

Bicycle and Transit A Powerful Combination

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Pressure on the (urban)road network is large, because of the economic growth of last years...

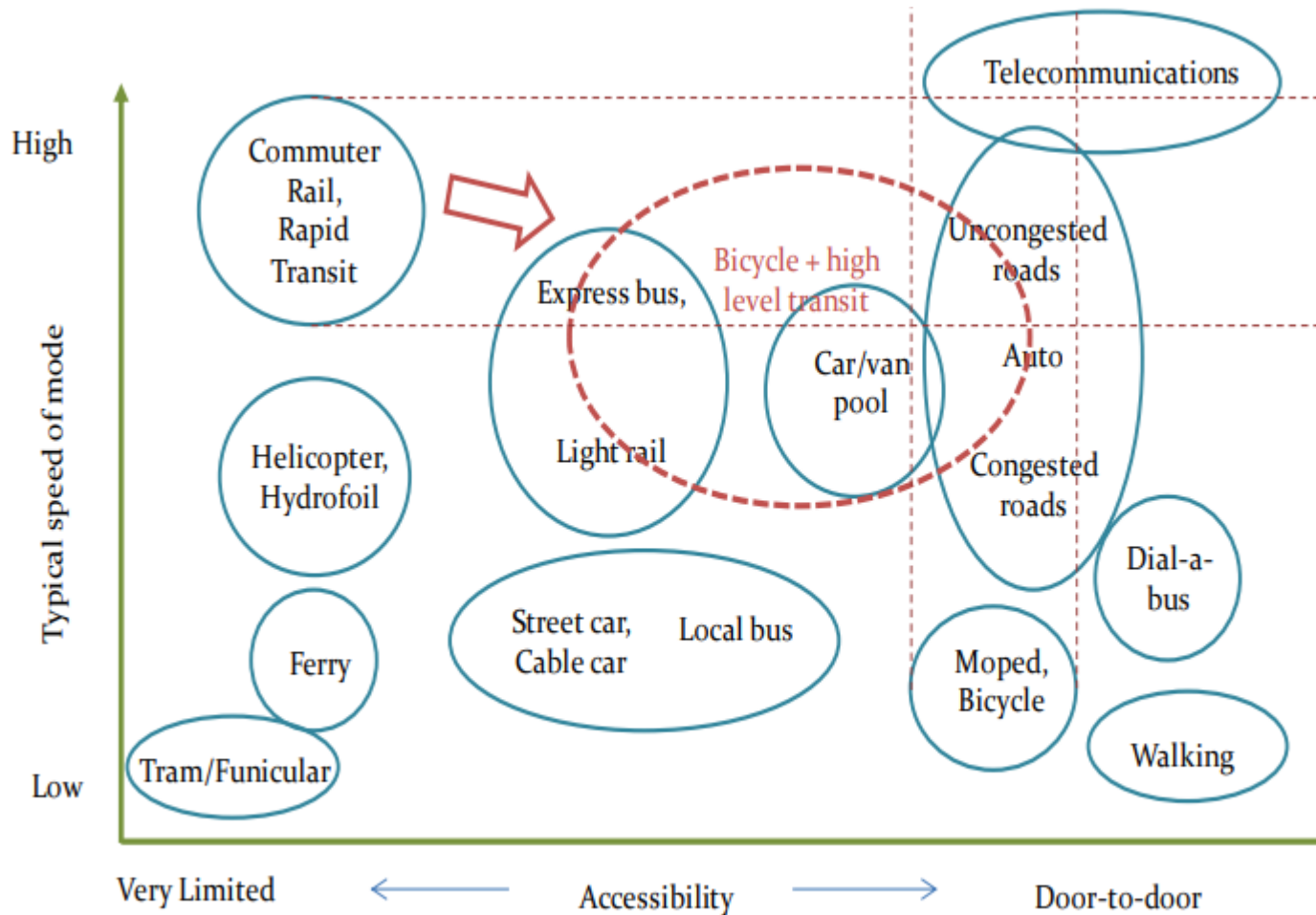




... and larger cities struggle with pollution.



Bicycle and Transit: Best of both worlds

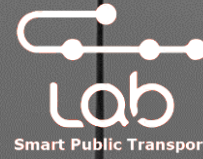


[Kager et al. (2016), Shelat et al. (2017)]



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The story of bicycle and transit



Spatial Planning

- 1970s: Sectoral planning
- 1980s: ABC-planning
- 1990s: VINEX: last centrally organized masterplan
- 2008: Provinces may overrule local zoning plans



Spatial Planning

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- 2008: Provinces may overrule local zoning plans



Transit

- 1980 and 1990s

Major losses on transit

- 2000s

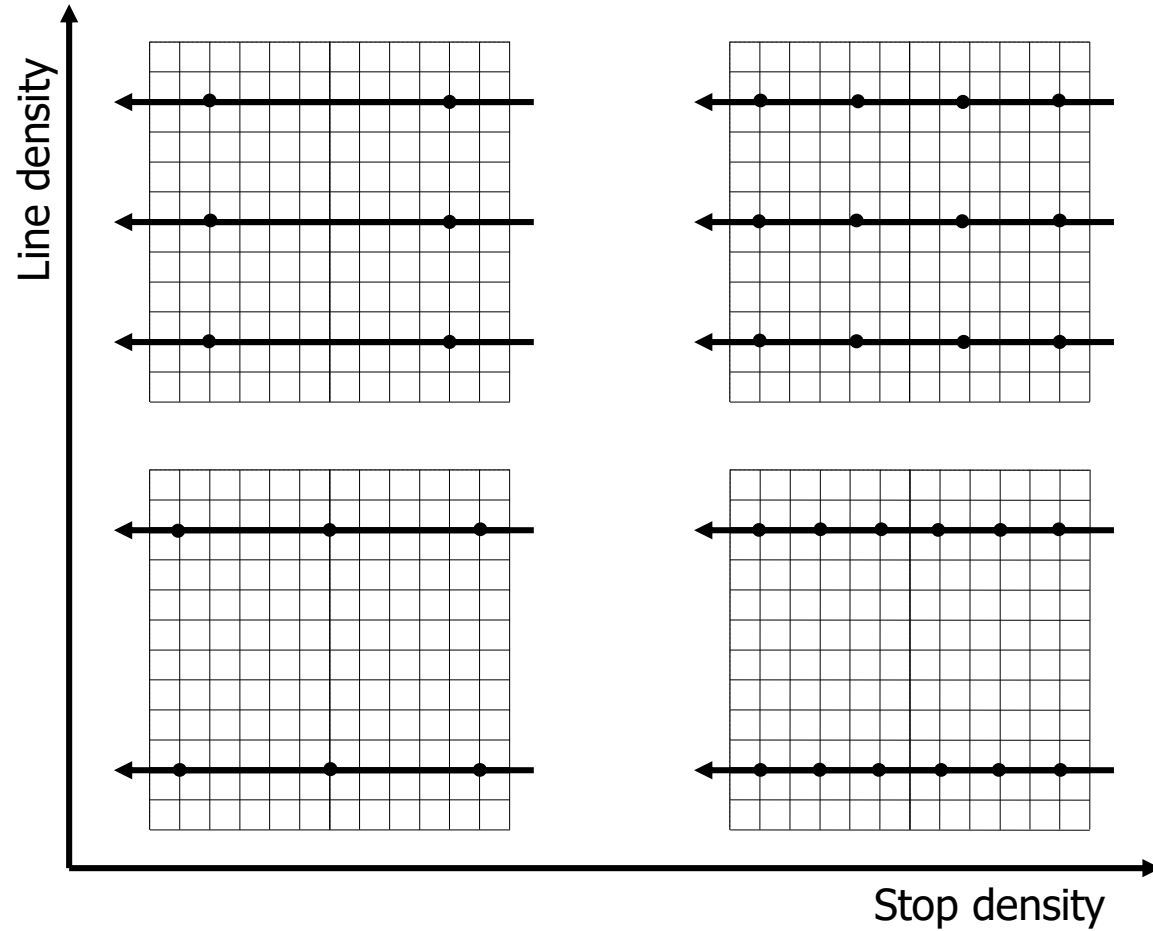
PSO contracts: emphasis on efficiency and attractiveness.

Provinces became responsible for efficiency of PT



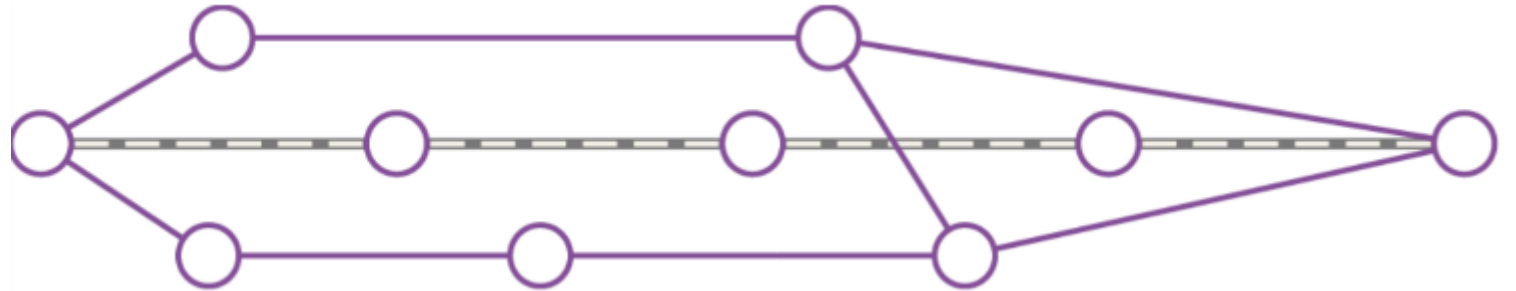
Image: Tim Castricum

Transit network design

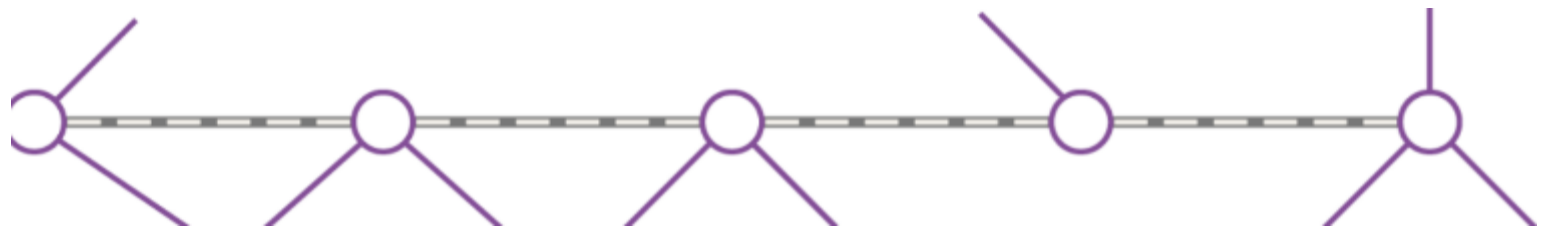


Transit

- 1980 and 1990s
Parallel lines



- 2000s
Fishbone network



Transit

- 1980 and 1990s

Parallel lines

- 2000s

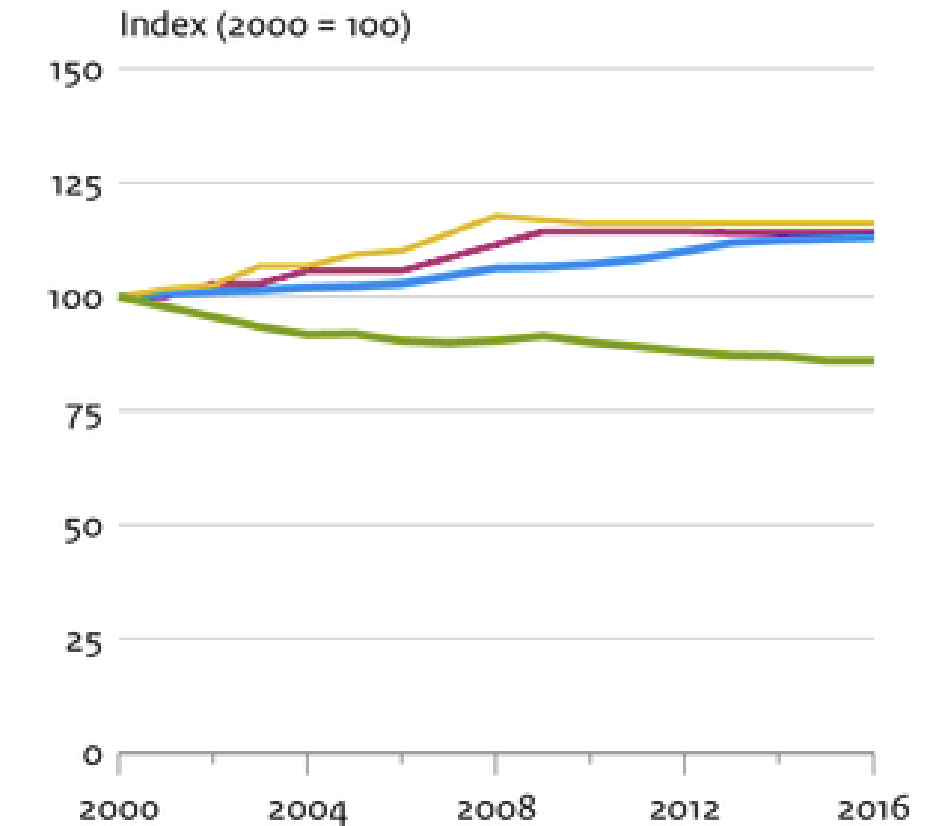
Fishbone network

<https://www.youtube.com/watch?v=XGwbGAM5YII>

Image: KiM

Aanbod van openbaar vervoer

Aantal stations en haltes



— Intercity knooppunten

— Totaal trein

— Metro en sneltram

— Totaal bus, tram en metro

Bicycle

- 1950s

Welfare brings car mobility

- 1970s and 1980s

Oil crises and negative consequences: revival of the bicycle mode

Image: PvdA, Breda



Bicycle

- 1970s and 1980s

Nationale government:
Bicycle masterplan

- 1990s

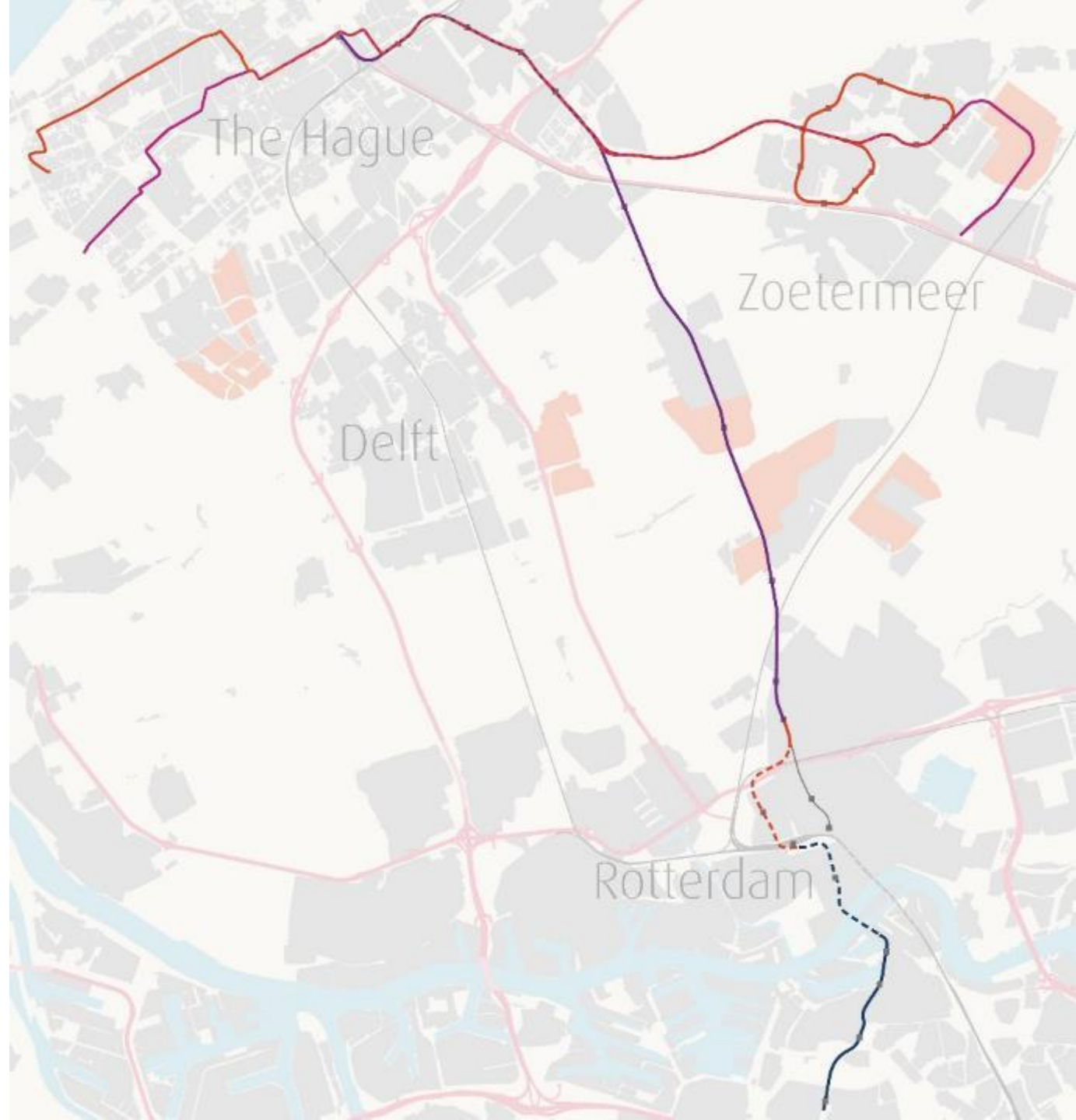
Comprehensive and
decentral approach



Governance

- 1990s and 2000s
Provinces became responsible for spatial planning, regional transit, and bicycle infrastructure

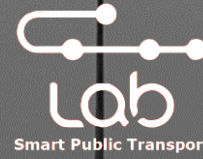
Image: Raymond Huisman





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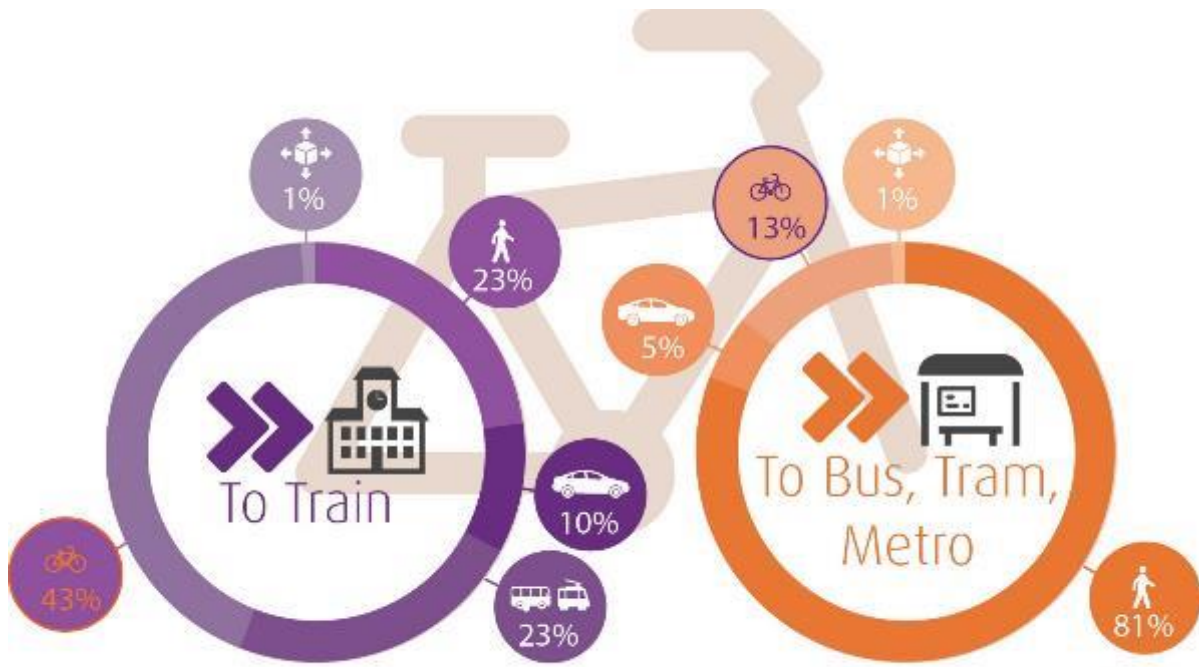
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Understanding the bicycle and transit chain





Access transport



Egress transport

Shelat, S. et al. (2018). Analysis of the trip and user characteristics of the combined bicycle and transit mode. *Research in Transportation Economics*.

The chain

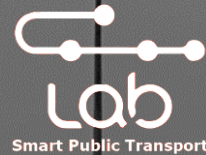


Image: Goudappel Coffeng



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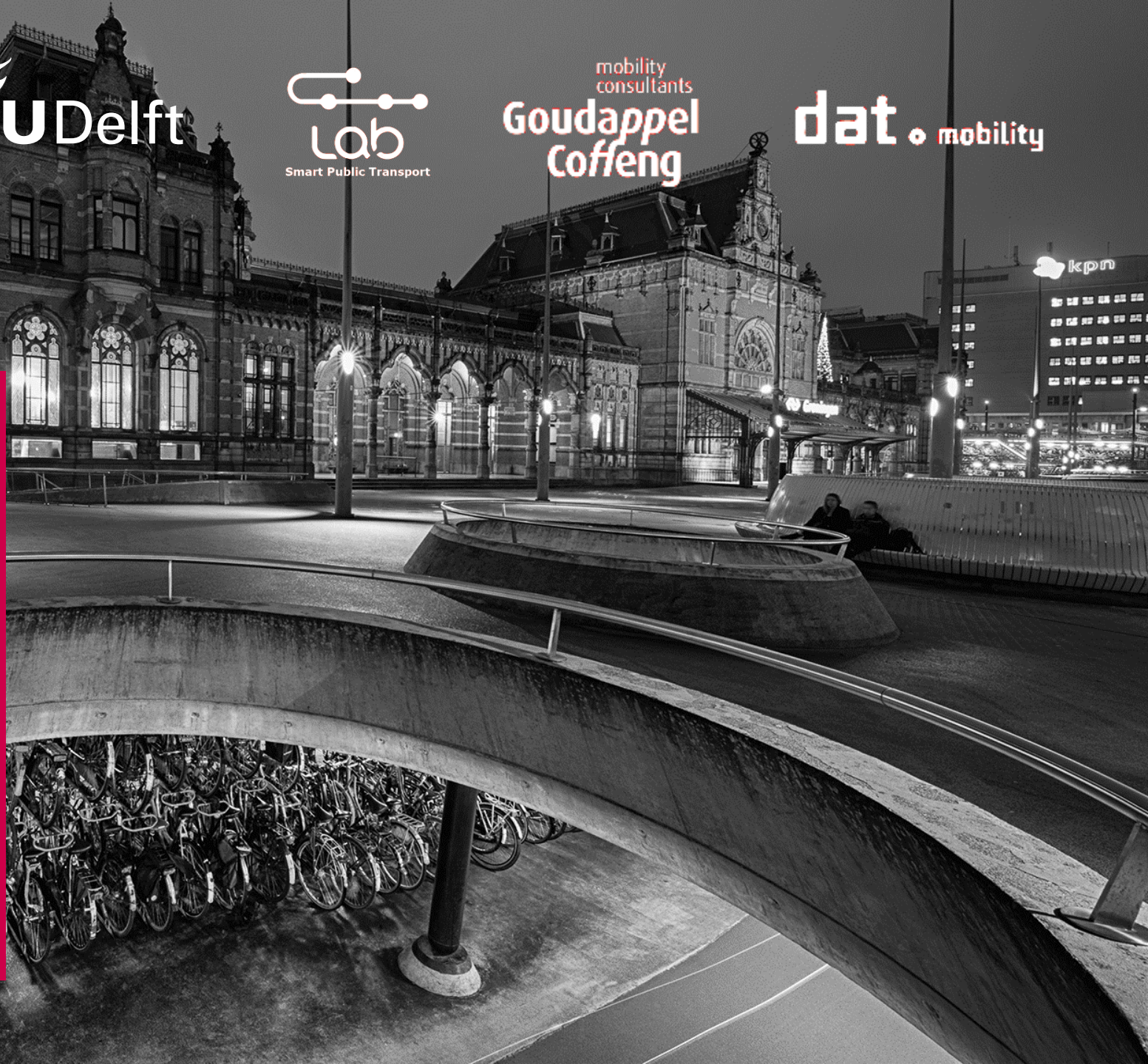


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Who uses Bicycle and Transit?



If Bicycle-Transit users were 100 people...



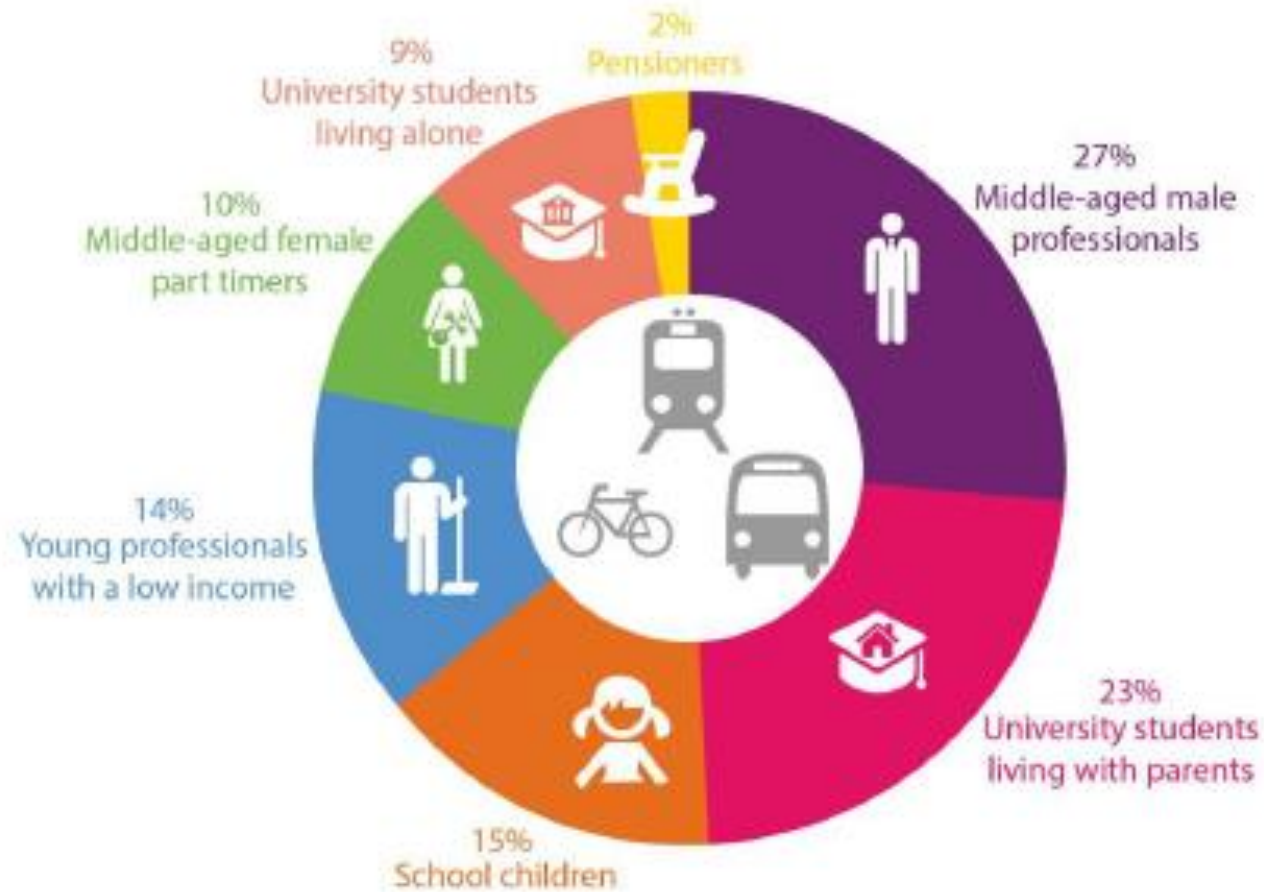
..., we could split them into 7 groups...



... with different characteristics.



... with different characteristics.

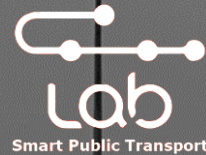


Shelat, S. et al. (2018). Analysis of the trip and user characteristics of the combined bicycle and transit mode. Research in Transportation Economics.



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Opportunities: last mile solutions



Bike-sharing timeline 1965 - now

1st generation (no locks)



Wittefietsenplan, Amsterdam

1965

1970-1990 period with few innovation

2nd generation (Coin deposit)



1991

Experiment with magnetic cards, University of Portsmouth, experiment Farsø, Denmark

Bycyklen Copenhagen, Denmark

1995



First citywide introduction, Rennes, France

1998

Introduction in multiple bigger cities in Europe and U.S.A.

2005 - 2010

3rd generation (card access)

1996



2003

OVFiets founded (PT-Bike), the Netherlands

4th generation (Smart locks)

2014



Ofo founded, China

2017

Introduction 4th generation Netherlands (Amsterdam, Rotterdam)



Mobike introduced, China

2016



Start pilot Delft, the Netherlands

2018

Shared bike types





Lessons from Delft






Average daily trips/ bicycle: 1.6.
Avg daily trips/ active bicycle: 2.5-3.8
Avg trip length: 1.7- 2.3 km

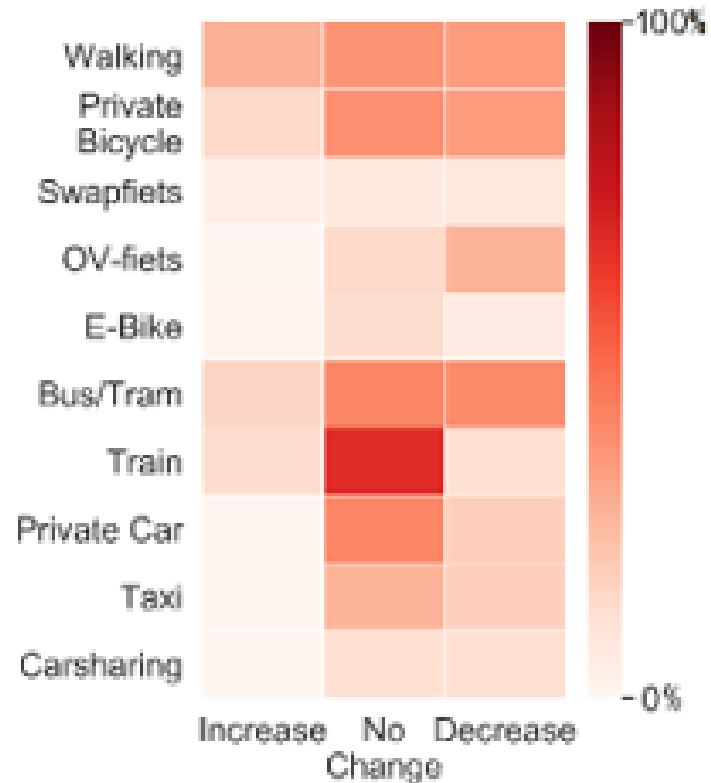
Boor et al. (2019)

https://youtu.be/MVqJtJA6_wg

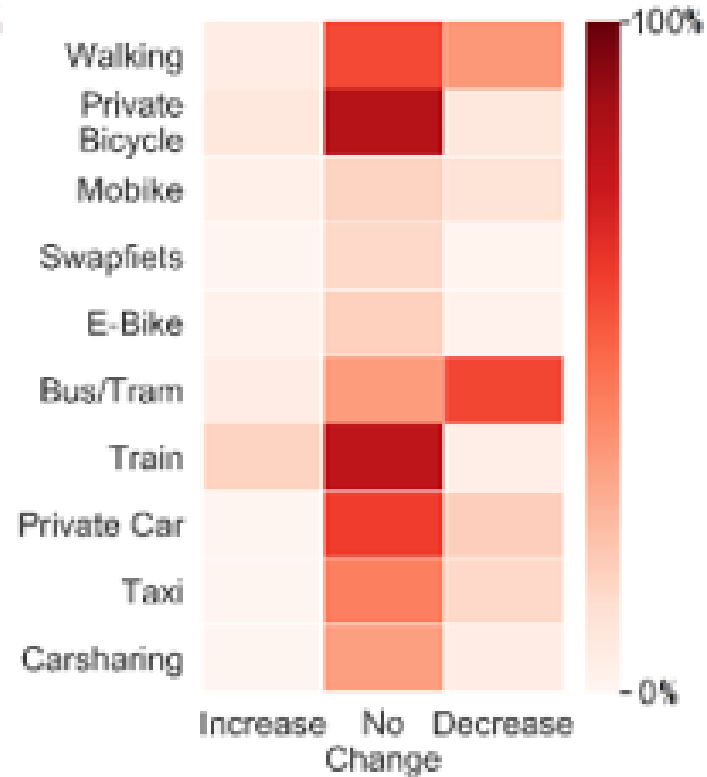
Different systems

Bike-sharing Type	OV-fiets	Mobike	Swapfiets
Image illustration			
Year Launched in the Netherlands	2003	2017	2014
Feature of systems	Docked bike-sharing system	Dockless bike-sharing system	Bicycle-lease system on a subscription basis
Way to use	1. Subscription online or on a NS App 2. Using the Personal public transport chip card (NS card) to rent a bike.	1. Subscription on a Mobike App 2. Using the Mobike App to open the bike.	Subscription online or on a Swapfiets App and get a Swapfiets bike within 1 day at a location of your choice
User pricing	€ 3.85/day	€ 12/month, 49.90/year or €1.5/20min	€ 15/month

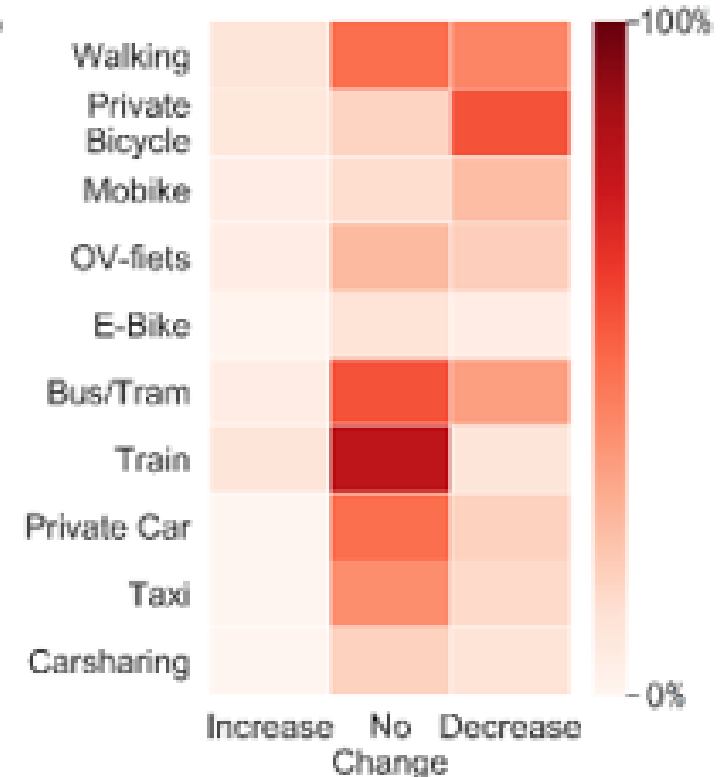
Modal split



(a) Modal Shift as a result of Mobike



(b) Modal Shift as a result of OV-fiets



(c) Modal Shift as a result of Swapfiets

Lessons learned



Lessons learned

- Chain is as strong as the weakest part
- Understand the Transit-Bicycle user
- Last mile is an opportunity
- What do last mile-users want?

Image: Annabel Jeuring



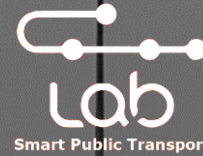
Sources and further reading

- Boor, S., R. Haverman, N. van Oort, S. Hoogendoorn (2019), Ridership impacts of the introduction of a dockless bike-sharing scheme, a data-driven case study, CRB annual meeting
- Brand, J., N. van Oort, B. Schalkwijk, S. Hoogendoorn (2017), Modelling Multimodal Transit Networks; Integration of bus networks with walking and cycling, MT-ITS Conference Napoli.
- Ma, X, Y. Yuan, N. van Oort, S.P. Hoogendoorn (2020), Investigating Impact of Bike-sharing Systems on Modal Shift: A Case Study in Delft, the Netherlands, TRB annual meeting (submitted)
- Shelat, S., R. Huisman, N. van Oort (2018). Analysis of the trip and user characteristics of the combined bicycle and transit mode. Research in Transportation Economics.



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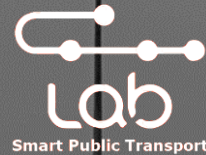
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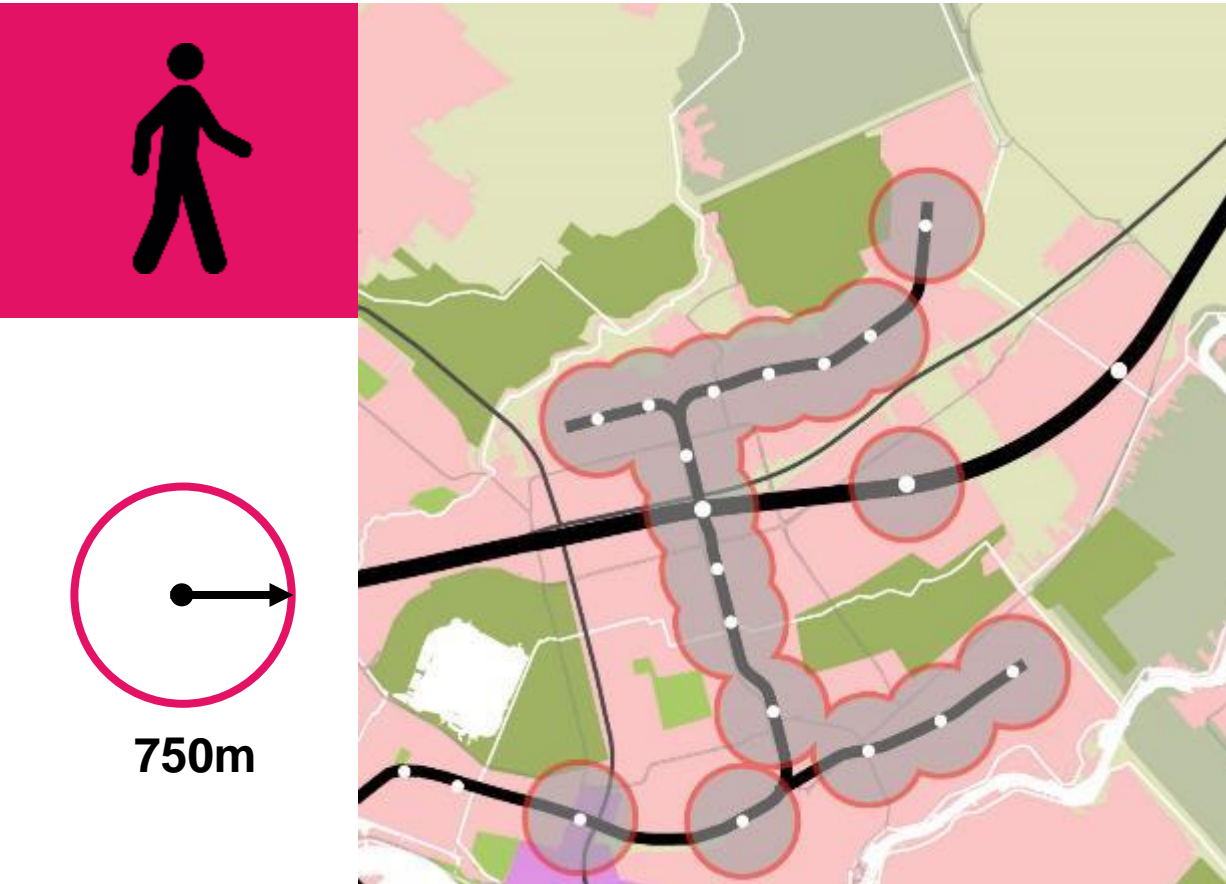
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Bonus



Catchment area

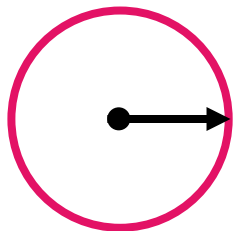
Walking



Distances based on: Brand, J., N. van Oort, B. Schalkwijk, S. Hoogendoorn (2017), Modelling Multimodal Transit Networks; Integration of bus networks with walking and cycling, MT-ITS Conference Napoli. Image: Raymond Huisman.

Catchment area

Cycling



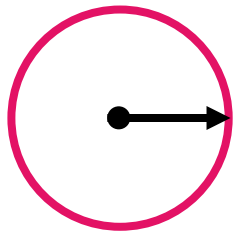
3.000m



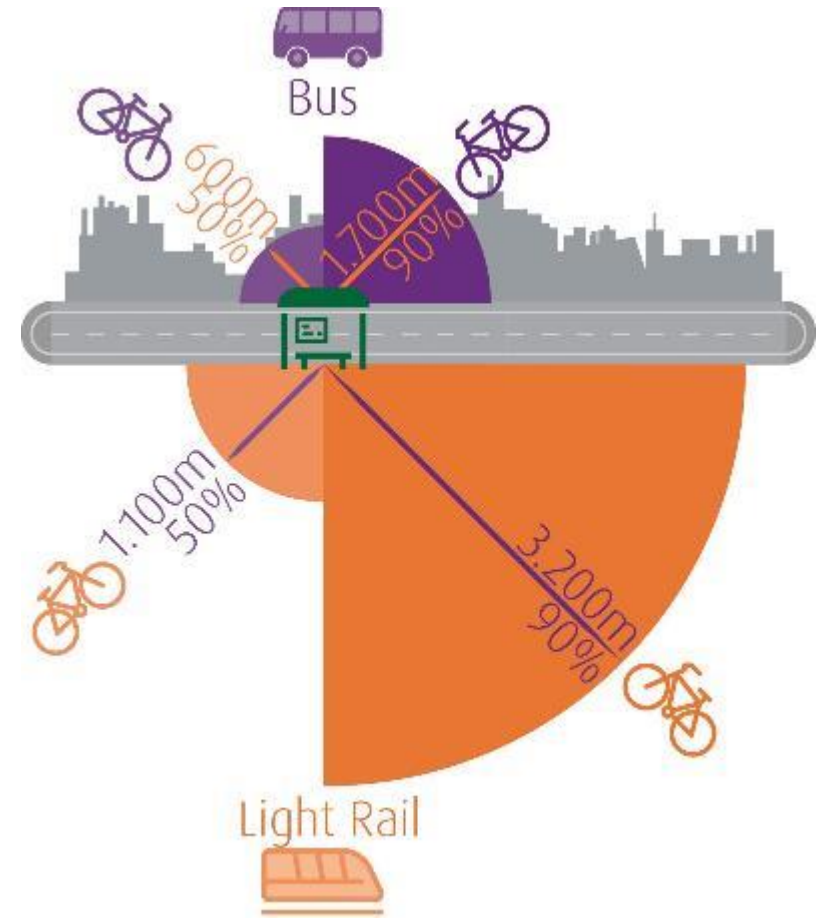
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Catchment area

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3.000m



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