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Competence Centre for Typology & Foresight Planning in Architecture

Research Focus and Projects

1. The Competence Centre - Focus

The Competence Centre for Typology & Planning in Architecture (CCTP) is an institute of the Lucerne University School - Technology & Architecture working in the fields of research and education.

Taking the needs of future users and society in general into consideration, the Competence Centre develops solutions for complex architectural issues and researches them on models for sustainable typologies in the construction industry. True to Buckminster Fuller's "think globally, act locally", the broad effect of those solutions and their implementation into the planning process play an important role, without neglecting specific requirements on technology and design.

Typological studies of buildings provide a valuable contribution in understanding system behaviour of the urban environment. They serve to reduce complex issues to the essentials - "to the basic idea, to its analytical moment" (Aldo Rossi) - and to understand building functionality.

System behaviour, performance and potential of different buildings types are researched at the Competence Centre with emphasis on two factors: human interaction with the urban environment and sustainable typologies in buildings and housing.

The institute's team attaches great importance to the holistic approach as well as interdisciplinary collaboration in its research projects. CCTP projects are supported by various institutions such as the Swiss Federal Office of Energy (SFOE), the Innovation Promotion Agency of the Federal Office for Professional Education and Technology, (CTI/OPET) and the International Energy Agency (IEA).

2. The Competence Centre – Typological Evaluation Methods

The most important aspect of the research is the typological evaluation, a service-based scientific appraisal which is of special interest to the construction industry, authorities, planning offices and research establishments. Building use and the value of the building to society is determined by selective analyses. This information is used to create systematics and subsequently transferred to decision-making and planning tools.

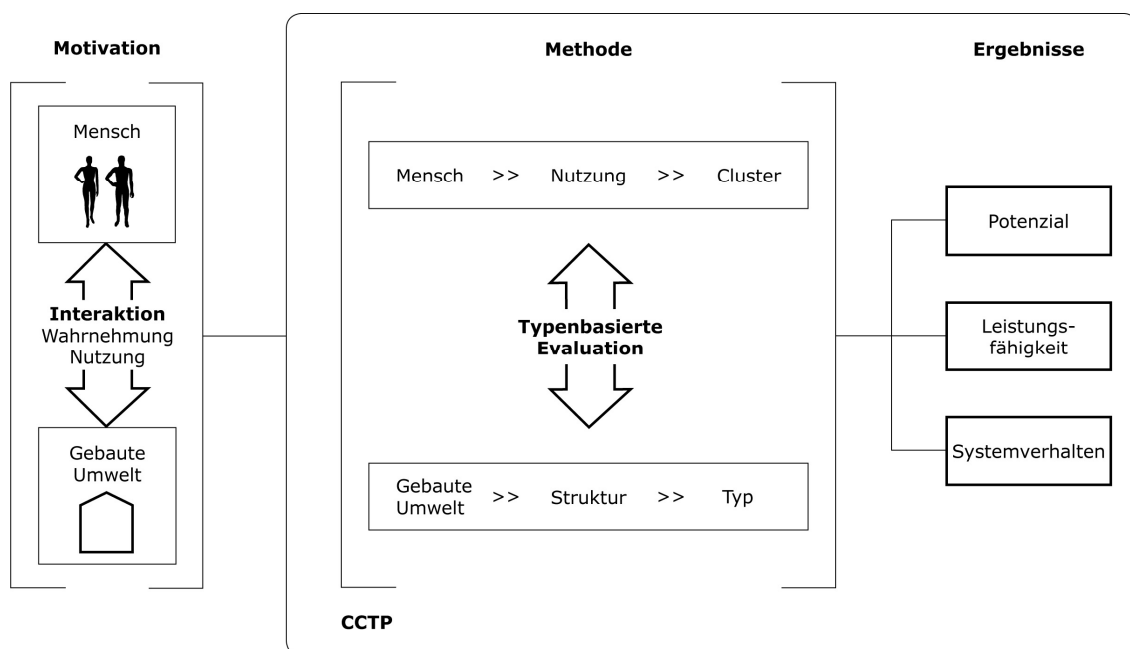
The typological evaluation is the systematic study of a building structure with regard to its use and benefit to society.

Based on scientific, rational principles, the evaluation describes and assesses the urban environment (structures and processes) holistically, systematically and within a set system limit in regard to their function (use and needs). In this way clients are able to use the results generated for predefined purposes (e.g. in decision-making, for planning tools, for training and further education).

The software has an intelligent design in which the evaluation criteria adapt to each individual case study with variable options. The same holds for the tool to be used, the structure to be analysed and the interpretation of the results.

Typological evaluation allows comparisons within and between different types of building construction and enables benchmarking and market analysis. In this way, the potential of the building is identified, inter-relationships determined and statements on efficiency and building performance are given.

This leads to the identification of new, future-oriented building types.



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fig. 1: typological evaluation

3. The Competence Centre – Organisation and Structure

Three types of projects are differentiated in the Competence Centre:

Fundamental projects (e.g. CO₂-reduced building typology) provide essential information for subsequent **application-oriented research projects** (e.g. prefabricated systems for low energy retrofit). **Trends & Foresight projects** investigate the impact of social development with regard to architectural needs and requirements (e.g. demographical change).

Typological evaluations, a continuously-updated CCTP terminology data base and scientific theories provide the methodical and theoretical research fundamentals.

An advisory committee of competent experts from both research and business sectors assist and support the CCTP to ensure scientific quality assurance.

As a university institute, the CCTP is also engaged in training and further education. Interdisciplinary planning methodology in sustainable structural development is an integral subject.

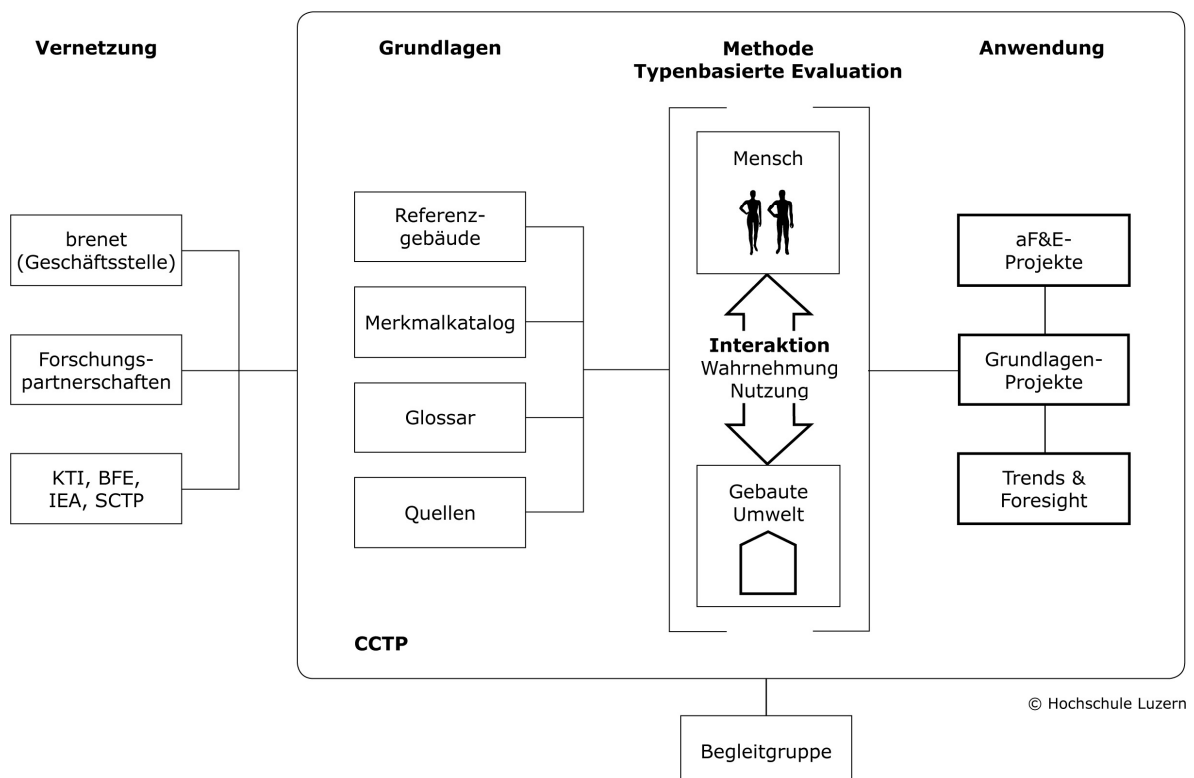


fig. 2: CCTP structure

4. The Competence Centre – Project Selection

Atria of the future (2002-05)

Atria is an interdisciplinary planning tool for the design, operation and maintenance of sustainable, glass-covered halls and courtyards. Typological studies record the atrium and its fundamental function. A list of requirements which take sustainable, holistic and interdisciplinary aspects into account, form the basis for the planning tool. Check lists, organisational structures and examples provide a common framework for successful planning. The tool is available in different mediums to suit various target groups (handbook published by Birkhäuser publishers, website and workshops). www.atrien.ch

Partners: Innovation Promotion Agency (CTI); Swiss Window and Façade Agency (SWFA); Lucerne University School of Art & Design; Building and Renewable Energies Network of Technology (brenet).

H-Scape (2004-05)

In the urban areas of Switzerland, there are 17 million square meters of derelict industrial area (brownfield land) according to SFOE statistics (2004). Amenity-attractive building plots have been lying unused or have not been used to their full capacity for months or in some cases for years, and significant potential income is being lost. This project has set aims to use potential space more profitably in constructing flexible building types which are to be used during a limited period of time.

Partners: Lucerne University School; planning offices

The House of the Future (2006-07)

The main focus of the project is to set requirements in view of sustainability in future-oriented multi-story wooden buildings and to compare them with current research results and innovative building materials. Collaboration with other branches (textile, car, aerospace industry etc.) is encouraged. Besides developments in future-oriented wooden buildings, the psychograph “future generations - their living habits and requirements” is of central importance to the project.

Partners: “MehrwertHolz”; industry; planning offices.

Human building - Optimal performance (2006-08)

In this project, relevant parameters for office-building performance are established and determined for planning processes. The interdependency is analysed between the invariant factors (e.g. cost, construction, materials and energy) and variant factors (e.g. user's requirements and behaviour, satisfaction, creativity and atmosphere). The influence of architecture is represented in relation to building performance and subsequently, planning guidelines are developed in order to increase efficiency, avoid absences, fluctuation and vacant office positions in future and convertible office space (www.humanbuilding.ch).

Partners: CTI; industry; Lucerne University School of Business; Lucerne University School of Social Work; Zürich University School of Applied Science.

IEA BCS Annex 50 - Prefabricated Retrofit System for Low Energy (2006-10)

The project is aimed at developing prefabricated, economically and technically-attractive refurbishment packages (facades, roof and building technology) which considerably reduce energy consumption by factor 5 to 10. The newly—developed prefabricated units are piloted and their effect demonstrated on building objects and subsequently optimized to allow a contribution to the development of future energy-efficient building types.

Partners: CTI; Swiss Federal Office of Energy (SFOE), industry, University School Northwestern Switzerland, brenet; Competence Center Energy and Mobility (CCEM).

Typology of Flexibility (2006-2008)

Flexibility is a current topic in the field of building construction. Sustainable buildings must be able to react to ever-changing requirements. Existing buildings were constructed at a certain time and for a defined use. The differing aspects of their flexibility (planning, extension, use and conversion) and its effect on other concerns such as fire protection, sound insulation, design, renovation etc. are made transparent. Their cause-effect is documented and an essential overview of its complexity is given.

Partners: University School of Lucerne

Typology of Infilling (2006-2008)

In this project all possible ways of infilling in suburban areas are represented. Opportunities and risks, loss of amenity value and social impact are identified in varying urban developments. Strategies are developed to make up for excessive infilling, such as the mobilisation of valuable land reserves.

Partners: University School of Lucerne

Typology of CO₂-reduced buildings (2007-2008)

This project aims to initiate fundamental multi-disciplinary discussion on CO₂ issues and serves to address the aspects of reducing CO₂ emissions from buildings. Additionally, the written statement of principles formulates a definition which gives consideration to the complexity of reducing CO₂ emissions from buildings and serves to pinpoint the research topics within this field.

Partners: University School of Lucerne; SFOE.

Contracting in high-rise buildings (2007-2008)

Renting and leasing models are becoming increasingly popular. Contracting is the term used for the rental of a complete performance package for a part of a building or building system (including infrastructure and maintenance). In this project, we are interested in the influence such contracting models have on the typology and construction of business and service centres. How are these buildings designed? What are the consequences for the planning process? What influences does contracting have on operation and maintenance of the building? How can the planning and legal security be established?

Partners: University School of Lucerne; industry.

IEA Task - Solar & Energy – Typology of Solar Buildings (2008 - 2010)

This project will develop solutions and strategies for typologies in solar multi-family residential houses in view of current use, the urban environment, topography and relevant climatic conditions. The combination of solar and other renewable energies will be taken into consideration to provide an overall energy concept for the building. The resulting typology will provide the basic framework for planning tools such as design tools, simulation tools and other technical developments.

Partners: SFOE, industry; University School Northwestern Switzerland; brenet (on request).

5. Team

Our work is based on disciplinary competence from a holistic point of view and to meet the demands of a client and practice-oriented project which is relevant to society.

Employees and their qualifications

| | |
|-------------------------|---|
| Sibylla Amstutz | Architect UAS/SIA, draughtswoman in structural engineering |
| Doris Ehrbar | Architect ETH/SIA |
| Robert Fischer | Architect UAS, draughtsman in structural engineering |
| Dorothe Gerber | Biologist, Environmental Scientist ETH |
| Marcel Hohl | Architect UAS |
| Yvonne Kaiser | Architect ETH |
| Fabienne Koller | Graphic Artist |
| Jörg Lamster | Architect TU, Bricklayer |
| Amelie Mayer | Architect cand. |
| Stefan Mennel | HVAC Engineer UAS / HS Engineer UAS |
| Nathalie Plagaroo-Cowee | Architect ETH/SIA, Philosophy study |
| Peter Schwehr | Architect TU/SIA, Upholsterer |

Curriculum Vitae – Head of the Competence Centre

Peter Schwehr, Dr.-Ing. (Arch) TU, SIA

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| since 2006 | Head of the Competence Centre for Typologie & Planning in Architecture (University School of Lucerne - Technology & Architecture) |
| since 2006 | Head of the focus area "Cities and Buildings" of the Swiss Construction Technology Platform (SCTP) |
| since 2005 | Member of the SFOE consultation group “Rational Energy Consumption in Buildings” |
| since 2003 | Manager of the national Building and Renewable Energies Network of Technology (brenet) |
| since 2002 | Member of the board for interdisciplinary building technology centre at the University School of Lucerne - Technology & Architecture |
| 2002-04 | Thesis at Stuttgart Technical University (Dr.-Ing.) |
| 1999-02 | Househusband, father and freelance architect |
| 1996-99 | Assistance and project management at Arat – Siegl & Partner (‘asp’) in Stuttgart |
| 1996 | Diploma at Stuttgart Technical University |
| 1994-95 | Assistance and project management - Prof. Volz. Backnang |
| 1989-96 | Study of architecture at Stuttgart Technical University |
| 1986-89 | Training to become an upholsterer |

6. Partners und References

Belimo Automations AG, Hinwil
Denz AG, Nänikon
D+H Management AG, Zürich
Hälg Facility Management AG, Zürich
Losinger Construction AG, Zürich
MehrwertHolz, Hochdorf
MIBAG Property + Facility Management AG, Zürich
Musegg Immobilien AG, Luzern
Pirmin Jung Ingenieure für Holzbau GmbH, Rain
Pro Holz Lignum, Luzern
Pro Juventute, Zürich
Pro Infirmis, Zürich
Renggli AG, Sursee
Schaerholzbau AG, Altbüron
Schweizerische Zentralstelle für Fenster und Fassadenbau (SZFF), Zürich
Siemens Schweiz AG, Zug
Swisspor Management AG, Steinhausen
Tuchschmid AG, Frauenfeld
Velux Schweiz AG, Trimbach
Vitra Schweiz AG, Birsfelden

Swiss Federal Office of Energy (SFOE), Bern
Federal Office for Professional Education and Technology (OPET), The Innovation Promotion Agency (CTI).

International Energy Agency (IEA)

Building and Renewable Energies Network of Technology – brenet
Swiss Construction Technology Platform (SCTP)
human building association®
Network Platform: Future Buildings