

# Effect of speed pedelecs on planning, designing and building

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**5<sup>th</sup> Cycle Highway academy**

Leuven

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# Who am I?

- researcher on speed pedelecs since 2012
- from September on lecturer *Energy Technology* @ Odisee
- member of *Scientists for Cycling* network
- board member of LEVA-EU



What do we know about  
the speed pedelec?



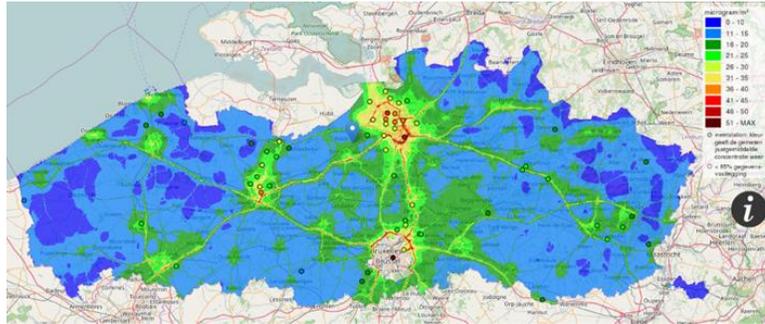
# Belgian commuters do buy it

- sales numbers show clear interest
  - 2041 registered in 2016
  - over 6 700 registered in 2017 (⇔ 2 713 electric cars)

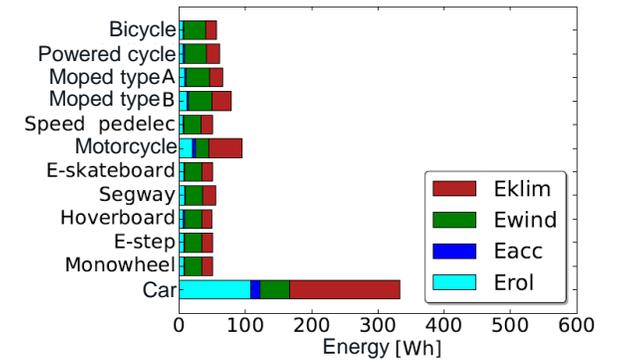
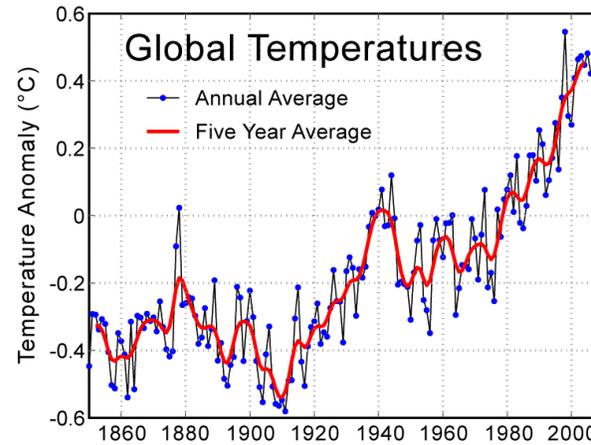
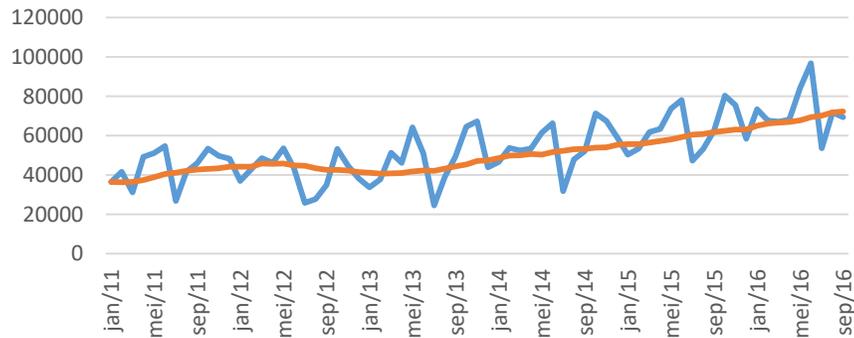
→ offers alternative for car commuting



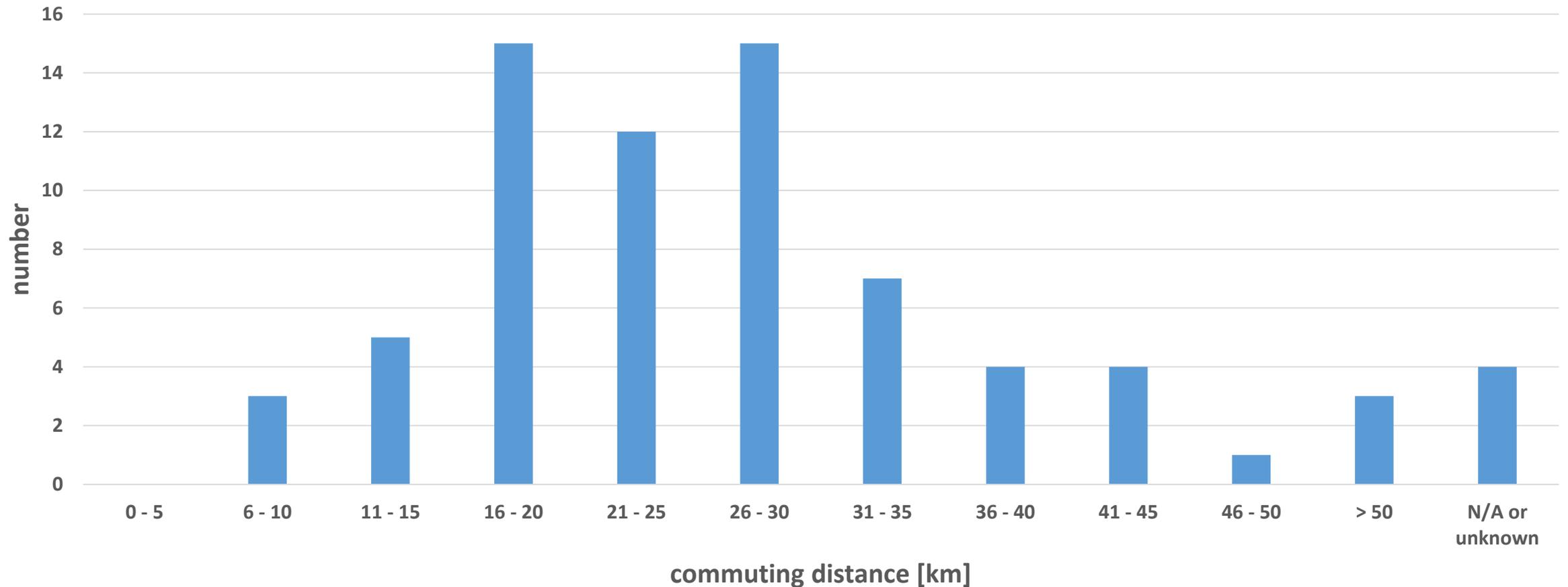
# Social advantages



Hours lost in traffic

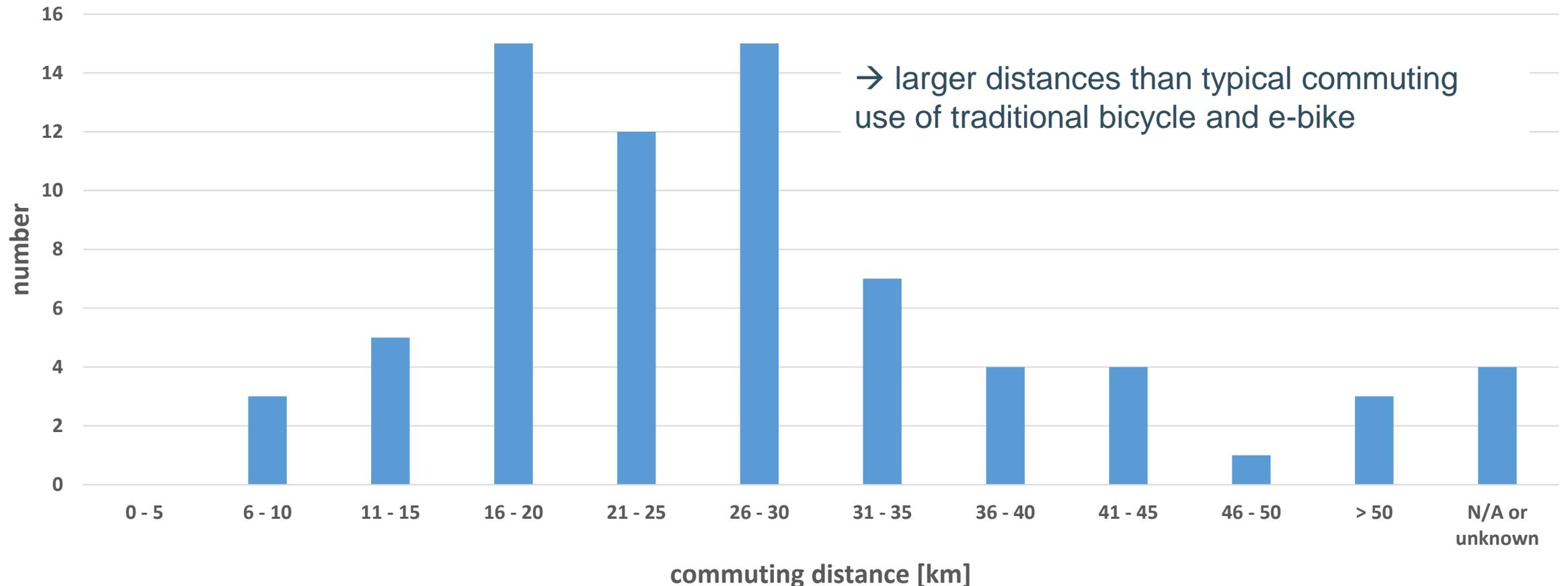


# Typically used for commuting



Rotthier B., Huyck B., Dikomitil L., Motoasca E., Cappelle J. (2016). *Social benefits and legislative challenges of speed pedelecs*. Velo-city Global 2016. Taipei, February 27 - March 1 2016.

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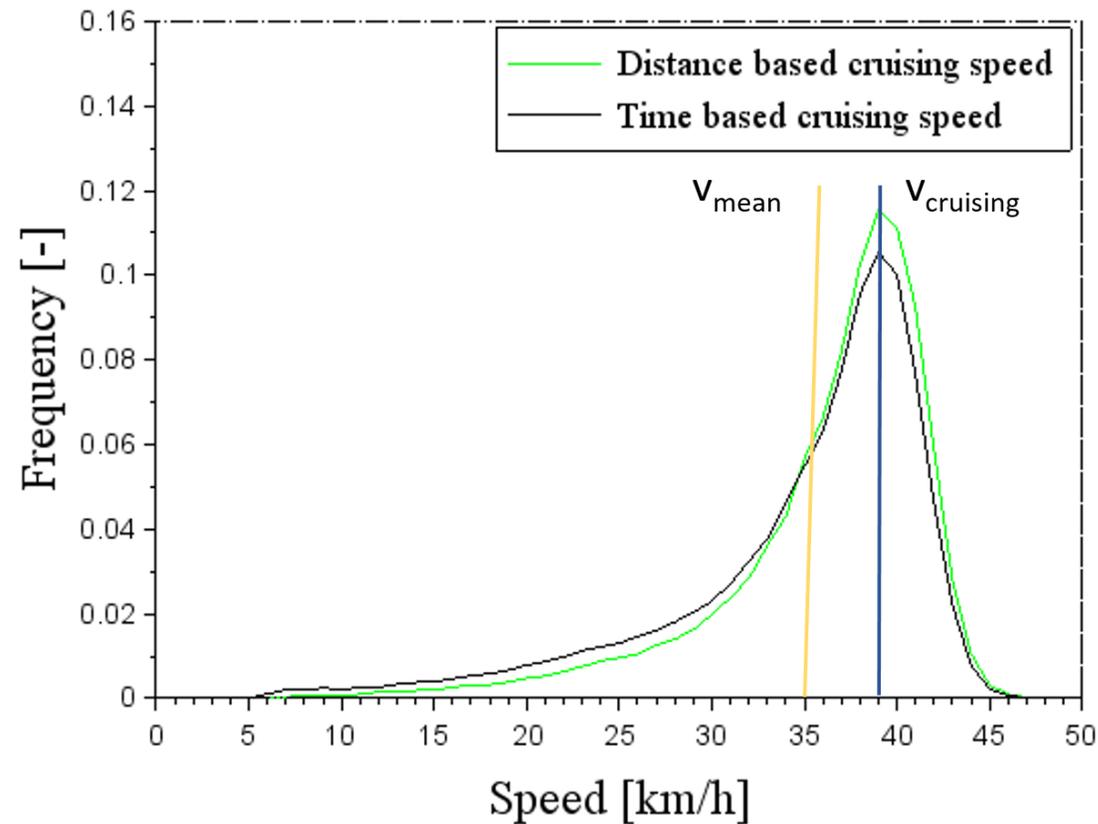
# Personal advantages

- commuting time competitive with car commuting or public transport
- low variation in commuting time
- cost
- sport
- fun
- ...

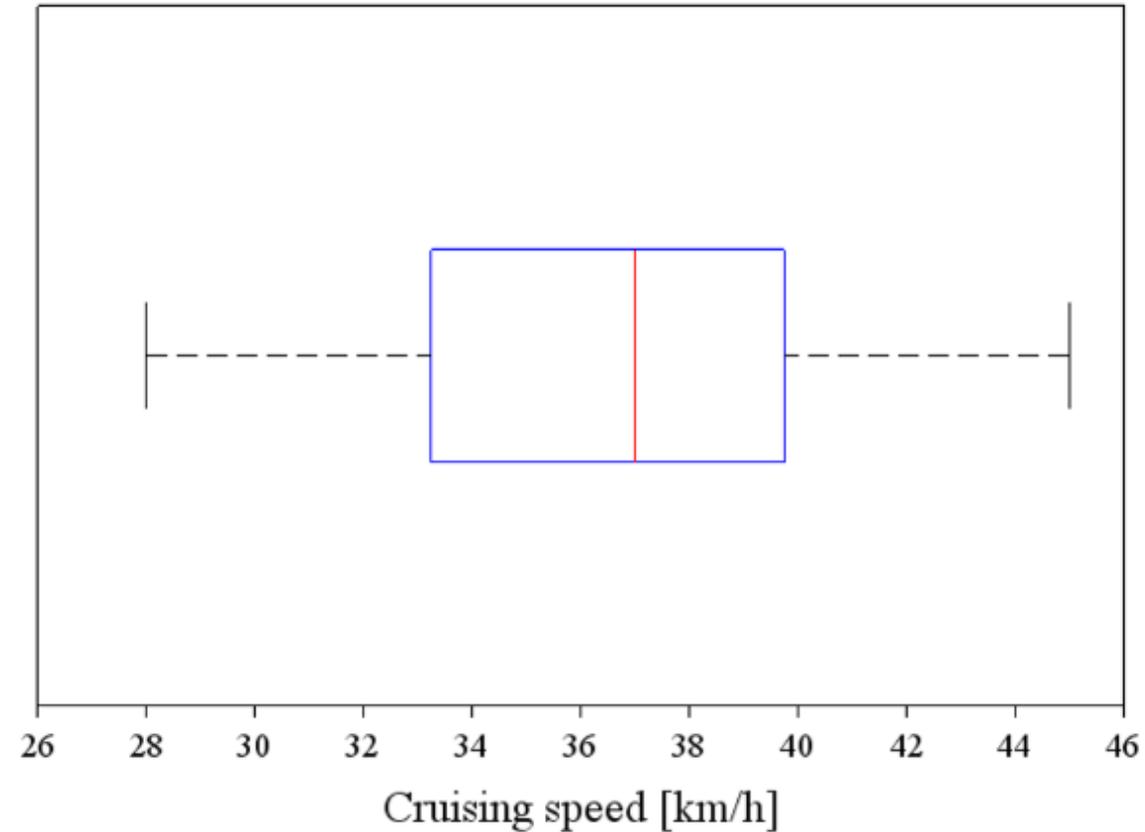


What is the typical speed of a speed pedelec user?

# Cruising speed of speed pedelec users

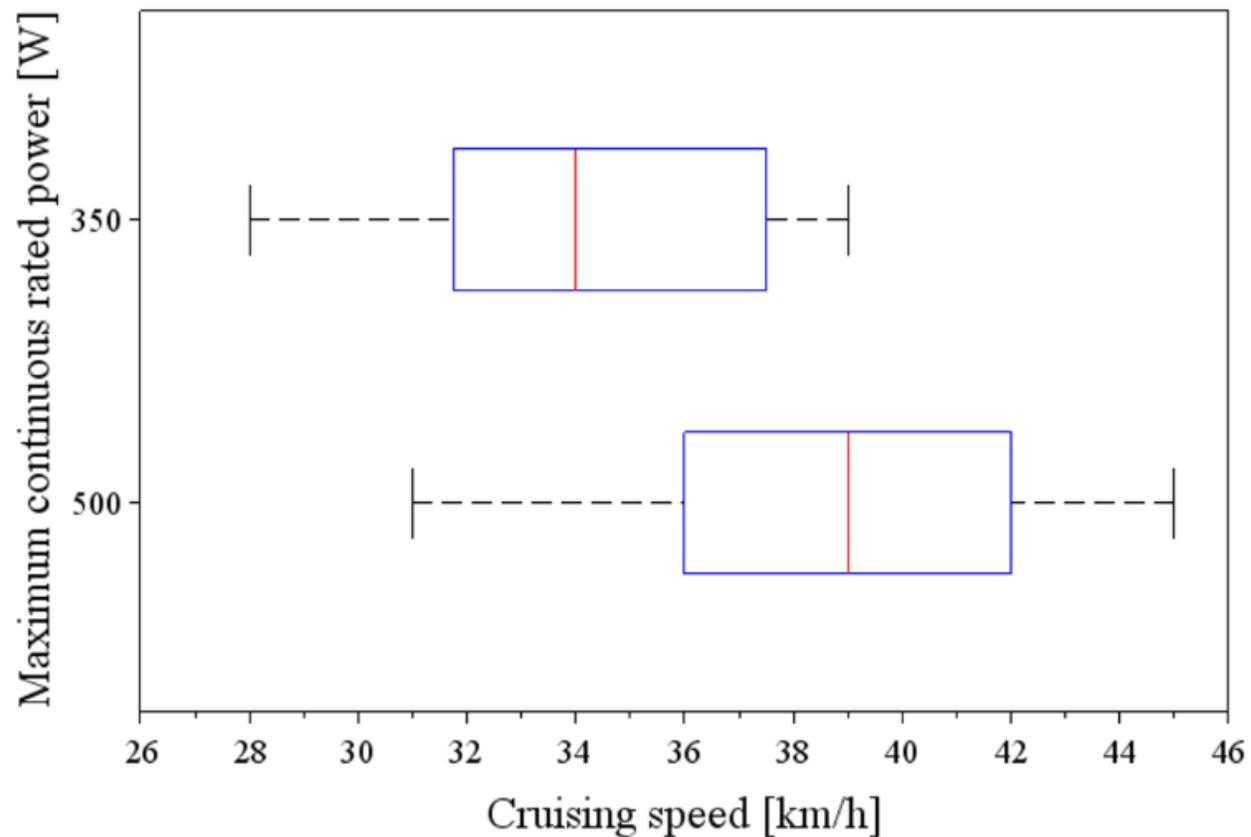


# Cruising speed of speed pedelec users



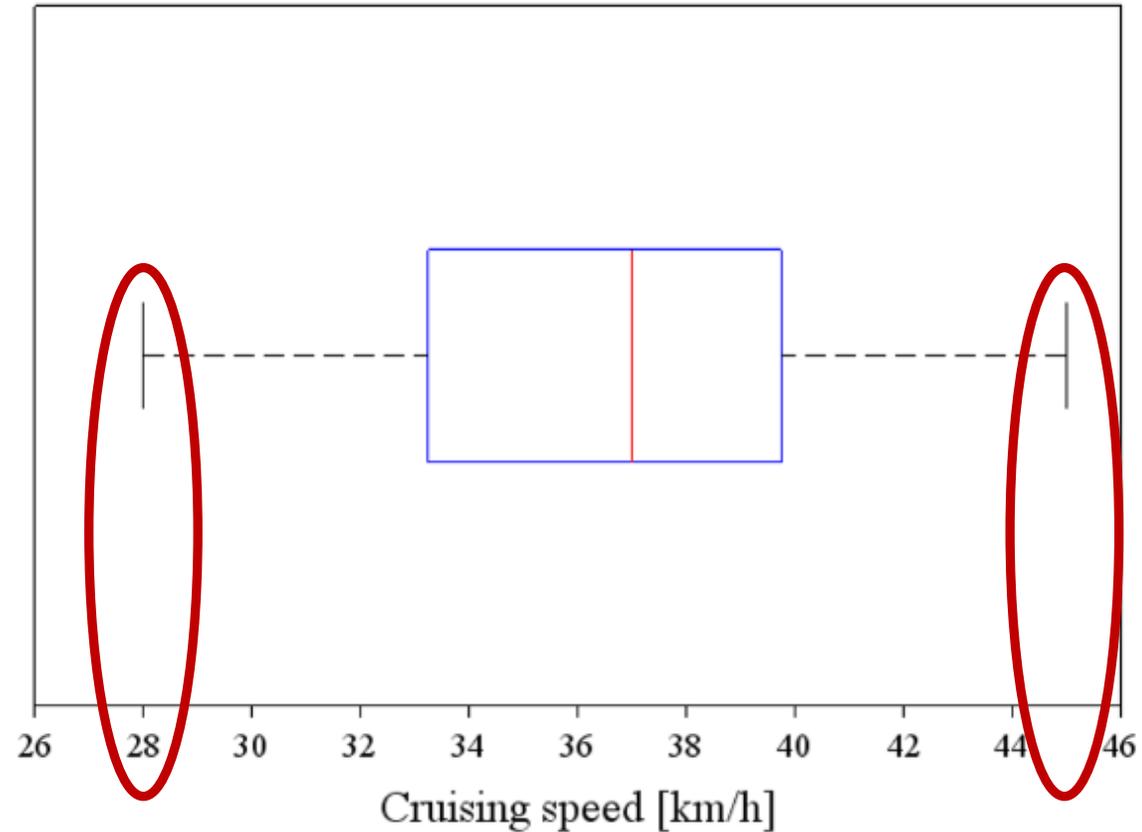
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# Cruising speed of speed pedelec users (350W ↔ 500W)

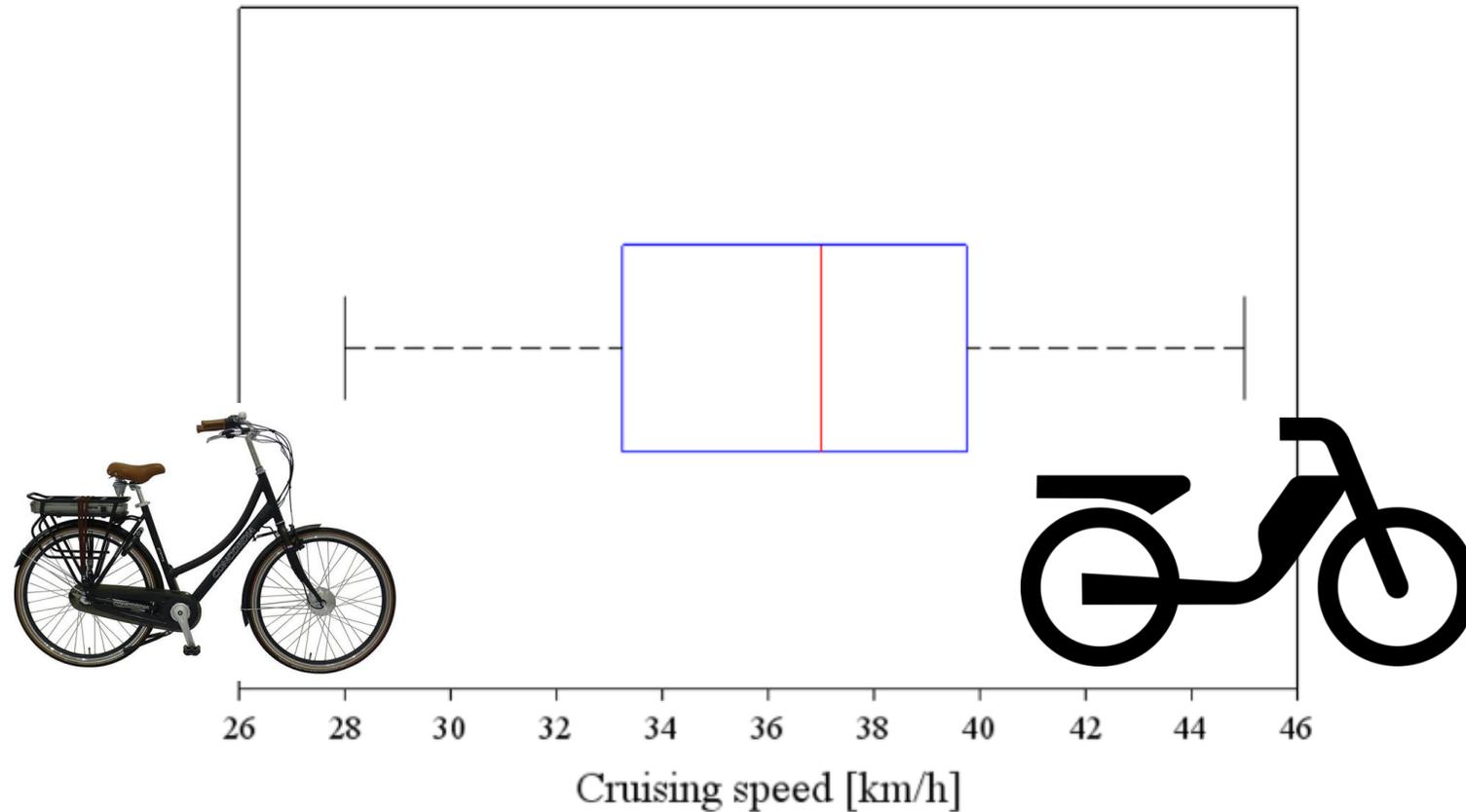


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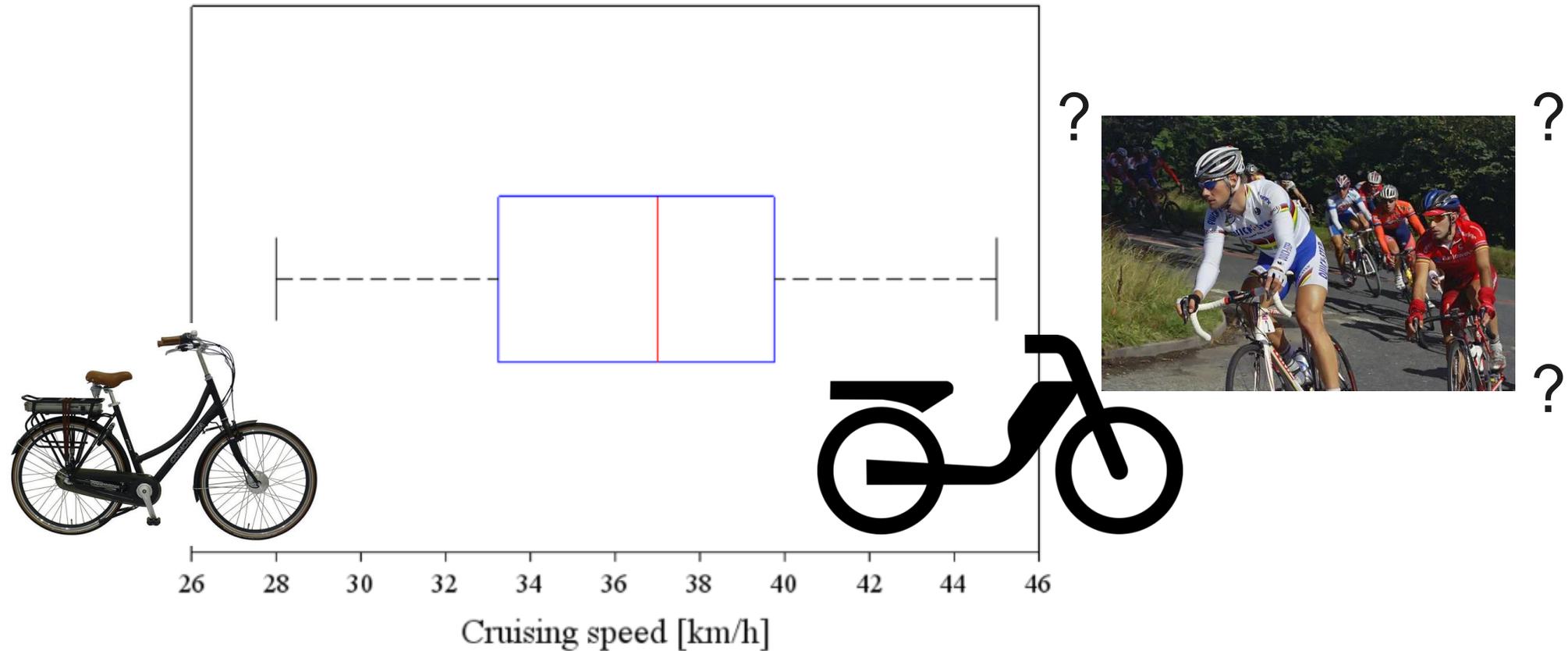
# Cruising speed of speed pedelec users



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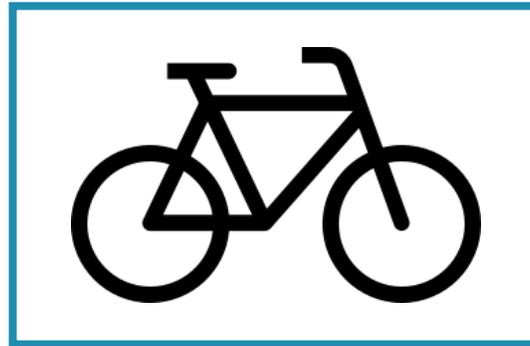
What about legislation?



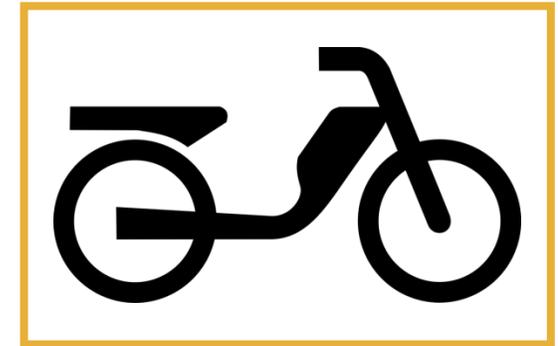
# Bike lane users in Belgium



Pedestrians

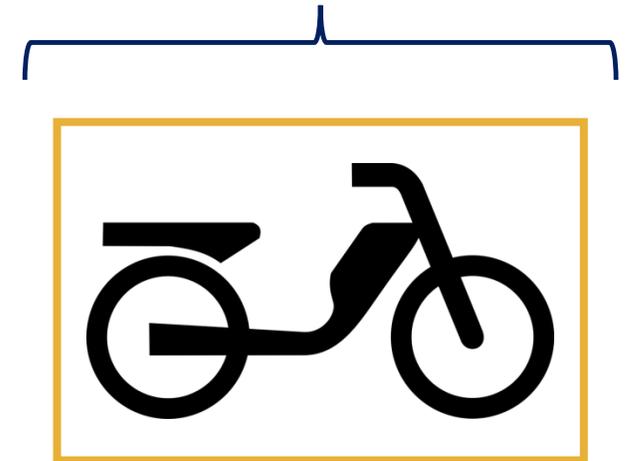
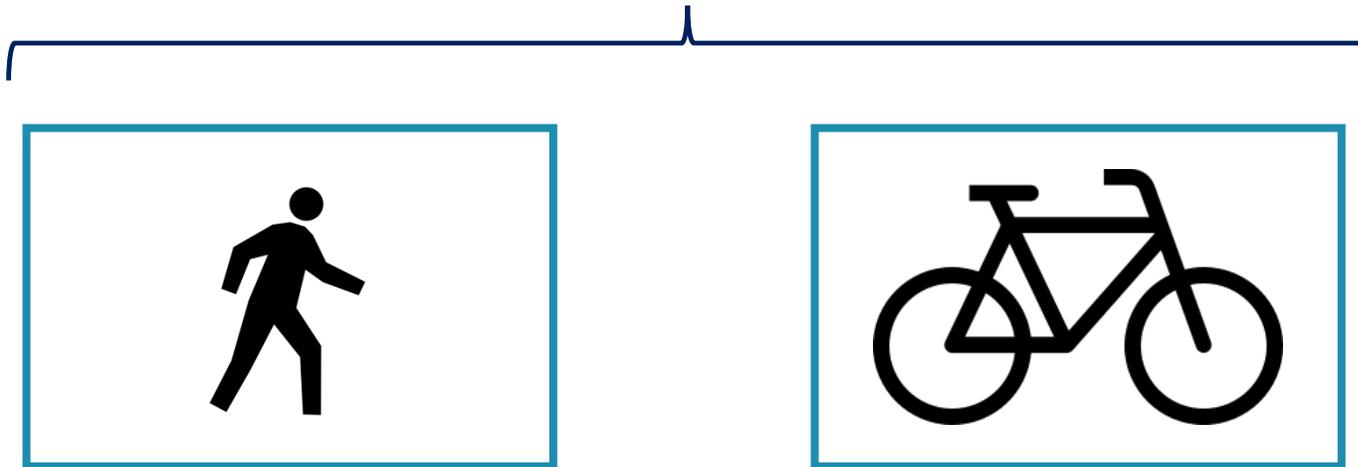


Bicycles

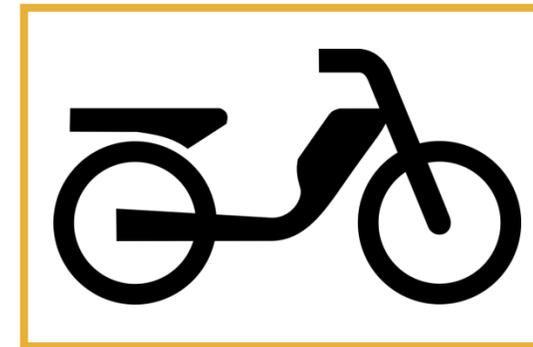
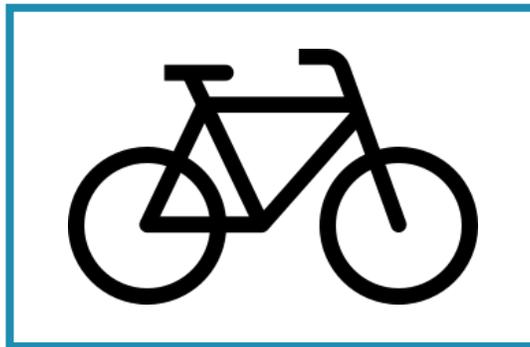


Mopeds (*in some cases*)

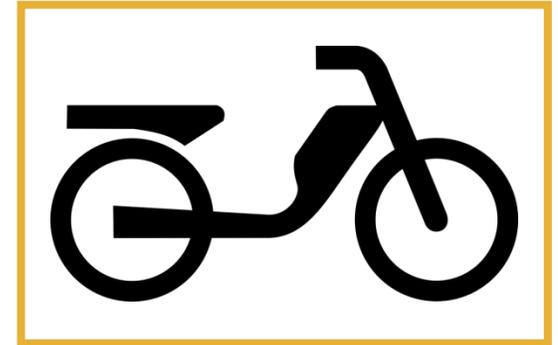
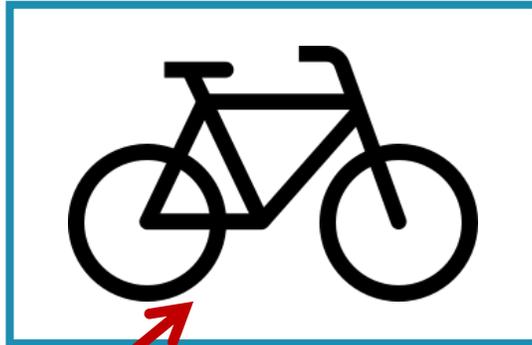
# Original difference



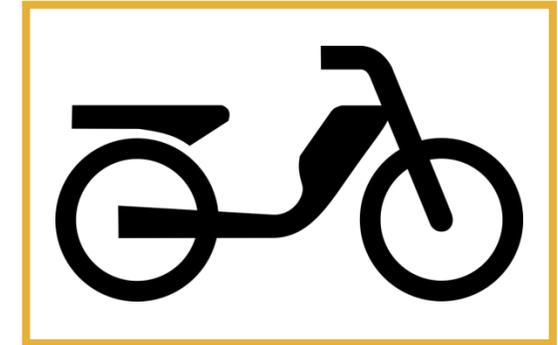
# ~ 1995: Introduction traditional electric bike



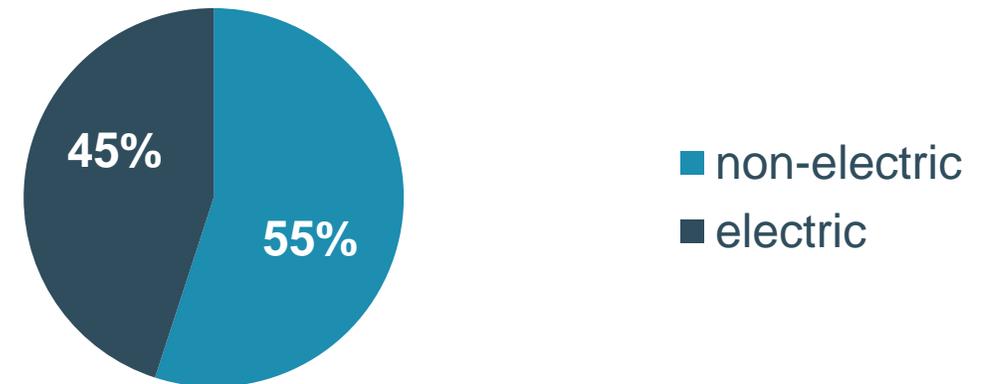
- pedal assistance
- maximum assistance speed  $\leq 25$  km/h
- max. cont. rated motor power  $\leq 250$  W



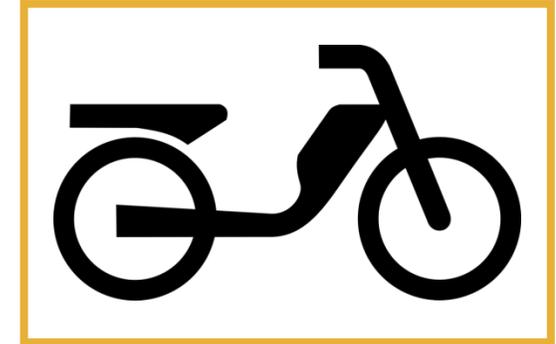
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Belgian bicycles sales in 2017

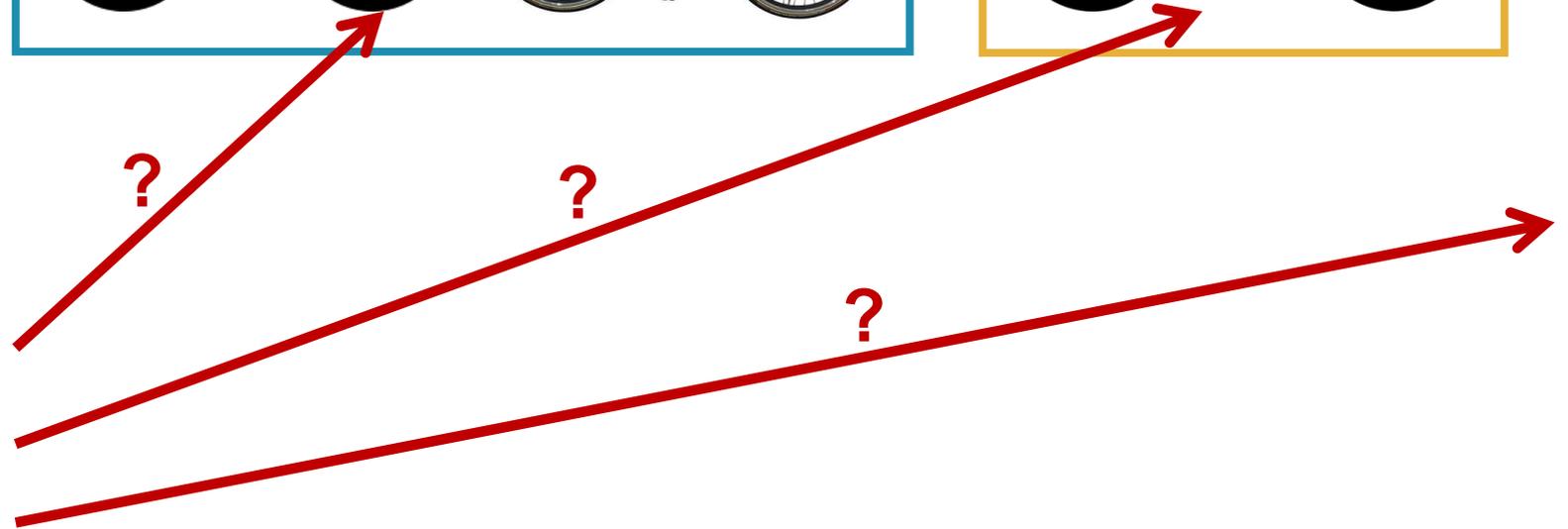
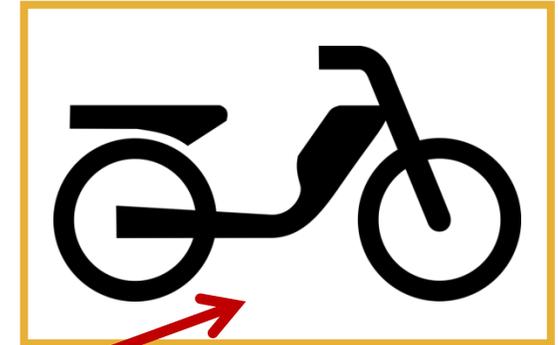
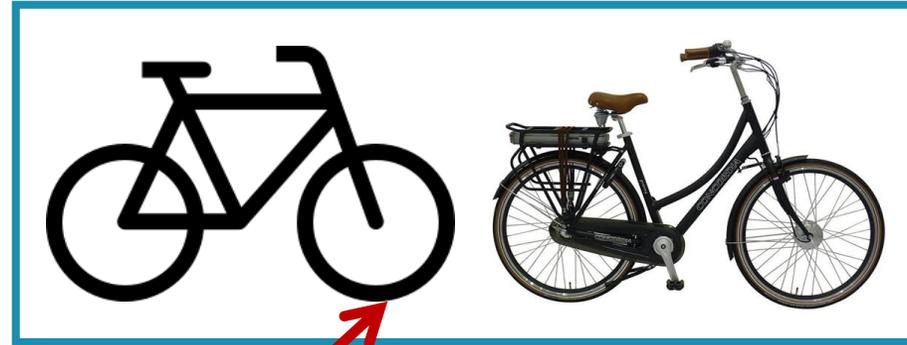


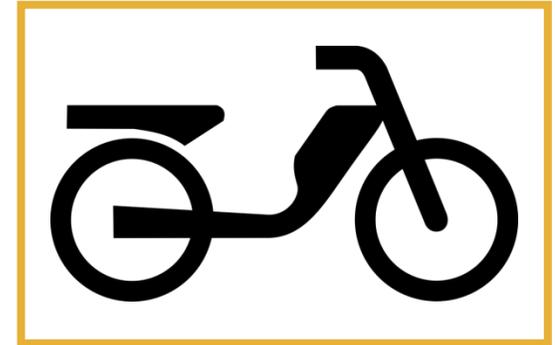
# ~ 2013: Introduction speed pedelec



- mainly pedal assistance
- maximum assistance speed  $\leq 45$  km/h
- max. cont. rated motor power  $\leq 4000$  W  
(typically 350 W or 500 W)

~ 2013

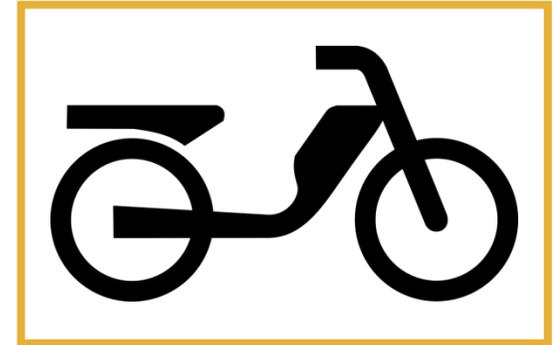




**Belgian legislator**



moped type  
speed pedelec

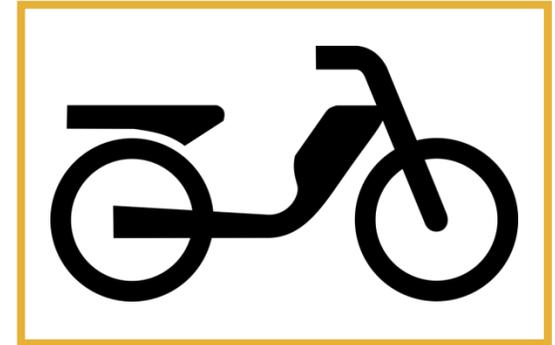


**Belgian legislator**



moped type  
speed pedelec





**Belgian legislator**



moped type  
speed pedelec

# The speed pedelec in Belgium

if speed limit  $\leq 50$  km/h



if speed limit  $> 50$  km/h



# The speed pedelec in Belgium

if speed limit  $\leq 50$  km/h



if speed limit  $> 50$  km/h



choice for  
road authority



D7



D9



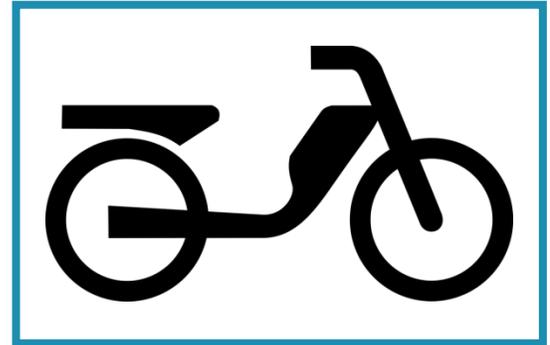
D10



F99c



Is the current legislation future proof?



walking pace

faster than walking pace

(Belgian traffic legislation)

# Future

- more innovations in Light Electric Vehicles
  - more “intermediate” vehicles



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# Option 1: Extra categories and exceptions

→ For every innovative vehicle, creation of new category or extra exception?



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→ For every innovative vehicle, creation of new category or extra exception?

→ Knowledge of road users up to date?



F99c



F101c



D7



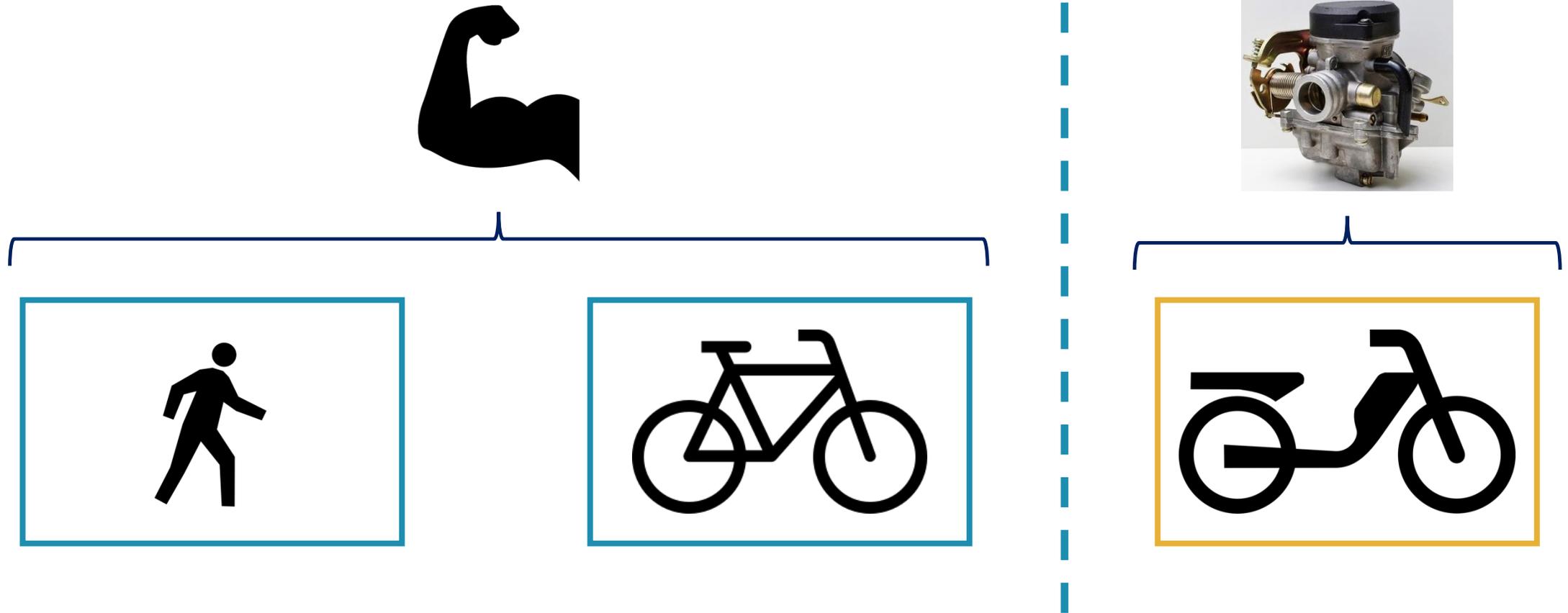
D9



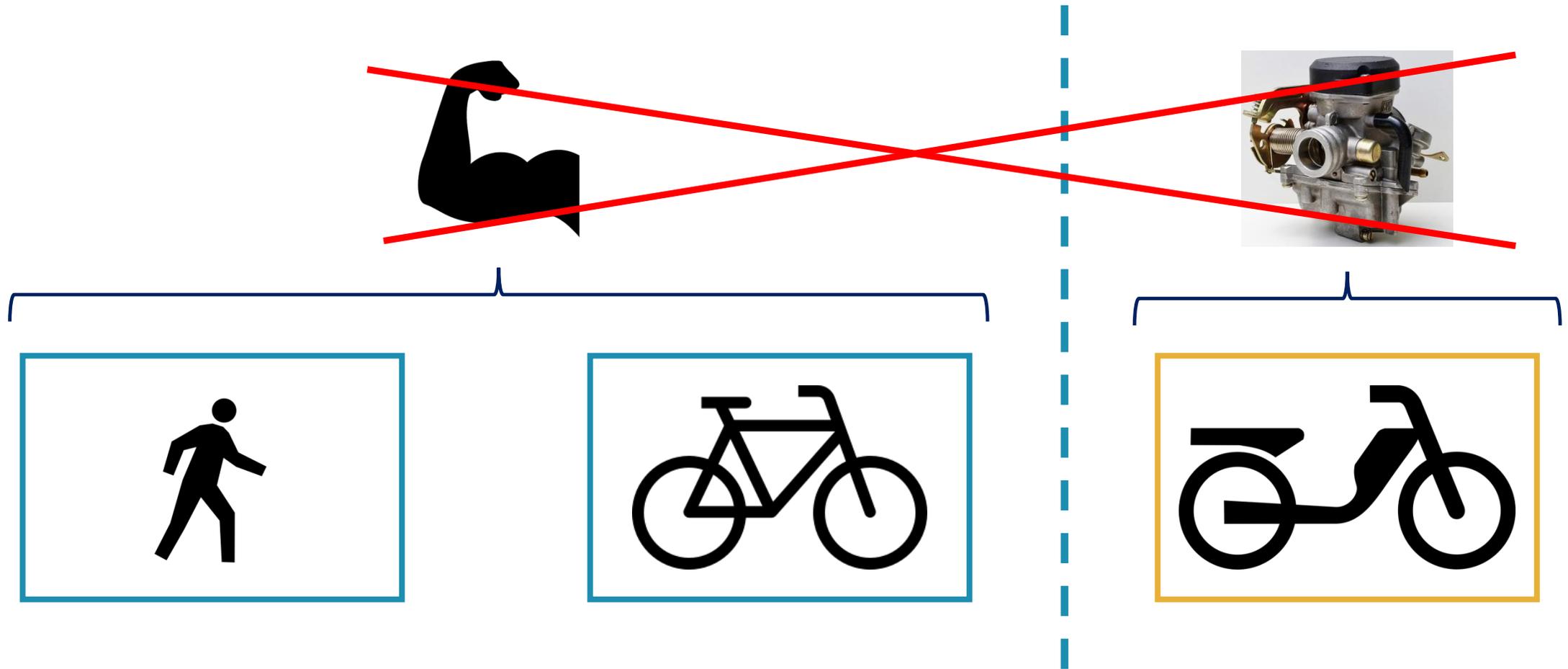
D10



# Option 2: Dogmatic approach

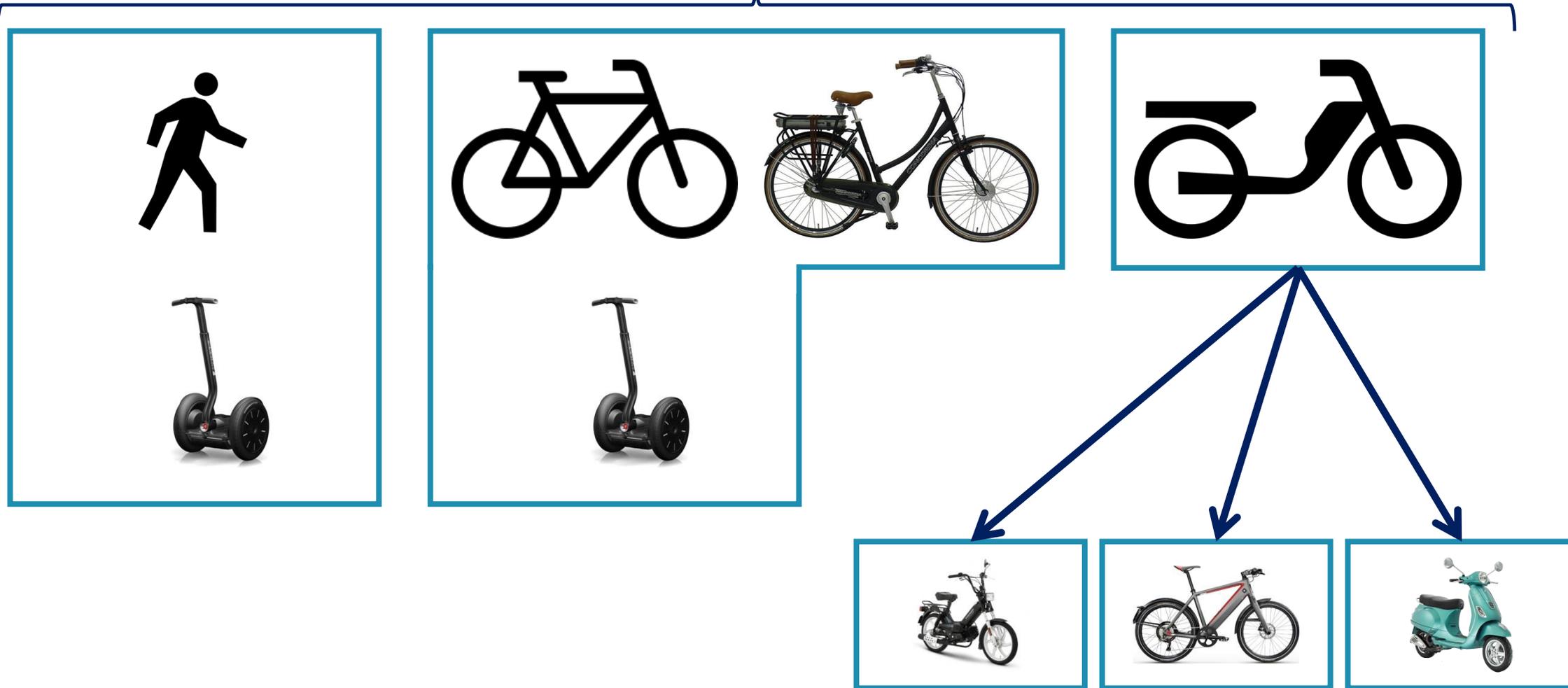


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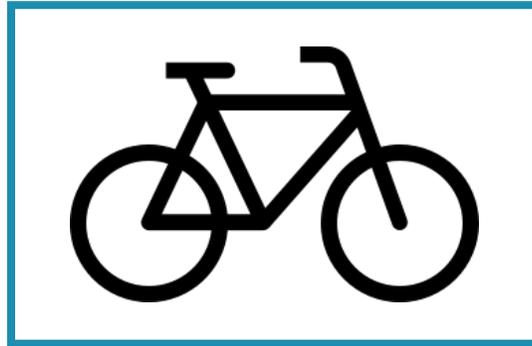




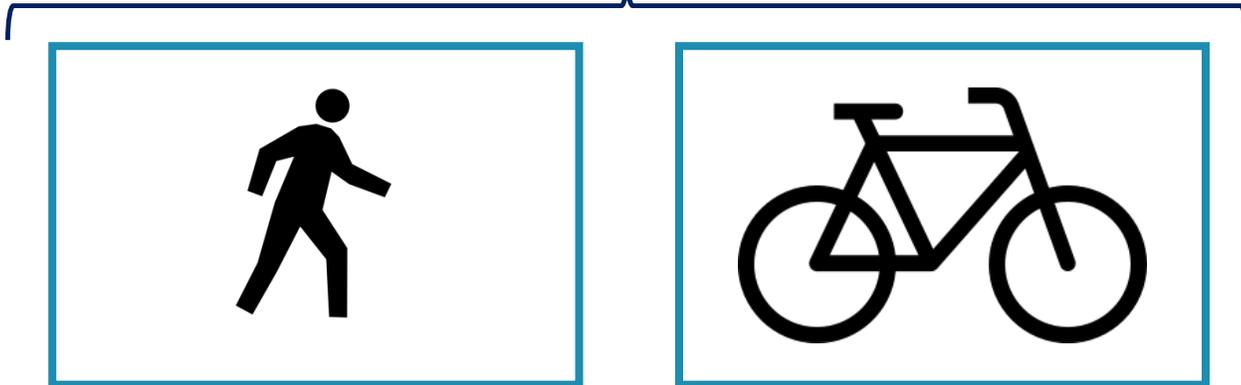
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# Option 2: Dogmatic approach



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what about?



Motor?

# Back to the essence of traffic regulations

*"A set of agreements, which regulate traffic behaviour on the road in advance, general rules that are applicable in every situation and that regulate the positions and movements on the road in such a way that **collisions are avoided**"*

D. Weber, *Automobilisering en de overheid in België voor 1940: besluitvormingsprocessen bij de ontwikkeling van een conflictbeheersingssysteem*, Gent: Proefschrift tot het behalen van de graad van doctor in de geschiedenis aangeboden aan de Faculteit Letteren & Wijsbegeerte van de Universiteit Gent, 2008.

# Back to the essence of traffic regulations

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- Is “motor ↔ muscle power” a good distinction to avoid collisions?

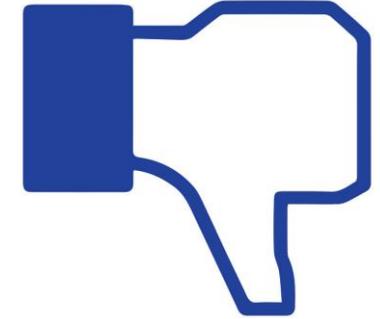
# Back to the essence of traffic regulations

*"A set of agreements, which regulate traffic behaviour on the road in advance, general rules that are applicable in every situation and that regulate the positions and movements on the road in such a way that collisions are avoided"*

- Is “motor ↔ muscle power” a good distinction to avoid collisions?
- alternative: based on objective parameters
  - *actual speed (road dependent)*
  - *mass and dimensions (vehicle dependent)*
  - **impulse and kinetic energy**

Speed pedelec ↔ cycle highway

# Speed pedelecs on bicycle highways



- greater speed differences
- silent, overtaking vehicles
- infrastructure not adapted for speed pedelecs

# Speed pedelecs on bicycle highways



- greater speed differences

→ *Shouldn't these car free roads, outside cities, not be supportive of alternatives for car use over larger distance?*

- silent, overtaking vehicles

- infrastructure not adapted for speed pedelecs

# Speed pedelecs on bicycle highways

- greater speed differences

→ *Shouldn't these car free roads, outside of urban areas, be considered as alternatives for car use over larger distance?*

→ *Are there greater speed differences?*

- silent, overtaking vehicles

- infrastructure not adapted for speed pedelecs



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# Speed pedelecs on bicycle highways



- greater speed differences

→ *Shouldn't these car free roads, outside of urban areas, be alternatives for car use over larger distance?*

→ *Are there greater speed differences?*

- silent, overtaking vehicles

→ *e-mobility = silent mobility, the speed pedelec is just the frontrunner*

- infrastructure not adapted for speed pedelecs



# Speed pedelecs on bicycle highways



- greater speed differences
  - *Shouldn't these car free roads, outside of alternatives for car use over larger distance?*
  - *Are there greater speed differences?*
- silent, overtaking vehicles
  - *e-mobility = silent mobility, the speed pedelec is just the frontrunner*
- infrastructure not adapted for speed pedelecs
  - *Road users can adapt to difficult situations*



# Speed pedelecs on bicycle highways



- recreative ↔ functional use of bicycle highways

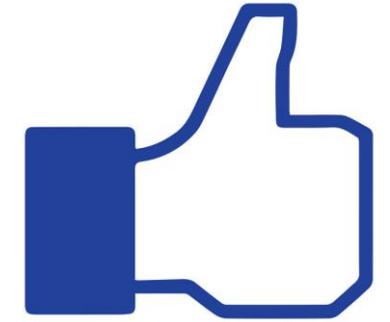


→ “*Bovenlokaal functioneel fietsnetwerk*”

→ **Supra-local functional cycle network**

- time shift between recreative and functional use

# Speed pedelecs on bicycle highways



## possible actions:

- Imposing (reasonable) speed limits on bicycle highways?  
→ linking to technical regulations → 45 km/h?
- future proof: wide, smooth surface, road marking, lighting,...

# Conclusion

- The speed pedelec offers various social and personal advantages.
- Typical speed varies between that of bicycle and moped.
- Back to the essence of traffic regulations?
- Embrace the speed pedelec as a bicycle highway user, the cyclist will profit from this.

*Questions, ideas or suggestions?*

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