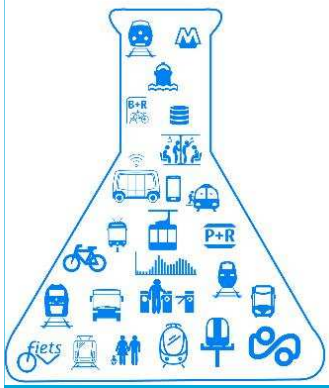
Insights into factors affecting the combined bicycle transit mode

CASPT
July, 2018



Joeri van Mil
Tessa Leferink
Jan Anne Annema
Niels van Oort

Smart Public Transport Lab
www.smartPTlab.TUDelft.nl

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Ministerie van Infrastructuur en Milieu

Witteveen + Bos

Royal family

We love to cycle, it is good for accessibility, the environment and our health.

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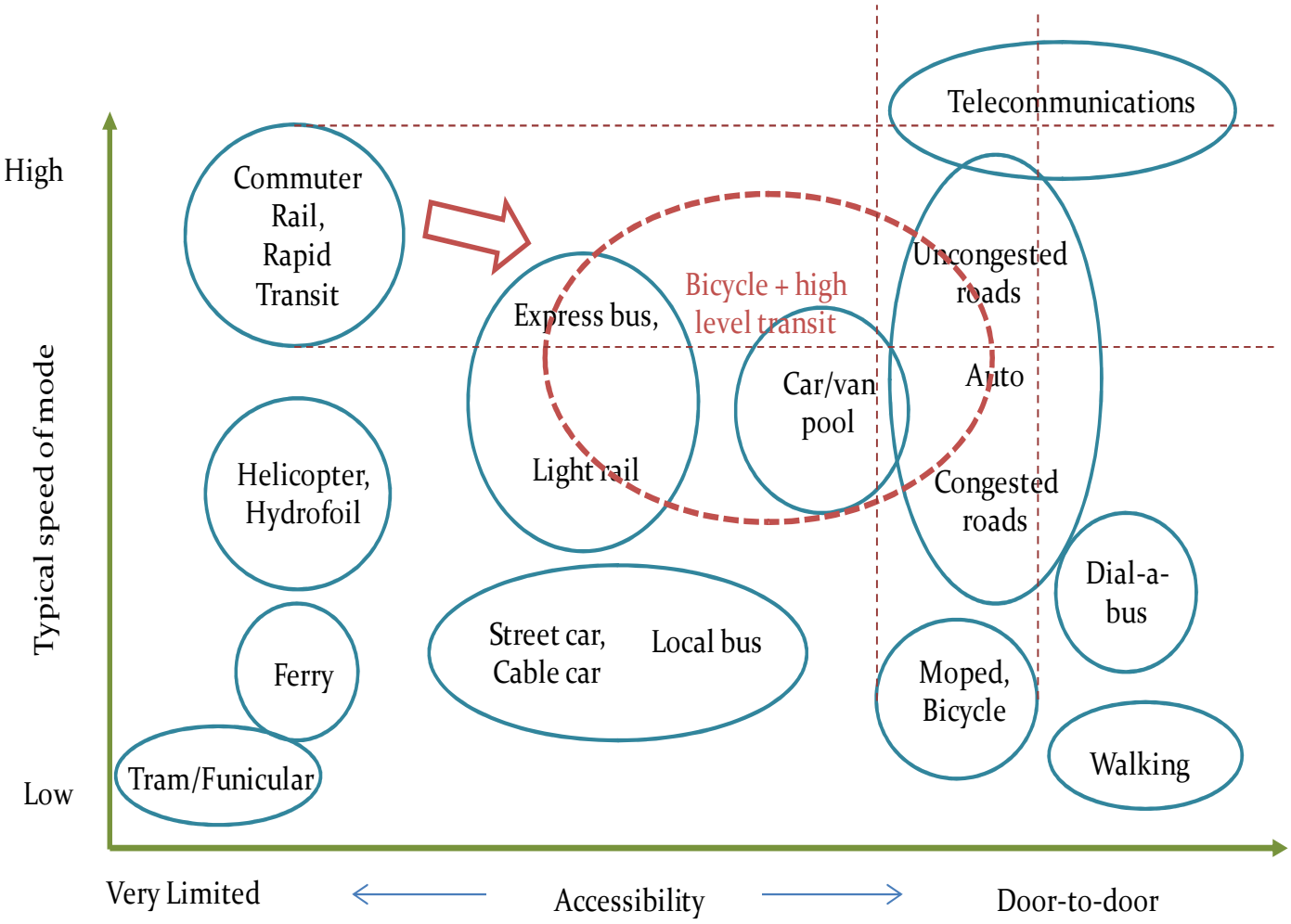
Combining best of both worlds



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

Challenges

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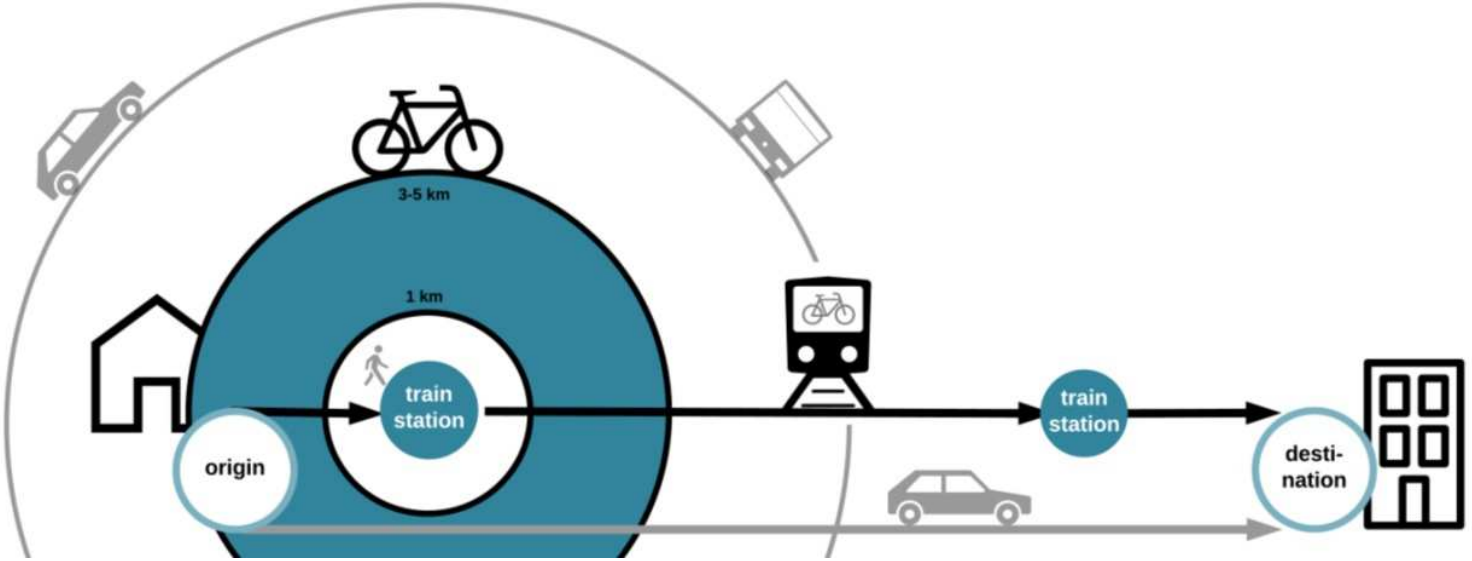
BICYCLE-TRANSIT IS AN OPPORTUNITY

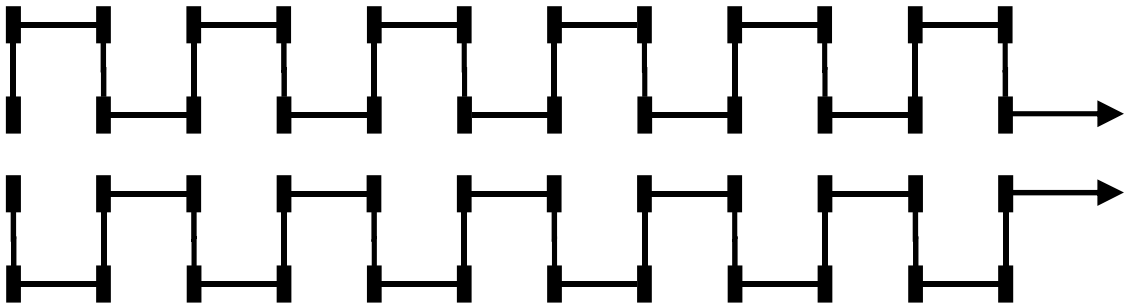
For the traveller

For the public transport sector

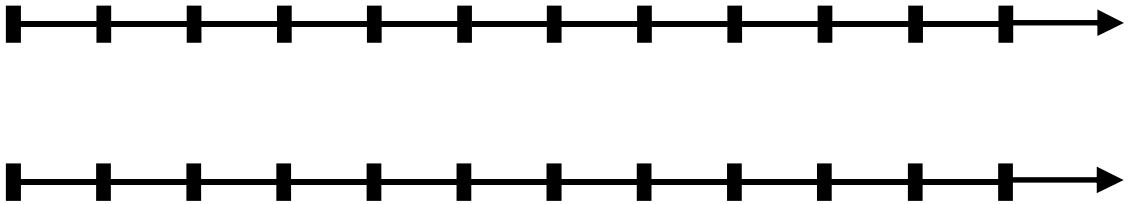
For the city



Network design dilemma



Many stops
Short access, long in-vehicle time



Few stops
Long access, short in-vehicle time

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Research objectives

Increasing modal share of sustainable transport (door-door)

1 To understand the bicycle and transit combination

Benefits
Users
Behaviour
Potential

2 To design optimal bicycle and transit transport

Routes, parking
Transit networks
Sharing facilities
Integrated design

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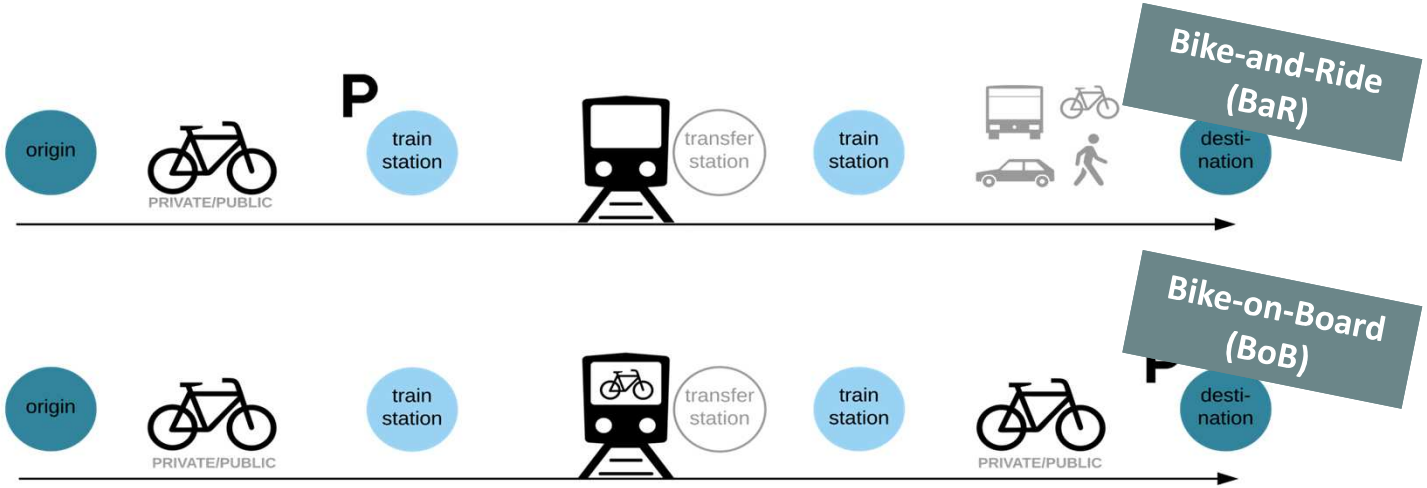
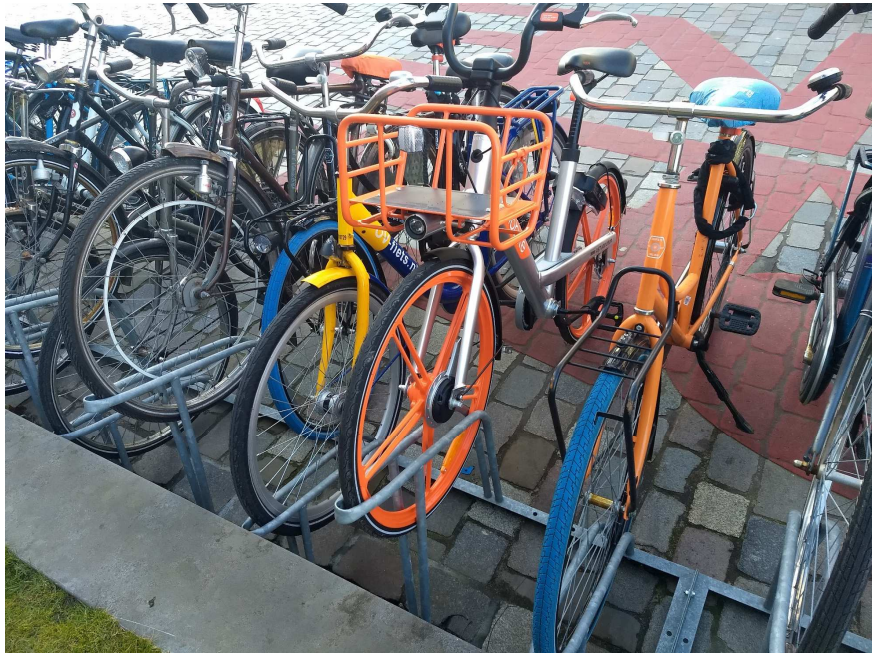
Scope


Bike-and-Ride (BaR)
origin
PRIVATE/PUBLIC
P
train station
transfer station
train station
desti-nation
Bike-on-Board (BoB)
origin
PRIVATE/PUBLIC
train station
transfer station
train station
PRIVATE/PUBLIC
desti-nation



Structure

1. Current use
2. What factors are of impact?
3. What is the influence of the main factors on station choice?

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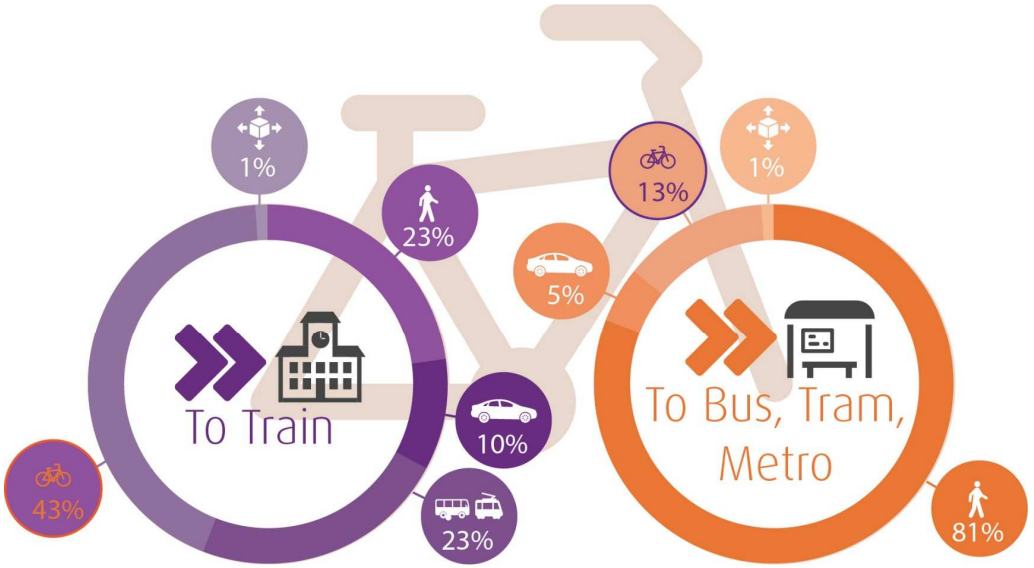
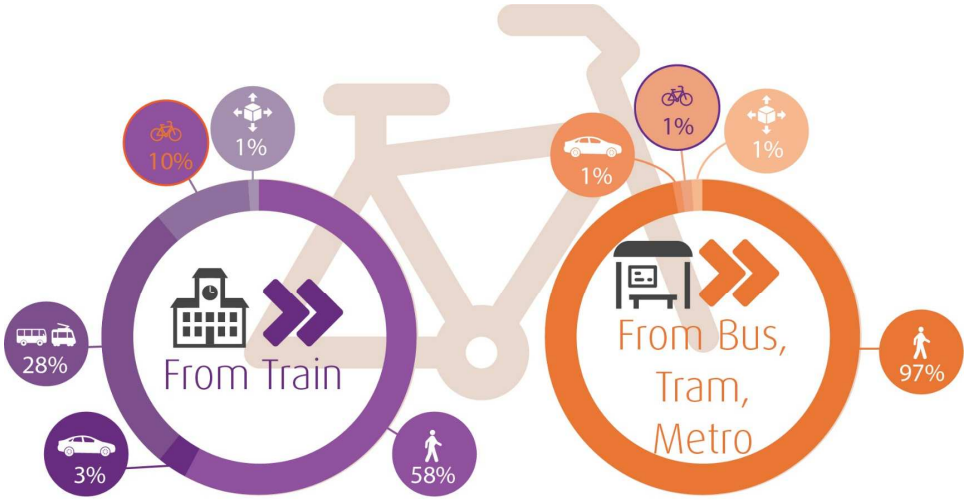
Part 1: Current use

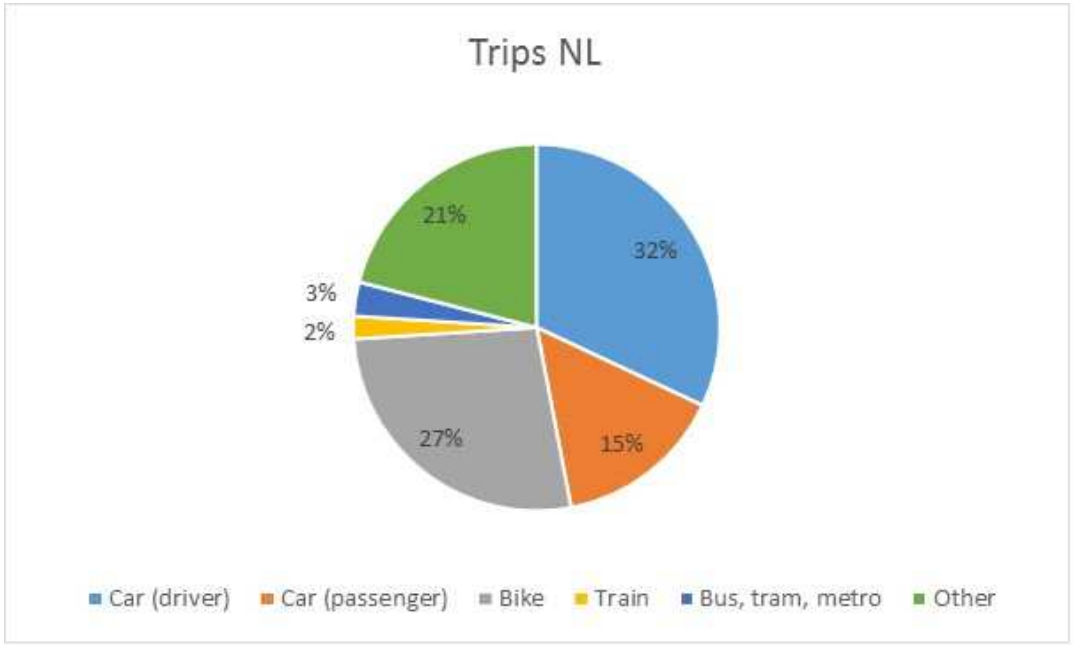


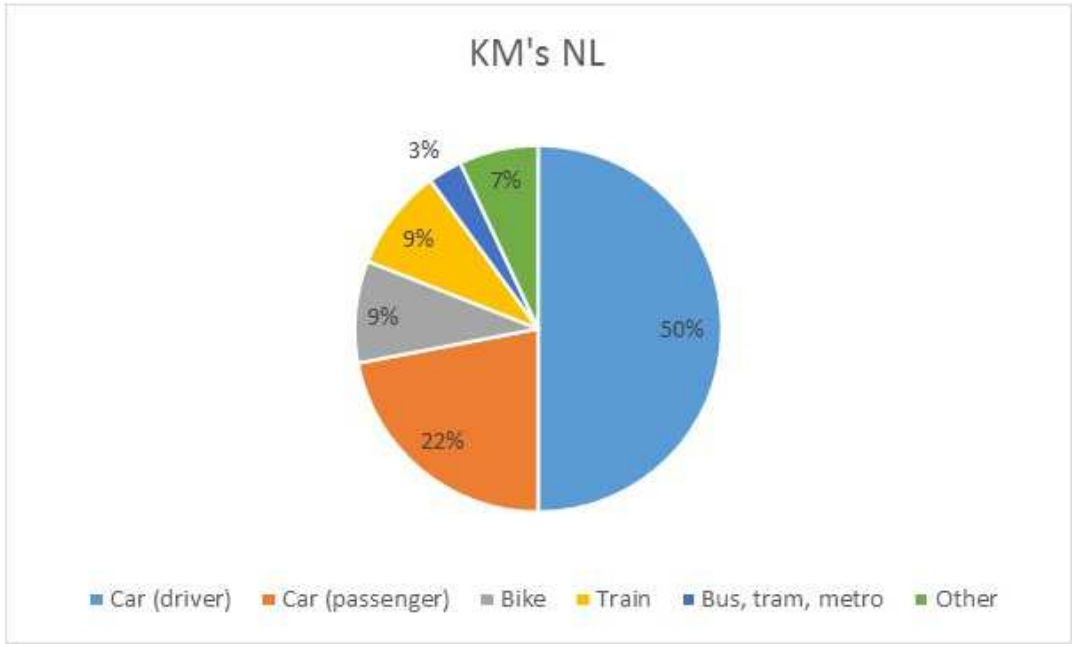
Access transport



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.

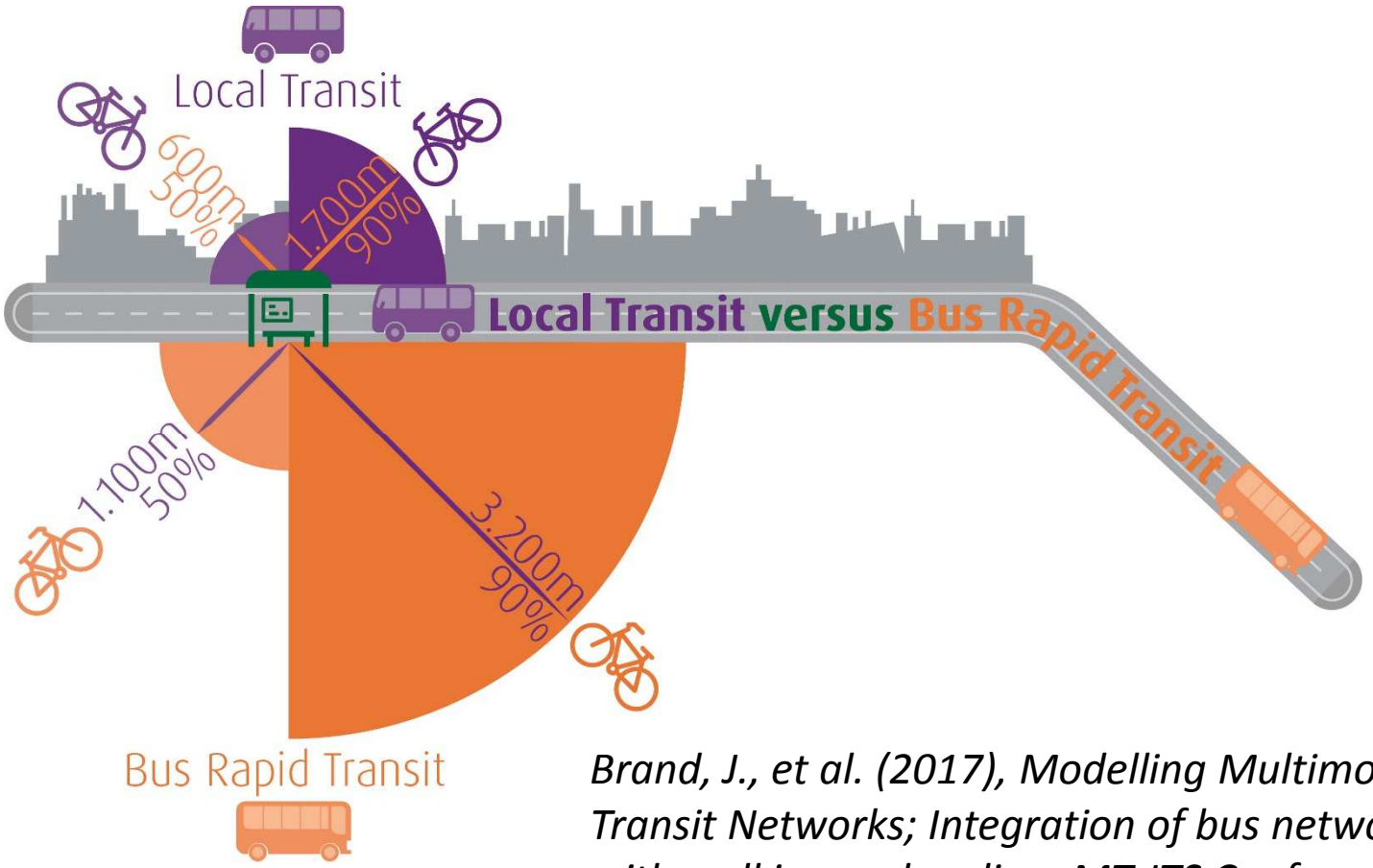

Trips NL
21%
32%
3%
2%
27%
15%
Car (driver)
Car (passenger)
Bike
Train
Bus, tram, metro
Other


KM's NL
3%
7%
9%
9%
50%
22%
Car (driver)
Car (passenger)
Bike
Train
Bus, tram, metro
Other

Catchment areas

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

Impact of PT quality on catchment areas



Brand, J., et al. (2017), Modelling Multimodal Transit Networks; Integration of bus networks with walking and cycling, MT-ITS Conference Napoli.

Part 2: Factors

39 FACTORS IN 8 GROUPS

1. Culture & attitudes towards cycling and rail
2. Characteristics cycle-rail users
3. Rail system
4. Train journey
5. Station typology
6. Region’s bikeability
7. Bicycle journey
8. Competition other modes

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FACTOR	INFLUENCE ON CYCLE-RAIL USE
Culture & Attitude	
local and national transport policy	depends
high level of cycling	++
high level of rail use	++
positive attitude towards cycling	+
positive attitude towards rail	+
low perception of barriers	+
car as status	-
User Charac	
higher level	
many 20-39	
high numbe	
high levels c	
high share c	
share of mic	
high numbe	
many peopl	
large house	

FACTOR	INFLUENCE ON CYCLE-RAIL USE
Rail System	
high (service) level of train	+
large distance between stations	+
high train frequency	+
Rail Journey	
trips of 20min+	
no other transfers required	
Station Typology	
close to production-zones (e.g. dwellin	
terminal station	
station category urban medium / rural	
close to attraction-zones (e.g. universit	

FACTOR	INFLUENCE ON CYCLE-RAIL USE
Regions bike ability	
early sunset	0 / -
long winters	-
hilly	-
low temperatures	-
rainy weather	--
Bicycle Journey	
small distance between station and cycle highway	++
good quality of cycling lanes	+
high quantity of cycling lanes	+
often right of way	+
large number of other cyclists / bicycle lane volume	+
direct cycle routes to station (directness)	+
high levels of safety	+
good route knowledge	+
high bicycle ownership	+
good storage facilities at/near home	+

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Part 3: Station choice

Factors that have the most influence

- The five strongest factors are used for the choice experiment:
  - *Bicycle travel time*
  - *Train travel time*
  - *Transfer time (time needed to park a bike and walk to the platform)*
  - *Directness (number of transfers in train trip)*
  - *Costs of bicycle parking*

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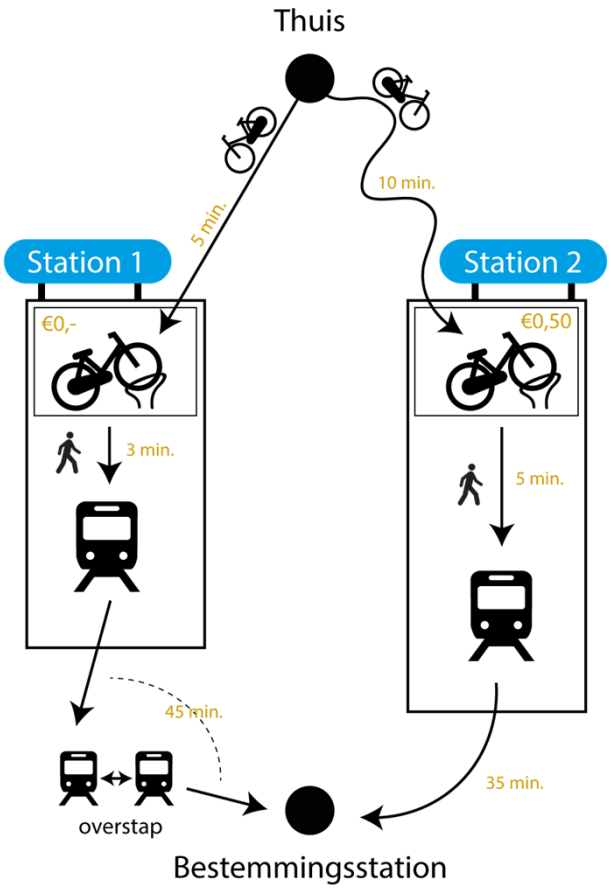
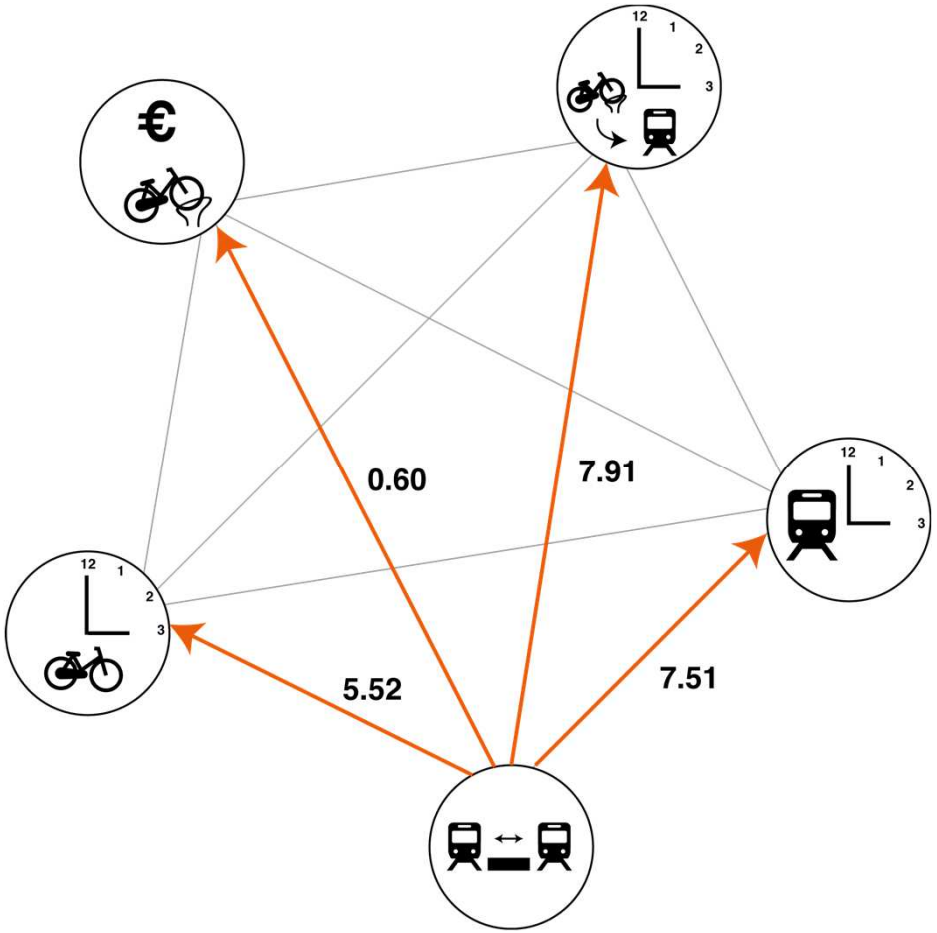
Impact of factors – *Choice experiment*



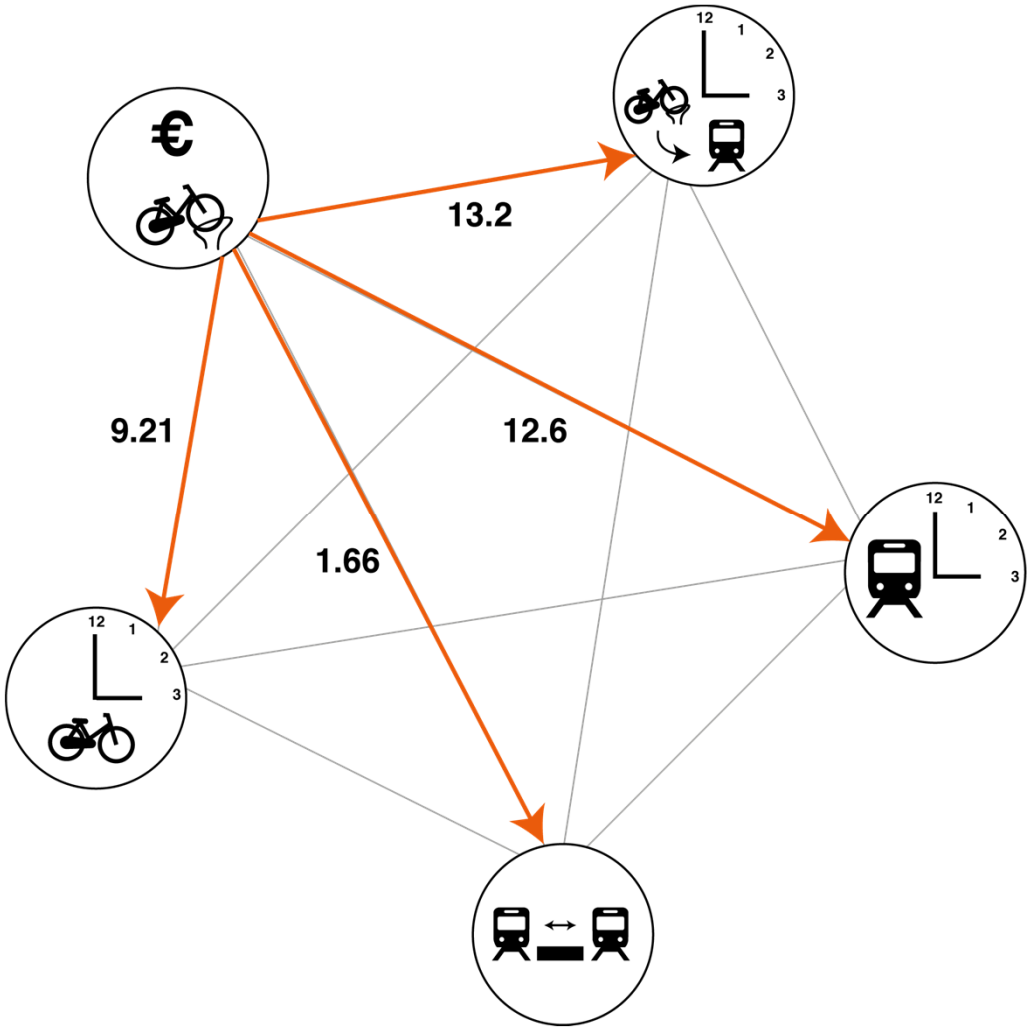
- 269 respondents

Results

Transfer



Price



Personal characteristics

	Bike time	Price	Time to park	Transfer	Train time
General	-0.11	-1.00	-0.08	-0.60	-0.08
Gender					
Male	-0.11	-1.00	-0.09	-0.63	-0.08
Female	-0.11	-1.00	-0.06	-0.60	-0.08
Age					
15-	-	-	-	-	-
16-24	-	-			-
25-44					
45-64					
65+	-	-	-	-	-
Access mode					
Bicycle	-0.11	-1.00	-0.09	-0.61	-0.08
Walking	-0.10	-1.00	-0.08	-0.62	-0.08
Transit	-0.10	-1.00	-0.07	-0.61	-0.07
Car	-0.11	-1.00	-0.08	-1.23	-0.08
Labor situation					
Employed					
Student					
Unemployed	-	-	-	-	-
Travel purpose					
Work	-0.11	-1.00	-0.10	-0.67	-0.08
Study	-	-	-	-	-
Recreation	-0.11	-1.00	-0.06	-0.58	-0.08
Trips per week					
More than 3	-0.10	-1.00	-0.08	-0.52	-0.07
1 to 3	-0.11	-1.00	-0.07	-0.55	-0.09
Few times per month	-0.12	-1.00	-0.07	-0.75	-0.09

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Conclusions

- Bike and PT combines benefits of both
- Potential to improve door to door services
- Potential for enhanced quality and efficiency of PT

- Relatively new research area
- Many knowledge gaps

- To do: Part 2: (Improving) integrated design

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Contact/questions

- N.vanOort@TUDelft.nl

- http://smartptlab.tudelft.nl/
- https://nielsvanoort.weblog.tudelft.nl/

- @Niels_van_Oort

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