

# GENIUS, a methodology to integer building scale data into urban microclimate and energy consumption modelling

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ENSA – École Nationale Supérieure d'Architecture  
de Toulouse, France.*

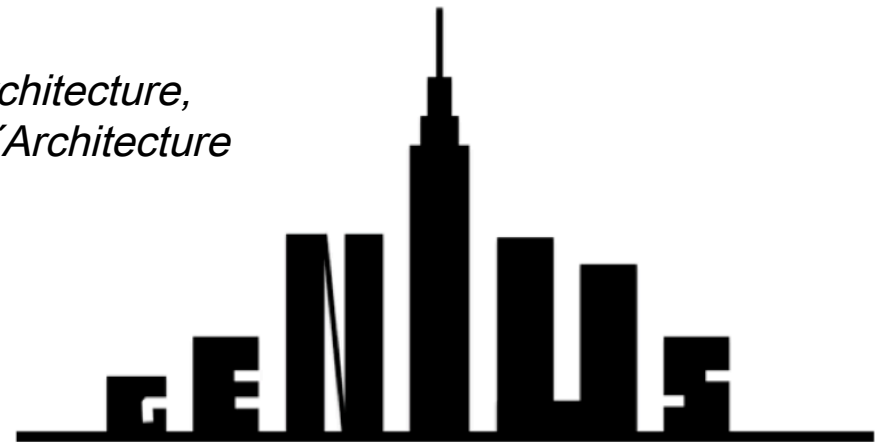


Illustration of Marion Bonhomme thesis

GENérateur d'Ilots UrbainS

GENIUS, a methodology to integer building scale data  
into urban microclimate and energy consumption modelling

Context

Problematics

1. Urban scale

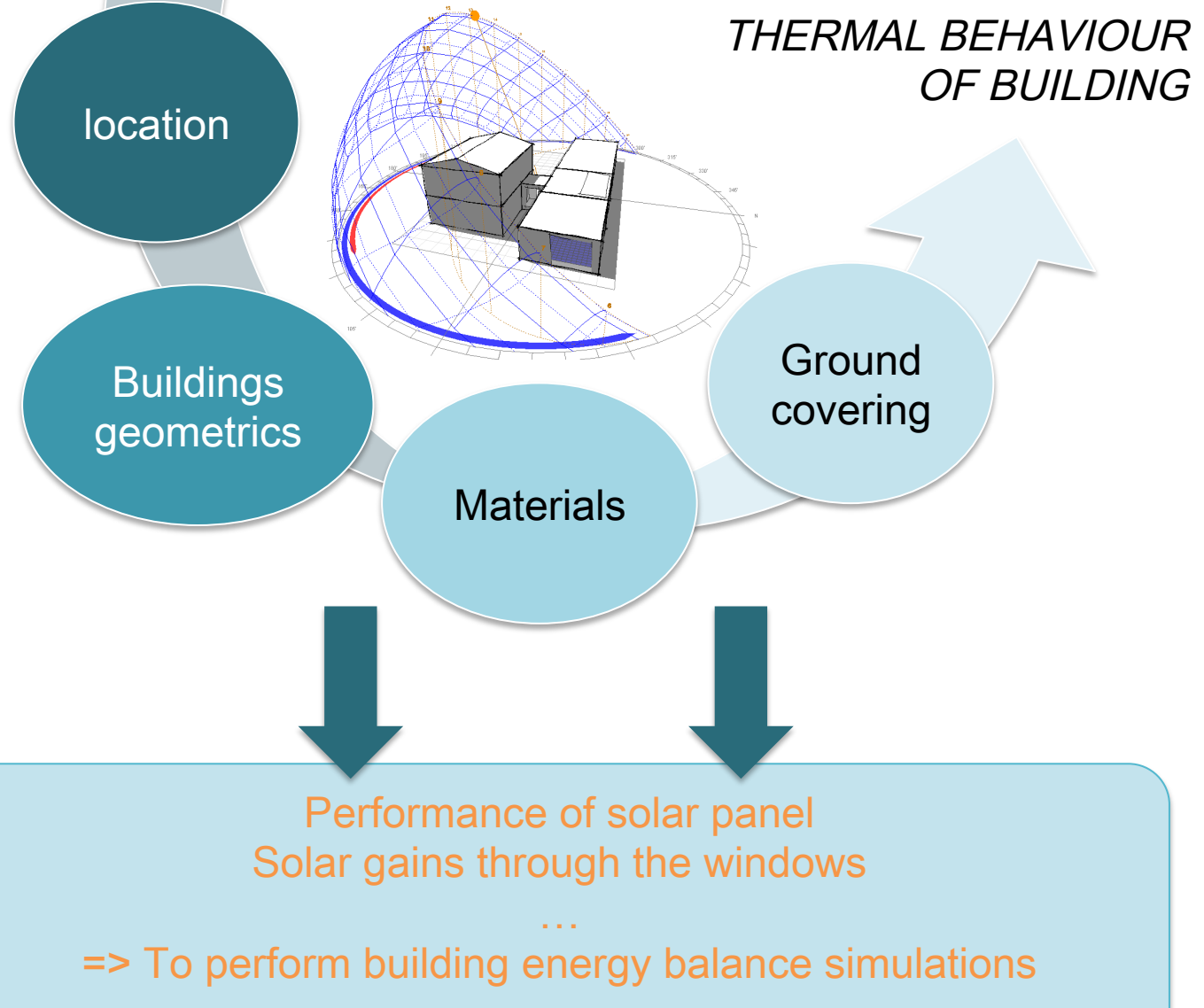
2. Building scale

3. Material scale

Development

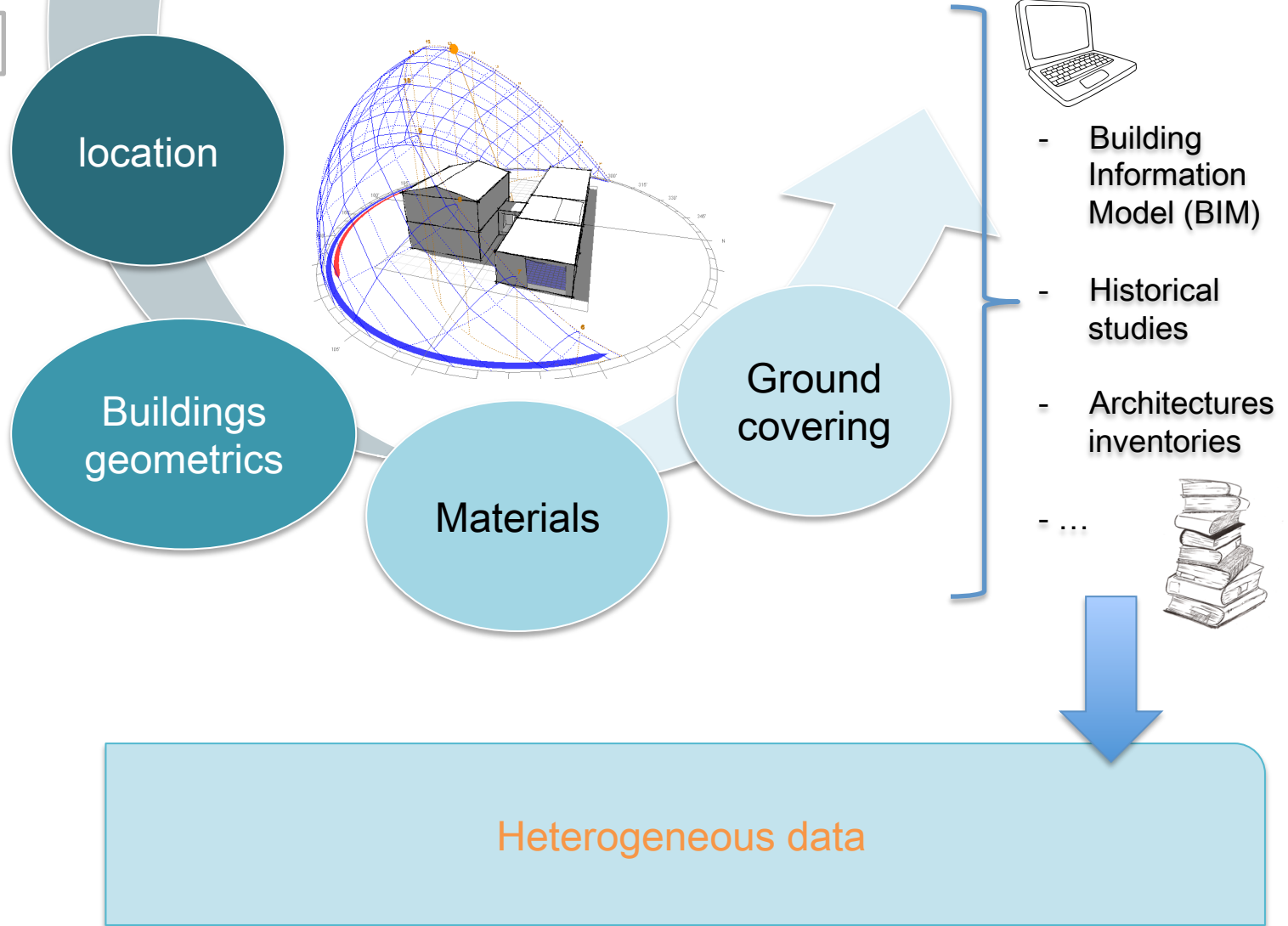
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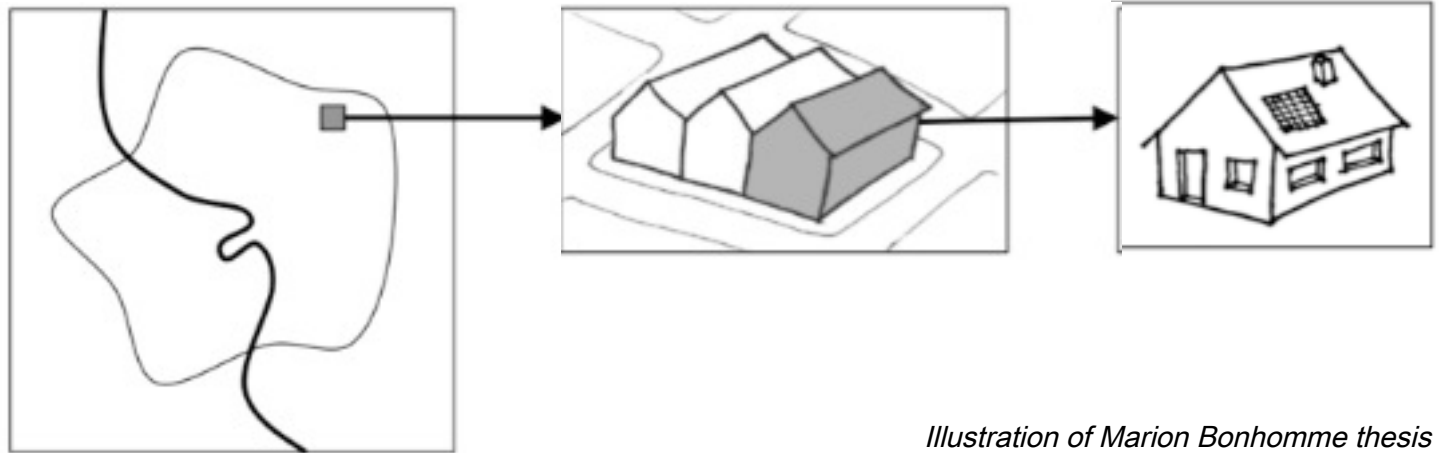
Context



# GENIUS, a methodology to integrate building scale data into urban microclimate and energy consumption modelling

Context

Problematics



*Illustration of Marion Bonhomme thesis*

How can we characterise the **building scale** in order to update, and to make full use of **urban simulation tools** ?

1.  
Urban scale

2.  
Building scale

3.  
Material scale

Context

Problematics

1. Urban scale

Method

Results

Discussion

**Method :** Interview urban planners (FNAU) about the different urban typologies in France.

**References :** Marion Bonhomme thesis

**Aim :** to take in account the vision of designers operating processes, in order to identify a system of ranking of urban typology .



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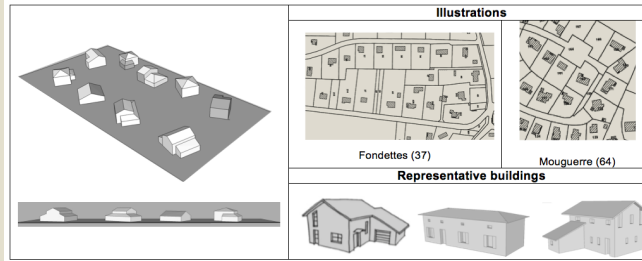
1. Urban scale

Methodology

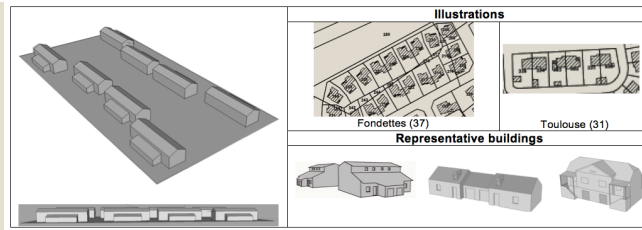
Results

Discussion

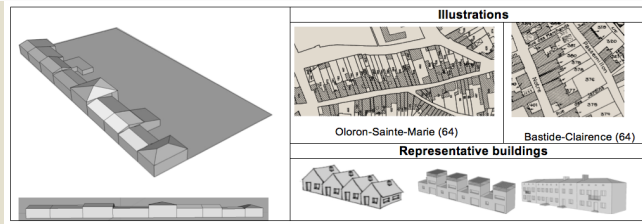
1\_ detached house



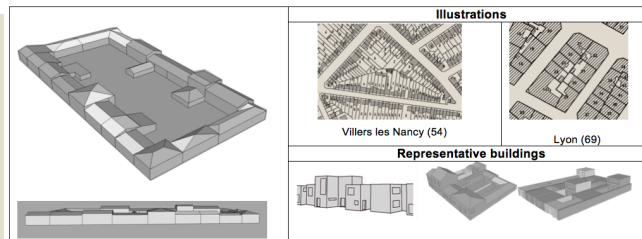
2\_ semi-detached house



3\_ row house on open island



4\_ row house on closed island



House scale

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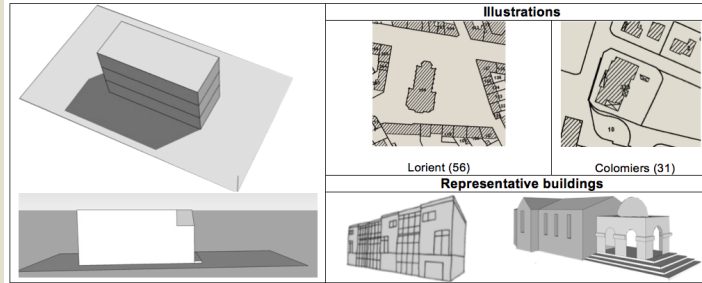
1. Urban scale

Methodology

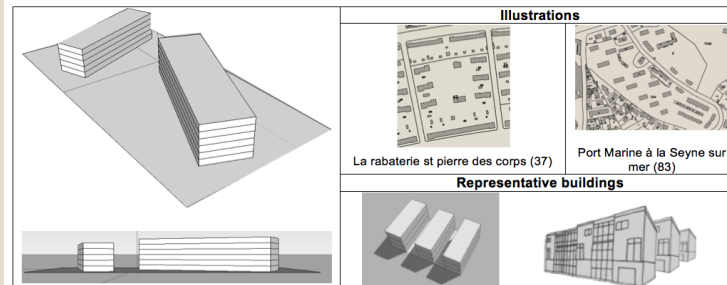
Results

Discussion

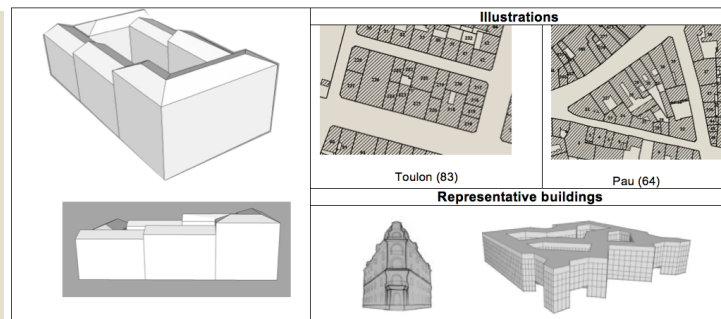
5\_ detached building



6\_ linear building on open urban island



7\_ linear building on closed urban island



Building scale



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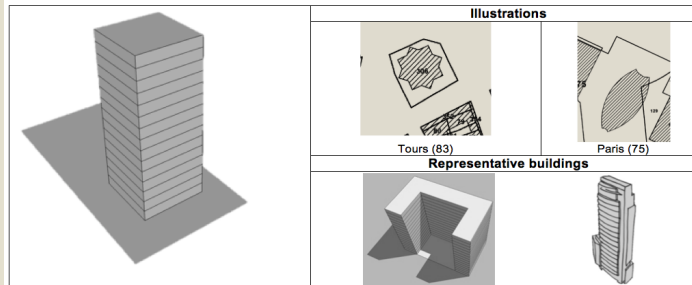
Results

Discussion

Problematics

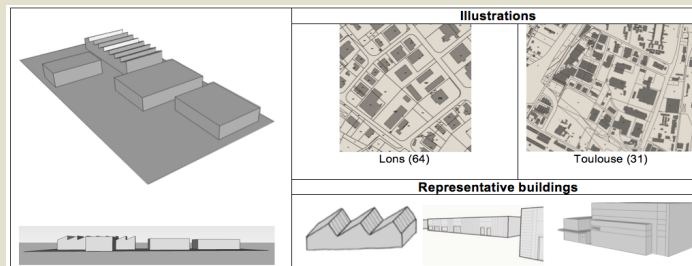
1. Urban scale

8\_ high rise building



High rise  
building

9\_ industrial building



Industrial,  
building

10\_ informal urban island

ephemeral  
constructions

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MApUCE project



1. Urban scale

urban typologies will be defined by **morphological indicators** at urban island scale

coded on the OrbisGIS/H2GIS GIS by IRSTV



This morphological indicators will be used as input **to an automatic classification** (unsupervised statistical analysis)

The method of the classification is a work in progress by LRA.



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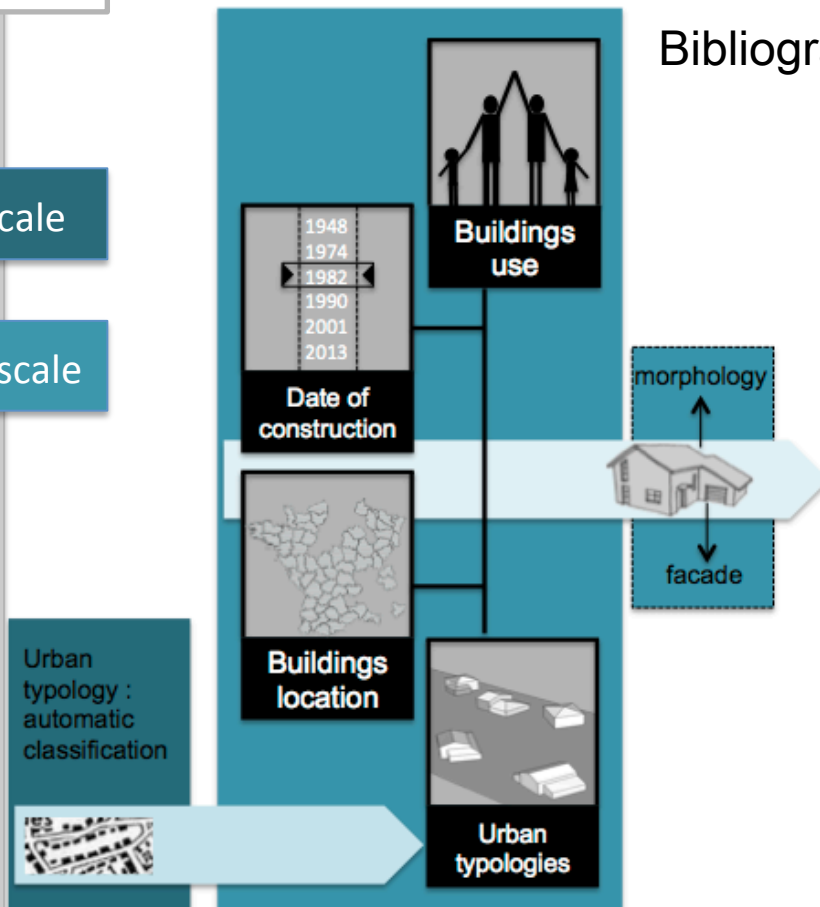
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1. Urban scale

2. Building scale



Bibliographical studies



Context

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1. Urban scale

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### Use building

Databases such as IGN (Institut Géographique National).  
Such as housing, office, religious building, castle, school, hospital...

### date of construction

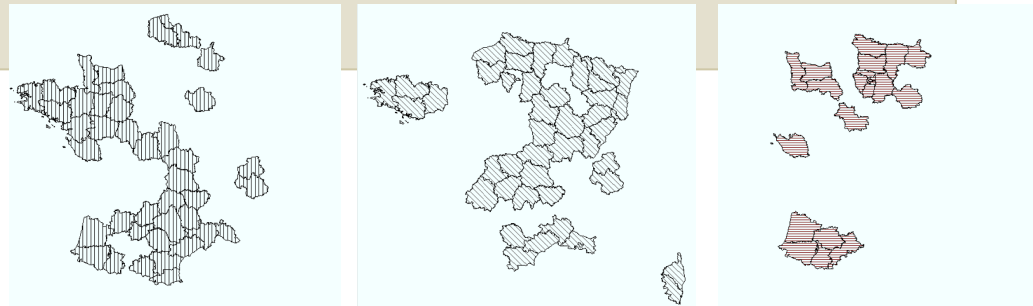
#### Thermal rules



### location building

#### Local materials

1\_schiste  
2\_meuliere  
3\_pisé



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1. Urban scale

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From input data :

- urban typology
- use building
- periods of construction
- and location

It is possible to predict typical or representative buildings  
on the territory of the France

Context

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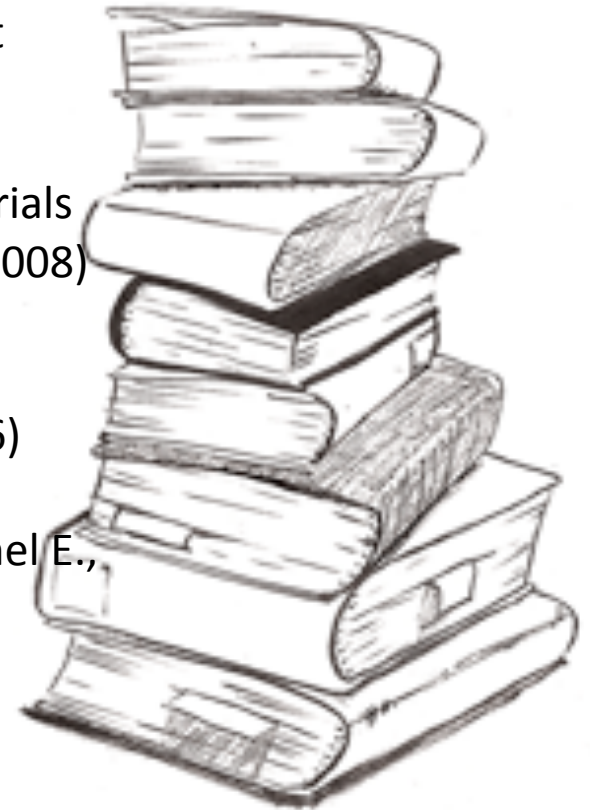
Method

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## Bibliographical studies

- “reference buildings” in France (Rapport «RAGE 2012»)
- technical works on the choice of materials (Hegger M. et Al. 2007) (Deplazes A., 2008) (Vittone R., 2010)
- works specific in uses (Brigode G, 1966) (Maillard C., 2007) (Morancé A. 1930) (Pelegriin Genel E., 2006) (Pelegriin Genel E., 2007).
- ...



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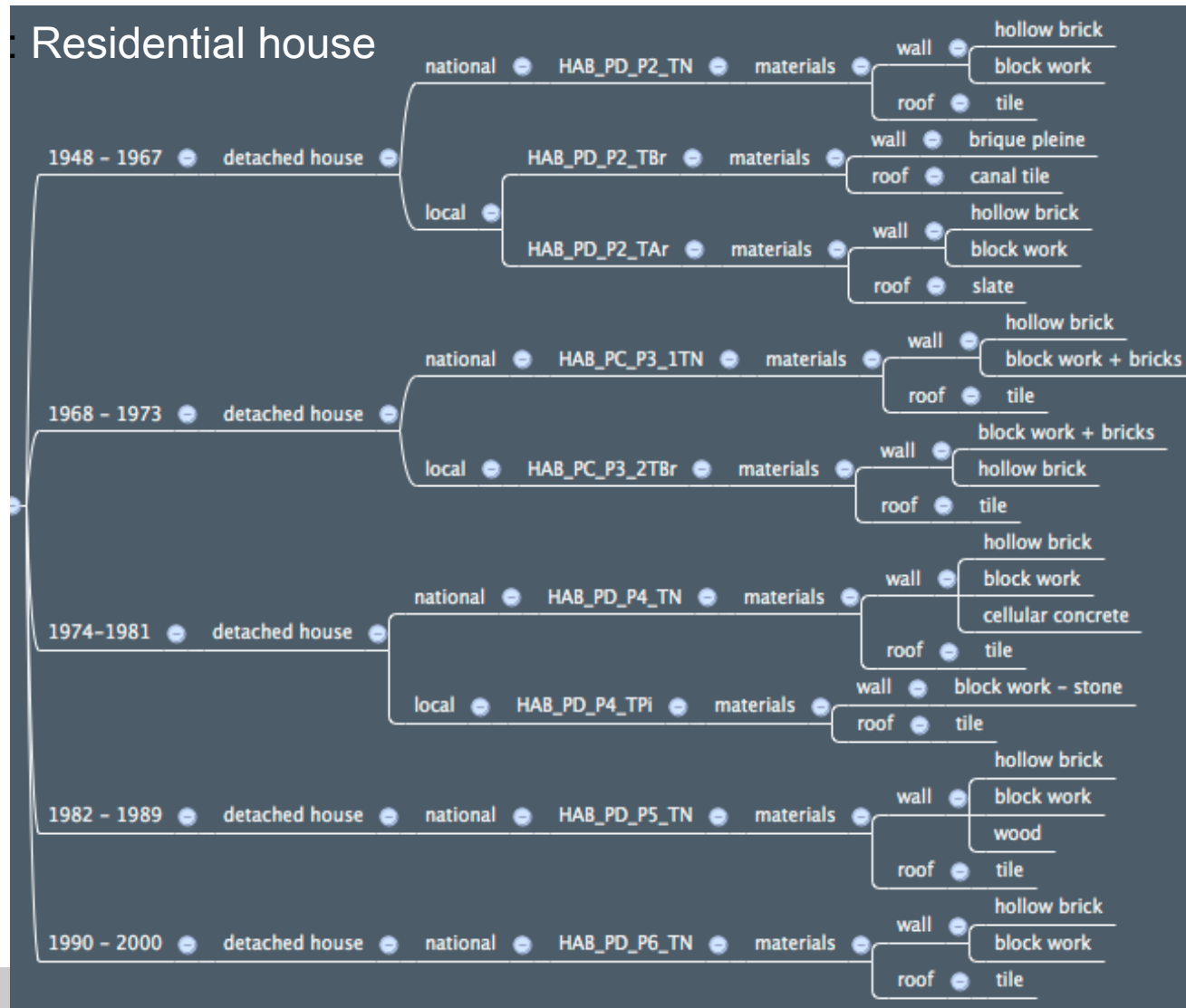
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Example : Residential house

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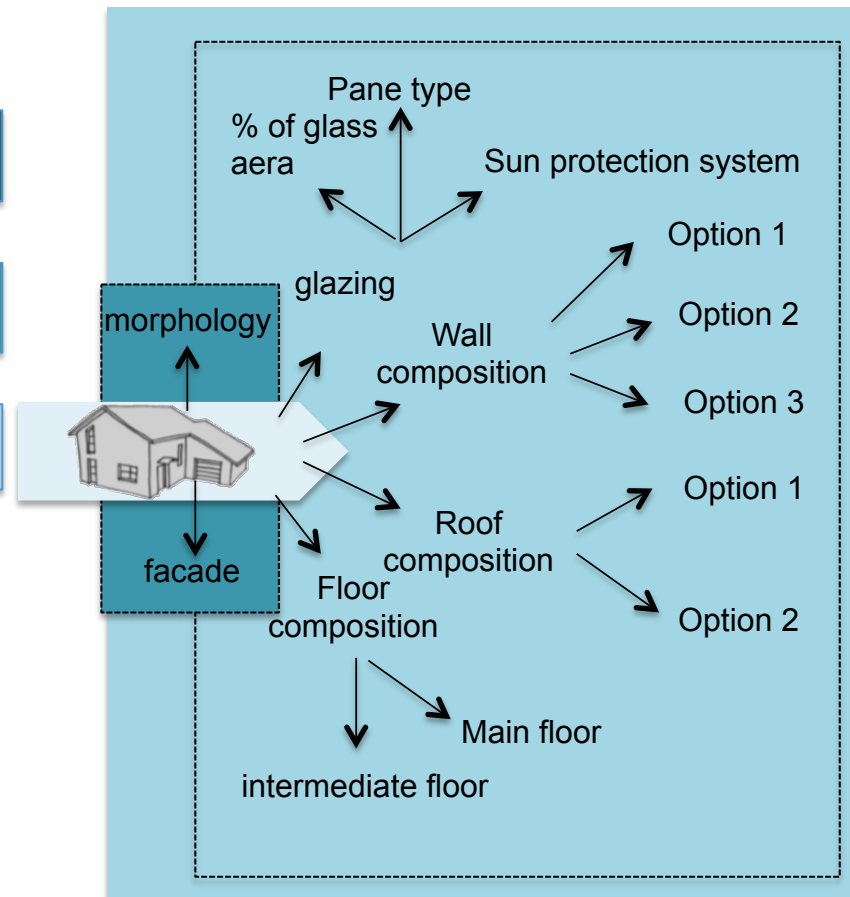
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1 urban  
typology  
+  
1 use  
building  
+  
1 date of  
construction  
+  
1 location  
  
≠  
  
one  
constructive  
system wall  
and roof.



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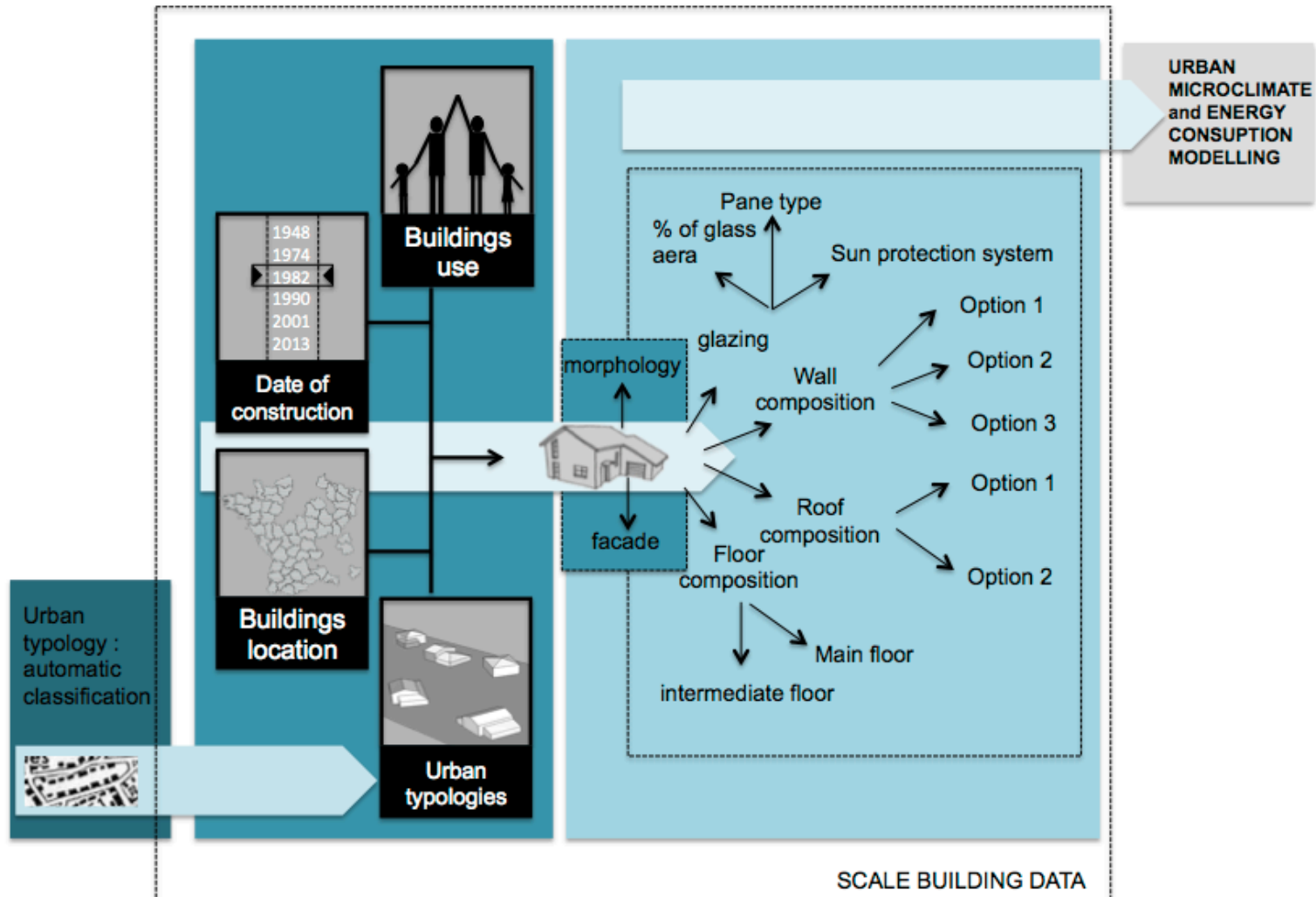
Problematics

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Development



Context

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1. Urban scale

2. Building scale

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Development

# Thank you

[nathalie.tornay@toulouse.archi.fr](mailto:nathalie.tornay@toulouse.archi.fr)