A Methodology to Identify Dispersed Occupation on a Local Scale

Jorge CARVALHO, Carina PAIS
GOVCOPP – University of Aveiro

Maio 2010
Background

How to identify Urban Dispersion on a Local Scale?
Local Scale

“Base Land Unit” (BLU)
Functional/Experiential reality
(conceptually linked to a demographic dimension suitable for local basic facilities – 1.000 to 5.000 residents)

The analyses carried out so far highlight BLUs as the most suitable unit to identify dispersed occupation on a local scale
Base Land Units Delimitation

ATTRIBUTES
BLUs are mainly delimited through:
  - their uses;
  - their functional/structural organization;
  - the presence of barriers and boundaries;
  - a minimum dimension (number of residents).

METHODS
  - “Empirical Knowledge on Cartography”
  - Statistical data
  - "Identification of Building Ensembles by Digital Method"
Base Land Units Delimitation

Évora, Portugal

Aveiro, Portugal
Base Land Units Characterization

distinguishing BLUs of dispersed occupation from other types of Units (unbuilt, concentrated...).

A methodology that comprises three steps was developed:

1. **Identification of Building Ensembles by Digital Method**;
2. **Calculation of the Disaggregation Index of Continuous Building Ensembles**;
3. **Criterion for Identifying BLUs of Dispersed Occupation**.
Identification of Building Ensembles by Digital Method

1. Method essentially digital, demanding some manual checks and additions.

2. Basic division in:
   - Continuous Ensembles
   - Dispersed Ensembles
   - Rarefied Ensembles

<table>
<thead>
<tr>
<th>Ensembles</th>
<th>Continuous ensembles</th>
<th>Dispersed ensembles</th>
<th>Rarefied ensembles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffer radius of each building</td>
<td>10m</td>
<td>45m</td>
<td>80m</td>
</tr>
<tr>
<td>Buffer radius of road sections that marginate buildings</td>
<td>40m</td>
<td>80m</td>
<td>120m</td>
</tr>
<tr>
<td>“Islands” and “Peninsulas” size</td>
<td>≤5,000m²</td>
<td>≤10,000m²</td>
<td>≤20,000m²</td>
</tr>
</tbody>
</table>
Identification of Building Ensembles by Digital Method
Overview of the application results in Évora e Aveiro-Ílhavo
Identification of Building Ensembles by Digital Method

Overview of the application results in Évora
Identification of Building Ensembles by Digital Method

Overview of the application results in Aveiro-Îlhavo
Calculation of the Disaggregation Index of Continuous Building Ensembles

Disaggregation Index of Continuous Building Ensembles (DI) index takes into consideration:

1. **The Ensemble’s Area** - the shorter an ensemble is, the bigger its disaggregation is.

2. **The Building Occupation** (implantation or construction index of the buildings incorporated into an ensemble) - the shorter the building occupation index is, the bigger the disaggregation is.

3. **The Ensemble’s Shape** an ensemble reaches the minimum disaggregation when the relation $P/\sqrt{A}$ is equal to 3.6 (corresponding to the shape of a circle); and an ensemble reaches the maximum disaggregation when $P/\sqrt{A}$ is equal to 13.6.
Calculation of the Disaggregation Index of Continuous Building Ensembles

**DI Mathematical Formula**

- **Ensemble Area**
  \[ A_i = 1 - 0,1 \sqrt{A} \]
  - \( A_i = 0 \) when \( A \geq 100 \text{ ha} \)
  - \( A_i = 1 \) when \( A < 1 \text{ ha} \)

- **Building Occupation**
  \[ B_i = 1 - 2 \cdot \frac{I}{A} \]
  - \( B_i = 0 \) when \( I/A \geq 0,5 \)
  - \( B_i = 1 \) when \( I/A = 0 \)

- **Ensemble Shape**
  \[ S_i = 0,1 \cdot \frac{P}{\sqrt{A}} - 0,36 \]
  - \( S_i = 0 \) when \( P/\sqrt{A} \geq 13,6 \)
  - \( S_i = 1 \) when \( P/\sqrt{A} \geq 3,6 \)

\[ \text{Disaggregation Index} \]
Disaggregation Index of Continuous Building Ensembles
Overview of the application results in Évora e Aveiro-Ílhavo
Criterion for Identifying BLU of Dispersed Occupation

1. Medium/low “Urbanisation Degree” (relation between the ensembles area and the BLU area).

2. Concomitantly, a BLU of dispersed occupation must have, at least, one of these conditions:

   - Significant Presence of Dispersed Ensembles.

   - and/or Continuous Ensembles with high Disaggregation Index.
Criterion for Identifying BLU of Dispersed Occupation

1. “Urbanisation Degree” $\geq 0.07$ and $\leq 0.35$.

$$UD = \frac{[C \times (1 - d_i/2)] + (D \times 0.4) + (R \times 0.2)}{LBU\ Area}$$

2. Concomitantly:
   - Dispersed Ensemble’s area $> \text{Continuous Ensembles area}$.
   - Average of the Disaggregation Index of Continuous Ensembles $> 0.7$. 
Urbanisation Degree
Overview of the application results in Évora e Aveiro-Ílhavo
Methodology to Identify Dispersed Occupation on a Local Scale

Characterise and typify BLUs, finding specific dispersion morpho-typologies
Thank you for your attention