
A Method for the Creation and Evaluation of Microclimate Eco-Friendly Urban Typologies: The Case Study of Altstetten, Zurich

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1. Introduction

The focus of this method was to contribute to a Swiss national project, the NRP65 or SUPat project [1], which aims to integrate qualitative and quantitative design and research activities throughout collaborative urban planning processes and visualization-simulation tools. Within this project, different regional future scenarios for the Limmattal region in Switzerland were evaluated and explored in order to proposed sustainable urban patterns for future developments.

2. Method

With Altstetten Zurich as the case study, the main goal of this method was to survey, evaluate and achieve eco-friendly urban design strategies, using microclimate and urban analysis methods, in order to implement this in the densification of existing blocks according to four future scenarios. The method is divided into six different steps as shown in figure 1.

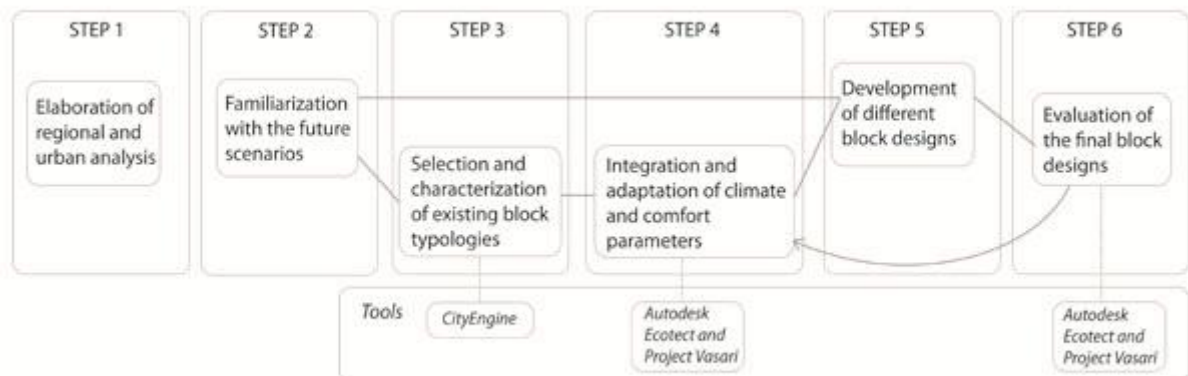


Figure 1
Diagram of the method

3. Implementation

Step 1

The first step consisted of the elaboration of regional and urban analysis of the local case study area and its context. In this way, an understanding of the case study conditions and its surroundings was achieved by the analysis and documentation of the different existing urban systems (Network system, natural and green areas, zone plan, etc.).

Step 2

For the second step, a conceptual analysis of the four future shell scenarios (Pure Dynamic, Character City, Smart City and Charming Valley) was elaborated in the form of simple diagrams. These diagrams were divided in three different urban systems: i. centres zones, ii. green public spaces, and iii. densification and distribution of residential areas.

Step 3

The third step was the selection and characterization of existing block typologies. Starting from the current situation of the case study, a matrix with the existing different block typologies was created and divided according to the zone plans and the building typologies. With this information, each block typology was further analysed in terms of design parameters and guidelines like, for example: public spaces, green areas, pedestrian pathways, building height, etc.

Step 4

The next step was the integration and adaptation of climate and comfort parameters to the envelope concept (Christiaanse, 2005) and its implementation into the existing block typologies described in the previous step. For the purpose of this research, this concept was adapted according to climate and comfort parameters and the process was implemented in an existing urban block (residential focus area). This process was divided into several sub-steps each dealing with either street patterns, visual impact, shadow range or wind tunnels. Using environmental analysis tools (Autodesk Ecotect and Autodesk Vasari), each step contributes to the construction of a new envelope (Figure 2).

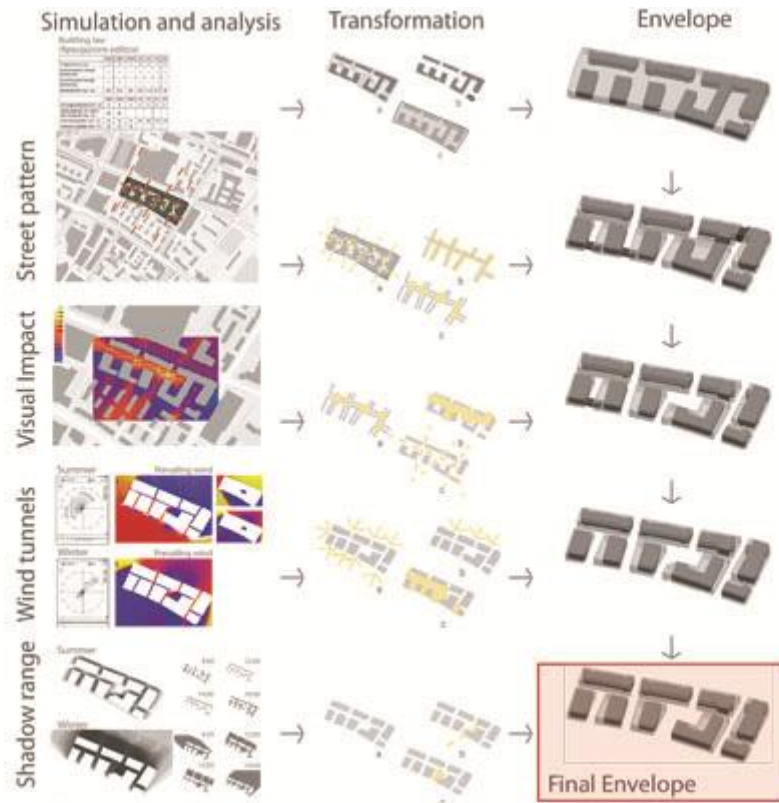


Figure 2
Steps of the envelope transformation

Step 5

A variant for each future scenario is created according to the characteristics that describe them as outlined in the SUPat project description [1]. Based on the final envelope, the final block designs were developed (Figure 3).

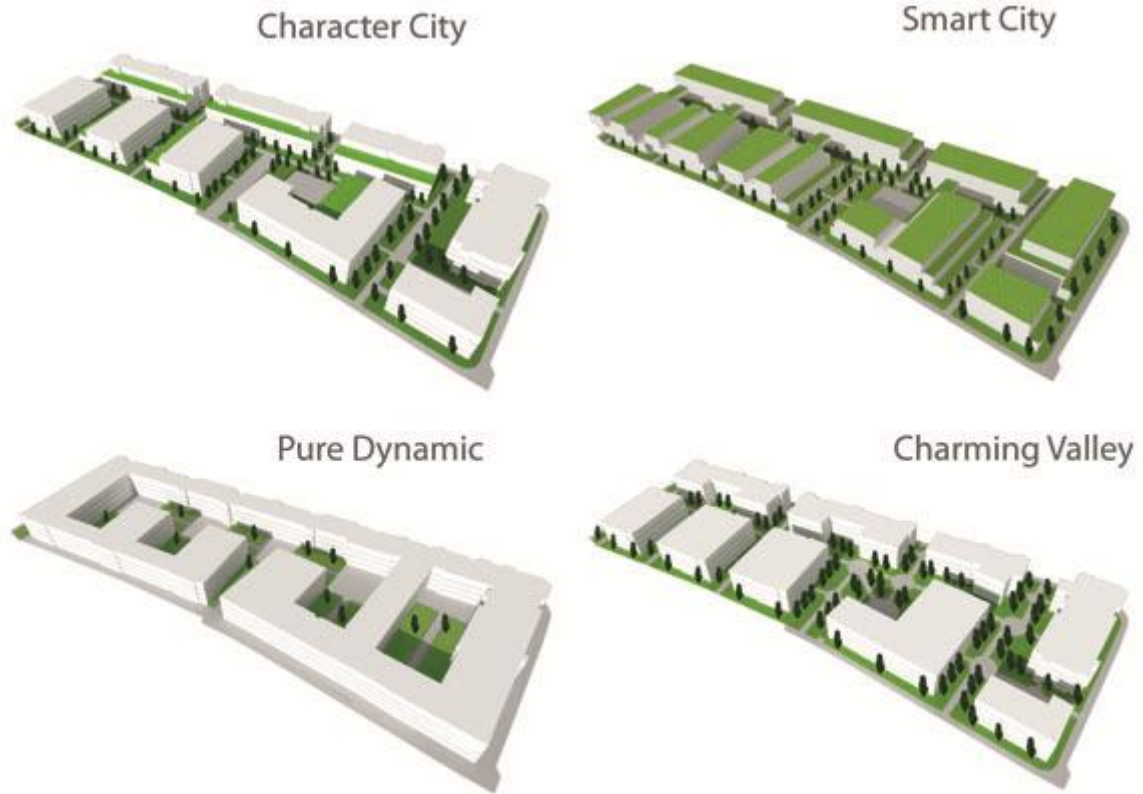


Figure 3
Block design variants for each future Scenario

Step 6

The final block variants were evaluated using the same microclimate techniques that were used initially to adapt the envelope concept.

4. Conclusions

The method developed in the work described here allowed us to evaluate different design strategies, based on microclimate and comfort parameters, for the densification of future cities scenarios according to a specific location. Also, this approach led to the creation of a design-based method for architects and urban designers to support the creation of microclimate-friendly urban typologies for the development and redesign of existing blocks.

It is clear that the parameters for the construction and evaluation of the urban envelope process can change depending on the location.

5. References

Christiaanse, K., Van Den Born, H., Gietema, R., Van Oort, I. 2005. Situation KCAP. NAI publishers.

[1] <http://www.supat.ethz.ch/>

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