Streamer

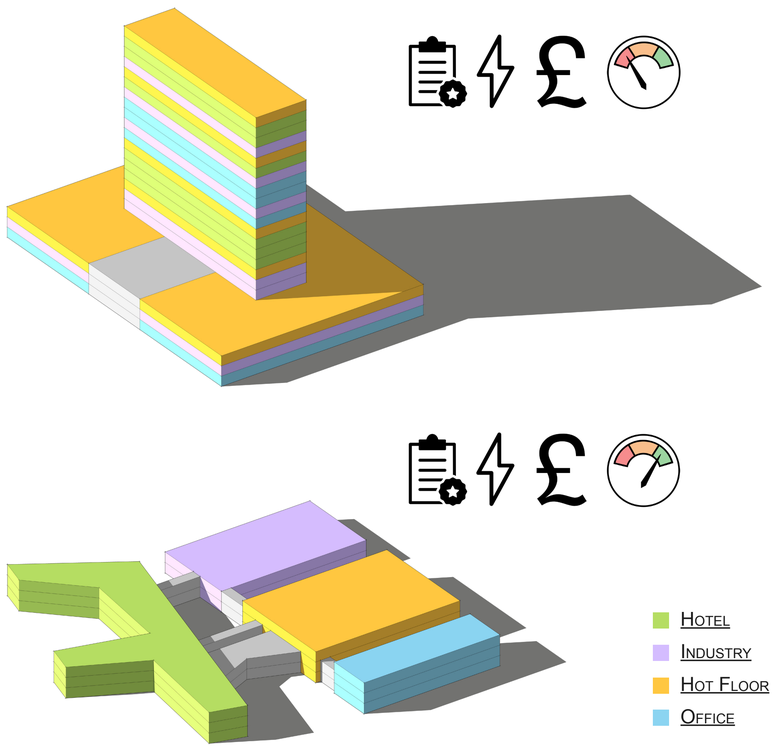
European research on energy-efficient healthcare districts

Optimised design methodologies for energy-efficient buildings

Hospital *Maas en Kempen* in *Maaseik, Belgium*, design de Jong Gortemaker Algra Architects - Example of a hospital according the Layer Methodology from Bouwcollege

STREAMER - an industry-driven collaborative research project on Energy-efficient Buildings (EeB) with cases of mixed-use healthcare districts that aims to reduce the energy use and carbon emission of new and retrofitted buildings in healthcare districts in the EU by 50% in the next 10 years.

STREAMER provides a integrated interdiciplinary design approach with tools to optimise a building layout during the design stages. The tools will also support several decision support moments during the design proces.



From Breitfuss model to Bouwcollege layers

Many hospitals are build according a one size fits all philosophy, with accordingly a generic structure and generic climate systems.

For a large quantity of functions this means they are placed in an over dimensioned building, using more energy than actual needed and are missing some specific qualities for specific functions.

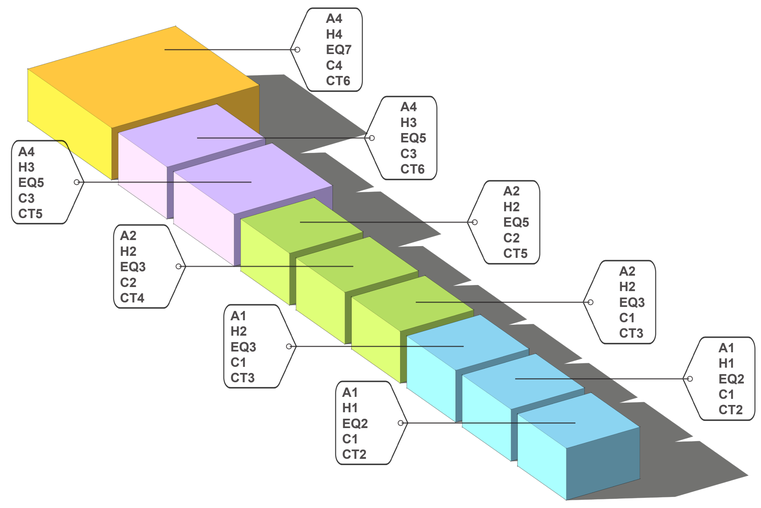
The layer methodology developed by the former Bouwcollege (now integrated within TNO), opts for a more specific approach. By developing more tailor fitted buildings, the building are more specified to the needs of the specific functions.

The specific buildings cost less to build, can achieve a quality fitted to specific function and will use less energy.

For the balance of too specific and too generic the program is divided into four layers:

Hotel - which includes the larger part of the patient accommodations
Industry - which accommodates those functions that are capital intensive, such as the laboratories and the production kitchen
Hot Floor - i.e. the capital intensive high-tech functions that are unique to the hospital
Office - with the outpatient units, accounting, management and training functions

INNOVATION 1



Enriching the Programme of Requirements with the label methodology

This concept allows the designer to attach design-related semantic properties to space units (i.e. rooms) in the early design phase even though much detailed information is still unknown.

These semantic labels express the knowledge and experience of designers and experts, and in turn are useful to create and validate design alternatives.

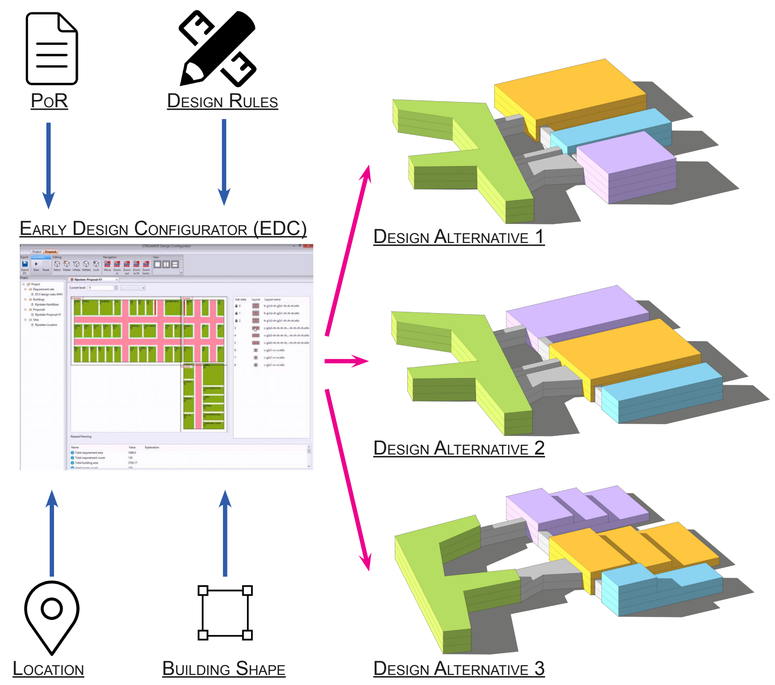
These labels are used as to cluster related functions with similar requirements. For instance functions with the same thermal requirements can be grouped.

In the case of a homogeneous group of functions regarding thermal requirements and opening hours, the energy transfer between rooms is not lost.

In a more heterogeneous situation the thermal requirements will differ greatly between adjacent rooms. With large energy transfers as a consequence.

The labels are divided in several groups such as comfort levels, user profile, construction class, hygienic class, accessibility and equipment.

INNOVATION 2



Creating multiple Design Alternatives using computer aided design.

Within STREAMER an Early Design Configurator (EDC) is developed. The EDC creates design alternatives based on the end-user's Programme of Requirements and the so called Design Rules.

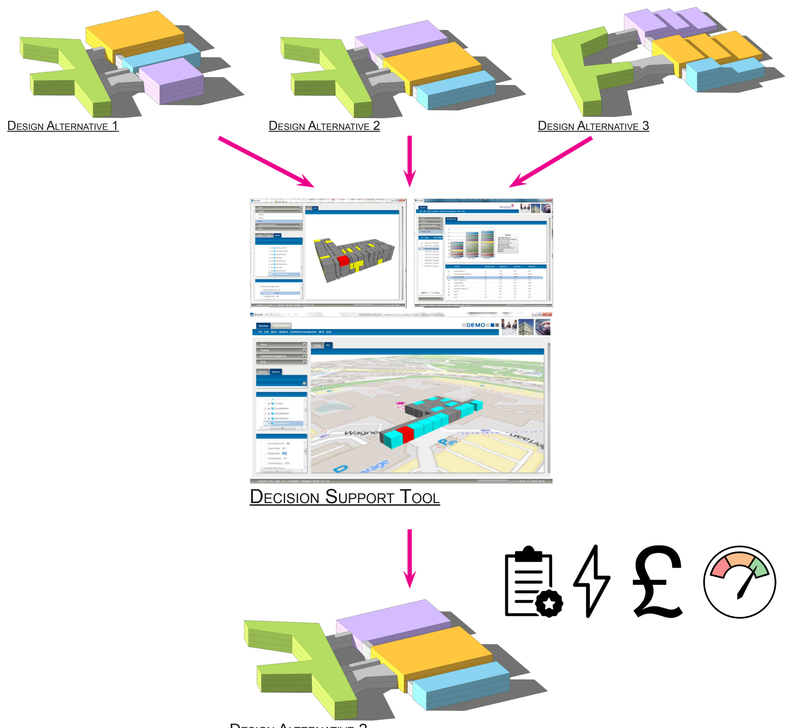
Design rules are basically defined relationships between functions of the PoR. The source can be anything, from expert knowledge to legislations.

Using the EDC, the design alternatives in Building Information Model (BIM) are automatically generated based on the design rules within predefined boundary conditions, such as building's outlines and geographic location.

These alternatives can be validated through several Key Performance Indicators (KPIs) in step 4.

When a design alternative is chosen as the one to proceed with, this alternative can be enriched with generic climate systems to make alternative simulations possible for the systems as well.

INNOVATION 3



Decision Support Tool

A Decision Support Tool (DST) for comparing various design alternatives and performing multicriteria analysis against a set of STREAMER Key Performance Indicators (KPIs) which address energy efficiency, total cost of ownership, and quality.

Along with these main results, many supporting project outcomes are available to facilitate the achievement of creating energy-efficient hospitals. Among these outcomes, there are tools for: preliminary calculation of energy demand in early-design and developed design phases; validation of IFC files (open standard of BIM) which are exchanged during the design process; document management and collaboration process steering; and capturing best practices into semantic design rules.

On the engineering side, STREAMER has created a comprehensive overview of various solutions for MEP (Mechanical, Electrical and Plumbing) systems and building envelopes for energy-efficient hospitals.

Additionally, STREAMER has also developed practical approaches to analyse energy-related aspects at campus and district scale with a particular aim to explore possible optimisations between various buildings within a hospital campus and the local district concerning energy production, consumption, distribution and storage.

INNOVATION 4

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 608739

Project Partners

TNO, the Netherlands

Ipostudio Architetti, Italy

de Jong Gortemaker Algra Architects and Engineers, the Netherlands

Becquerel Electric, Italy

DWA, the Netherlands

AEC3, United Kingdom

Karlsruher Institut für Technologie, Germany

Demo Consultants, the Netherlands

Bouygues Construction, France

NCC, Sweden

Mostostal Warszawa, Poland

Rijnstate Ziekenhuis, the Netherlands

APH Paris, France

The Rotherham NHS,United Kingdom

AOC Careggi, Italy

Mazowiecka Agencja Energetyczna, Poland

Commissariat a lénergie atomique, France

Centre Scientifique et technique du batiment, France

Locum, Sweden

More information and contact

WEBSITE: www.streamer-project.eu
DURATION: 48 MONTHS (2013-2017)
EU GRANT: EUR 8MILLION
PROGRAM AREA: EeB (Energy-Efficient Buildings)
POSTER BY: de Jong Gortemaker Algra Architects
WEBSITE: www.djga.nl
E-MAIL: info@djga.nl