

Outcomes of BIM for Health Care seminar

## PROGRESS IN STREAMER-PROJECT



**TNO** innovation  
for life

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**Streamer**   
European research on energy-efficient healthcare districts

*This research project has received funding from the European Union's Seventh Framework under grant agreement no 608739 - FP7-2013-NMP-ENV-EeB.*

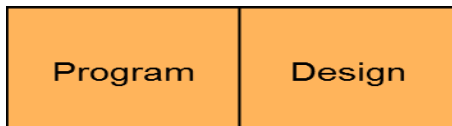


# RECAP on BIM for Health Care Seminar (17<sup>th</sup> of April 2014)

Introduction to BIM for application in health care sector

- Different levels of awareness/possibilities (Budapest, 2013)
- Different understanding of it's use (programming, design, assembly, operational phase)
- Changes in construction industry & process with BIM

17 participants from all over Europe  
Owners, planners, builders, government





# RECAP on BIM for Health Care Seminar (17<sup>th</sup> of April 2014)

## Discussing BIM for health care

- Architects vs Engineers way of working (“a hospital is (not) a car”)
- How to use BIM in the operational phase of your building; capture the experience/information about operations.
- How to integrate knowledge about design outcomes (evidence based designs) into BIM in programming/design phase?



Report: [Report on BIM for Health care seminar- April 2014](#)



# Strategic aim and project scope

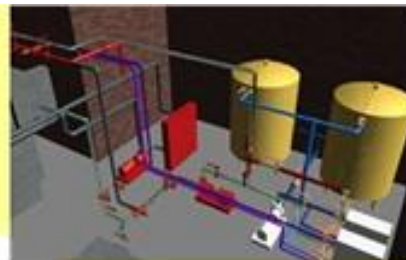
**Aim:** 50% reduction of energy-use and CO2 emission of healthcare districts in 10 years.

**Scope:** Energy efficient Building design optimisation in 3 levels / areas:

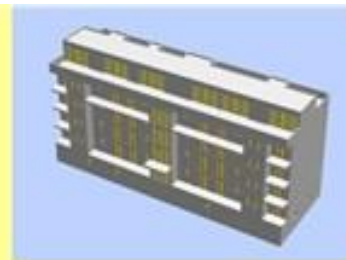
1. Building MEP systems ↔ high-tech medical equipment
2. Building envelope and spatial layout ↔ new healthcare services
3. Building energy systems ↔ neighbourhood systems (grid, heat storage/exchange, etc.)



Medical equipment



Energy and MEP systems



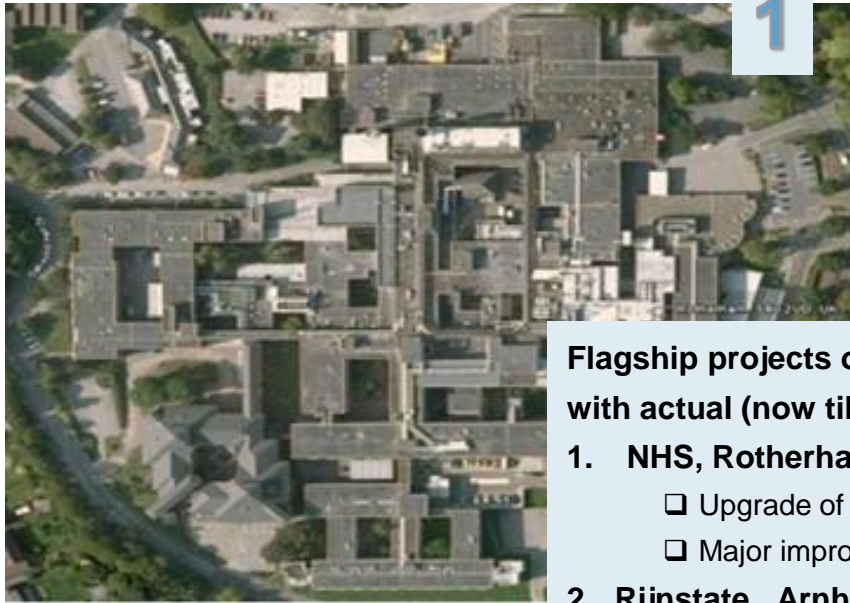
Building



Neighbourhood energy system







1



2

**Flagship projects of 4 hospital districts  
with actual (now till 2020) EeB design plans:**

**1. NHS, Rotherham, UK**

- ☐ Upgrade of Building Management Systems
- ☐ Major improvements in overall building fabric

**2. Rijnstate, Arnhem, NL**

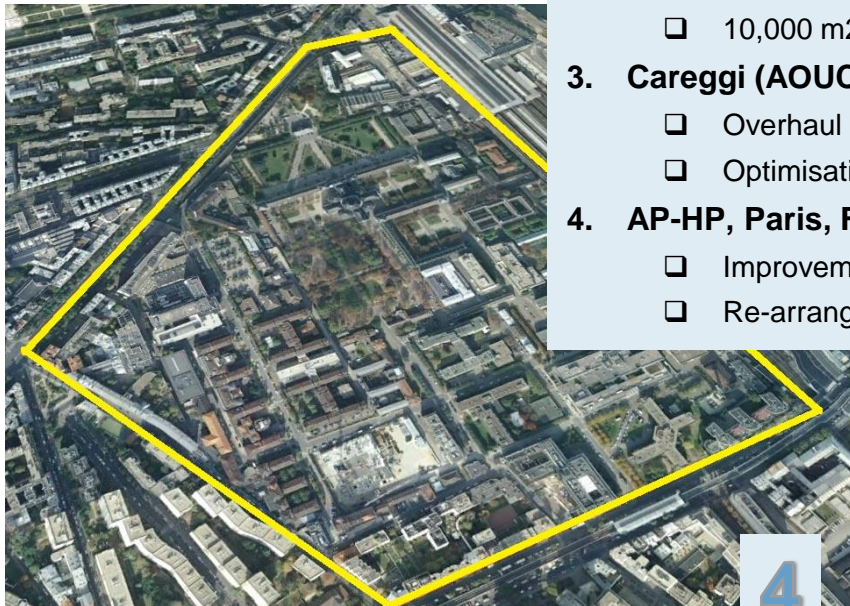
- ☐ Mid-life renovation to replace MEP systems
- ☐ 10,000 m2 extension and new buildings

**3. Careggi (AOUC), Firenze, Italy**

- ☐ Overhaul of electricity and heat distribution
- ☐ Optimisation of inter-building functions

**4. AP-HP, Paris, France**

- ☐ Improvement of logistic and waste systems
- ☐ Re-arrangement of building spaces



4

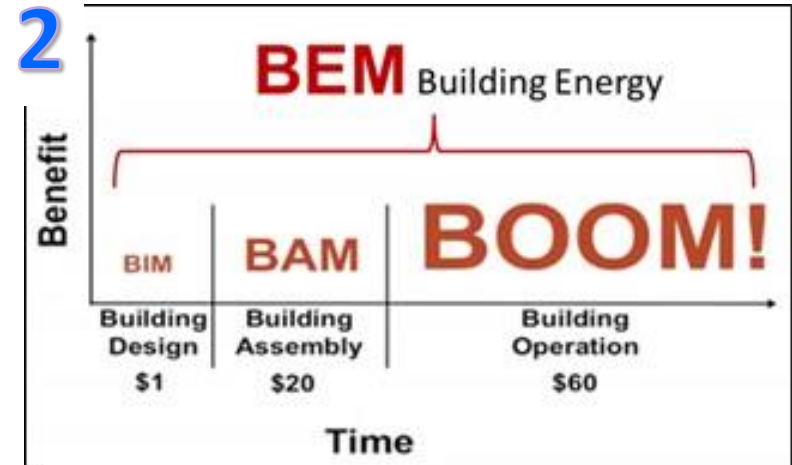
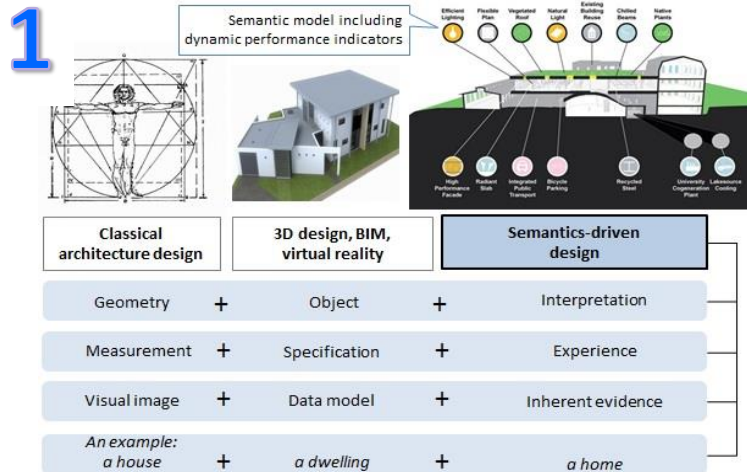


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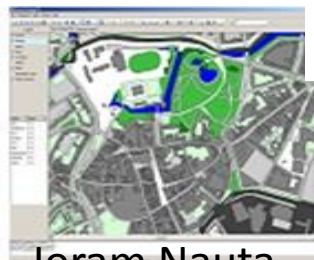
# Results for Designers/Users



1. **Generic semantic BIM+GIS typology models** of Energy-efficient Buildings in healthcare districts: adjustable semantic BIM+GIS models as 'design template' for new-built and retrofitting projects.
2. **Framework for BEM (Building Energy Model)**: lifecycle model inter-connecting BIM, BAM, BOOM.
3. **Design decision-support tool**: interactive tool which accommodates: a) design proposals; b) analysis results regarding energy performance, lifecycle-cost, and functional optimisation; c) stakeholder's requirements, decision criteria, and priorities.



**3**





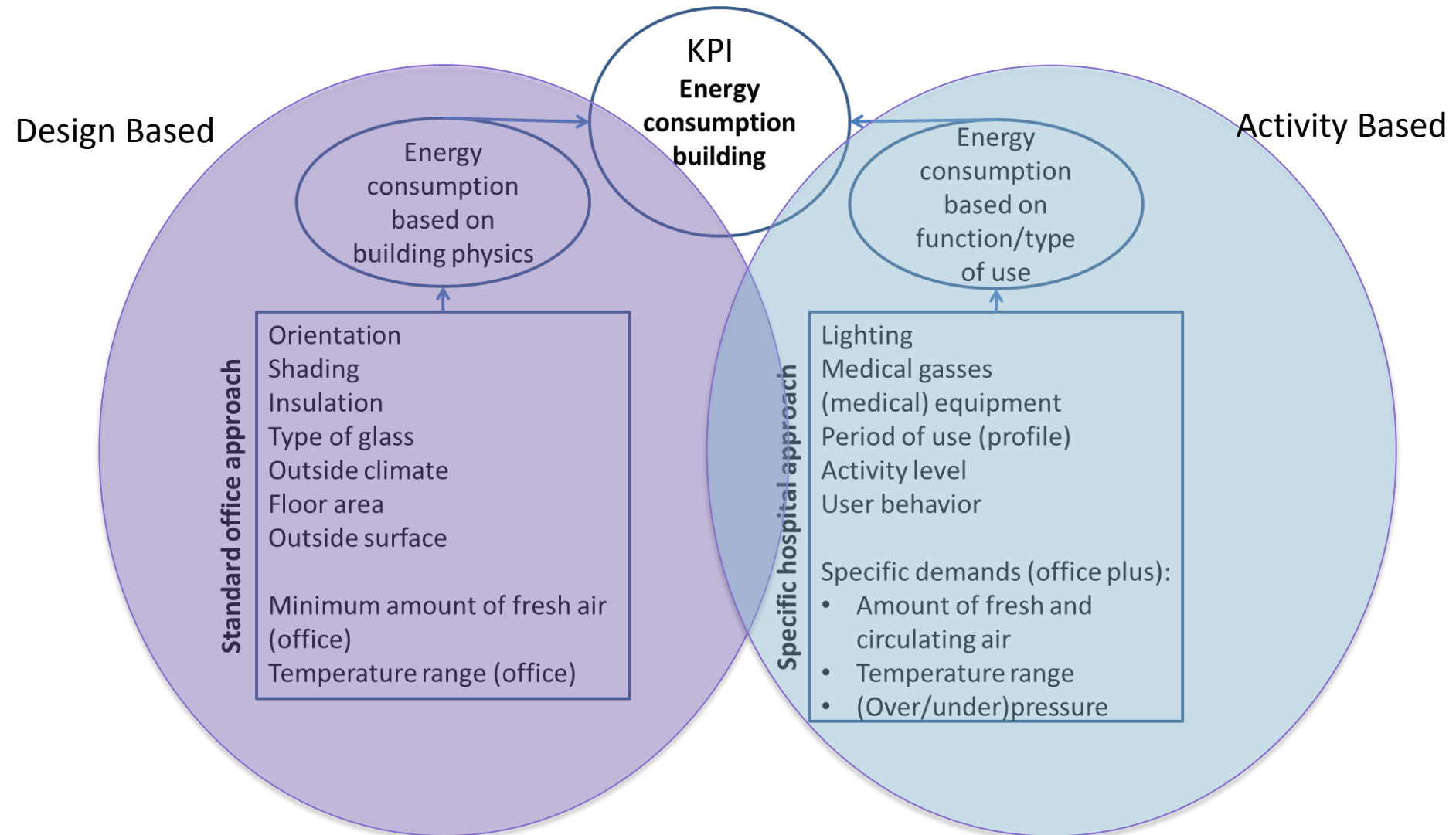


## Where are we now? Results so far:

- [D1.1 Taxonomy of healthcare districts focusing on EeB morphology and features](#)
- [D2.1 EeB technologies for MEP systems of healthcare buildings](#)
- [D2.4 EeB technologies for building envelope and space of healthcare buildings](#)
- [D3.1 Building-oriented EeB KPIs of newly designed and retrofitted buildings](#)



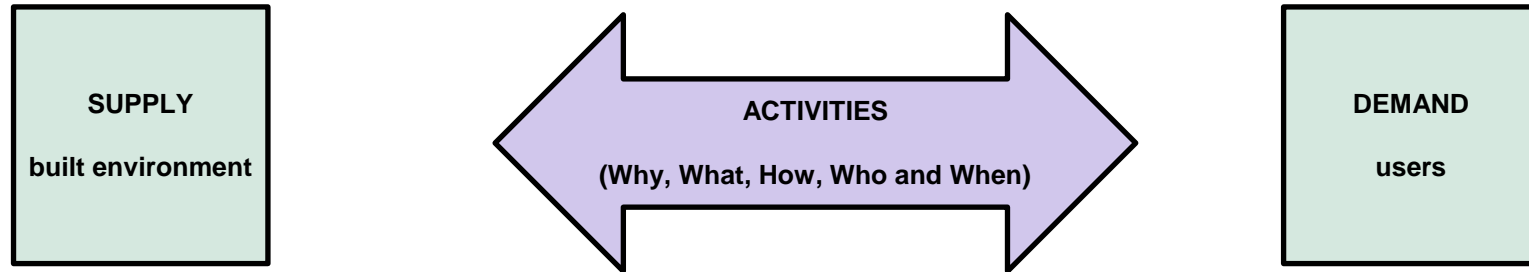
# Breaking down energy consumption (KPI)







# Outside In vs Inside Out



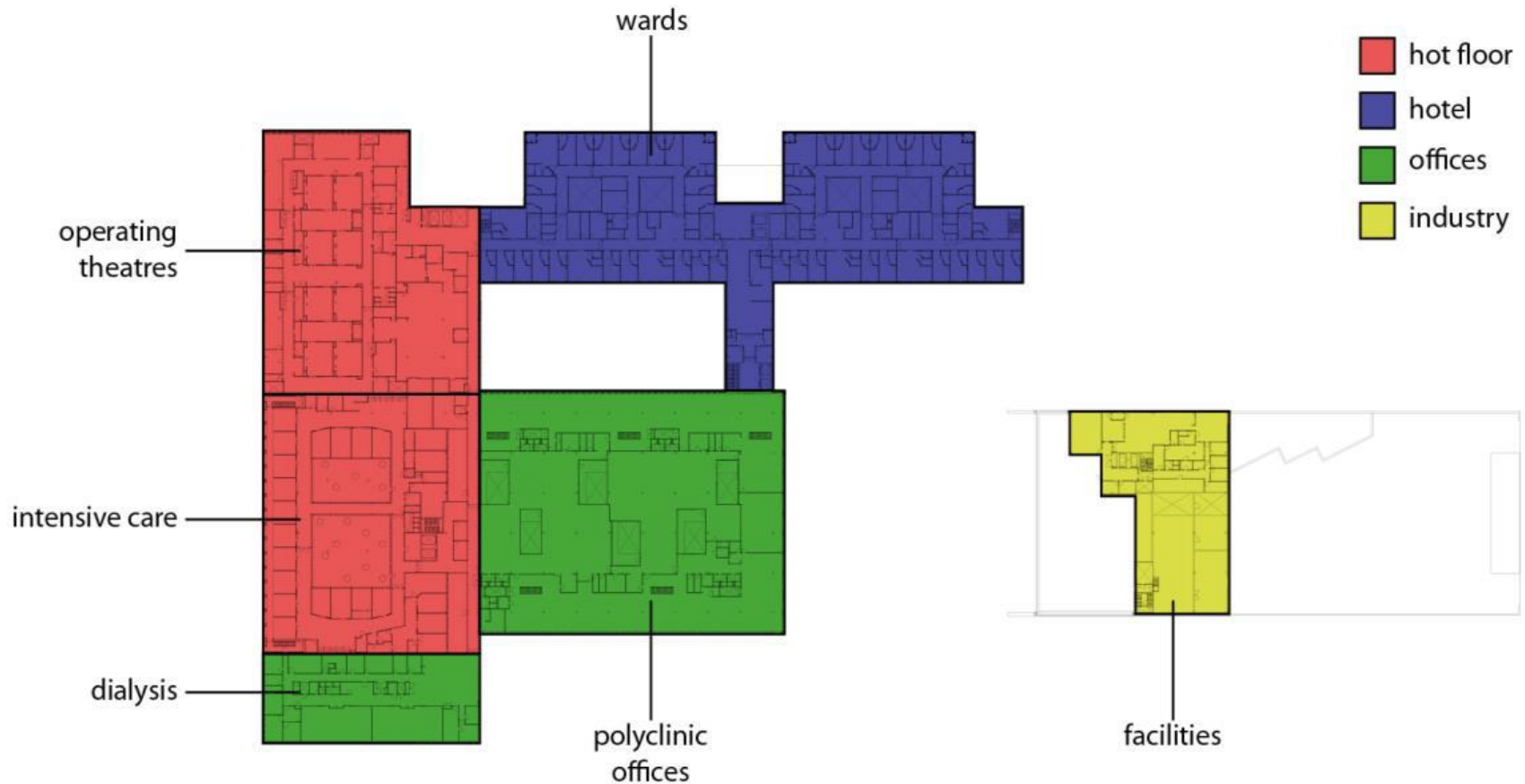
## Labelling activities:

- Specifies conditions
- Specifies connections
- Specifies equipment

Label	level
Hygienic classes (has a relation with amount of ventilation, air tightness, cleaning, materials)	<ul style="list-style-type: none"> <li>- H1 (corridor, réception, toilette, , etc.)</li> <li>- H2 (office, bath room, etc.)</li> <li>- H3 (patient room, examination room, treatment room, etc.)</li> <li>- H4 (operating room, insulation room, etc.) -&gt; additional air tightness and ventilation extra ductwork is necessary</li> <li>- H5 (laboratory, production pharmacy, etc.) -&gt; additional air tightness ventilation extra ductwork is necessary</li> </ul>
Accessibility (has a relation with the position in the hospital, safety/protective/security device)	<ul style="list-style-type: none"> <li>- A1 (Public)</li> <li>- A2 (Patients, visitors and staff)</li> <li>- A3 (Patients and staff)</li> <li>- A4 (All staff members)</li> <li>- A5 (Specific staff members)</li> </ul>
Equipment (has a relation with the type of function, high electric power needed, medical gasses, , ICT data points)	<ul style="list-style-type: none"> <li>- EQ1 (Office level)</li> <li>- EQ2 (EQ1 and medical gasses)</li> <li>- EQ3 (EQ1 and extra electric power)</li> <li>- EQ4 (EQ1 and extra ICT data points)</li> <li>- EQ5 (EQ2, EQ3 and EQ4)</li> <li>- EQ6 (High electrical safety)</li> <li>- EQ7 (special equipment)</li> </ul>
Construction (has a relation with floor strength, shielding against radiation, floor height, air tightness)	<ul style="list-style-type: none"> <li>- C1 (Office level)</li> <li>- C2 (Office level with extra floor strength)</li> <li>- C3 (Office level with extra floor height)</li> <li>- C4 (C2 and C3)</li> <li>- C5 (Accessible from the outside with heave load)</li> <li>- C6 (Shielding against radiation)</li> <li>- C7 (high level of air tightness)</li> </ul>
User profile (has a relation with the type of use)	<ul style="list-style-type: none"> <li>- U1 (Monday to Friday from 8:00 – 18:00)</li> <li>- U2 (U1 with emergency function outside this timeslot)</li> <li>- U3 (24*7)</li> <li>- U4 (U1 extended till 20:00)</li> </ul>



# Labels to help classify buildings





## Next steps:

- Validate labels in practice & develop design support tool
- Try to establish energy performance & forecasts based on labelling
- Incorporate KPI system into BIM (not only energy, but also other boundary conditions)
- Allow alternative EeB measures to be proposed in BIM (list of measures)
- Identify how design decision support tool can become part of decision making process

## Colophon

PowerPoint: Streamer\_EuHPN2014.pptx

Issue Date: 3rd October 2014

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Version: 1

The Streamer project is co-financed by the European Commission under the seventh research framework programme FP7-2013-NMP-ENV-EeB with contract no.: 608739. The information in this publication does not necessarily represent the view of the European Commission.

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