Mapping the Gross Potential for Cycling: a tool to support planning for cycling in starter cities

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CITTA/ FEUP
CHALLENGES

- Residual use of bikes (little critical mass)
- Car-centric societies and car-centric planning
- Limited cycling infrastructure (often leisure oriented)
- Resistance at public, political and technical levels
- Lack of research, data and planning methods specifically focused on starter cycling cities.

Source: PRESTO (Dufour, 2010)
### Current State

Employed and student population that uses the bicycle as the main transport mode for commuting (inside and outside the municipality)

### Cycling Modal Share

- 0.0% - 0.5%
- 0.6% - 1.0%
- 1.1% - 2.5%
- 2.6% - 5.0%
- 5.1% - 10.0%
- > 10.1%

National average: 0.5%

### 2030 Targets

**National Strategy for Cycling Active Mobility 2019-2030**

- 7.5% of commuting trips in the whole national territory
- 10% of commuting trips in cities

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*Source: INE, Census 2011*
BooST’s Objectives

- Bridging the gap between planning research and practice
- Providing specific technical know-how for enhancing decision-making processes - urban planners as the main target group
- Breaking with resistance
- Boosting cities to reach the next level of bicycle use...

GPC – Gross Potential for Cycling

- Local scale
- Regional/ National scale (Portuguese Bike Industry Cluster)

EVC – Economic Value for Cycling

CMS – Cycling Measures Selector

Support the identification and packaging of Measures according to specific contexts and objectives
# State-of-Art

<table>
<thead>
<tr>
<th>Models for assessing cities’ cycling potential</th>
<th>Examples</th>
<th>Applicability to Starter Cities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a) Tools assessing the existing cycling environment/ infrastructure</strong></td>
<td>Copenhagenize Index (Colville-Andersen 2018); Index of city readiness for cycling (Zayed 2017)</td>
<td>Assess pre-existing cycling infrastructure; only provide city wide averages, not disaggregated analysis</td>
</tr>
<tr>
<td><strong>b) Tools forecasting potential demand for bicycle commuting</strong></td>
<td>Propensity to Cycle Tool (Lovelace et al 2017); Analysis of Cycling Potential (TfL 2010, 2017)</td>
<td>Require data that often are not available for starter cities, such as origin-destination pairs or survey data on current travel patterns</td>
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<tr>
<td><strong>c) Micro-scale indicators assessing streets compatibility with cycling</strong></td>
<td>Levels of traffic stress (Mekuria, Furth, &amp; Nixon 2012); Bike Network Analysis; Bicycle Compatibility Index (Harkey et al. 1998); Bikeability indexes</td>
<td>Require large amounts of data, making it difficult to assess large areas; do not consider socioeconomic factors</td>
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</table>
Main novelty: focus on the **gross potential**, rather than previous travel patterns, the level of existing cycling infrastructure or user satisfaction, as commonly used for ‘champion cities’.

- Draws on the Cycling Potential Assessment Method (CPAM)
  Generation.Mobi (Silva et al. 2019)

**Reveal the potential for cycling of a city – 2-dimensional approach:**
- **Target-Population**
  - What is the population with higher potential to cycle and where do they live?
- **Target-Areas**
  - What are the physical conditions that favour cycling and where can they be found?

**Overcome the political/planning scepticism towards cycling**

**Support the development of evidence-based cycling policies** (specific for each city)
**Gross Potential for Cycling**

**INDICATORS**

- **P1. Age**
- **P2. Population Density**
- **P3. Employment Density**
- **P4. Amount of Drivers**
- **P5. Average Trip Distance**

**Target Population**

- **Circulation Conditions**
  - Cycling Infrastructure
  - Road Hierarchy
  - Road Network speed
  - Accidents
  - Topography (Slopes)

**Target Area**

- **A1. Accessibility to Education Facilities**
- **A2. Accessibility to centralities**
- **A3. Accessibility to PT**
- **A4. Relative Accessibility to Car**
- **A5. Connectivity**
- **A6. Occupation Diversity**

**Approach to Urban Areas**

- Cities
- Towns and Suburbs
### Case Study: Matosinhos

**Source:** INE, Census 2011

<table>
<thead>
<tr>
<th>Transport mode</th>
<th>Modal share (%)</th>
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</thead>
<tbody>
<tr>
<td>Walking</td>
<td>16.1</td>
</tr>
<tr>
<td>Cycling</td>
<td>0.4</td>
</tr>
<tr>
<td>Public Transport</td>
<td>20.2</td>
</tr>
<tr>
<td>Private Motor Vehicle</td>
<td>61.9</td>
</tr>
<tr>
<td>Others (taxi, company/school collective transport)</td>
<td>1.4</td>
</tr>
</tbody>
</table>

"Half a million cars chokes Porto every day" *(JN 30 October 2019)*
**Population Density**

- 5: > 8805 inhabitants / km²
- 4: 4842 – 8805 inhabitants / km²
- 3: 1500 – 4842 inhabitants / km²
- 2: 820 – 1500 inhabitants / km²
- 1: < 820 inhabitants / km²

**Surrounding Urban Areas**

**Employment Density**

- 5: > 1472 employments / km²
- 4: 685 – 1472 employments / km²
- 3: 274 – 685 employments / km²
- 2: 79 – 274 employments / km²
- 1: < 79 employments / km²

**Urban Centres**
Accessibility to Education Facilities

- Below 5 min (BE and SE) or 10 min (HE) or 15 min (HE)
- Between 5-10 min (BE and SE) or 10-15 min (HE)
- Between 10-15 min (BE and SE) or 15-20 min (HE)
- Between 15-20 min (BE), 15-25 (SE) or 20-30 min (HE)
- Above 20 (BE), 25 (SE) or 30 min (HE)

Accessibility to Centralities

- Less than 5 min (SC) or 10 min (PC)
- Between 5-7.5 min (SC) or 10-15 min (PC)
- Between 7.5-10 min (SC) or 15-20 min (PC)
- Between 10-15 min (SC) or 20-30 min (PC)
- Above 15 min (SC) or 13 min (PC)

Accessibility to Public Transport

- Less than 2.5 min
- Between 2.5 and 5 min
- Between 5 and 7.5 min
- Between 7.5 min and 10 min
- Above 10 min
Relative Accessibility Car/Bicycle (5min)

- **Acc by Bike 1.2x Acc by Car**
- **Acc by Bike 1.2 – 1x Acc by Car**
- **Acc by Bike 0.8 – 1x Acc by Car**
- **Acc by Bike 0.4 – 0.8x Acc by Car**
- **Acc by Bike 0.4x Acc by Car**
- **No Population**

Connectivity (Average Block Size)

- **< 8.000 m²**
- **8.001 – 20.000 m²**
- **20.001 – 80.000 m²**
- **80.001 – 200.000 m²**
- **> 200.0017 m²**
- **No Population**

Occupation Diversity

- **5** All 9 types of activities in a 500 m radius
- **4** Between 7 and 8 activities in a 500 m radius
- **3** Between 4 and 6 activities in a 500 m radius
- **2** Between 1 and 3 activities in a 500 m radius
- **1** No activities in a 500 m radius
GPC – Aggregated Map

**Indicators**

- Overall Cycling Potential
- Target-Population and Areas
- Age
- Car Users as Drivers
- Population Density
- Employment Density
- Accessibility to Education Facilities
- Accessibility to the Centralities
- Accessibility to Public Transport
- Relative Accessibility to Car
- Connectivity
- Occupation Diversity

**Decision Making Process**

- Testing different scenarios
- Location of new infrastructures
- Identifying complementary measures
- Understanding and addressing the city’s potential and constraints to increase cycling as a relevant mode of transport
Library of Mobility Management Measures aimed at promoting cycling in Starter Cycling Cities

Inspiration:
- Konsult, TDM Encyclopedia of Victoria Transport Policy Institute

Support the creation of packages of measures and the development of cycling plan (specific for each city/ institution)

Connected to the Gross Potential for Cycling
Cycling network
Safe and efficient intersections
Bike parking network
Cyclists’ Support Infrastructure
Limited-speed zones
Car connectivity restrictions
Horizontal and vertical road deflections
Road narrowing
Limited car access areas
Car-free areas
Car parking restrictions
Management, maintenance and monitoring
Bike sharing
Integration of bicycle in public transport
Organization mobility management
School mobility management
Urban logistic and services
Information
Education for mobility by bicycle
Education for mobility in a cycling environment
Cycling classes
Bike events and parties
Branding
Multimedia and social networks
Temporary cycling streets
Parking pricing for vehicles
Financial incentives to cycling
Road user charging
Urban sprawl restrictions and rectifications
Connect people and schools
Connect people and urban transport
Infrastructure
Management and Services
Attitudes and Behaviours
Finance
Land-Use
Next Steps:

• **Case Studies & workshops** with 25 Portuguese municipalities – *participatory process* opening up space for collaboratively improving and implementing the tool

• Negotiating access to data/ not open data

• **National Ranking** of cities GPC?

• **Starter Cycling City Roadmap** articulating GPC – EVC – CMS
THANK YOU FOR YOUR ATTENTION

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