New business opportunities and challenges:

A facilities management view on how new intelligent technology can improve the value of buildings over their lifetime

Per Anker Jensen, Associate Professor, BYG-DTU

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Disposition

Introduction

- Presentation
- What is a facilities management view point?
 - Physical environments that create value
- Does the intelligent building exist?
 - Learning buildings and usability
- Is there a market for intelligent buildings?
 - Research and cases
- What are the main challenges?
 - Standardization and declaration
- Concluding remarks

Presentation

- Who am I
- □ M.Sc. in Civil Engineering, PhD, MBA
- □ Researcher at DTU 1979-84
- Consulting Engineer in Rambøll 1985-1991
- Project/Facilities Manager in DR 1991-1999
- Deputy Project Director in DR BYEN 1999-2005
- □ Associate Professor at DTU from 1. April 2005
- Author of books on facilities management and building planning

Presentation– Publications



DFM-netværk, 2001



Forlaget Tegl, 2002

What is a facilities management view point?

Physical environments that create value

The facilities management model



Facilities Management - Definition

- An integrated process
- to support and improve the effectiveness
- of the primary activities of an organisation
- by the management and delivery
- of agreed support services
- □ for the appropriate environment
- that is needed
- to achieve its changing objectives.

Facilities Management and intelligent building technology

- An integrated process technology
- to support and improve the effectiveness
- of the primary activities of an organisation
- by the management and delivery control
- of agreed support services systems
- □ for the appropriate environment
- that is needed
- to achieve its changing objectives.

Facilities Management - Focus

- Support the need and development of the core business
- Buildings are not the starting point but the activities that is going to take place in the buildings
- The need of the users is a the centre
- Includes integration and optimization of support functions, i.e. facilities and related services
- Development of physical environments that create value for the primary activities

The Facilities Management Cycle



Does the intelligent building exist?

Learning buildings and usability

The Intelligent Building Pyramid

(Himanen, 2003, P. 56



Intelligent buildings

(Himanen, 2003)

- Post Occupancy Evaluation (POE) 1993-97
- 12 new office buildings in Helsinki
- IB's are better than non IB's
 - Level of integration
 - Space flexibility and utilisation
 - Movable space elements and equipment
 - Image of high technology
 - Interaction
 - Adaptability
 - End-user need orientation
 - Spatial quality particularly shares spaces
 - Quality of equipment

Building intelligence

(Himanen, 2003)



Building intelligence and intelligent building concepts

(Himanen, 2003)



Learning buildings and usability

- Learning buildings (McGregor & Then, 2001, p.158)
 - Adaptability
 - Capability
 - Compatibility
 - Controllability
 - Sustainability
- Usability (Hansen, Haugen & Leaman, 2005)
 - Efficiency
 - Effectiveness
 - Satisfaction

Is there a market for intelligent buildings?

Research and cases

Results from a Norwegian Study

(Arge, 2004)

- Why do real estate actors weight adaptability differently for office buildings
- Financial, physical and functional flexibility
- Financial flexibility includes
 - Controls systems with EIB/LonWorks
 - Fire precaution with sprinklers throughout
- Functional flexibility includes
 - Technical grid of 2,4 x 2,4 m for workplaces
 - HVAC based on VAV (Variable Air Volume)
 - Extra HVAC capacity
 - Raised floor for service ducts
 - 3D and zone based electrical and ICT cabling

Results from a Norwegian Study

(Arge, 2004)

High priority

- Actors who build for own use
- Focus on use value with long time perspective
- Medium-low priority
 - Actors who build for rental and management
 - Mainly focus on exchange value but with a long time perspective

Low priority

- Actors who build for sale
- Focus on exchange value with a short time perspective (build and disappear)

Case of new headquarters for Danish Broadcasting Corporation





Environmental design themes

- Compact building
- Indoor climate in open space offices
- Daylight and intelligent lighting
- Double facades and natural ventilation
- Building integrated solar panels (BIPV)
- Groundwater cooling and free cooling
- Environmental friendly materials
- Re-use of rainwater
- Waste management
- Health & safety

IT-ECO

Indoor climate and energy

"Holistic" indoor climate First: **Energy savings** Next:

"Holistic" indoor climate

Air quality and temperature Low emission products **Cleaning and ventilation Daylight and artificial light Acoustics Interior design Flexibility User's influence Architectural quality**

Energy savings

Anticitaped environmental impact: Percentage of CO_2 , SO_2 and NO_x emissions = 38 % of a conventional plant supply

Montie workshop 24. November 2005

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BMS in DR BYEN – System layout



BMS i DR BYEN – Main station



BMS i DR BYEN – Supply systems



BMS i DR BYEN – Workspaces



BMS i DR BYEN – Security systems



BMS i DR BYEN – Communication



Case from a Danish Housing Project in Aalborg





Case from a Danish Housing Project in Aalborg

Standard features

- Advanced lighting control
- Alarm in case of electricity fall out
- 4 Mbit ADSL internet connection to each flat
- Shared data network among all flats
- Internal network in each flat for distribution of IT, phone and aerial signals
- Configuration by the users via PC
- Optional features
 - Burglar alarm
 - Smoke detectors
 - Management and control via mobile phone and external PC
 - Wireless lighting control in living room

What are the challenges?

Standardization and declaration

Challenges

Improved integration

- Inadequate interoperability
 - Between BMS sub-systems
 - With other ICT systems, i.e. CAFM and ERP
- Need for common standards
- Need for common control strategies
- Need for more standard software
- Declaration
 - How intelligent is an intelligent building?
 - How high an IQ can the industry offer?

Environmental declaration and classification of DR BYEN



Building intelligence declaration and classification of DR BYEN?



Concluding remarks

- Intelligent technologies are means but the interesting things are the ends
- Can you provide value for money to the end users?
- A whole life cycle perspective should be promoted
- Can you provide convincing evidence to investors and end users?
- Demonstration projects are important but specific business cases are better