BEYOND 2020 NOVEMBER 2 - 4 WORLD SUSTAINABLE BUILT ENVIRONMENT ONLINE CONFERENCE

Towards sustainable transitions of peri-urban residential neighborhoods

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Issues and opportunities

As a direct product of urban sprawl processes, peri-urban mono-functional settlements of detached houses raise growing issues. Authors differ about the theoretical definition of settlements and whether they are considered as urban. Nevertheless, they tend to agree upon the necessity **to develop proactive research to bring those territories towards more sustainable futures**.

The research aims at raising awareness on impacts of future decisions about peri-urban neighborhoods of detached houses; whether nonexistent (inertia) or highly proactive (transition). The **novelty of this research** lies on two major aspects: 1. it considers peri-urban areas as worthy case-studies and goes beyond current stigmatization of such settlements of owner-occupied houses; 2. it applies a proactive approach at neighborhood scale and works with the complex land fragmentation. Within **the topic of urban transition**, the research investigates future scenarios applied to existing neighborhoods according to their current state and context.

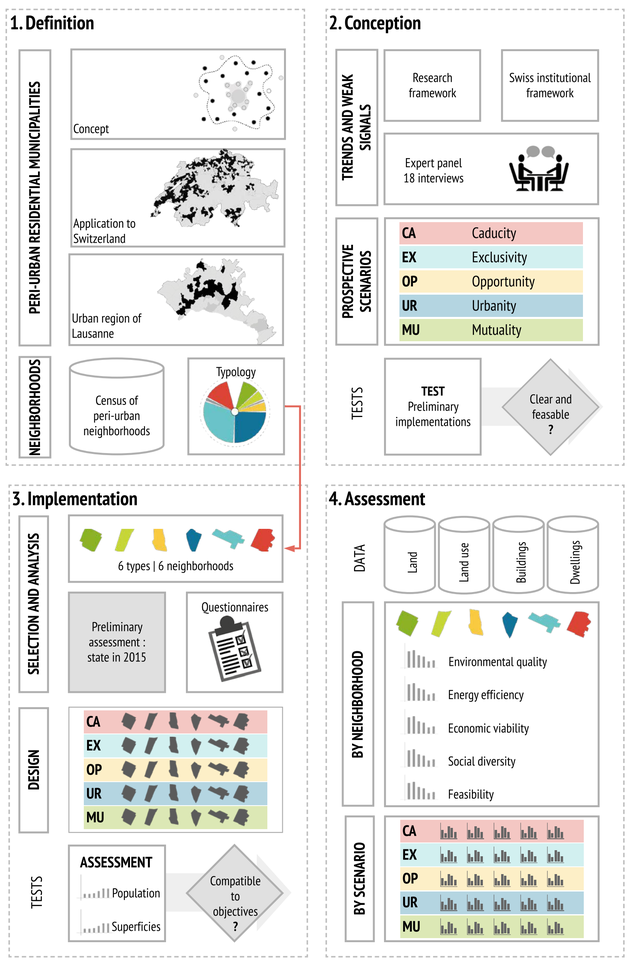


Figure 1: Overall methodology of the research project

Although theoretical, the implemented approach, provides rich and diverse results. The integration of essential components – such as the alternation of occupation cycles and the conditions of individual ownership – plays a major role in **ensuring reliability in the application of future scenarios**.

The poster focuses on the multicriteria assessment phase. Its goal lies in **identifying strengths and weaknesses of each scenarios** in order to perceive potential consequences of chosen actions and to be able to anticipate them according to a specific context. As a result, a strategy could be chosen above another in relation to local policy objectives.

Peri-urban neighborhoods of detached houses have proven themselves to be ideal experimentation sites, where the limited growth potential supports diffuse mutations compatible with their specific context. **An effective transfer of the method and the scenarios** to sites with higher built- and occupation density **is conceivable.**

Figure 2: Existing neighbourhood (type 6) in 2018 | Lausanne urban region | EPFL - LAST - O.Wavre

Example of implementation

Scenarios ***Caducity*** and ***Exclusivity*** consider a situation of demographic stagnation resulting from the implementation of current planning policies in favor of densification of strategic urban areas. Scenario ***Opportunity*** refers to emerging soft-densification processes applied at dwelling or plot scales. Scenarios ***Urbanity*** and ***Mutuality*** recognize potential transition paths, at odds with common practice, towards different built forms and governance systems.

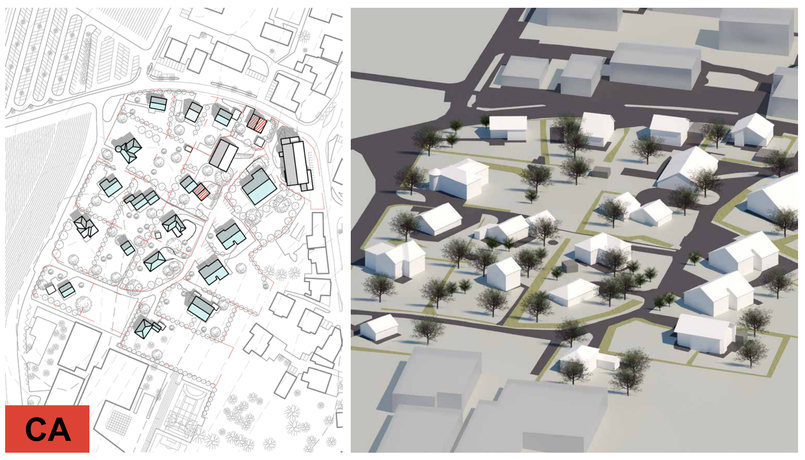


*Figure 3: Implementation of scenario **Caducity***

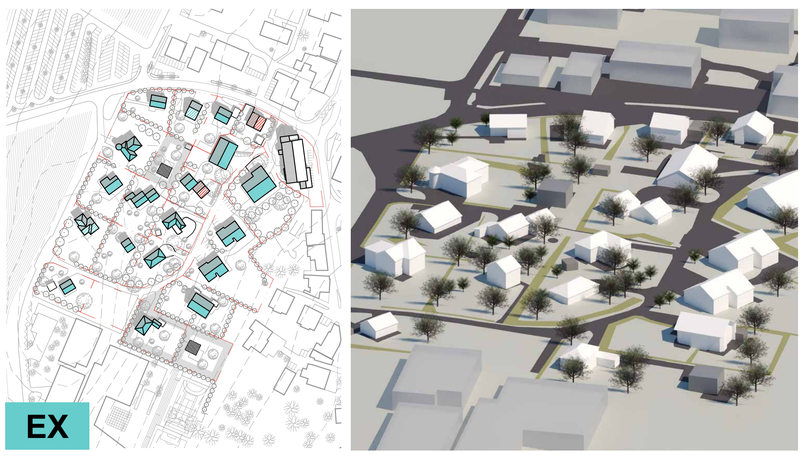


*Figure 4: Implementation of scenario **Exclusivity***

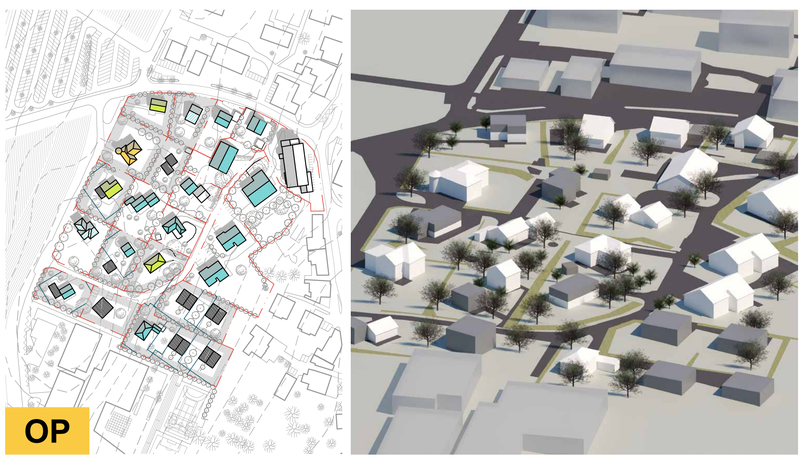


*Figure 5: Implementation of scenario **Opportunity***

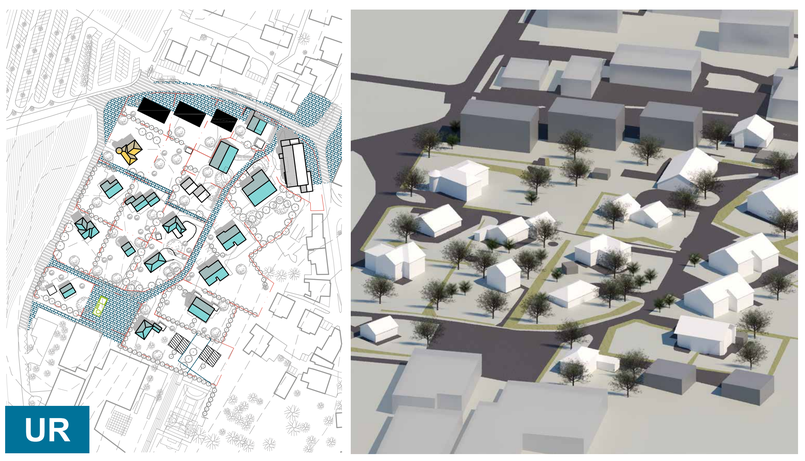


*Figure 6: Implementation of scenario **Urbanity***

*Figure 7: Implementation of scenario **Mutuality***

Comparative multicriteria assessment

The constitution of a **holistic assessment matrix** was meant to highlight the cumulated effects of the transformations induced by the application of the five scenarios by 2050. Five criteria were selected to directly address major challenges related to environmental quality, energy efficiency, economic viability, social diversity and feasibility. To each criteria, several indicators were assessed in a systematic approach in order to allow a transversal comparison of results.

Environmental quality

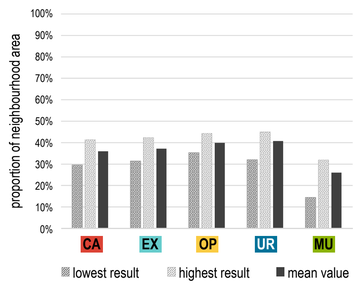


Figure 8: Proportion of sealed soils at neighbourhood scale (entire neighbourhood area).

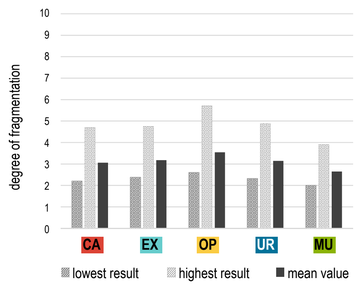
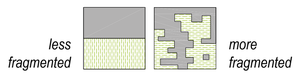


Figure 9: Degree of fragmentation of open spaces, according to the concept shown below

Preserving the extend and quality of the existing green infrastructure (open spaces and private gardens) is a challenge for future projects. It is fundamental to maintain the neighbourhood's identity.



Energy efficiency

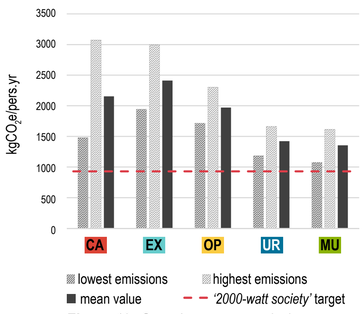


Figure 10: Greenhouse gas emissions per person for construction, operation and daily mobility in 2050

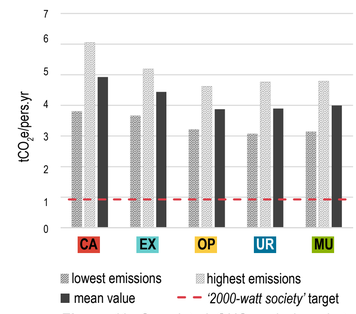


Figure 11: Cumulated GHG emissions between 2015 and 2050; on average per person per year

The assessment considers all residential buildings of six neighbourhoods. The environmental impacts owing to construction/retrofit, to operation and to the induced daily mobility of inhabitants are taken into account. They are compared to 2050 targets set within the *2,000-watt society* concept: red line on both adjacent graphs.

Economic viability

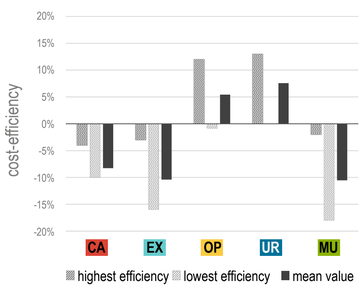


Figure 12: Average cost-effectiveness of scenarios implementation among six neighbourhoods

This indicator, assessed at neighbourhood scale, considers all actions undertaken between 2015 and 2050 for each scenario:

- Building retrofit
- New construction for a house extension
- Purchase of an empty plot of land and construction of a new building
- Construction of a second building on a plot already built
- Purchase and demolition of an existing old building and construction of a new building after demolition of a previous one

For scenarios ***Urbanity*** and ***Mutuality*** the assessment also includes:

- Purchase of land and construction of non-residential areas
- Economic profitability of non-residential areas
- Renewal and/or creation of public spaces

Social diversity

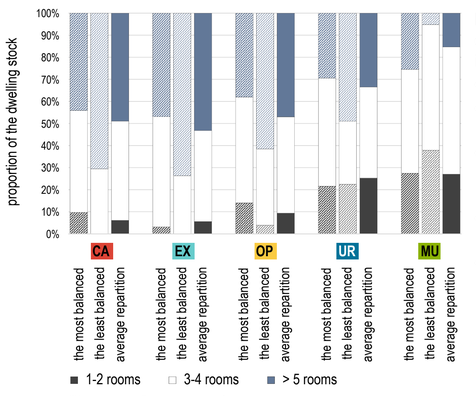


Figure 13: Repartition of dwellings according to size by number of rooms

Repartition according to current dwelling characteristics and new dwellings planned in each scenario.

- ***Caducity***: equal to repartition in 2015
- ***Exclusivity:*** new premium detached houses
- ***Opportunity***: subdivision of larger dwellings, extension of smaller dwellings, or new small or standard detached houses
- ***Urbanity***: multi-family residential buildings
- ***Mutuality***: low-rise high-density buildings

Feasibility

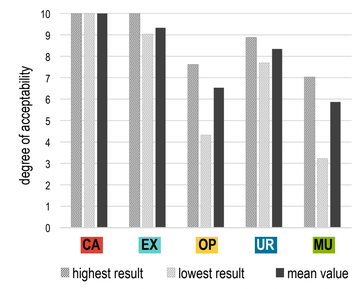


Figure 14: Degree of acceptability of actions undertaken in the implementation of the scenarios

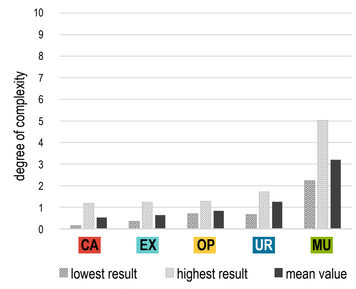


Figure 15: Degree of complexity of the implementation of the scenarios

Those indicators measure the impact of future transformations in a context of owner-occupied dwellings. They take into consideration changes in terms of densities, of property/facility management, of land management, of policy adaptation, of building footprint, etc.

Acknowledgements & contact information

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