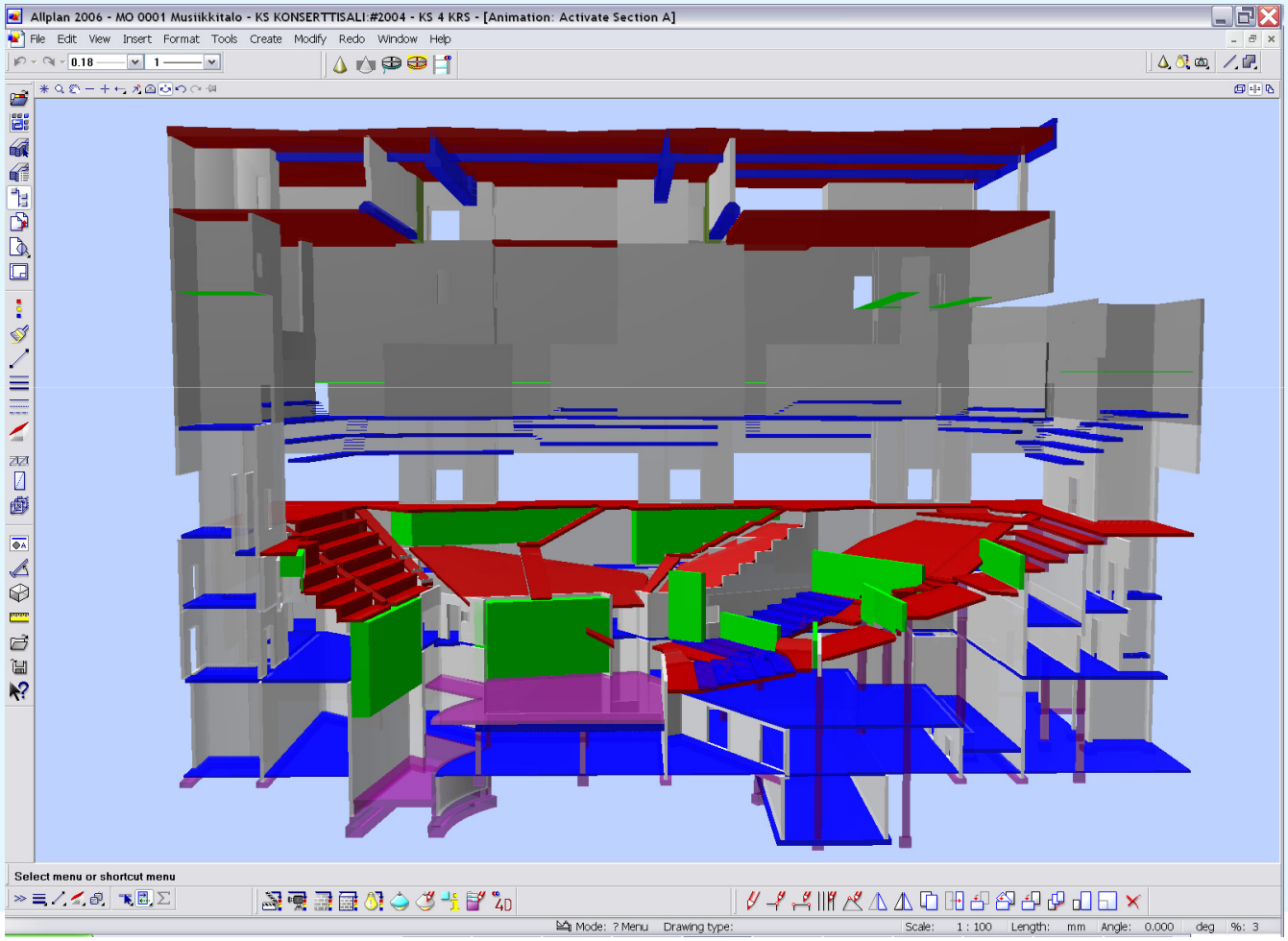


VAHANEN

3D and 4D modeling of the building

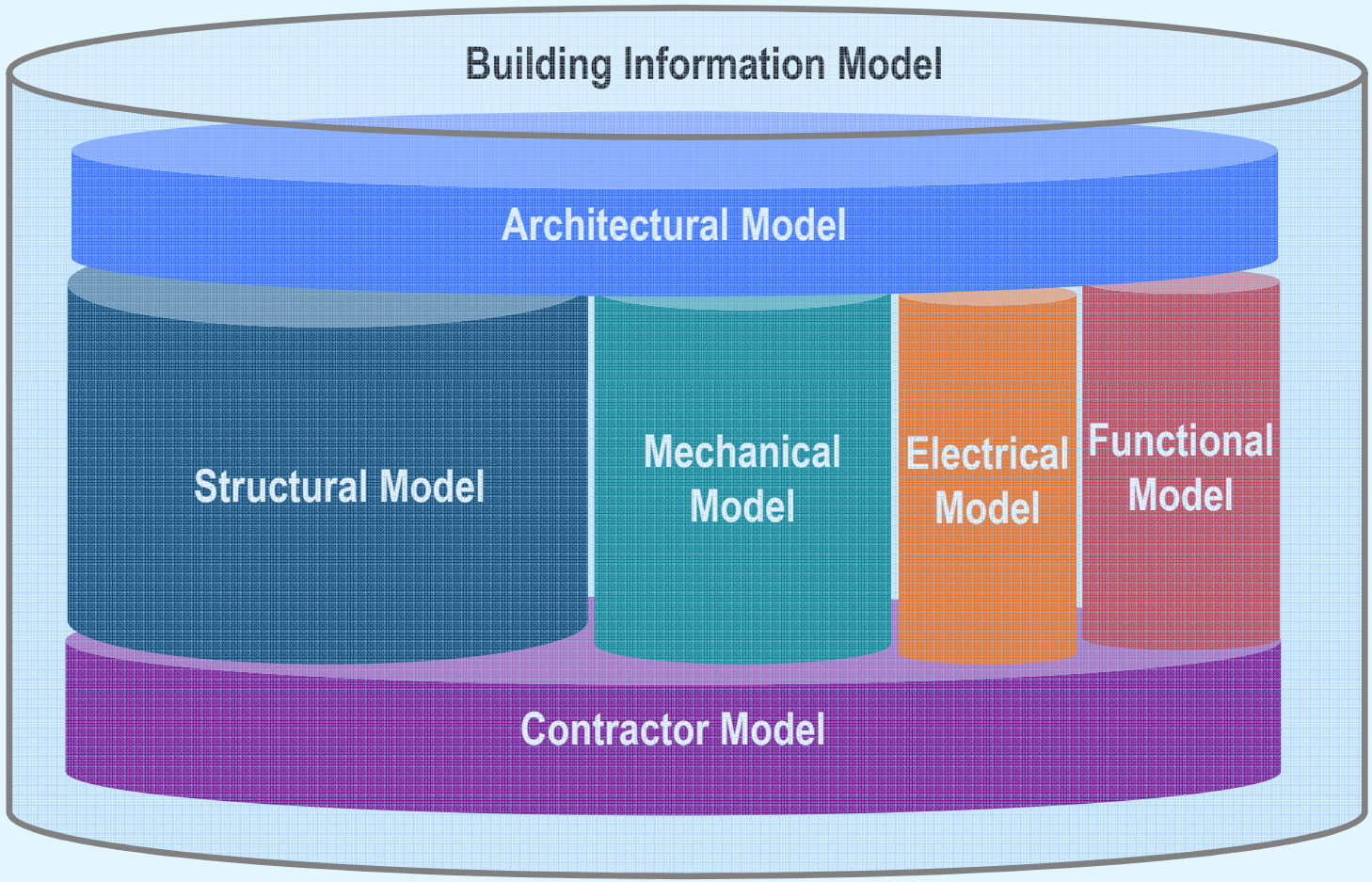


Helsinki Music hall
Section A-A

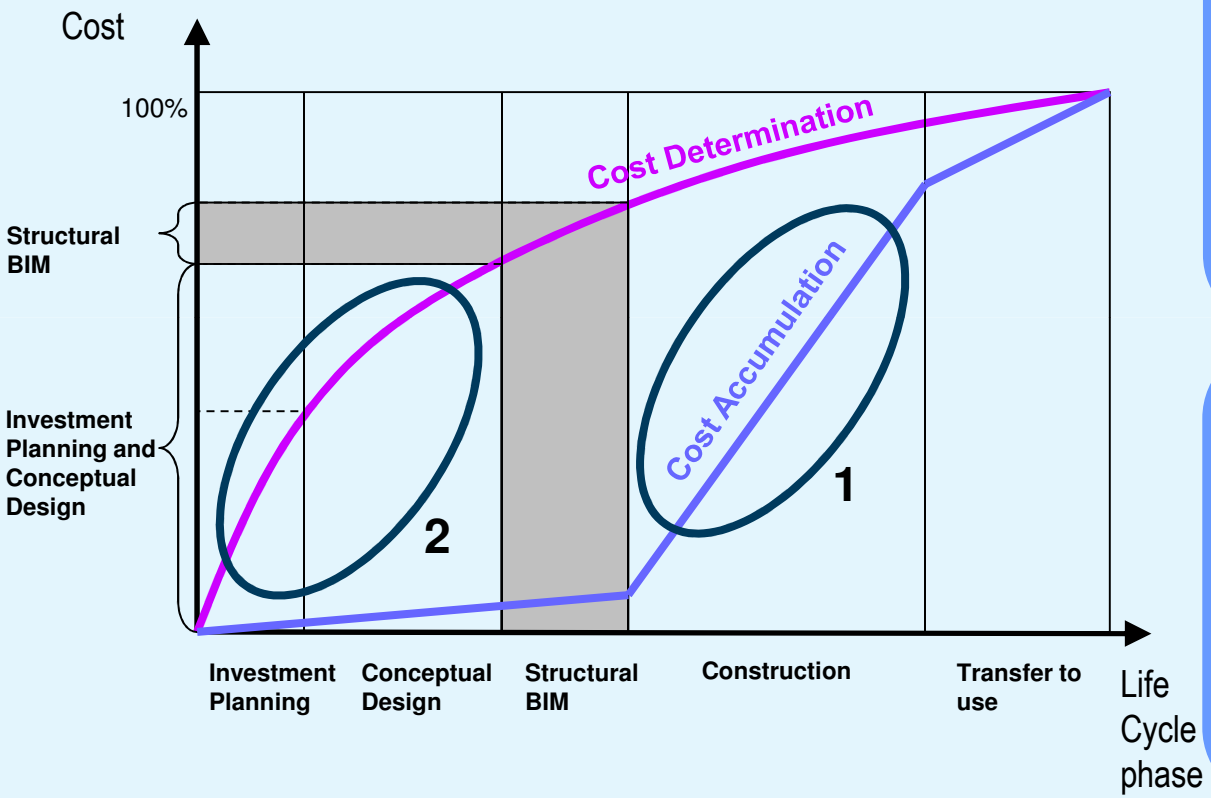


VAHANEN

BIM - One virtually shared model



Construction Management



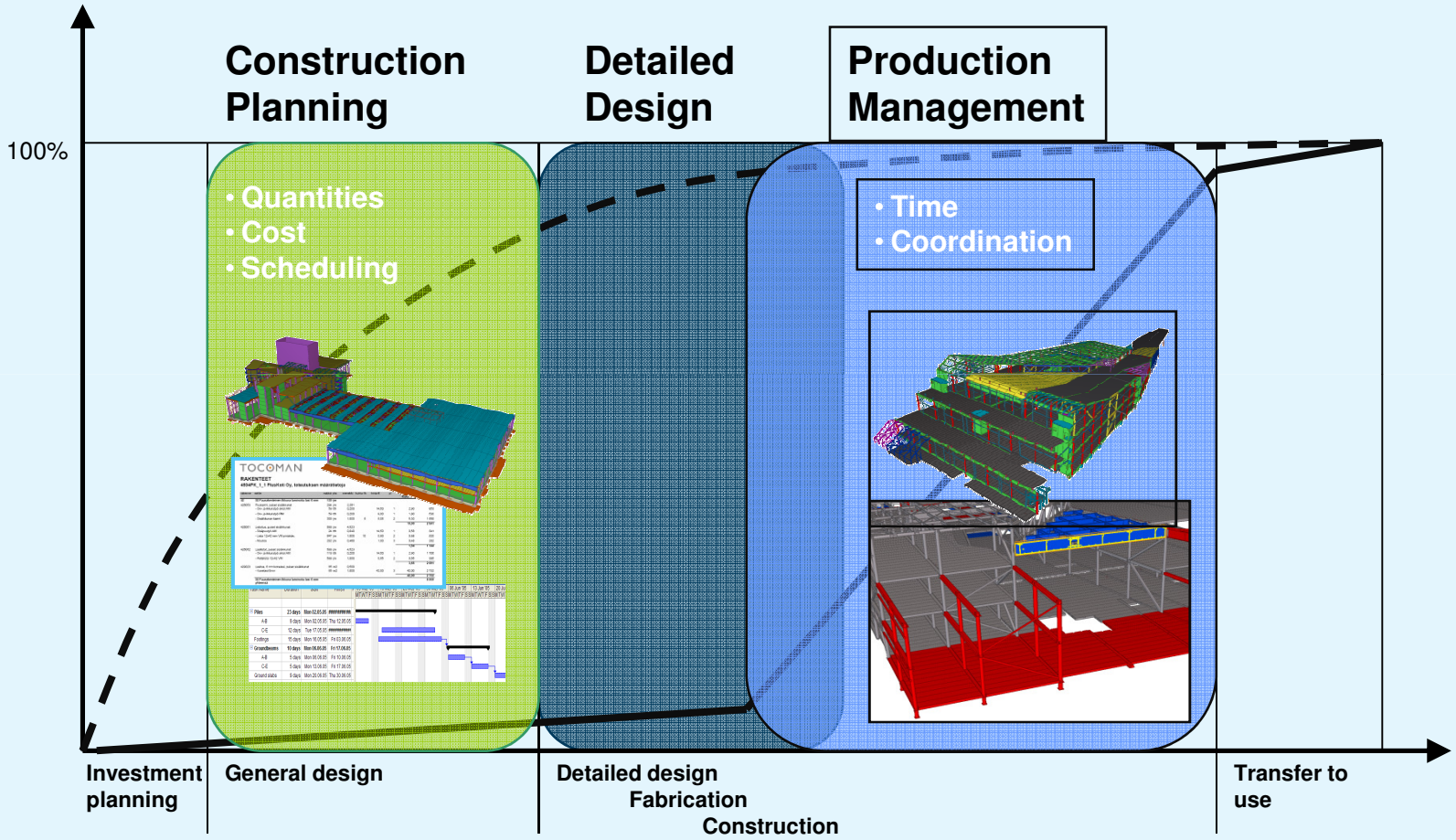
1. Construction Site Management

- Visualization
- Design coordination
- Virtual erection
- Construction coordination
- Manage the delivery chain – design, production, erection

2. Construction Project Management

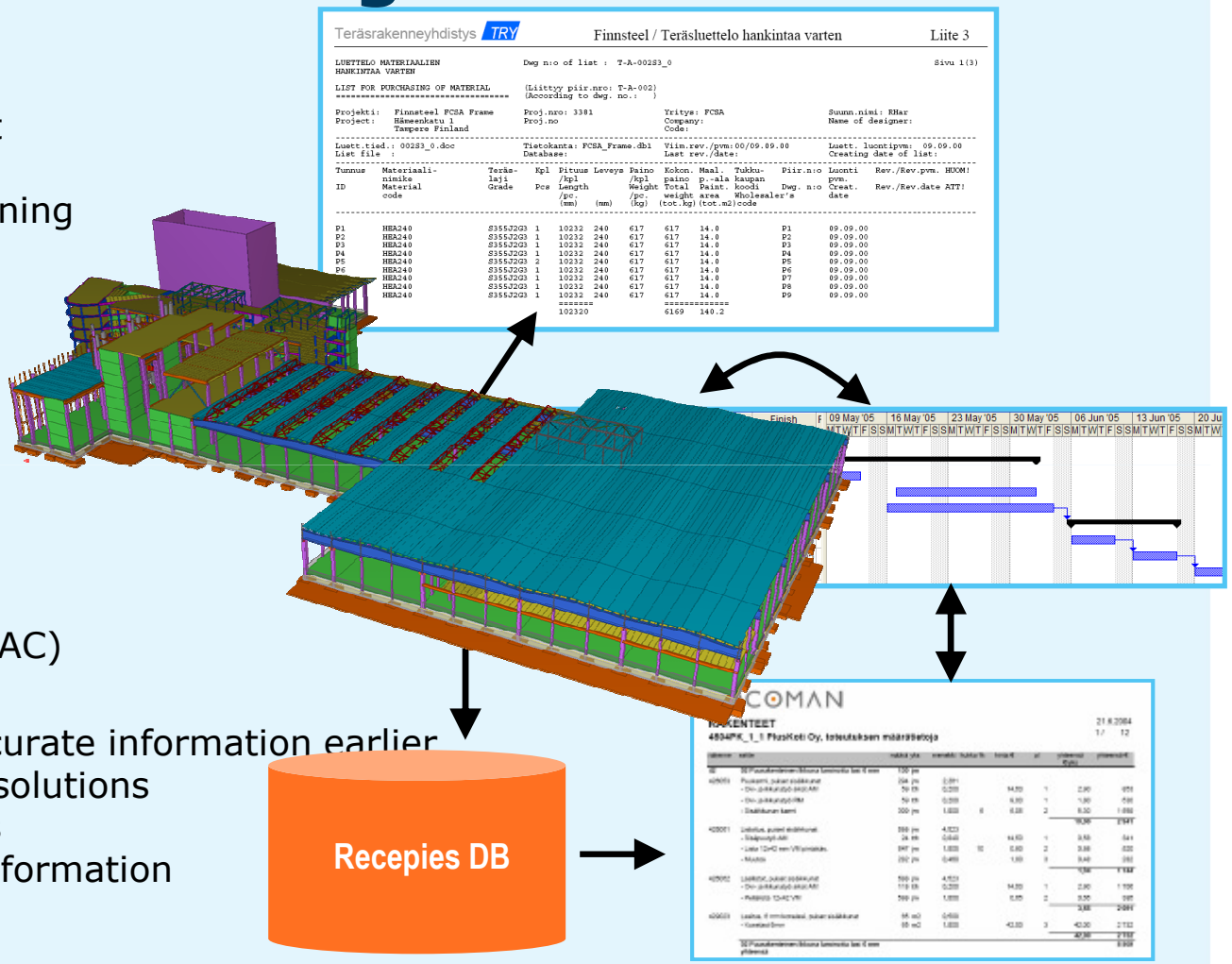
- Quantity and cost analysis
- Scheduling
- Procurement
- Design management
- Resource management
- etc.

BIM Based Construction Management



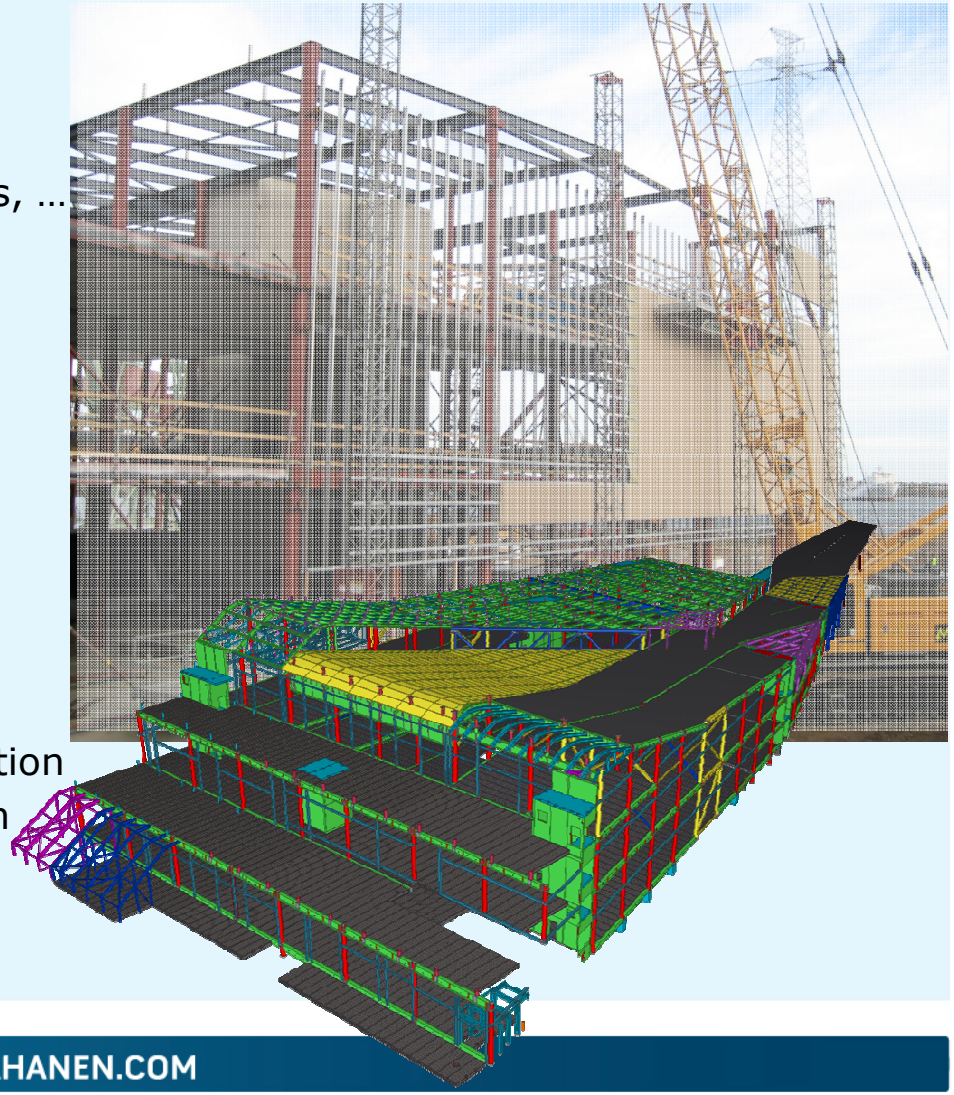
Construction Planning

- **Model used for**
  - Quantity management
  - Cost management
  - General schedule planning
  - Design management
  - Production planning
  - Resource planning
  - Quality and risk management
- **Combined model**
  - Architectural model
  - Structural model
  - Geotechnical model
  - Mechanical model (HVAC)
- **Benefits**
  - Detailed and more accurate information earlier
  - Alternative structural solutions
  - Easy to make changes
  - Production planning information



Construction Coordination

- **Visualization & reporting**
  - Erection, subcontractors, site meetings, …
  - Quantities directly from model
  - Communication with web viewer
- **Production planning**
  - Visualization of general schedule
  - Planning contracts for subcontracts
  - Weekly schedules for subcontractors
  - Layout planning
- **Production management**
  - erection ← fabrication ← design
  - Subcontractor and workforce coordination
  - Managing changes in weekly/daily plan
- **Design coordination**
  - Clash checks of different models
  - Logical errors easy to detect



BIM based building delivery process

Feedback to design and simulation

Design and simulation data to applications

Design

Standard tools
- Architectural design (IFC)
- Structural design (IFC)
- Simulation (IFC)
- System functionality design (IFC)
- HVACE design (IFC)

3D

IFC

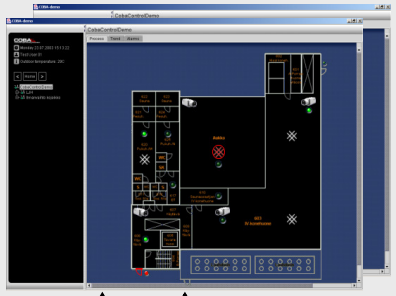
Implementation

Project management with Building Infromation Model (IFC)

4D, 5D

IFC

Operation and maintenance

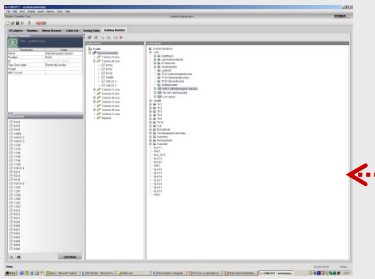


BOS User Interfaces and Facility Management Clients

nD

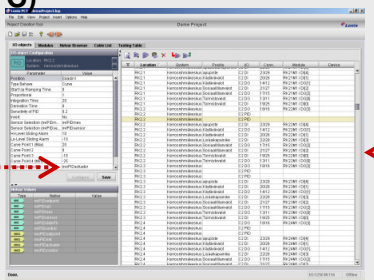
IFC

COBA System Functionality Configurator (COBA SFC)



XML

COBA Project Creation Tool (COBA PCT)



XML

Standard interface

BOS

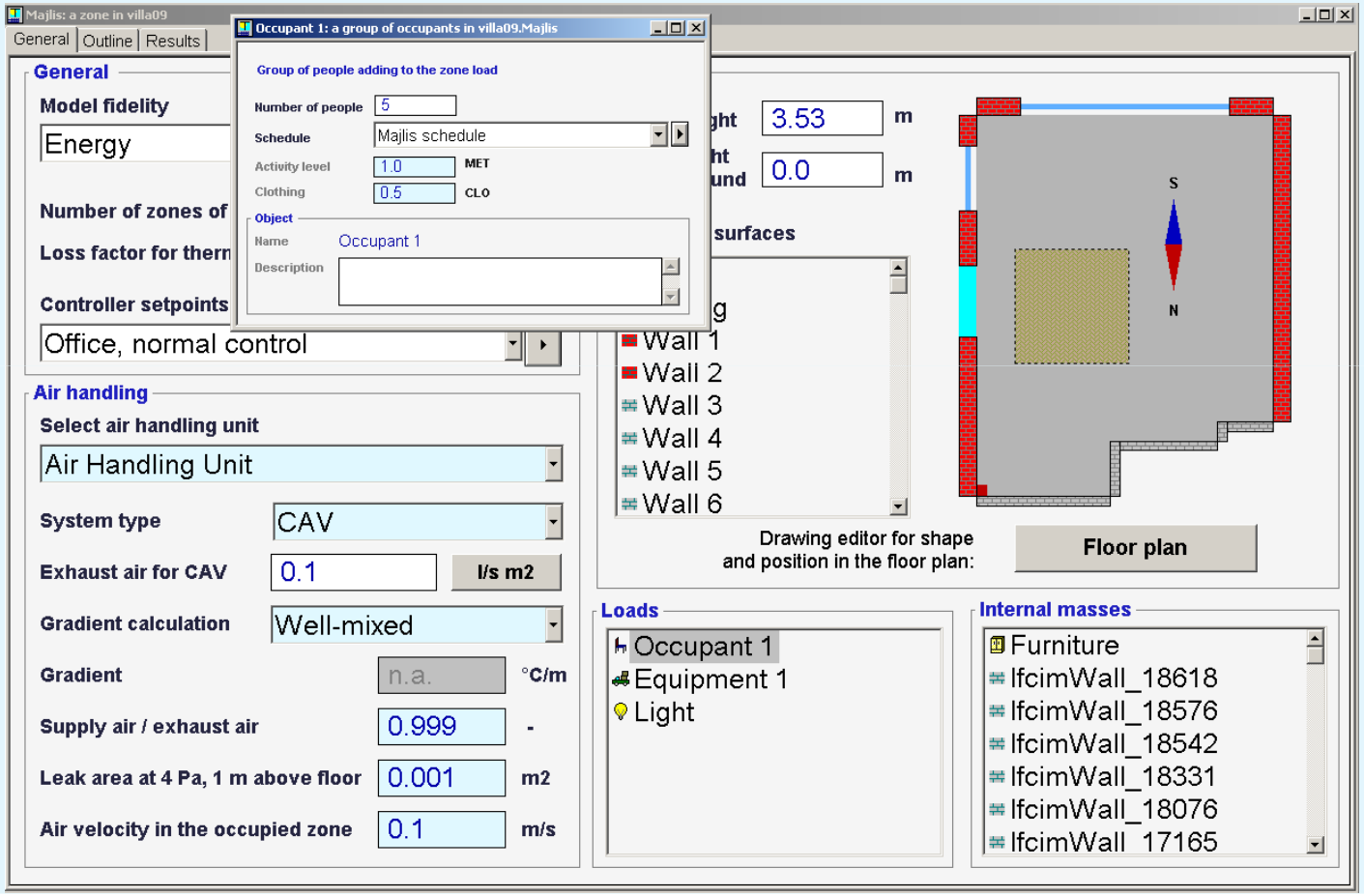
Control network

Data in standard electronic format

Data in standard electronic format

Dynamically updating data in one place, in standard electronic format

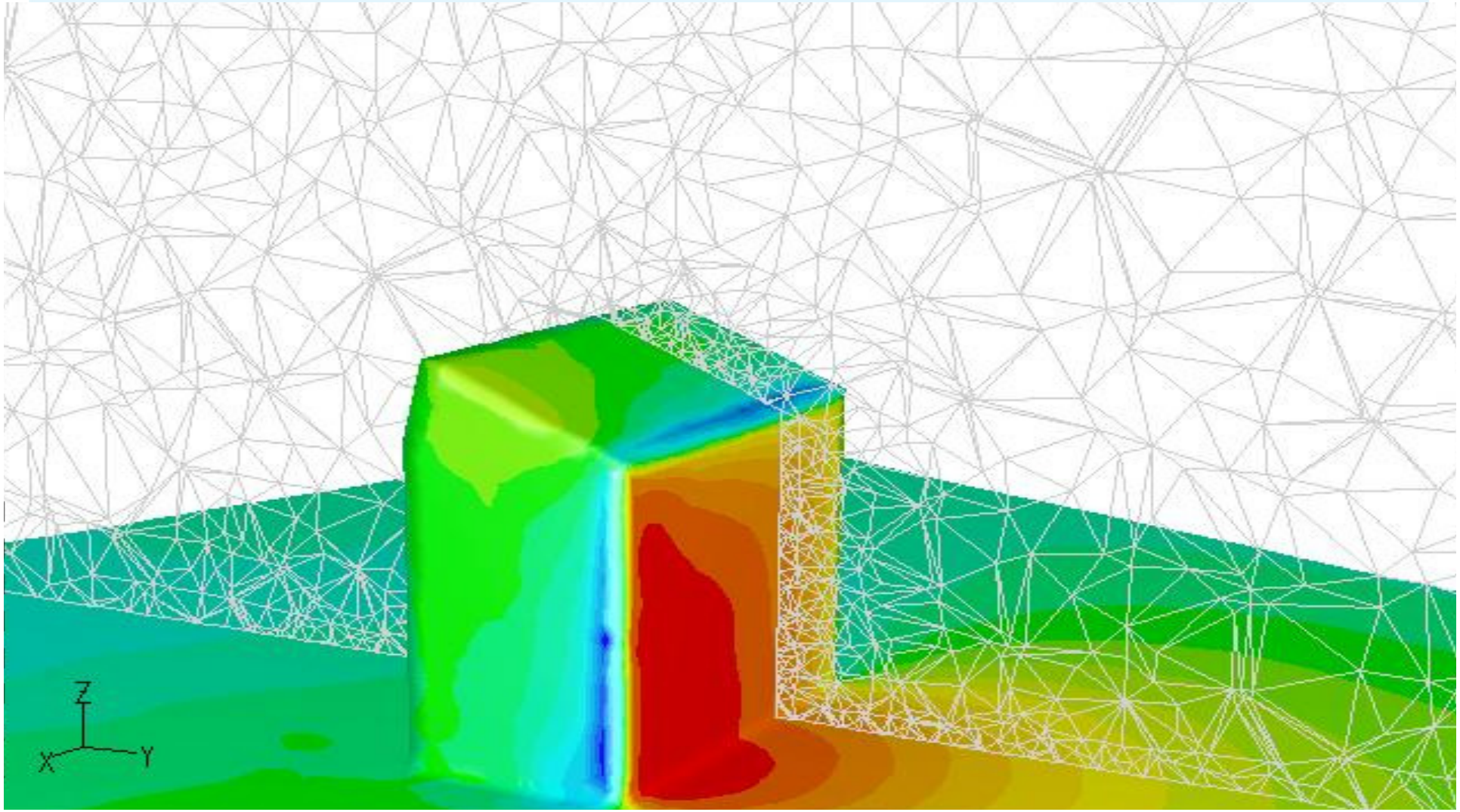
Adding physical properties to 3D model: thermodynamics, moisture, acoustics



VAHANEN

Heat and moisture
Indoor climate
Acoustics

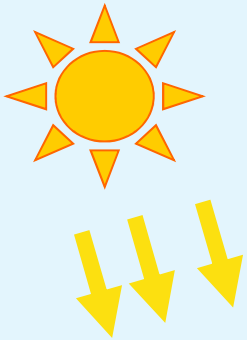
Flow technics (CFD)
Radon + emissions
Fire



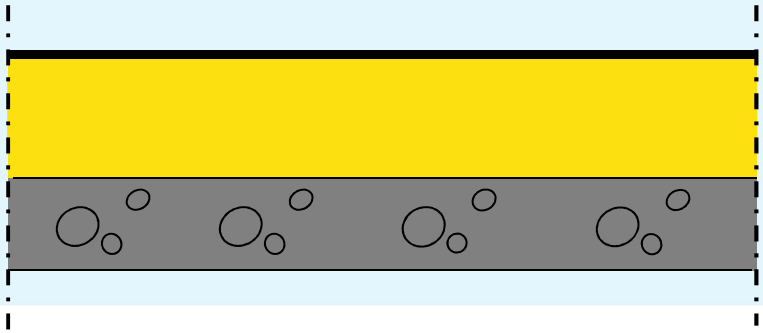
New Intelli-Structure during the hot season

VAHANEN

Daytime



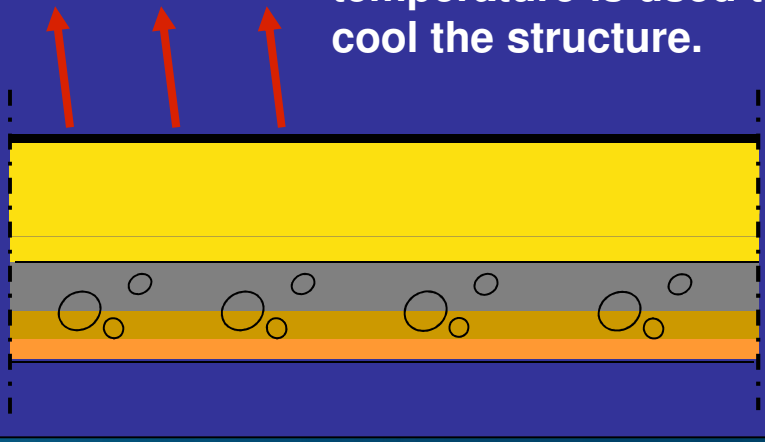
In Intelli-Structure thermal energy is collected from the top part of the structure thus preventing it from passing through to the living space.



Night-time

The Intelli-Structure takes advantage of cool ambient air and radiation into the night sky that drops the surface temperature of the structure below that of the ambient air.

Therefore, in Intelli-Structure nocturnal low temperature is used to cool the structure.



Functional Modeling according BIM

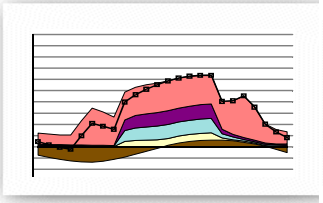
- One Functional model from all Low Current systems in relation to spaces
- User intefaces to different users (guard, maintenance, tenant) and different UI devices (PC, Touch Screen, TV, PDA, Mobile Phone)
- System integration design
  - Elimate overlappings of diffent Low Current Systems (clients, servers, networks, panels, sensors)
  - Sanity check for Low Current system designs (drawings and specifications)
  - Elimination of design errors (average 10 %)
  - Better project management to Low Current systems
  - Enables system integration between different Low Current systems (BMS, Home/Room Automation, Lighting Control, Access Control, Intruder Alarms, Video Monitoring, Cental Battery System, Fire Alarm) -> **Eneabe implementation of Intelligent Green Buildings**
  - Enables one stop shopping for integrated Low Current system package

BIM to achieve Intelligent Green Building

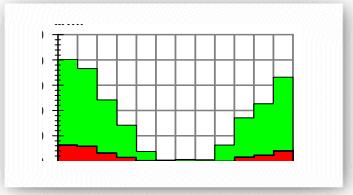
VAHANEN

Managed Green Building Process

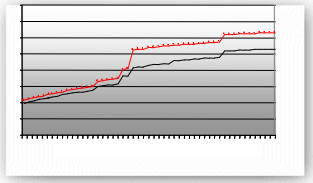
3. Comfort simulations



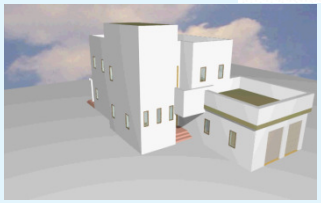
4. Energy simulations



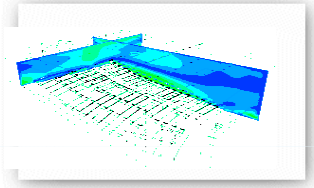
5. Life cycle analysis LCC / LCA



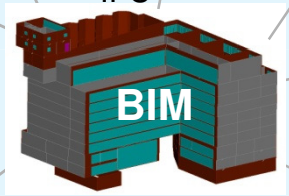
2. BIM model



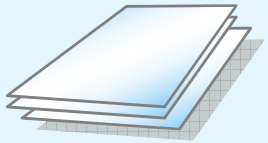
6. CFD simulations



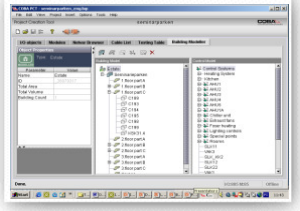
IFC



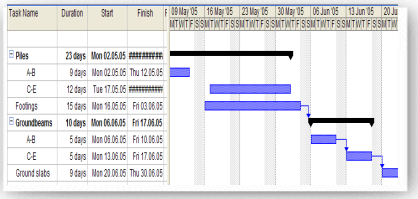
1. Architect design



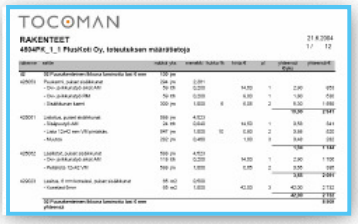
7. Functional design



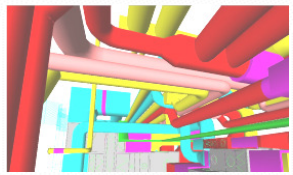
10. Time shceduling



9. Quantities and Costing

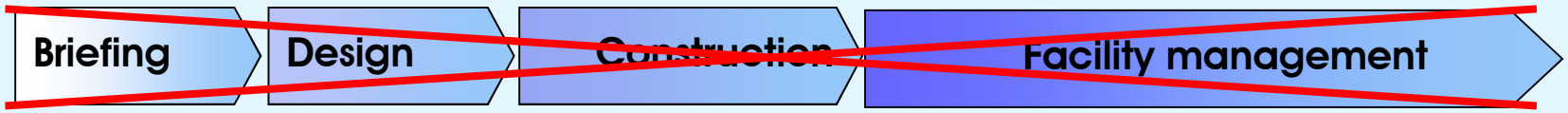


8. BIM model of HVACE

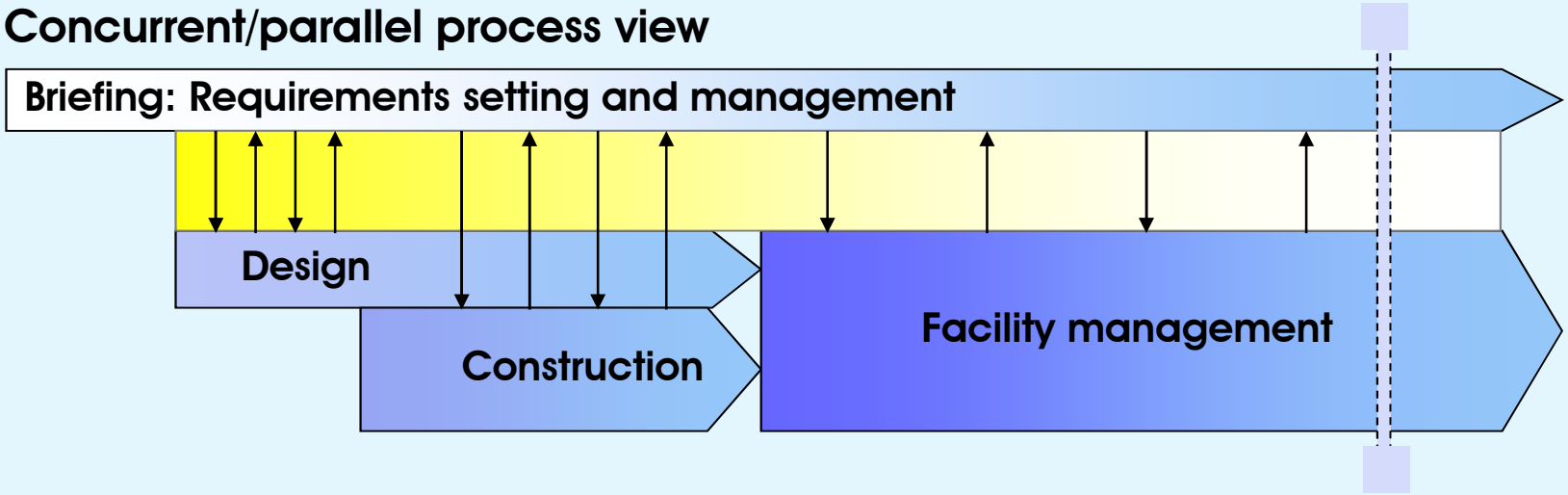


The Integrated Approach

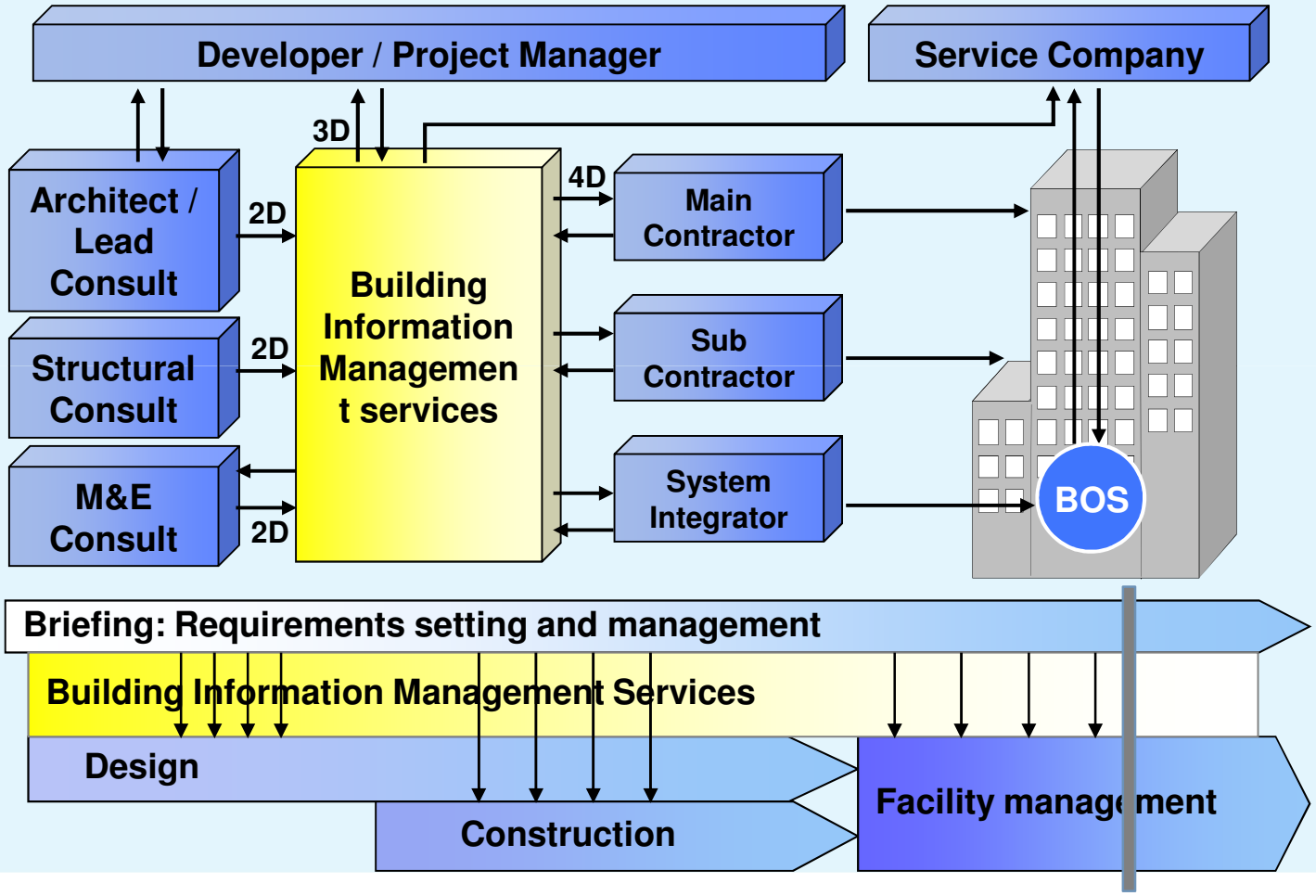
Sequential process view



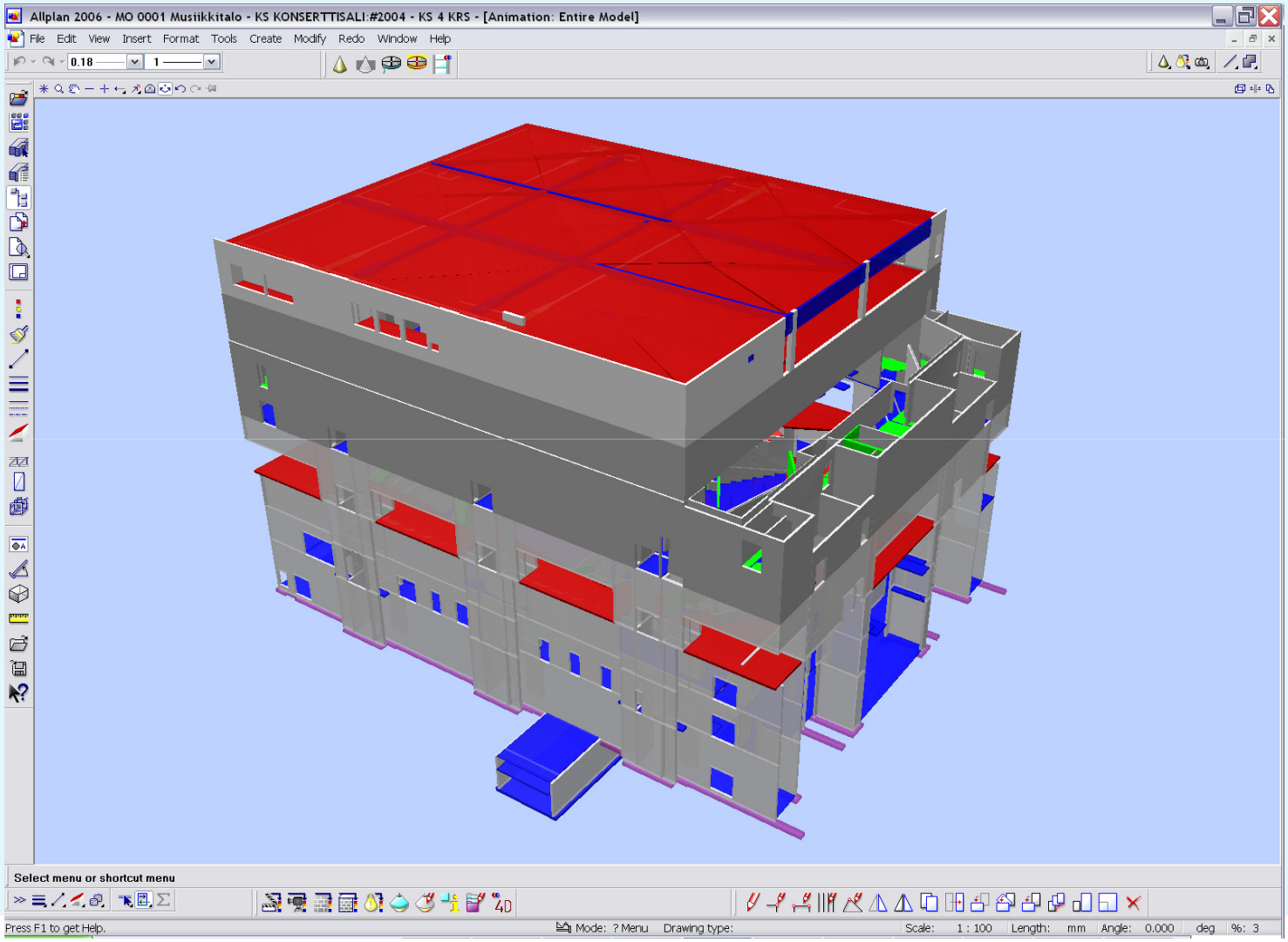
Concurrent/parallel process view



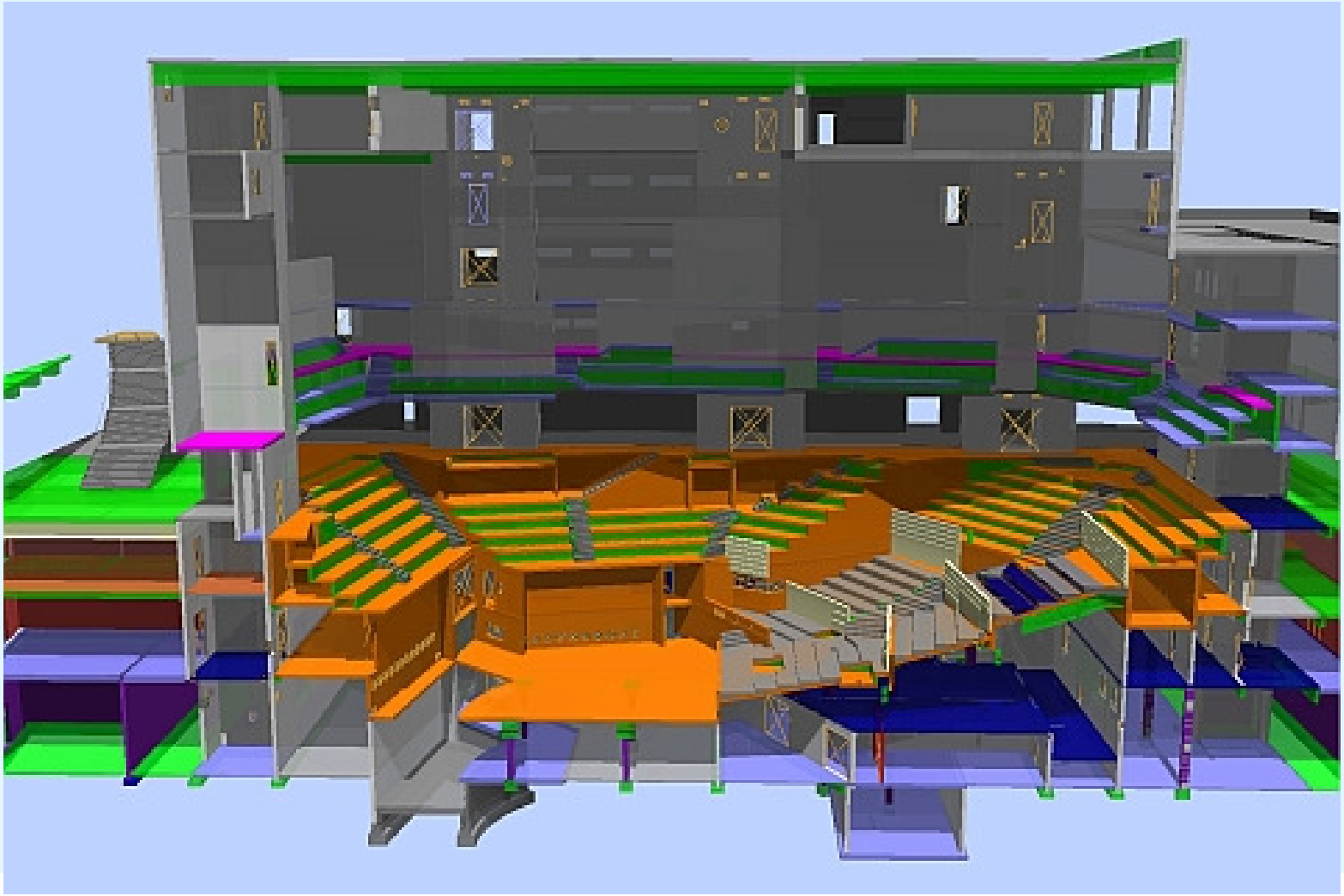
Building Information Management service

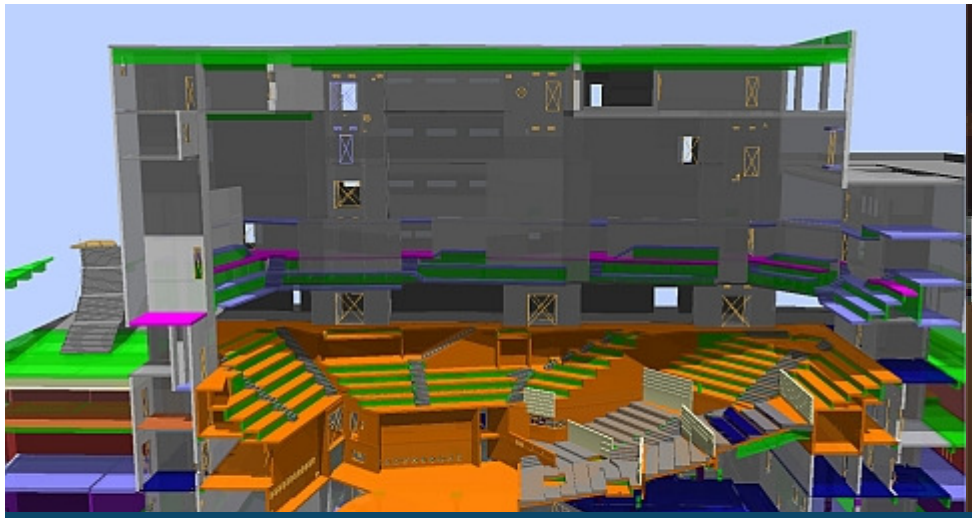


Helsinki Music hall



Helsinki Music Hall



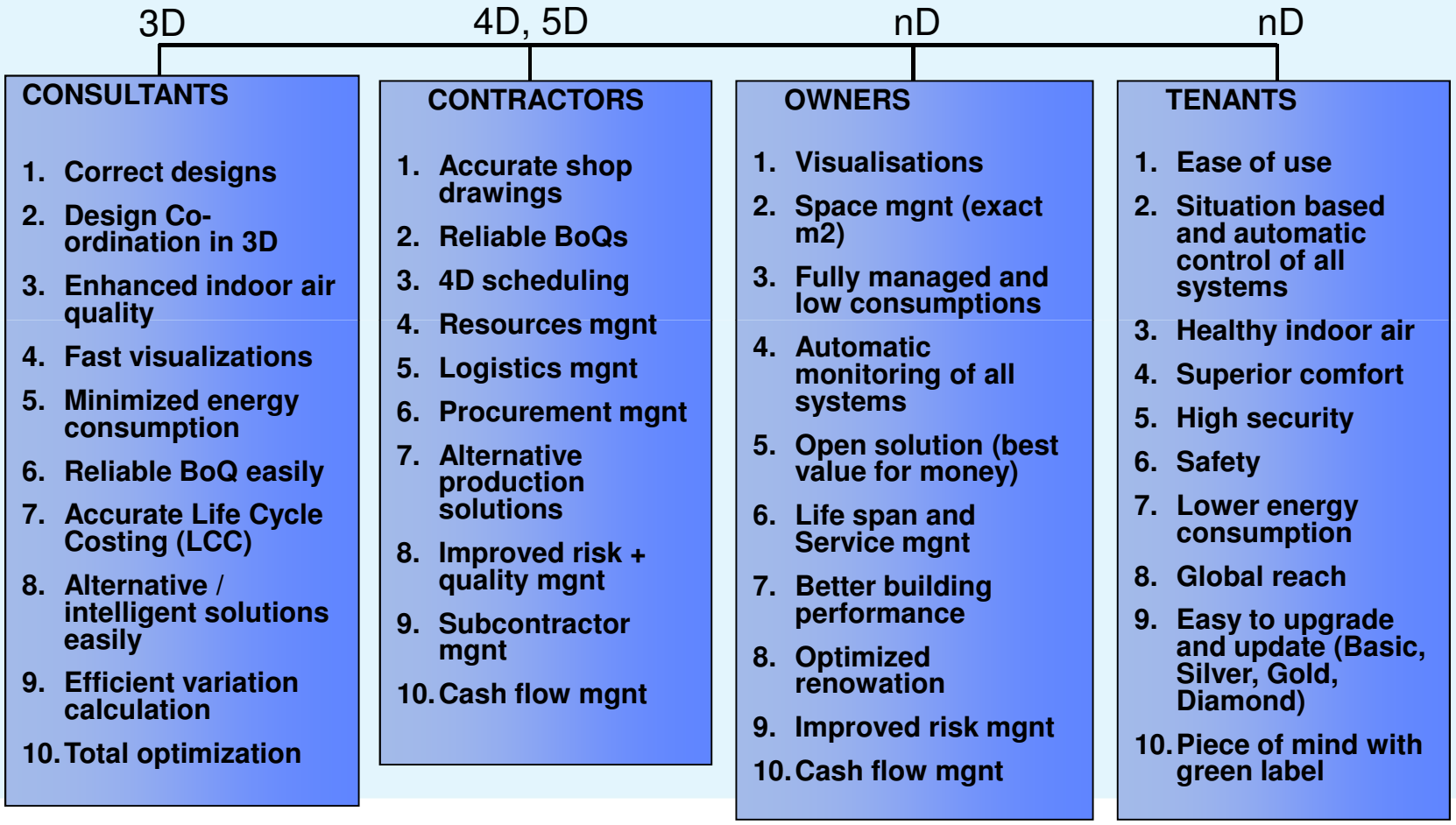


First prize in the Nemetschek Engineering User Contest 2009

- the Jury had 122 projects from 16 different countries to choose from
- Vahanen won the first prize in the category of *CAD Engineering for Buildings* with the Helsinki Music Hall project
- Quote of the Jury: "This project attracts high public interest. It is technically very demanding due to the complex geometry and the acoustic requirements. During the multidisciplinary design process the advantages of BIM have been explored very convincingly, especially for coping with ongoing design changes."

Benefits of virtual approach (BIM) and ICMS

Luxurious conditions with forefront open technologies



ICMS, Intelligent City Management System

VAHANEN

The Real Estate Cash Flow – 25 years