

# BIM based Life cycle Management system and 4D visualisation



Daniel Hallberg

BIM-seminar 24 November 2008

# AEC/FM Industry

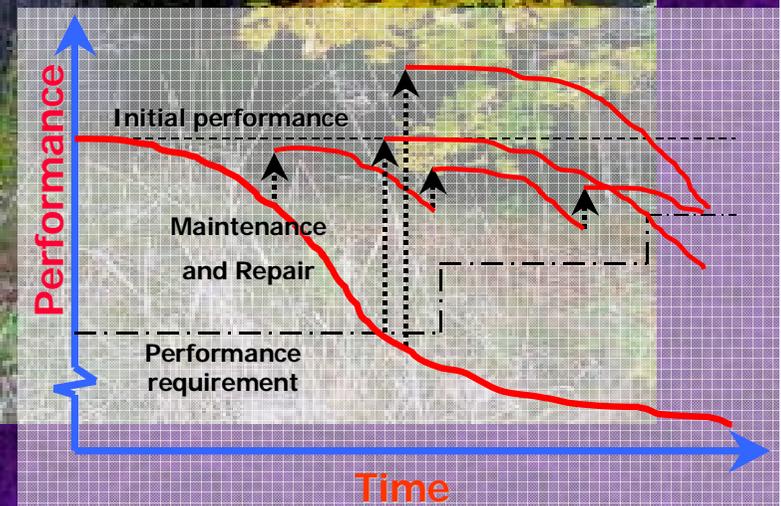
**The situation...**

**...the challenges...**

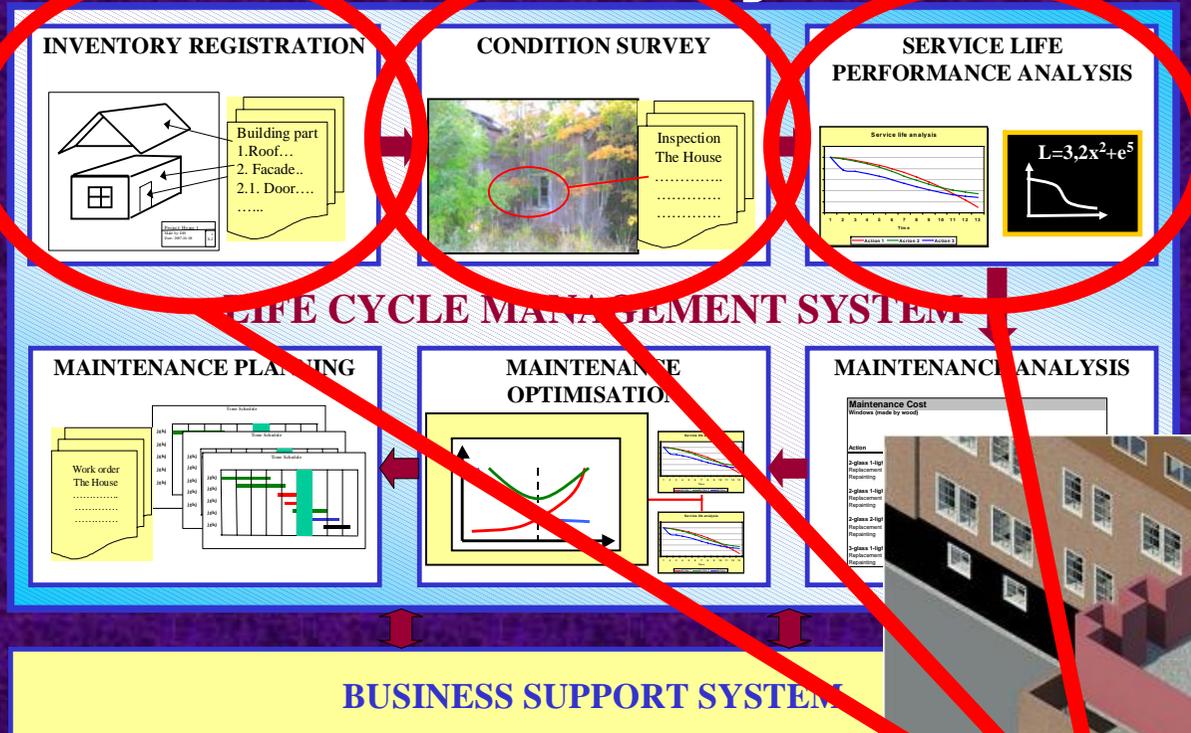
**...and opportunities!**

# What is LMS?

- Decision making and planning:
  - Optimal life cycle design
  - Optimal maintenance management
- ...By prediction of performance- over-time and service life...
- ...LCA, LCC etc.

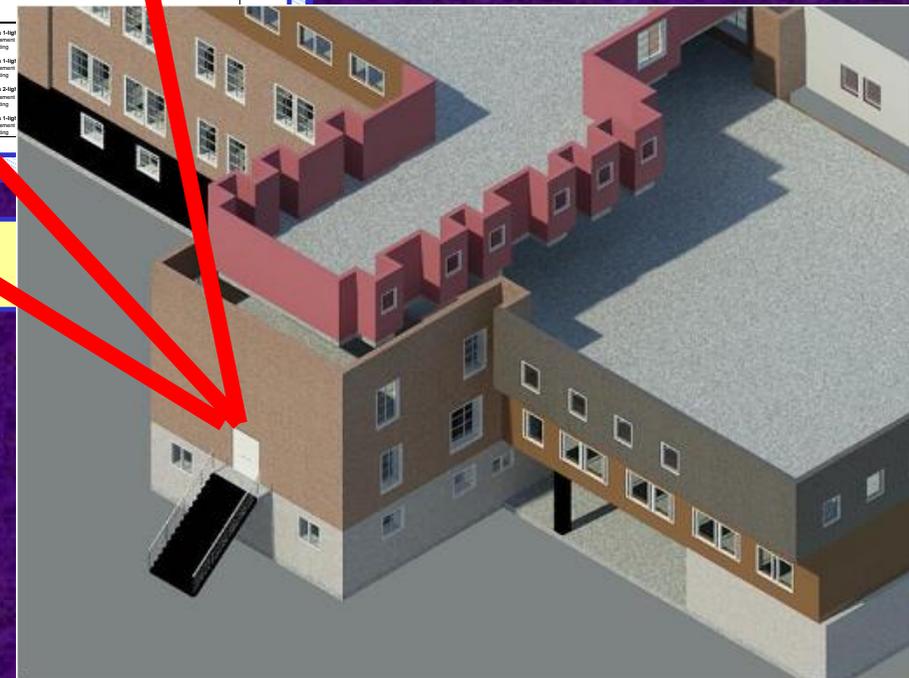


# Life cycle Management System



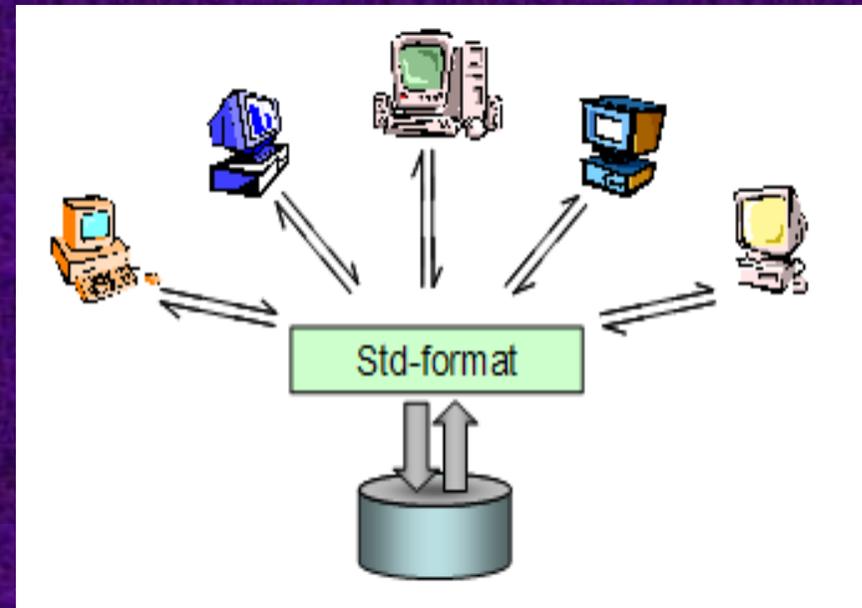
LMS requires information management!

BIM may facilitate the implementation of LMS...To what extent?



# Advantage of (open) BIM

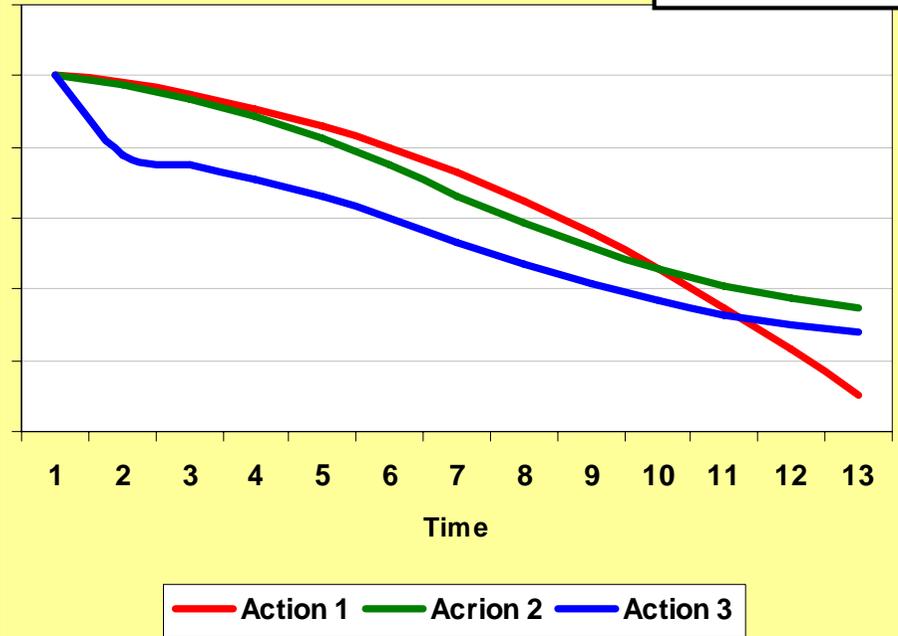
- **Object oriented** (Compare IKEA Home Planner)
- **Parametric objects**
- **One single model** (views - not drawings)
- **Enriched 3D Model**
- **Interoperability**
- **Model servers**
- **Time savings**



# Visualisation of performance-over-time

Service life analysis

$$t_0 = \frac{1}{12D} \left( \frac{c}{1 - (C_{th} / C_s)^{1/2}} \right)^2$$

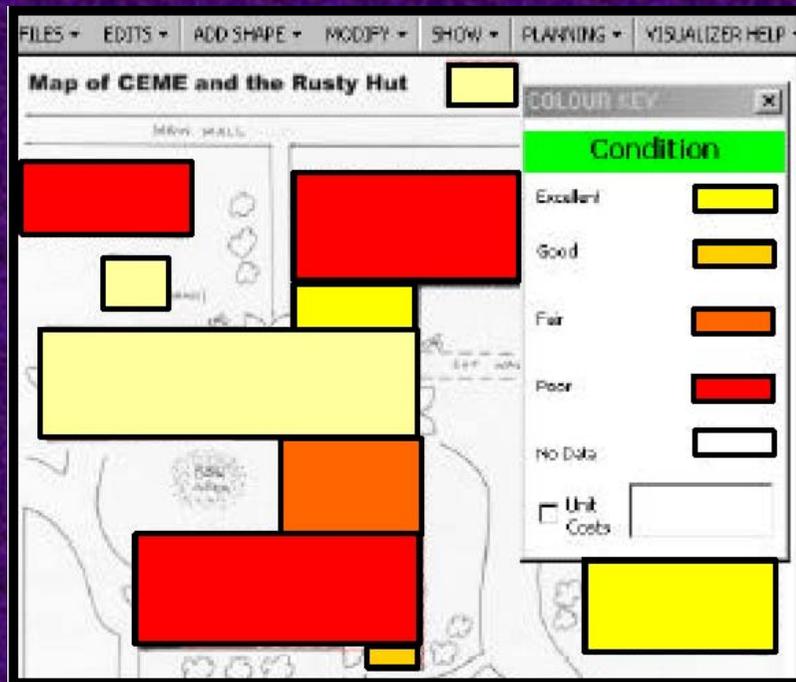


Year	Action 1	Action 2	Action 3
1	10	10	10
2	9,8	9,75	7,8
3	9,5	9,375	7,5
4	9,1	8,875	7,1
5	8,6	8,25	6,6
6	8	7,5	6
7	7,3	6,625	5,3
8	6,5	5,85	4,68
9	5,6	5,175	4,14
10	4,6	4,6	3,68
11	3,5	4,125	3,3
12	2,3	3,75	3
13	1	3,475	2,78

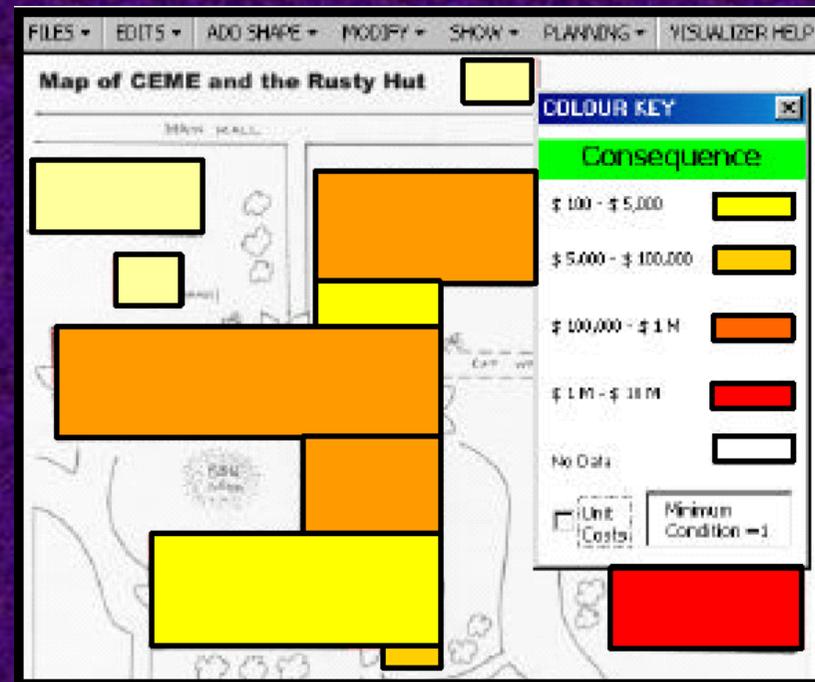
# Examples on visualisation of performance-over-time

”Visualizer”

Kyle et al. (2002)



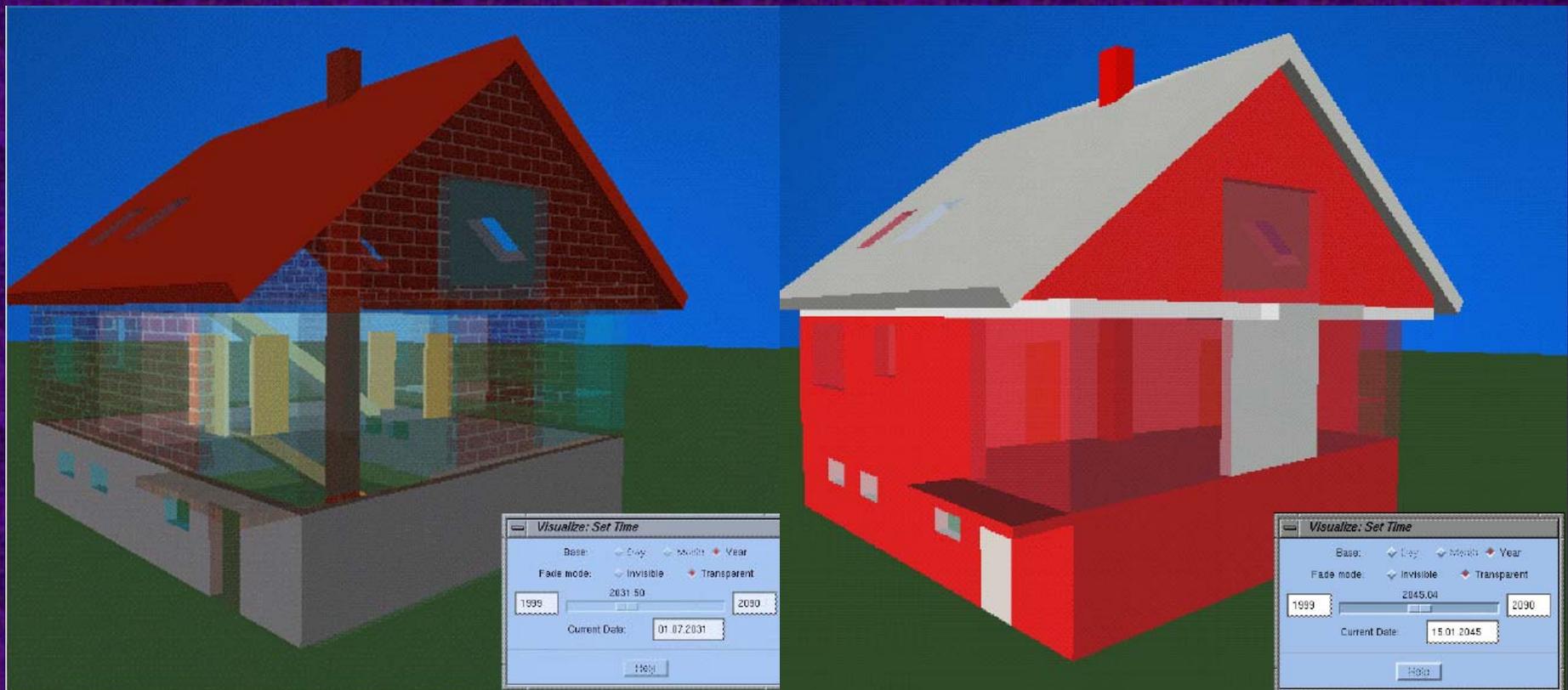
Condition



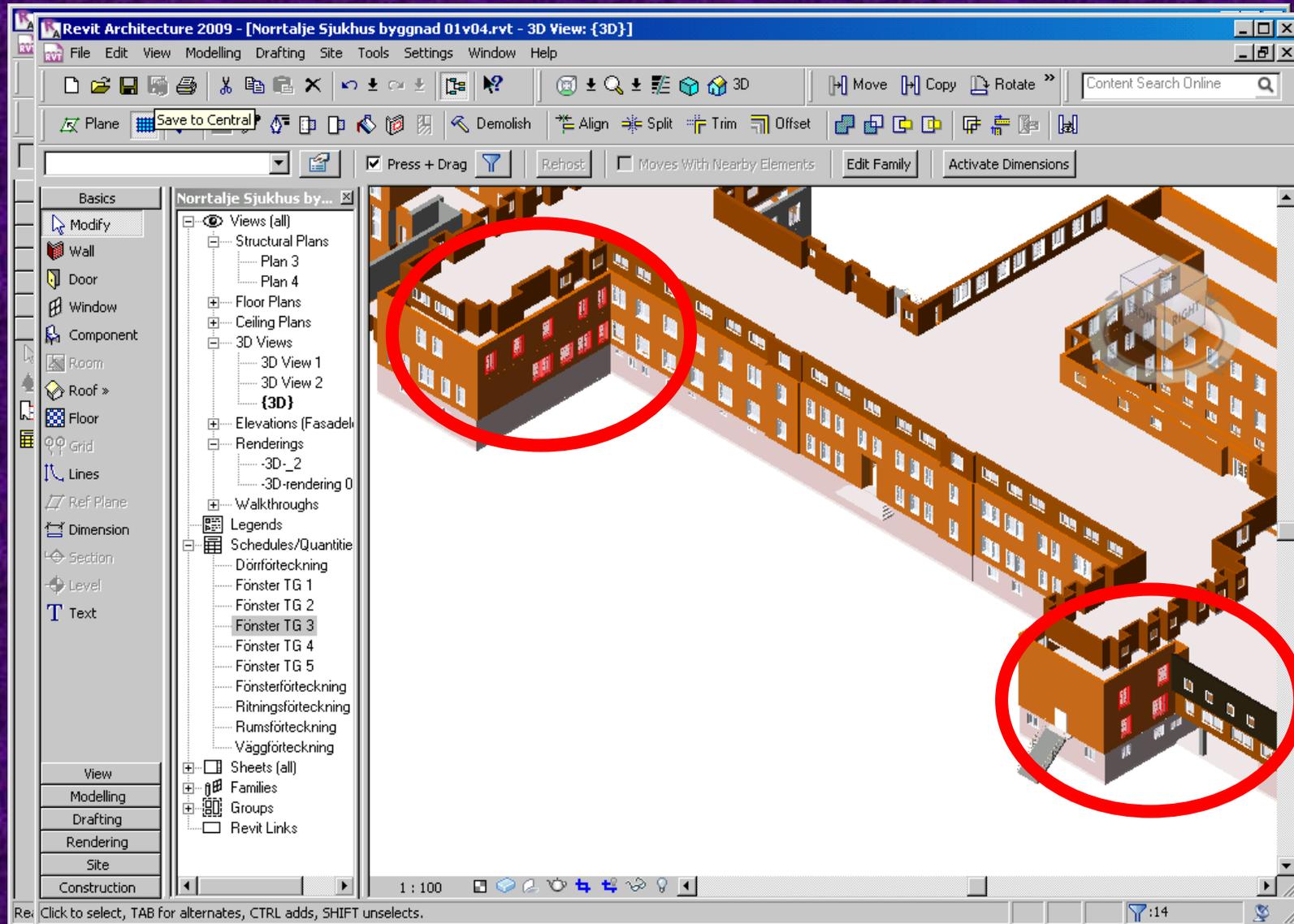
Consequence

# Examples on visualisation of performance-over-time

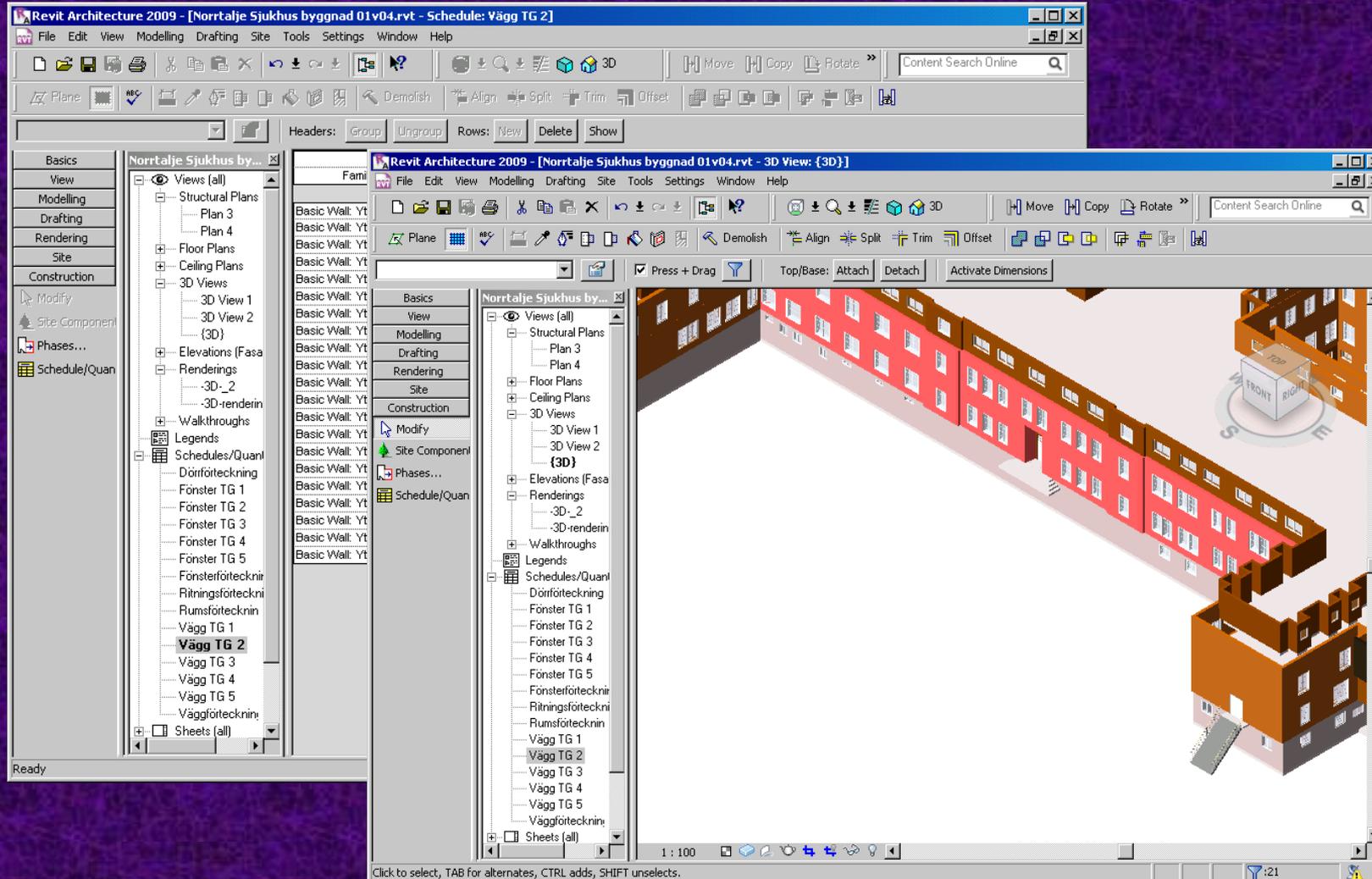
Linnert et al (2000)



# Visualisation of Condition assessment data



# Visualisation of Condition assessment data



# 4D Visualisation of performance-over-time



# Conclusions

- BIM may serve as repository of basic data for LMS
- BIM may serve as basic model in 4D visualisation
- There is still need to develop a BIM integrated LMS solution (based on IFC and PLCS)

# Conclusions

- Lack of performance-over-time data and service life declaration
- ISO 15686 series on Service life planning
- Incorporate IFC based building product declaration as part of building product models
- **Get going with the implementation of open BIM!!!**