Deployment of bicycles in a MaaS system

By
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BINAMICS Bicycle Technology
TGVelo: Measuring the Quality of an Electric Bicycle

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Alternatives in mobility
Mobility
Climate
Energy
Jams
Safety
Spaces

Electric / Hydrogen / CNG,...
Climate
Energy
Jams
Safety
Spaces

Electric cars

Autonomous vehicles
Climate
Energy
Jams
Safety
Spaces

Electric cars
Autonomous vehicles
Public transport
Climate
Energy
Jams
Safety
Spaces

Electric cars
Autonomous vehicles
Public transport
Hyperloop
Climate
Energy
Jams
Safety
Spaces

Less emissions
Less energy use
Improved organisation (MaaS, Swarms, PT)
Less speed/mass or separation
Less and/or smaller vehicles
Modal shift
Mobility distances

Source figures: “Onderzoek Verplaatsingsgedrag Vlaanderen”
mobielvlaanderen.ovg
BUT!

Luggage?
Distances?
Weather conditions?
Children?
Party dresses?
Testosteron?
Fear?
Habits?
Need for speed?
Lack of power?
Status?
Mastering the two-wheeler?
Insurance?
Law?
Protection?
Quality?

...
Mobility Mix

Source figures: “Onderzoek Verplaatsingsgedrag Vlaanderen” mobielvlaanderen.ovg
Modal shift
Bicycles in MaaS: Development needed
Usability

- Distances
- Luggage
- Passengers
- Multi-modality
Bicycles suited for MaaS

• # bodies and preferences
• Locking, charging, location
• Maintenance
Attractiveness

• Image!
• Dry & Warm!
• Luggage!
• Safety!
• Dependable!
Legislation

• People learn the traffic code only when they want to drive a car

• Traffic code is complicated

• System with classification is discriminating the weaker

• Traffic code is good when traffic is separated
Infrastructure

• Separated traffic works in Holland, Denmark and Flanders

• The cost for separated bicycle infrastructure in the rest of Europe is very high

• Bicycle infrastructure must be fine-grained, is in contradiction with highways
Business Models

- Renting bikes at low cost?
- Only bikes in cities?
- Renting specialised and expensive bikes?
- Keeping specialised bikes outside 24/24?
- Peer to peer sharing?
- Bicycle fleets for events?
Light vehicles: Innovation Possibilities
Bicycle assets:
- Simple
- Versatile
- Traditional

“The bicycle is one of the finest examples of engineering design all time. It uses so little in the form of material or resources to produce, yet it does so much so efficiently. Cheap healthy transport, enjoyable leisure, exciting sport and no harmful side effects. In fact, the best our little planet has to offer”

Mike Burrows
Bicycle design, 2008
Safety!
Communication  Radar  Concentration

Weather forecast  Panic button  Anti-fall equipment
Length & Posture
Energy & Power
Motors
Resistance
Battery

Speed
Range
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<tr>
<th>100W Human Power</th>
<th>Speed</th>
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<tbody>
<tr>
<td>City bike</td>
<td>12km/h</td>
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<tr>
<td>Slope</td>
<td>1%</td>
</tr>
<tr>
<td>Wind</td>
<td>10km/h</td>
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5 km/h: 1 to 2 beaufort
10 km/h: nearly 3 beaufort
1%: 1m climb on 100m
<table>
<thead>
<tr>
<th>100W human power</th>
<th>Design Speed (km/h)</th>
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<tbody>
<tr>
<td>City Bike</td>
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<tr>
<td>12</td>
<td>20</td>
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<tr>
<td>Racing Bike</td>
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<td>Design Speed (km/h)</td>
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<td>31</td>
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<td>36</td>
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<tr>
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<td>Design Speed (km/h)</td>
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<td>Racing Bike + 250 W</td>
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<tr>
<td>Velomobile + 250 W</td>
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Learnings

Choose the motor wisely

Don’t mention range, use available energy instead

Promote and show the original bicycle character

The motor controller contains interesting innovation chances

Motor efficiency is more important than battery capacity
Intermezzo:

Difference between front wheel motor and mid motor
Electric bicycle assets:

+ Faster
+ Stronger
+ Electricity

- Weight
- Dependency
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<tr>
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<th>Gebruik</th>
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<td>Uitwisselbaarheid</td>
<td>Regeling motorvermogen</td>
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<td>Standaardisatie</td>
<td>Fiets aan de hand</td>
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<tr>
<td>Vork / kader</td>
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<td>Effectiviteit pikkel</td>
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