3ENCULT Historic Building Information System: the “Raumbuch” concept integrated with energy issues - a tool for the multidisciplinary design approach

Alexandra Troi, EURAC research
Eight case studies: different climatic conditions, different utilization, different epochs and degree of conservation restrictions, different needed/planned interventions
REQUIREMENTS

- Systematic stocktaking of all relevant parts of the building
- Similar system for all partners involved in the investigation
- Precise localization of the features
- Integration of plans, photographs, written sources for building research purposes
- The basis for planning of restoration and refurbishment
- Archival properties and durability of the media
THE «Raumbuch»- a tool for documentation

### DOCUMENTATION content

**GENERAL INFORMATION:** Name/Company of surveyor, Location, name of building, Legal investigation, Present function, original function, Date of completion, Architect/Artists/other persons, Construction methods, Short description,

<table>
<thead>
<tr>
<th>URBAN CONTEXT</th>
<th>URBAN CONTEXT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location, accessibility, orientation, historical context</td>
<td>Position of building in city context, location of over-shadowing from trees or other buildings</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BUILDING</th>
<th>BUILDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>shape/dimensions, levels/axes, short description of facades and roof, internal access/floor plan, building history</td>
<td>Buildings consistency regarding static problems, fire protection, seismic safety, consistency and type of building services; particular architectural solutions related to original use of the building, energy consumption</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROOMS/ CONSTR. ELEMENTS</th>
<th>ROOMS/ CONSTR. ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>design including structure and arrangement, material properties, all features that indicate an existing or previously existing system of construction, design or function, all characteristics that indicate the disorder of these previous systems, the movable elements, installations etc.</td>
<td>construction of the external walls, windows, internal partitions and basement, identification of materials, type and dimensions. Technical data of materials: density, conductivity, specific heat capacity, water vapor diffusion resistance index, long term water absorption etc., possibilities for using daylight, analysis of technical systems/buildings services.</td>
</tr>
</tbody>
</table>
OBJECTIVES

technical and structural issues

State before alteration

measures

Status after alteration

evaluation, archiving, assessment

preservation issues
OBJECTIVES

- planning process of projects of a certain size or complexity

- guideline for intervention in smaller projects with well documented study cases

- documentation of the intervention history and their motivation
The „Raumbuch“ concept extended to energy issues

http://www.prodenkmal.org/3encult/startseite.php
Main interface

Acquisition

- General Information
  - Name and company of surveyor:
    - Arch. Marcella Faustini Fustini - Municipality of Bologna
    - Arch. Valerio Nemmi, Arch. Nicola Silingardi - ICT
  - Name and location of building:
    - Palazzo dell'Accademia, Piazza Maggiore, 40121 Bologna
  - Cadastre number: 6
  - Altitude: 54 m
  - Heating days: 183 days
  - Heating degree days: 2259 HDD

- Previous location names:
  - Palazzo della Scala (1205)

- Legal investigations:
  - Ownership: Municipal property of Bolzano

- Local land use:
  - Urban building

- Planned activities within the project:
  - Building history
  - Urban context
  - Building as-is-state/consistency
  - Building zones: Room groups
  - Building potential
**Windows**

**Selected Window Type**

**Window Characteristics**

**Label:**

Box-type window (1950s)

**Sublabel:**

Box-type window is a

**Typology:**

Number of sashes: 4 parts

**Box type window:**

6

**General description:**

The standard box-type window is a box-frame window with a steel frame in between. Each of these windows is separated into 4 sashes. The window is insulated with 2 layers of 16.5 cm between them.

**Window photo/sketch**

- **Frame:**
  - Frame type: Wooden frame 45 mm
  - Material: Wood
  - General description:
    - The frames of the window and the fixed part are made of solid spruce wood. The profiles are connected with tenon joints. To protect the wood against rain, humidity and UV-radiation the frames are painted with a white coating.
    - Only the outside part of the fixed window frame is painted with a red coating to give the window a clear arrangement in the facade. At many spots the coating is not in a good condition anymore because it is peeling. Therefore and because of temperature forces there are a lot of breaks which causes a upright envelope.
  - Frame profile dimensions
    - Width left: 0.2
    - Width right: 0.2
    - Width below: 0.16
    - Width above: 0.16
  - U-value: 1.89

- **Glazing:**
  - Fenetre
### Material type catalogue

#### CS1_Weighhouse_interior plaster

- **Material type characteristics:**
  - Thermal conductivity [W/(m·K)]: 0.8
  - Density [kg/m³]: 1811
  - Heat capacity [J/(kg·K)]: 1000
  - Water diffusion resistance: 11
  - Porosity [% (m²/m³)]: 0.35

- **Air tight:**
  - Vapour tight:
  - Water tight:

- **Details:**
  - Literature: no
  - Comment: no
  - Entered by: no
  - Entry data: no

- **Graph/Drawing:**

---

**Technische Universität Dresden**

**EURAC research**
## Construction Element Catalogue

### Construction Element Details

<table>
<thead>
<tr>
<th>Construction element:</th>
<th>Single facade</th>
<th>Area:</th>
<th>Enter by:</th>
<th>Total Thickness (mm)</th>
<th>Date:</th>
<th>Comment:</th>
<th>U-Value (measured): 0.72 W/m²K</th>
</tr>
</thead>
</table>

### Construction Element Sketch

![Construction Element Sketch]

- **Temperature Profile**
  - **Temperature**: Temperature variation over the wall.
  - **Rossi**: Thermal resistance of the exterior surface (0.04)

### U-Value Data

- **U-Value (measured)**: 0.72 W/m²K
- **RSI**: 0.72
- **RSE**: 0.13

---

### Table: Construction Elements

<table>
<thead>
<tr>
<th>Construction Element</th>
<th>Area</th>
<th>Total Thickness</th>
<th>U-Value (calculated)</th>
<th>Comment</th>
<th>Entered by</th>
<th>Entry date</th>
</tr>
</thead>
<tbody>
<tr>
<td>U01_test room_Living over Portico</td>
<td>407</td>
<td>1.34</td>
<td>Dagmar Exner</td>
<td>2013-02-22 14:02:40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>brick</td>
<td>285</td>
<td>5.88</td>
<td>Case Study 2</td>
<td>2013-03-15 22:44:21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>plaster</td>
<td>20</td>
<td>7.14</td>
<td>Case Study 2</td>
<td>2013-03-15 22:45:13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS1_TE01_Exterior wall</td>
<td>620</td>
<td>5.88</td>
<td>Dagmar Exner</td>
<td>2013-03-17 01:00:06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Planning phases