WP5: Piloting and good practices evaluation

Heidi Tauriainen, Project manager
Anneli Paakkari, Permit Architect

3.12.2019
Team of Building supervision office

- Heidi Tauriainen, project manager
- Eveliina Tackett, quality manager
- Anneli Paakkari, permit architect
- Esko Knuutila, structural engineer
- Ilkka Räinä, leading HVAC engineer
- Eero Kannisto, HVAC engineer
Why?

- developing the skills of SMEs
- raise awareness of BIM in SMEs and Building Supervision
- BIM based building permit

- Reform of the Land Use and Building Act
  → The government proposal for parliament early in the autumn term of 2021
WP5: Piloting and good practices evaluation

- T1: Building code difference analysis and requirements on BIM models
- T2: BIM operated planning permission pilot
- T3: Practices in BIM operated building projects and management
- T4: Evaluation of the experienced practices
Bachelor thesis

- Milla Remo: Differences in National Building Decrees in Nordic Countries (T1)
- Lotta Vähäkangas: Designtalo´s Turnkey House´s Suitability for Export Sweden and Norway (T1)
- Anni Teppola: Suitability of Building Information Model for Building Supervision’s BIM Based Inspection of Regulatory Compliance with Solibri Office (T2)
- Katri Ojala: Differences in building permit process in Nordic Countries (T2)
- Kaisa Lehtinen: Experiences of Building Information Modelling in Maintenance (T3)
T1: Building code difference analysis

Milla Remo: Differences in National Building Decrees in Nordic Countries

- Kirjala - li
- Flyttfågeln - Umeå
- Saga - Alta
## Example of comparison chart, page 13

<table>
<thead>
<tr>
<th>External doors</th>
<th>SUOMI</th>
<th>RUOTS</th>
<th>NORJA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ulko-ovi</td>
<td>Rakennuksen oven on oltava helposti avattavissa myös olosuhteiden muuttuessa.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ulko-oven leveys</td>
<td>&gt;850 mm</td>
<td>&gt;800 mm</td>
<td>&gt;860 mm</td>
</tr>
<tr>
<td>Oven vapaa korkeus</td>
<td>&gt;2100 mm</td>
<td>&gt;2000 mm</td>
<td>&gt;2000 mm</td>
</tr>
<tr>
<td>Kynnys</td>
<td>&lt;20 mm, muotoitava siten, että pyörätuolilla pääsee helposti yli</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oven aukeamissuunta</td>
<td>Asuinkerrostalon poistumistienä käytettävän kerrostaso-oven on avauduttava poistumissuuntaan.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapaa tila ulko-oven edessä (tasanne)</td>
<td>&gt;1500x1500mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Finnish Legislation Collection 2018  
Byggteknisk forskrift TEK17
T1: Building code difference analysis

- Lotta Vähäkangas: “Designtalo’s Turnkey House’s Suitability for Export Sweden and Norway
- Designtalo
  - prefabricated single family houses and town houses
- accessibility, space planning, fire safety, safety in use
- U-value of structure types (external wall, roof and basefloor)

⇒ with minor design changes ready to export
T2: BIM operated planning permission pilot

- Cooperation with Building Supervision of Järvenpää and Hyvinkää, City of Vantaa and Solibri

- Rules to check compliance with building permit requirements with Solibri Model Checker (SMC): accessibility, safety of use, housing design

- Ministry of the Environment of Finland and project “Land Use Decision” promotes the digitalisation of the land use planning system → a definition of a information model based city plan
**Builder's Process in City of Oulu**

- **Forming the Building Project**
- **Sketching Phase**
- **Final Decision to Build**
- **Planning Phase**
- **Building Permit Application**
- **Starting the Construction**
- **Construction Phase**
- **Finished Building**

**Proactive Guidance**
- **Large Buildings**
  - 1st Guidance Meeting for Planning
  - Conditions for building: Detail Plan of the area, building instructions for the area, needs of the building developer
- **Single Family Homes**
  - Quality Guidance Evenings
  - Seminars and education for professionals and private parties (single-family home builders and renovators)

**Preliminary Permit Process**
- Permit Assistant checks the application:
  - ownership of the plot
  - required plans are attached
  - overall quality of plans
  - Neighbor Notification Process

**Permit Inspection**
- Permit Architect/Engineer assesses that:
  - the plans meet the regulations (architectural and technical)
  - quality of design is acceptable and fits its surroundings
  - required professionals are named and they are competent for the project

**Initial Meeting/Inspection**
- Initial meeting on construction site:
  - Building Supervision
  - Client
  - Builder
  - Principal Planner
  - Foreman

**Receiving the Detailed Plans**
- Inspectior Engineer receives the required detailed plans:
  - Structural plans
  - HVAC plans

**Inspections**
- Inspections required in the Building Permit:
  - Structural Inspection
  - HVAC Inspection
  - Chimney Inspection

**Practical Completion Inspection**
- Construction ready to be taken into use but some work still left to be done
- Final Inspection
- Finishes and closes the Building Permit

**Average time to process the building permit is 16 days**
(The time that customer takes to complement the application if information was missing/incomplete is deducted)
T2: Mapping BIM based systems in Oulu building supervision

- Study of different applications of IFC-models in the following tasks:
  - Guidance meetings
  - Cityscape workgroup
  - Technical workgroup
  - Permit inspection (Solibri-Office checking)
- BIM education for the staff
- Early stages of development
  - Mapping different opportunities and tools available
  - Quick tests and interviews
  - Notes and reports
Technical workgroup

Cityscape workgroup
Renovation projects

BUILDING SUPERVISION’S PERMIT PROCESS IN CITY OF OULU

FORMING THE BUILDING PROJECT

SKETCHING PHASE

FINAL DECISION TO BUILD

PLANNING PHASE

BUILDING PERMIT APPLICATION

STARTING THE CONSTRUCTION

CONSTRUCTION PHASE

FINISHED BUILDING

SIGNIFICANT CHANGES TO DESIGNS DURING CONSTRUCTIONS PROCESS

DETAILED PLANNING (structures, HVAC, etc.)

BUILDING PERMIT GRANTED

PROACTIVE GUIDANCE

LARGE BUILDINGS

1st Guidance Meeting for Planning

Conditions for building: Detail Plan of the area, building instructions for the area

Needs of the building developer

SINGLE FAMILY HOMES

Quality Guidance Events

Digital land use plans

Renovation projects

AS-BUILT MODEL (IFC)

IFC-Model

Archive/3D city model

Average time to process the building permit is 16 days (the time that customer takes to complement the application if information was missing/incomplete is deducted)
T2: BIM operated planning permission pilot

- Anni Teppola (OUAS) Bachelor thesis: BIM based building permit – cases (pilot projects)
  - Report of the current state of BIM in the permit process
  - 3 Apartment house models
  - YIT, Lehto and Bonava
  - Construction companies have their own BIM Requirements
ArchiCAD testing models

Testing model in Solibri Office

Studying Solibri Office

Similar tests were also made using Revit
T2: Piloting BIM-based inspection of Building regulations using Solibri Office

- Mapping out the current state of the models, but also the tools, that Solibri has developed to check IFC-models for Finnish building regulations automatically.

- 3 Similar apartment buildings made comparisons easy and effective

- Problems occurred with the models, and with the Solibri tools
  - Reports for the construction companies and Solibri were made
  - Instructions and guidelines for architects were made
T2: Piloting BIM-based inspection of Building regulations using Solibri Office

- Further development and more cooperation between the different sides are needed in order to make the automated checking possible

- Commonly agreed BIM requirements for automated checking
- Digital (3D) city plan
- Archiving the BIM
T3: Practices in BIM operated building projects and management

- Kaisa Lehtinen’s bachelor thesis “Experiences of building information modelling in maintenance”
- Three cases:
  - Oulu Kastelli community centre
  - Oulu Hiukkavaara community centre
  - Pudasjärvi “Log campus”

→ The way BIM models are built favors design and construction
→ Maintenance needs are generally overlooked at different stages of construction projects
BIM-bacis’s education

- Metropolia University of Applied Sciences
- 3 day course for building supervision authorities

- Topics:
  - What is BIM?
  - Solibri Model Checker
  - Common BIM Requirements (YTV2012)
  - Trimble Connect
What next?

In City of Oulu?

In Finland?
What next?

- 3D CAVE?
- More BIM-models → more experience → more awareness → more requirements → education for customers → better BIM-models
- National Archives report on IFC archival eligibility in year 2020 ??
- A nationwide digital register of the built environment and information platform will be created in Finland, on which decisions and processes concerning land use and construction will be based
Development continues →
Materials

• Milla Remo: http://urn.fi/URN:NBN:fi:amk-2018120319645
• Lotta-Maria Vähäkangas: http://urn.fi/URN:NBN:fi:amk-201805148095
• Kaisa Lehtinen: http://urn.fi/URN:NBN:fi:amk-2018052410019
• Reform of the Land Use and Building Act: www.mrluudistus.fi
• Nationwide digital register of the built environment and information platform: https://www.ym.fi/fi-FI/Maankaytto_ja_rakentaminen/Ohjelmat_ja_strategiat/Rekisteri_ja_tietoalusta
Thank You!
Questions?