

**‘It’s striking that 1918’s Motor Car of the Future doesn’t look — or operate — all that different in concept from the 2013’ ~ NY Times, 2013**







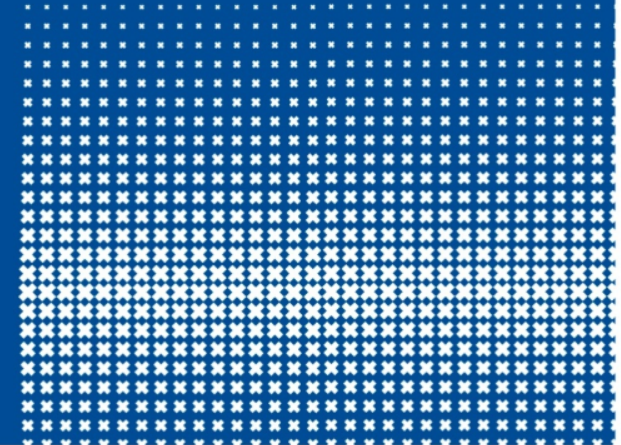








## Centre for Urban Studies



# TØI Kollektivforum, Transit and cycling; competition, synergy or both?

Part I. Why 'bike-train' is relevant

Roland Kager | #biketrain | @BikeTrainGuru

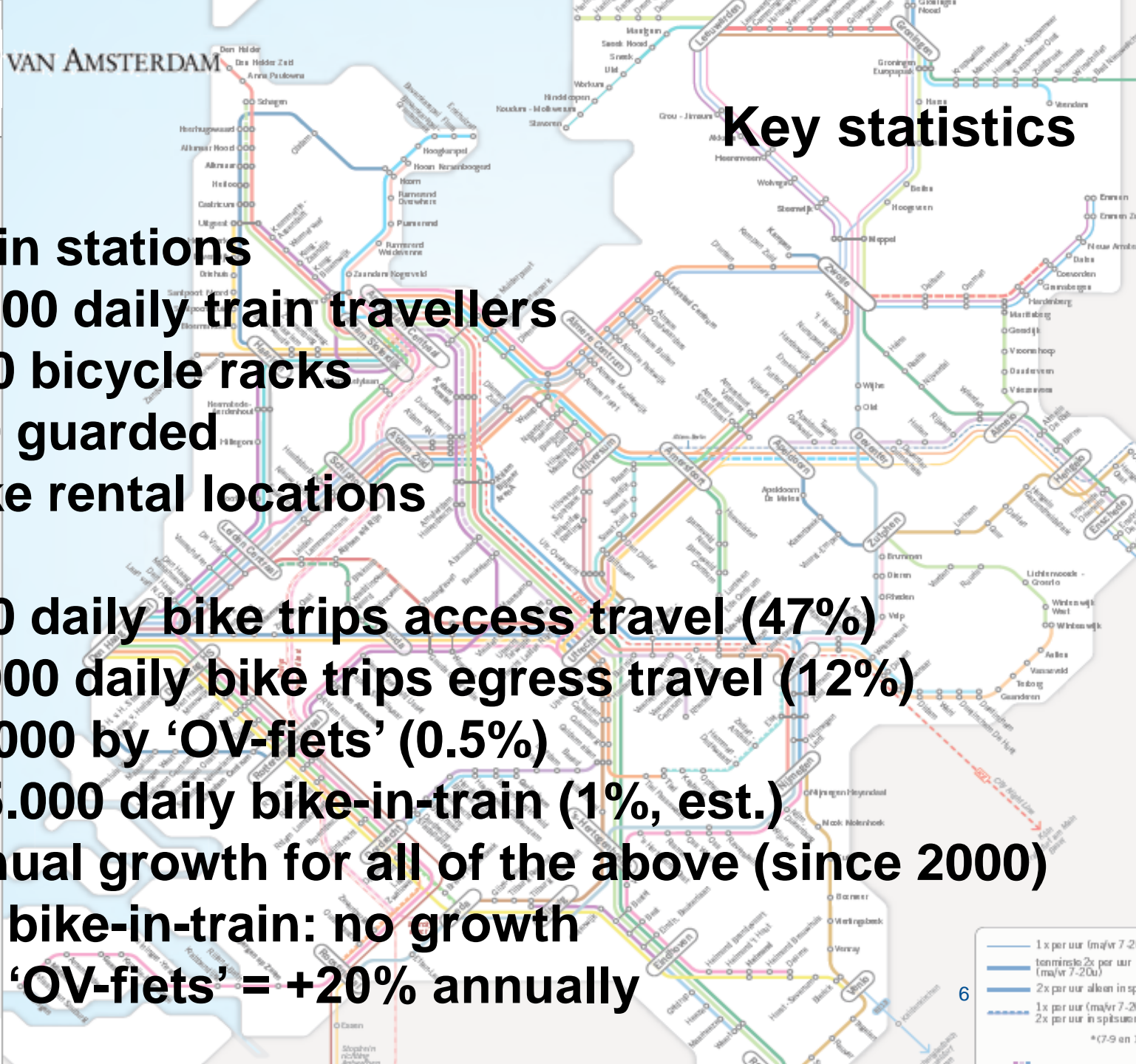


## WHY IS BIKE-TRAIN SYSTEM RELEVANT?

### 1. Because it is (increasingly) there!

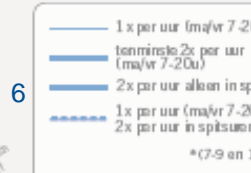
- ❑ >50% of 1.3 mln daily train journeys in NL
- ❑ 5% annual growth
- ❑ solid outlook: ict, (re)urb, gen Z, p2p, flex-economy





# Key statistics

- ❑ 410 train stations
- ❑ 1.300.000 daily train travellers
- ❑ 500.000 bicycle racks
- ... 125.000 guarded
- ❑ 250 bike rental locations
- ❑ 600.000 daily bike trips access travel (47%)
- ❑ + 150.000 daily bike trips egress travel (12%)
- .... incl. 8.000 by 'OV-fiets' (0.5%)
- .... incl. 15.000 daily bike-in-train (1%, est.)
- ❑ 5% annual growth for all of the above (since 2000)
- .... except bike-in-train: no growth
- .... except 'OV-fiets' = +20% annually







## WHY IS BIKE-TRAIN SYSTEM RELEVANT?

**2. Because it is most viable alternative to car dependency**

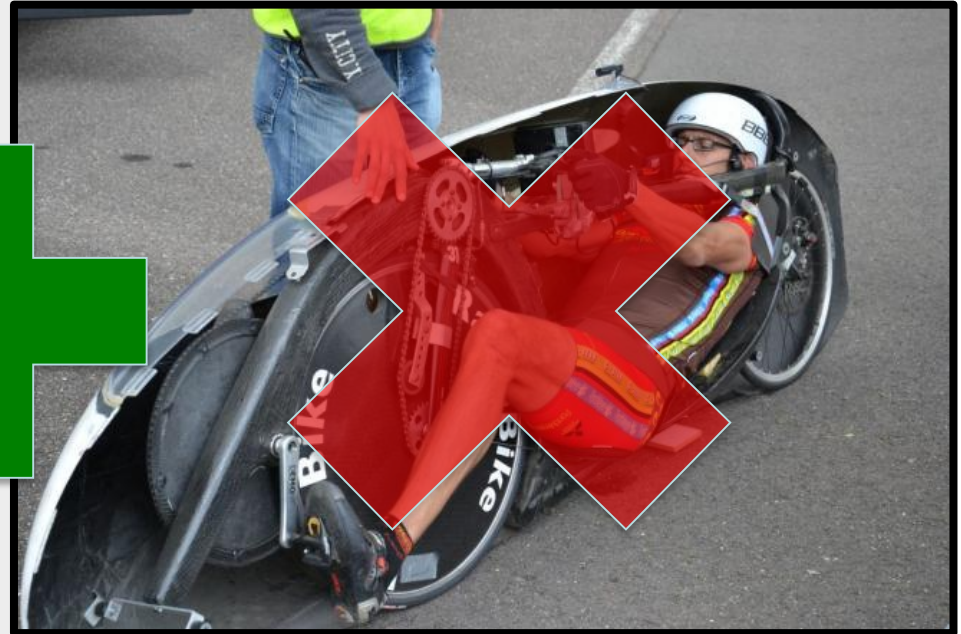


# The problem of the bicycle...



**... performance (sharply) decreases with increasing distance**







## Station access for Dutch population. Walk + cycling dist.

Percentage of Dutch population	N	< 1 km (nearest)	< 5km	< 7.5 km	Choice (5 km)	Choice (7,5 km)
All stations	388	19,2%	69,1%	81,2%	2,32	3,47
-Large IC station	17	1,1%	15,8%	23,8%	1,33	1,39
-IC station	27	1,8%	20,6%	28,5%	1,13	1,30
-Small IC station	22	1,5%	10,5%	17,0%	1,03	1,05
-Hybrid station	16	1,2%	7,6%	12,3%	1,05	1,11
-Plus station	86	4,6%	28,8%	42,3%	1,41	1,77
-Small station	216	9,4%	36,3%	53,6%	1,55	1,95



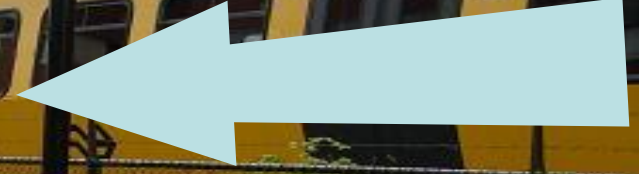
## WHY IS BIKE-TRAIN SYSTEM RELEVANT?

**3. Because cycling and transit are mutually dependent**



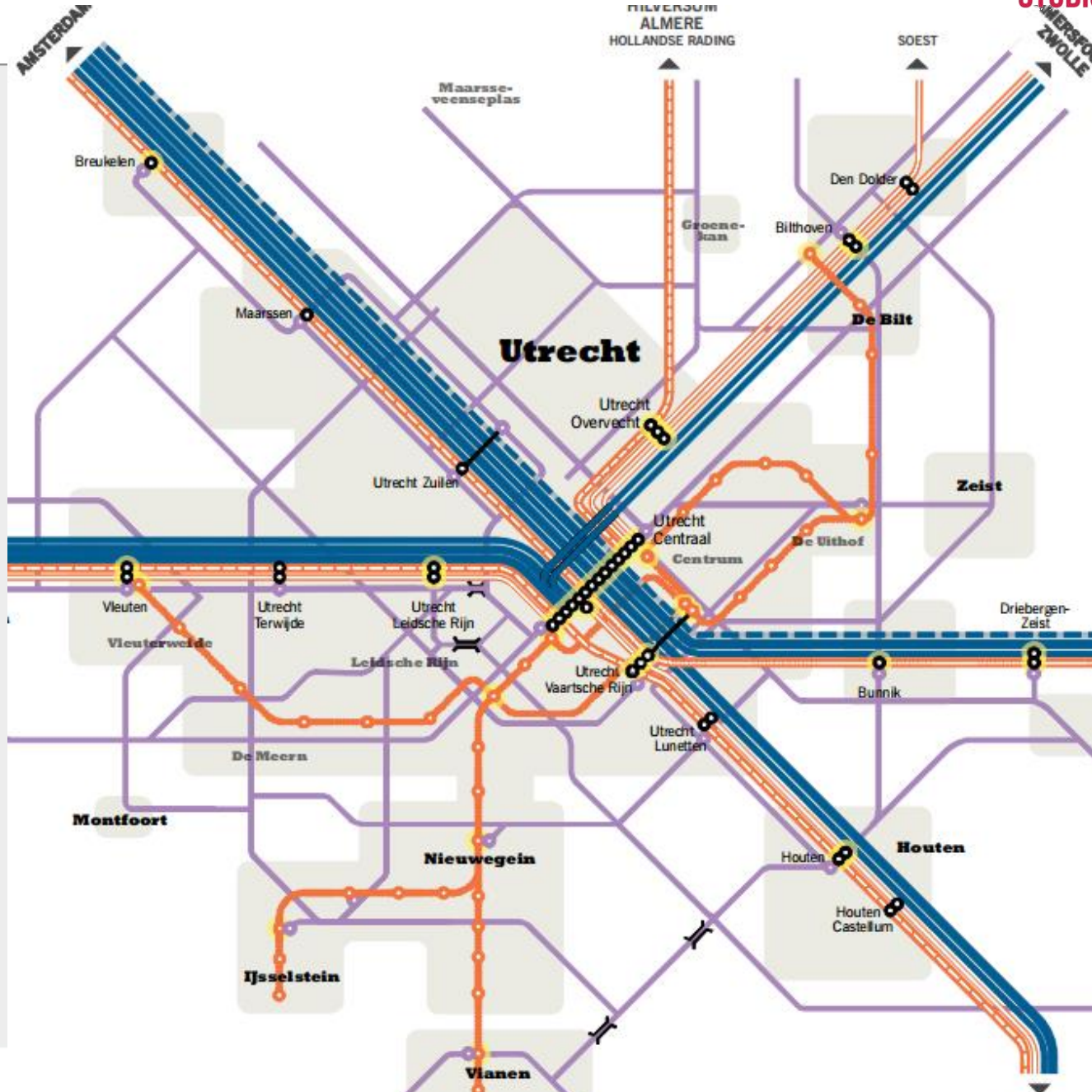
# Combination: bike-train

47%



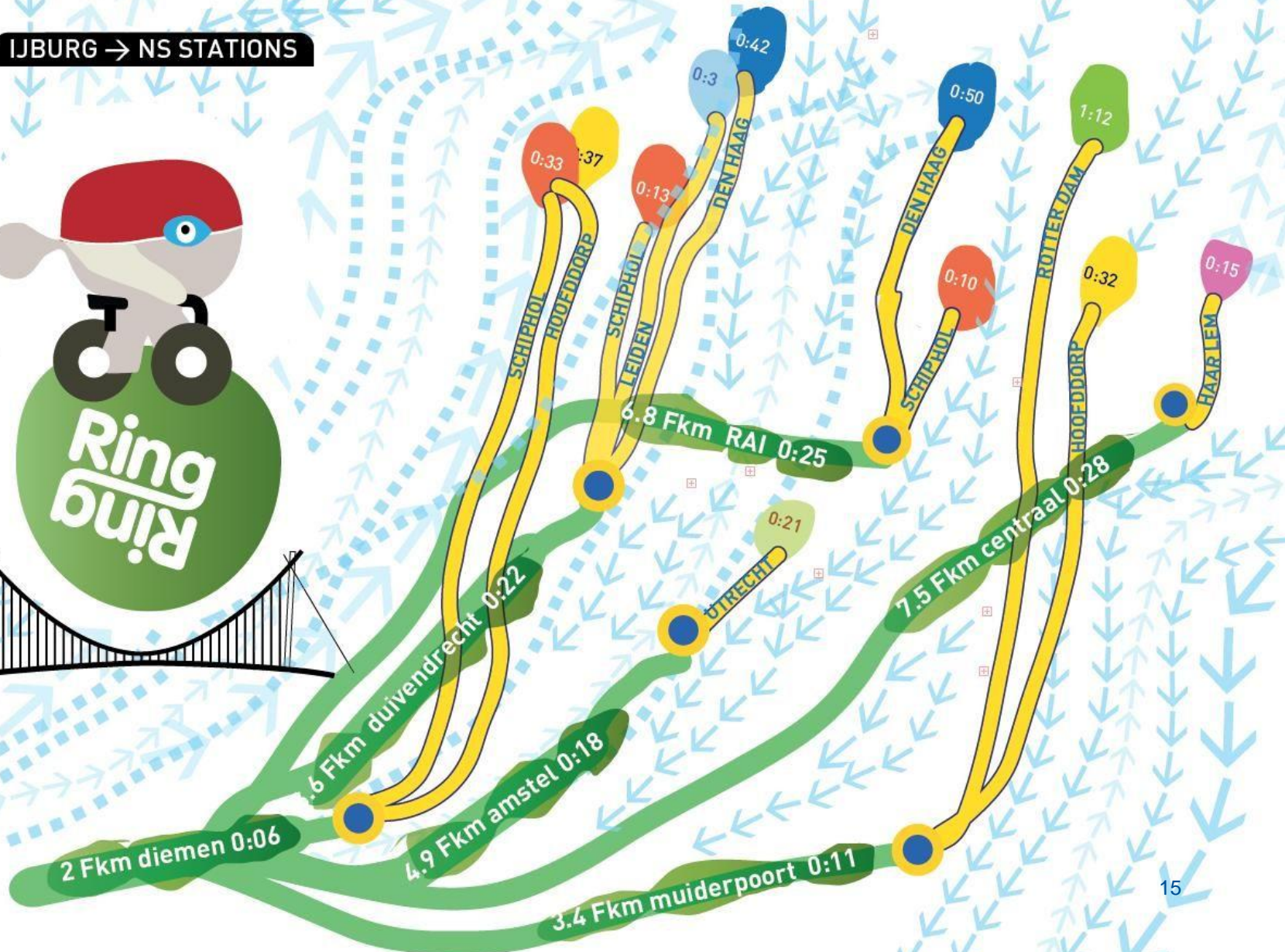




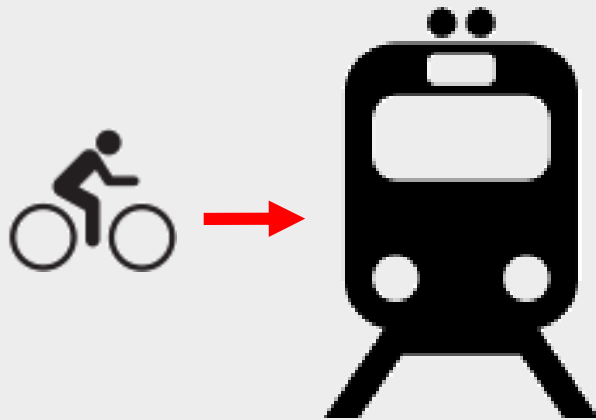




IJBURG → NS STATIONS



## Two perspectives on the same synergy:



“Bicycles extend the catchment area of stations, with acceptable impact on the speed of travel”



“Trains extend the action radius of the bicycle, with acceptable impact on the flexibility / individuality of travel”

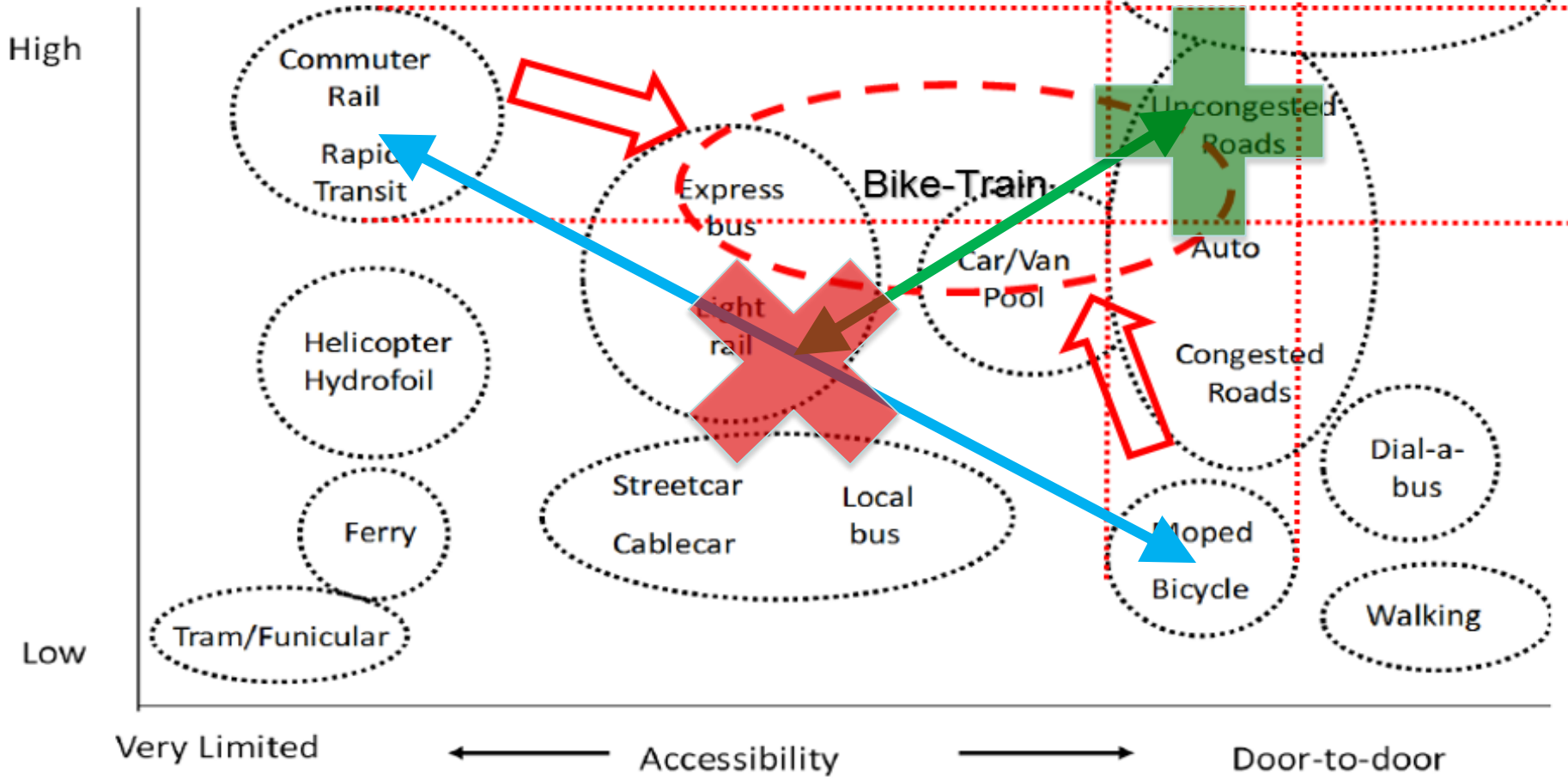


An architectural rendering of a modern, multi-level transit hub. The scene is brightly lit with natural light from large skylights. In the foreground, a person in a white shirt and purple shorts walks towards the left. In the middle ground, a person with a backpack walks up a wide staircase. To the right, a person is pushing a bicycle. The background shows a mezzanine level with several people standing near a railing. The ceiling is a mix of green and white panels with circular lights. The floor is a mix of yellow and red. The overall atmosphere is clean, modern, and functional.

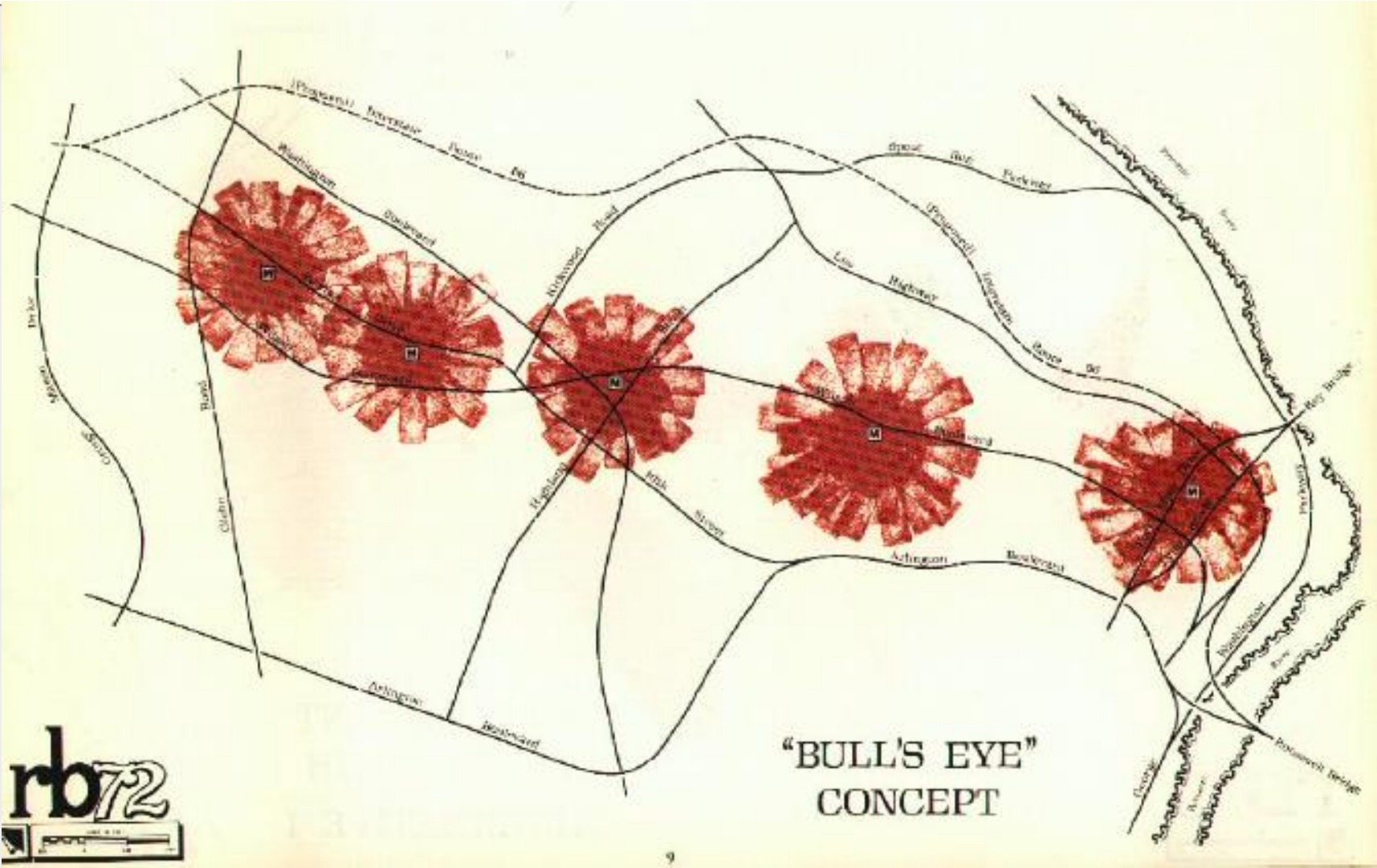
**WHY IS BIKE-TRAIN SYSTEM RELEVANT?**

**4. Because it is more than the sum of its parts!**

Typical Speed  
(on that mode)

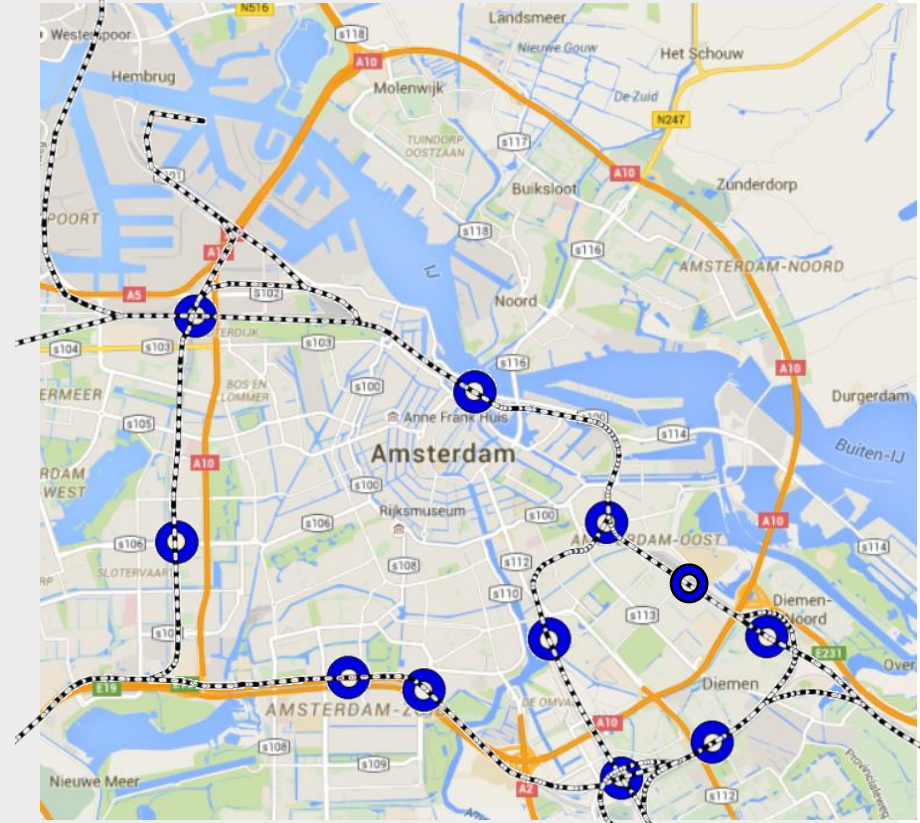
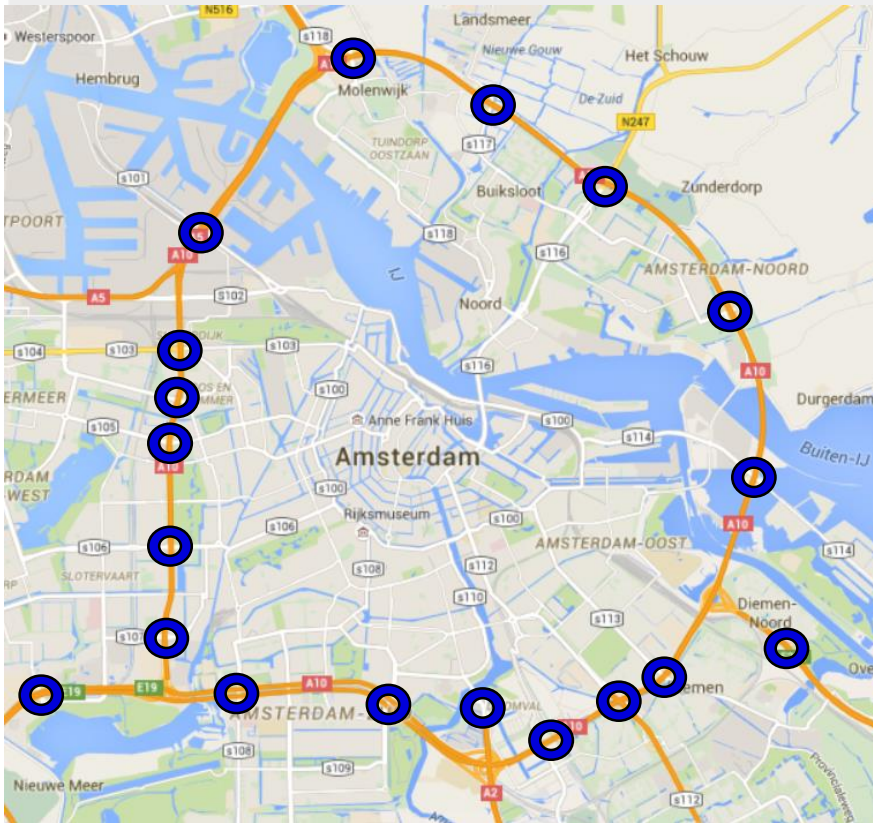






# The option of station choice – Why?

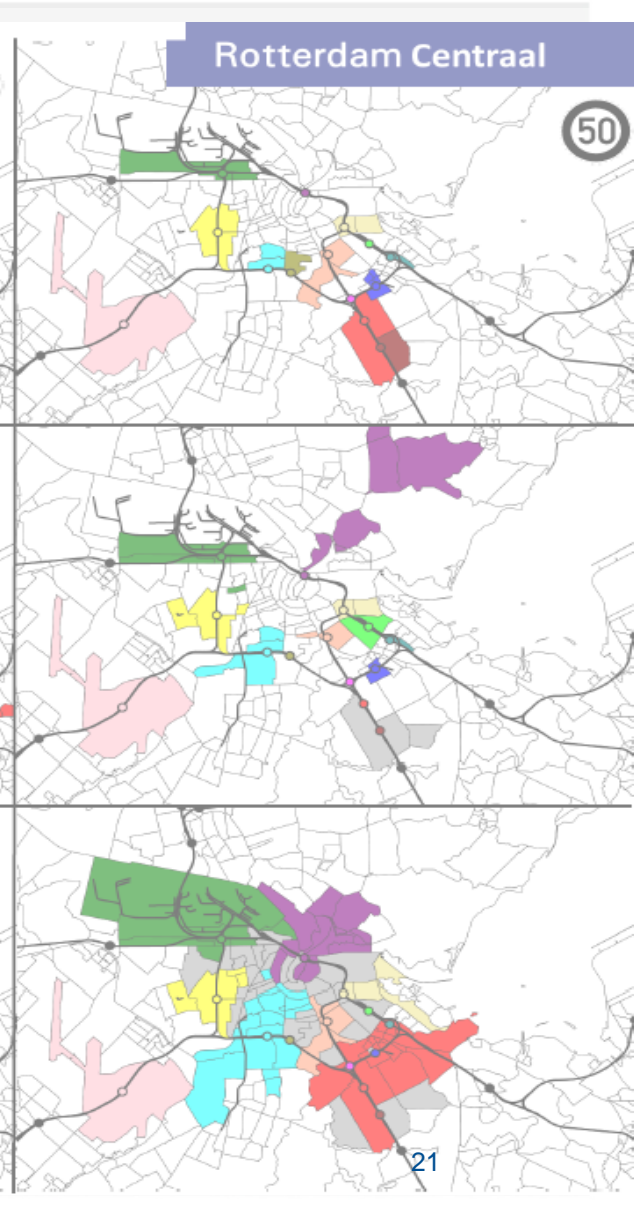
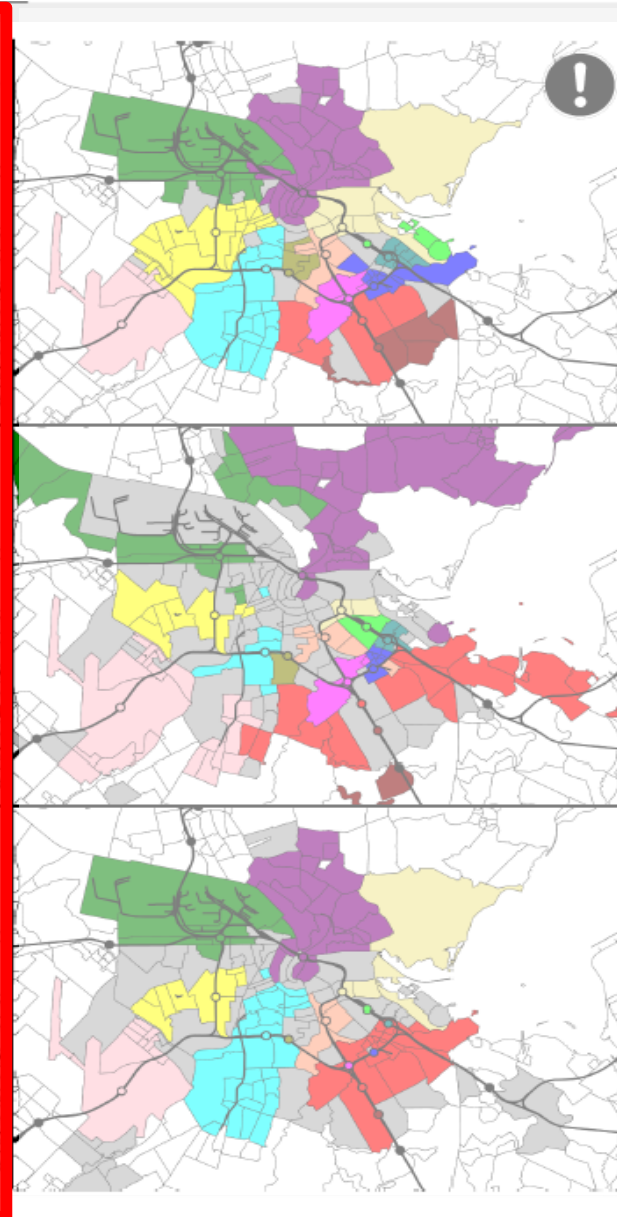
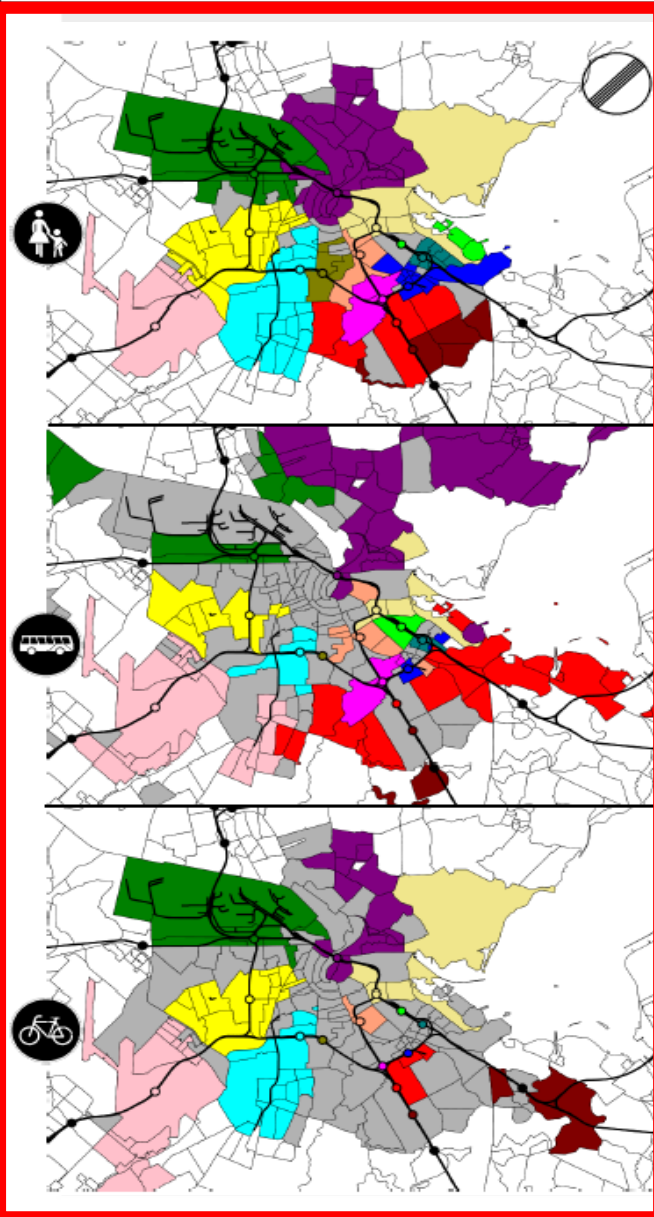
↓ Which access ramp is used?

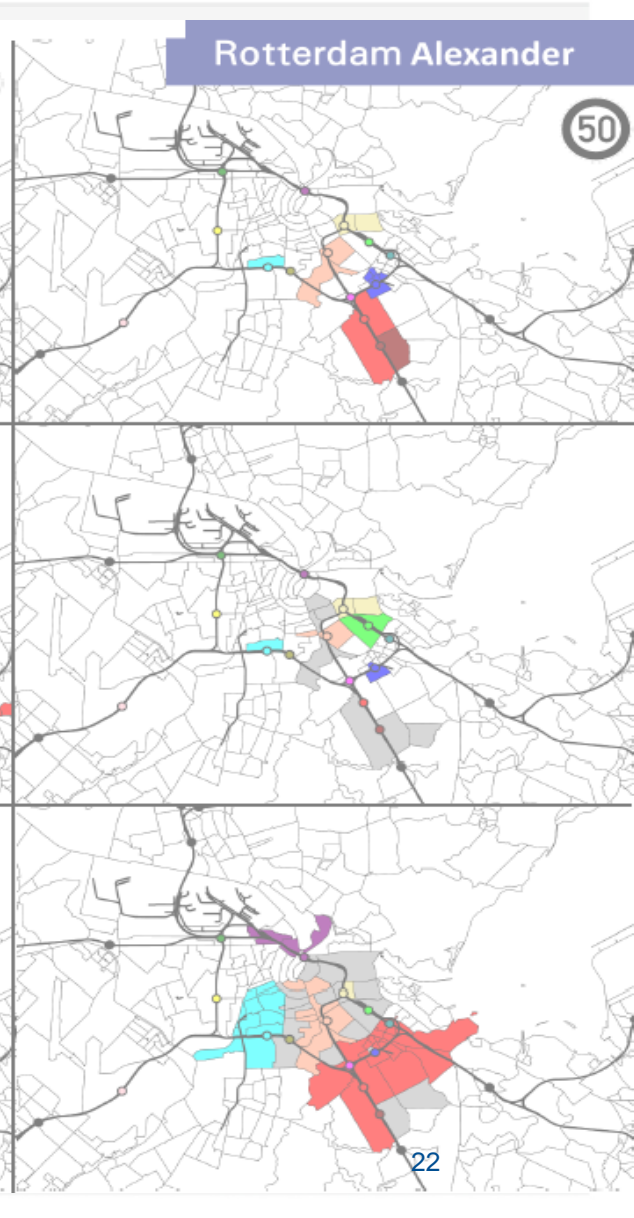
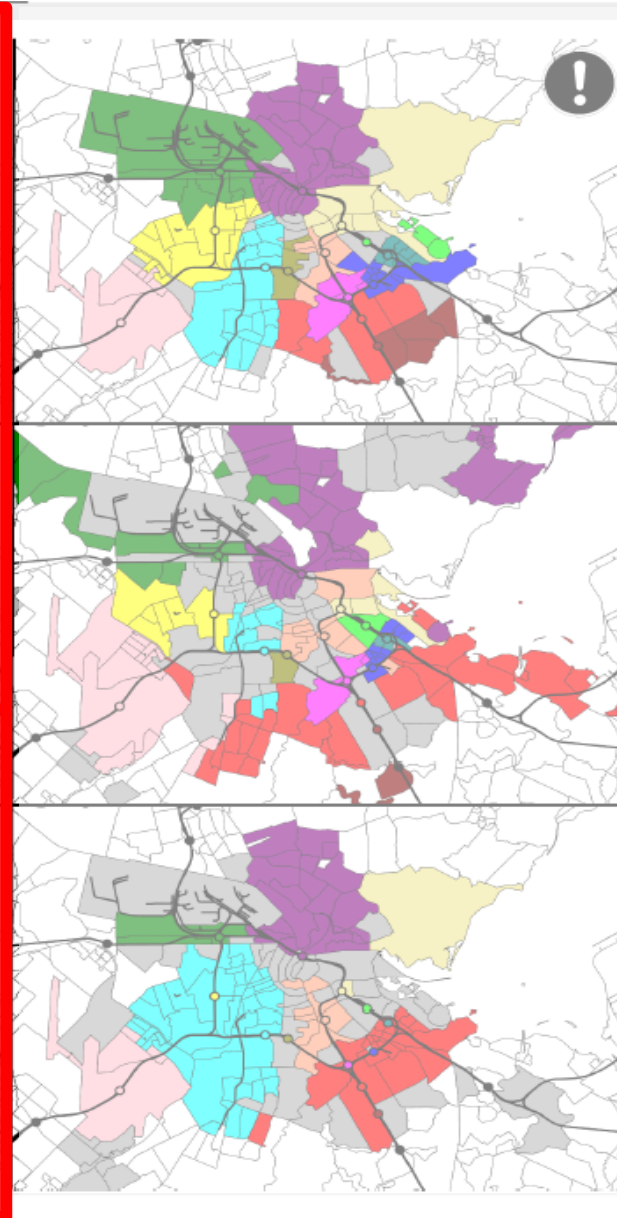
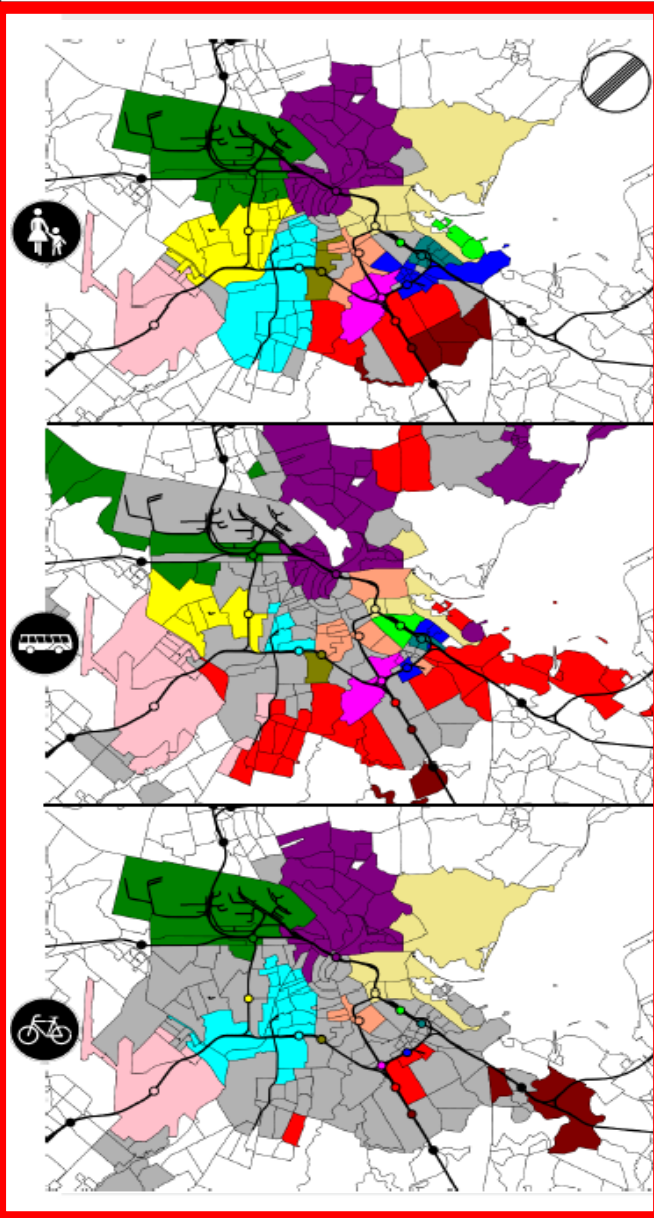


Which access station is used?









Rotterdam Alexander

50





<https://vimeo.com/147017127>



## WHY IS BIKE-TRAIN SYSTEM RELEVANT?

**5. Because it has fundamental ramifications for land use – mobility interaction**

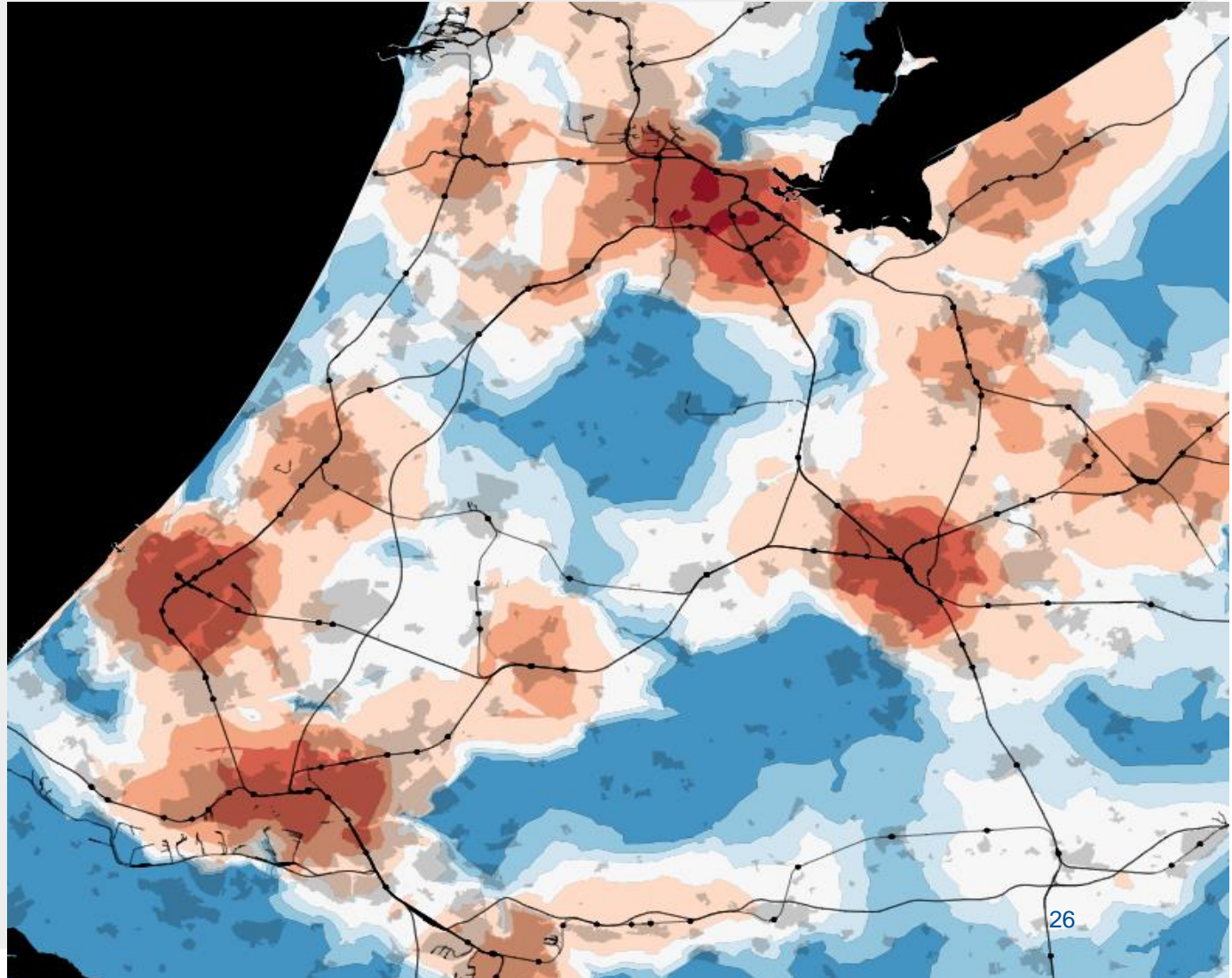


# Trends in urbanity, bicycle, transit.

## Changes between 2000-2015

Largest 30 cities in NL	Bicycle	'Train'	↔	Urbanity
1.Amsterdam 4.Utrecht	↑↑↑	↑↑↑		↑↑↑
10.Nijmegen 22.Leiden	↑↑	↑↑		↑↑
2.Rotterdam 3.The Hague 15.Arnhem	↑	↑↑		↑
5.Eindhoven 7.Groningen 14.Amersfoort, 17.Den Bosch 20.Zwolle 28.Delft 30.Deventer	↑↑	↑		↑
11.Enschede 13.Haarlem	↑	↑		↑
8.Almere 9.Breda 18.Hoofddorp 23.Dordrecht	0	↑		0
16.Zaanstad 19.Zoetermeer 25.Leeuwarden 27.Alkmaar	↑	0		0
6.Tilburg 12.Apeldoorn 21.Maastricht 24.Ede 26.Emmen 29.Venlo	0	0		0

# Number of departing trains per hour at <20 minutes of cycling



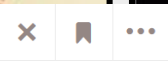
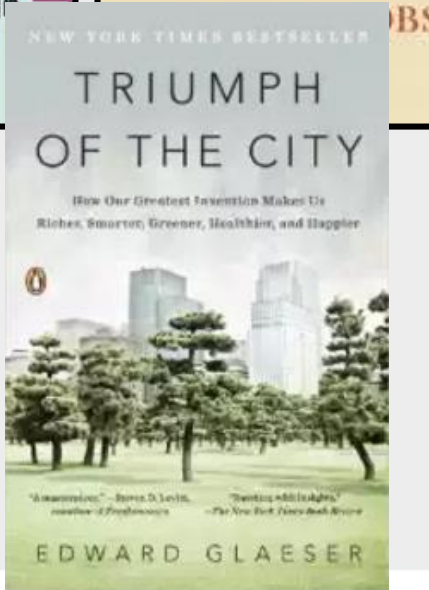
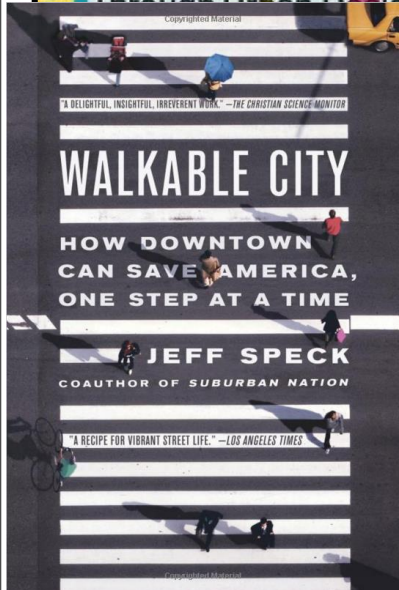
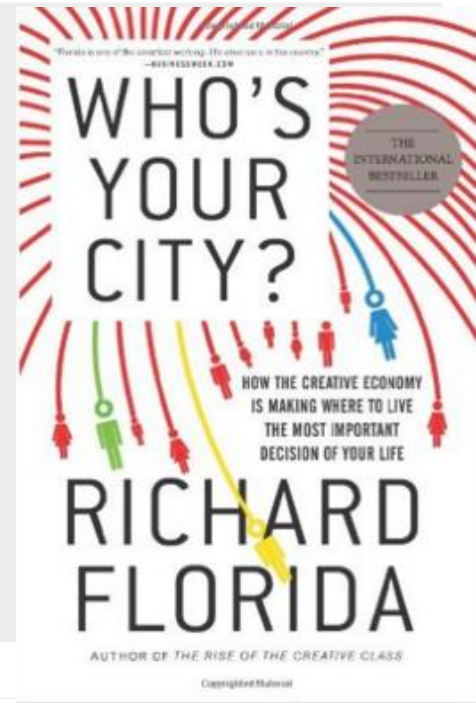
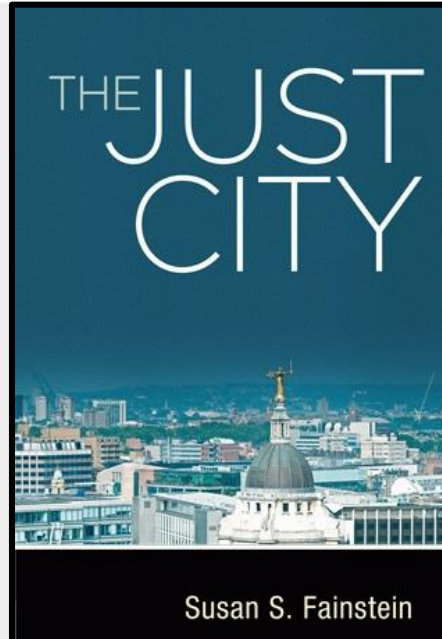
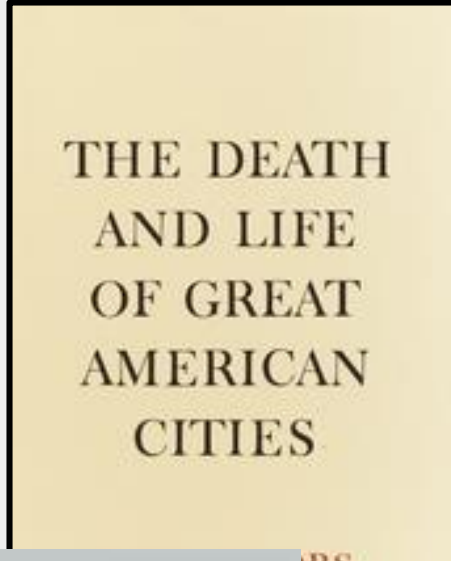
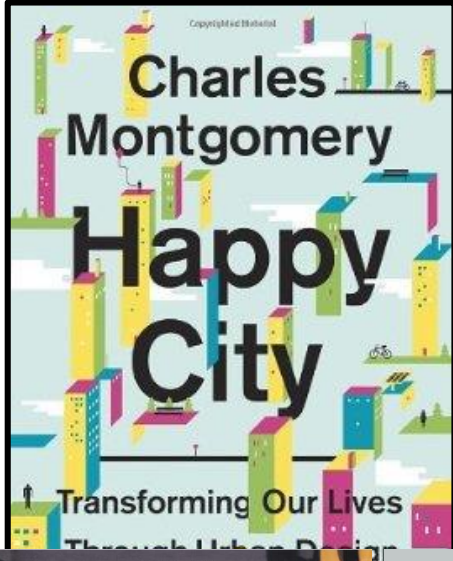


## WHY IS BIKE-TRAIN SYSTEM RELEVANT?

**6. Because it supports sustainable, healthy liveable and robust urban regions**



Pic: Herbert Tiemens  
Osnabrück, Germany



# Help, het gaat goed met Amsterdam!

PATRICK MEERSHOEK

Amsterdam is razend populair. Nu er meer mensen willen wonen dan er kunnen wonen, dreigt het

de kerstmarkt en de o  
buiten beschouwing la  
dan vaststellen dat he  
Amsterdam. Het  
gemeentelijke burea  
Statistiek bevestigt he  
vol in de zeilen heef  
voorbij is. De bedrijvi  
gemiddelde, de wer  
toeristen uit de hel  
Amsterdam te vinder





Revival of the city →

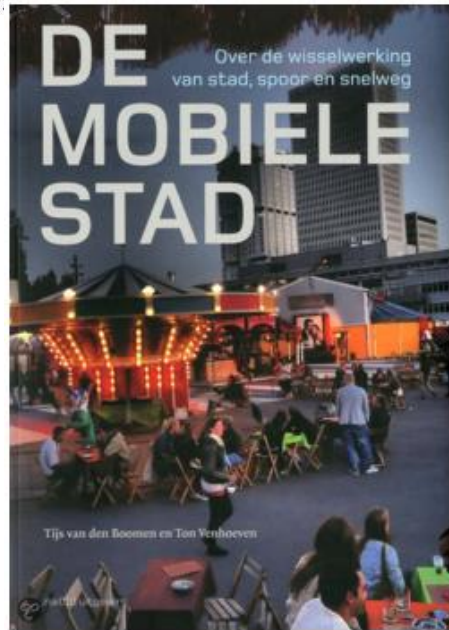
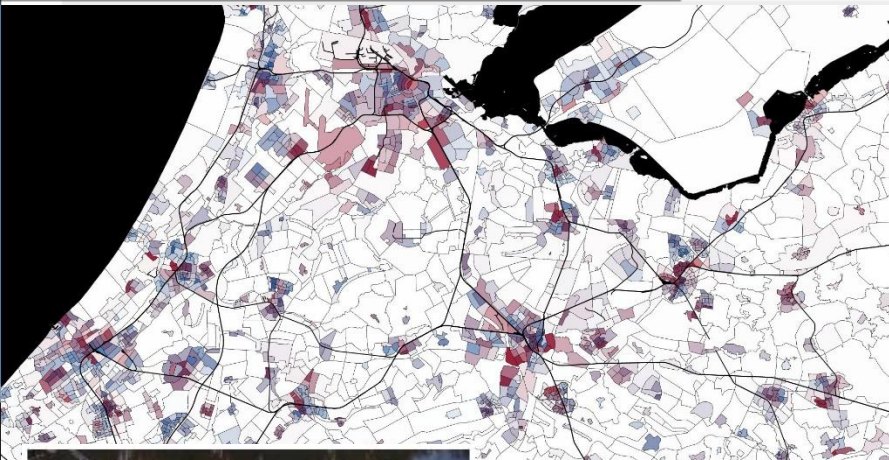
Density & Diversity →  
Proximity, Access & Inclusiveness

Zoek na van welk idee al wel/niet een Airbnb of Uber bestaat

Nederlandse initiatieven en het type product of dienst dat ze aanbieden

	Airbnb van... Particulieren verhuren hun bezittingen	Uber van... Particulieren verhuren hun arbeid	Tinder van... Relaties leggen tussen personen	Booking van... Bedrijven verhuren hun product
Belastingadviseurs		Belastingbutler		
Betalen	Finkq	Tabster		
Boodschappen		Superbuddy, Ubermart		
Boten	GoBoat	Barqo		Seaticket.eu
Caravans/campers	Goboony, Camploo			
Casting		iCasting		
Energiezuinig huis		Bleeve		
Fietsen	Cycleswap			BimBimBikes
Hulswerkbegeleiding	Didactique			
Hypotheek	EyeOpen			
Kleding	United Wardrobe		Dardecade, Swipe & Shop	
Klusjes	Butlerbuddy	Jobadoo		
Medicijnen		MyTomorrow		
Muziek			Popped	
Parkeren	Parkyourcar			Mobypark
Persoonlijke verzorging		Gyld		Treatwell
Restaurants	AirDnD			
Software	Ekpa			
Sport		Filmo	Crowd Active	
Studenten	Stuudnest			
Taxi's				Cheaptaxi's
Teams			Part-Up	
Toeristen/reizen	Withlocas	Mondygo		
Unieke ruimtes	Beesspots			
Vrijwilligerswerk	WeHelpen			
Werk(plekken)	Chairity		Otso, Jobtalk, Cocoon	Deskbookers

# Emergence of parallel 'car-world' and 'transit- world'







<http://www.fastcoexist.com/3052699/these-historical-photos-show-how-amsterdam-turned-itself-into-a-bike-riders-paradise>







## WHY IS BIKE-TRAIN SYSTEM RELEVANT?

### 6. Because it needs attention

Pic: Luca Bertolini  
Subway, Fanling MTR station

# ‘Cycleable’ catchment areas generate a *fundamentally* different transport system



**Compare with design & policy**

**Consider resultant opportunities & scales!**

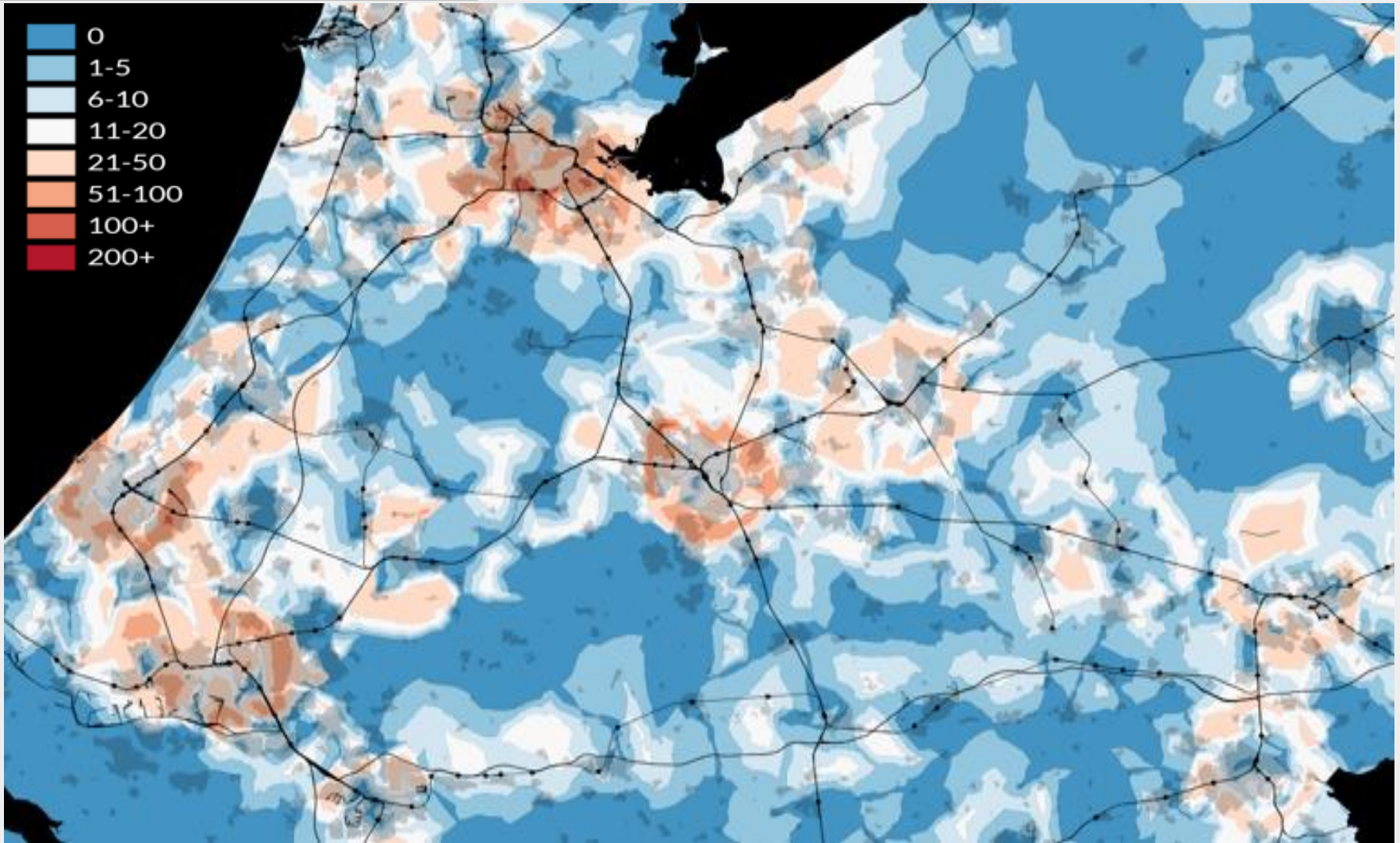












Additional number of departing trains within 20 min. when using pedelec





# Rent a bike from someone like you

Save money, meet awesome people, and consume less

🔍 Where would you like to rent?

Search

▶ See how it works



Bikes



Surf



Snow

## WHY IS BIKE-TRAIN SYSTEM RELEVANT?

**6. Because it has general applicability, (also where cycling levels are low or barriers exist)**



# Why general applicability:

## Cycling+transit...

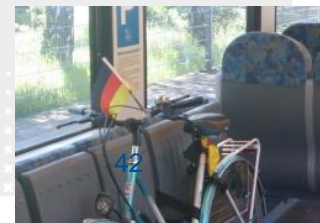
- fits well with typical ‘mesh-size’ of transit
- solves the first and last mile problem (which was a misleading question anyway)
- increases ‘individuality’ of transit (‘traveller in control’)
- consumes less space and investment (urban settings!)
  - for govts, operators and individuals.
  - hence: compatible with urbanisation!
- adaptive and robust by nature (‘anti-fragile’)







Bike-train also going to *explode* in these places? Role of urbanisation?





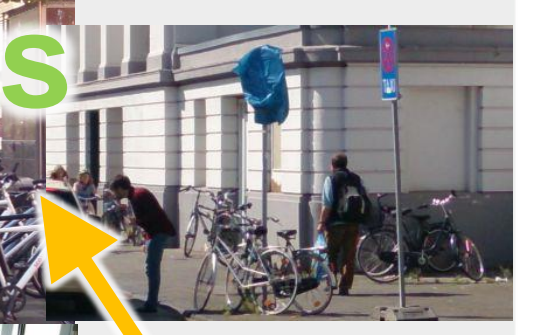
## WHY IS BIKE-TRAIN SYSTEM RELEVANT?

1. Because it is (increasingly) there!
2. Because it is viable alternative to car dependency
3. Because they are mutually dependent
4. Because it is more than the sum of it parts!
5. Because it has fundamental ramifications for land use – mobility interaction
6. Because it supports sustainable, healthy liveable and robust urban region
7. Because it needs attention
8. Because it has general applicability





Cities



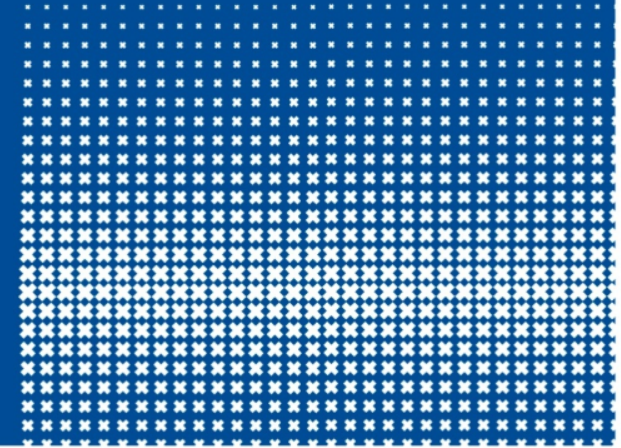
Cycling



Transit







# TØI Kollektivforum, Transit and cycling; competition, synergy or both?

Part II. Concepts: what *is* 'bike-train'?

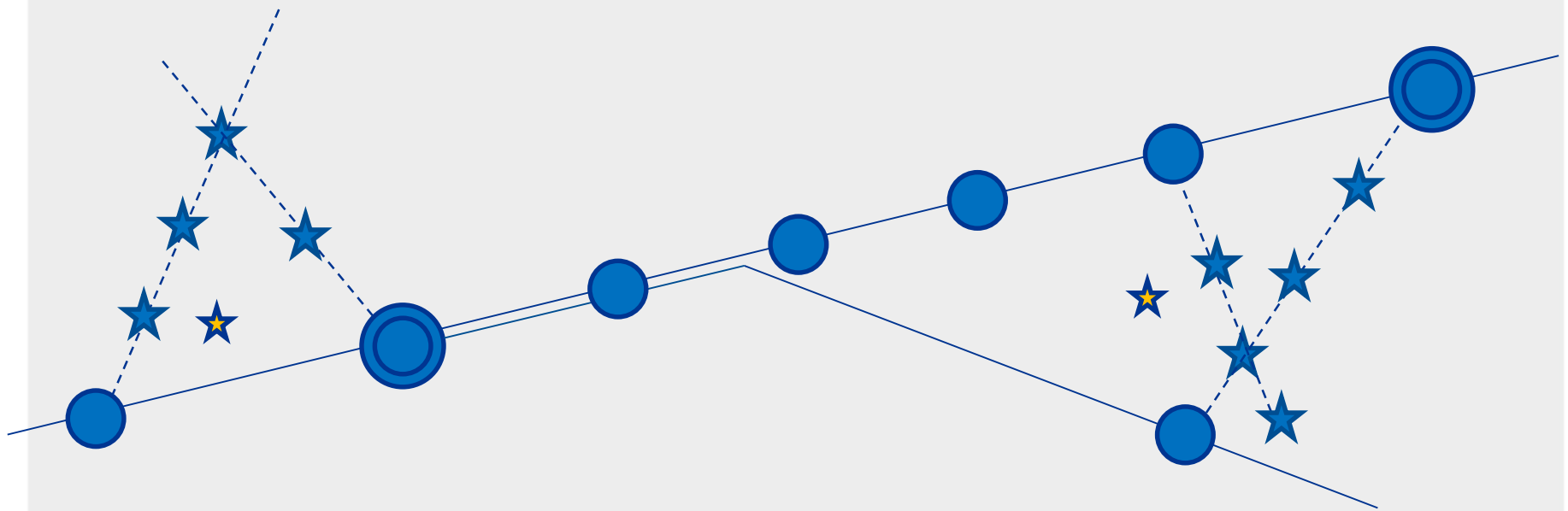
# Concepts 'bike-train' system

- Subdivision of transit → 'Feeders' and 'Trains'
  - 'trains' as a concept... could be (fast) bus, metro, ...
- Station choice & Why it is important
- 'Stand-alone transit' vs 'Bike-Train'
- Competition vs synergy





# Trains and feeders



Train stop, express/IC

— Train service



'Real' origin / dest.



Train stop

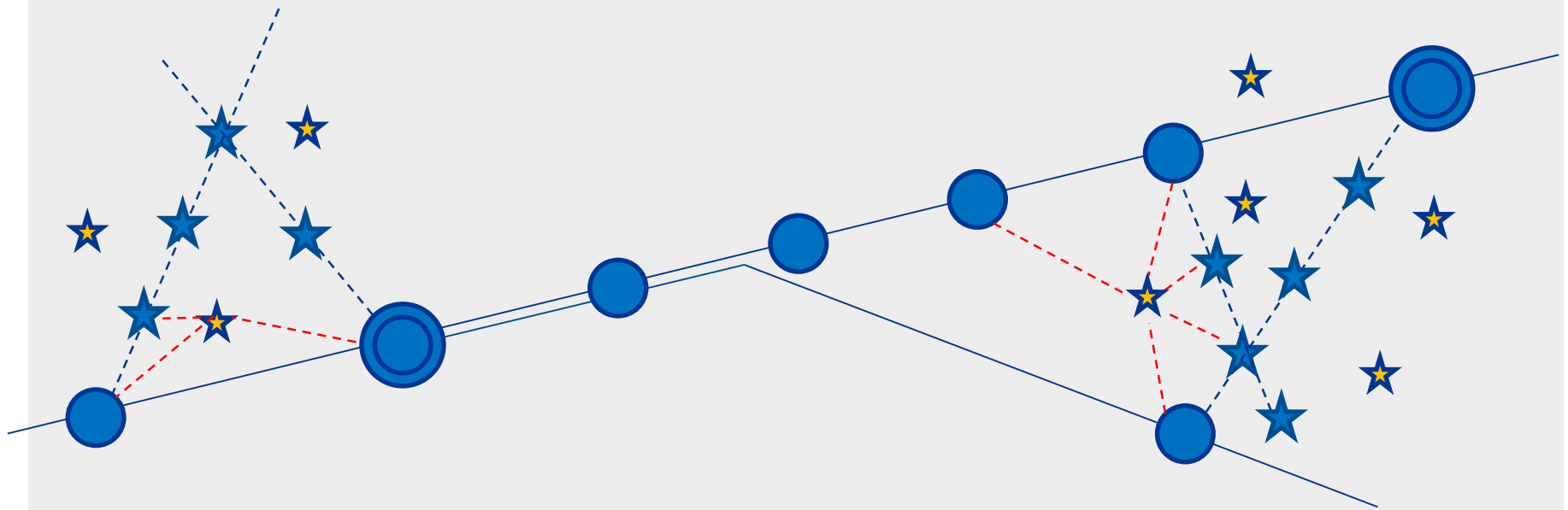


Feeder service



Feeder stop

# Network and topology



Train stop, express/IC

— Train service



'Real' origin / dest.



Train stop



Feeder service



Feeder stop



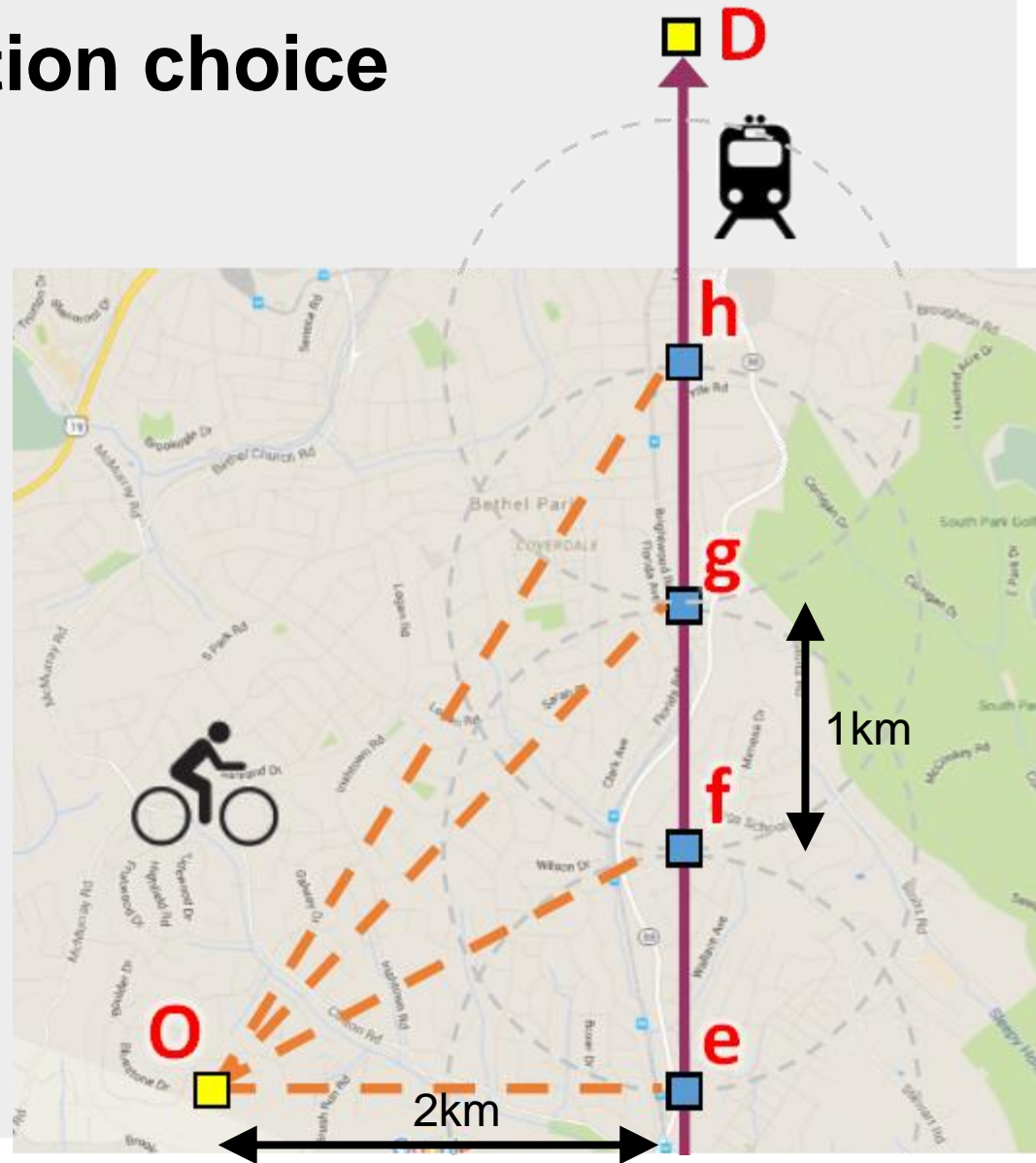
Walk / bike ('topology')



# The option of station choice - in theory

How does a cyclist  
choose between  
stations?

... and different so  
from a pedestrian?



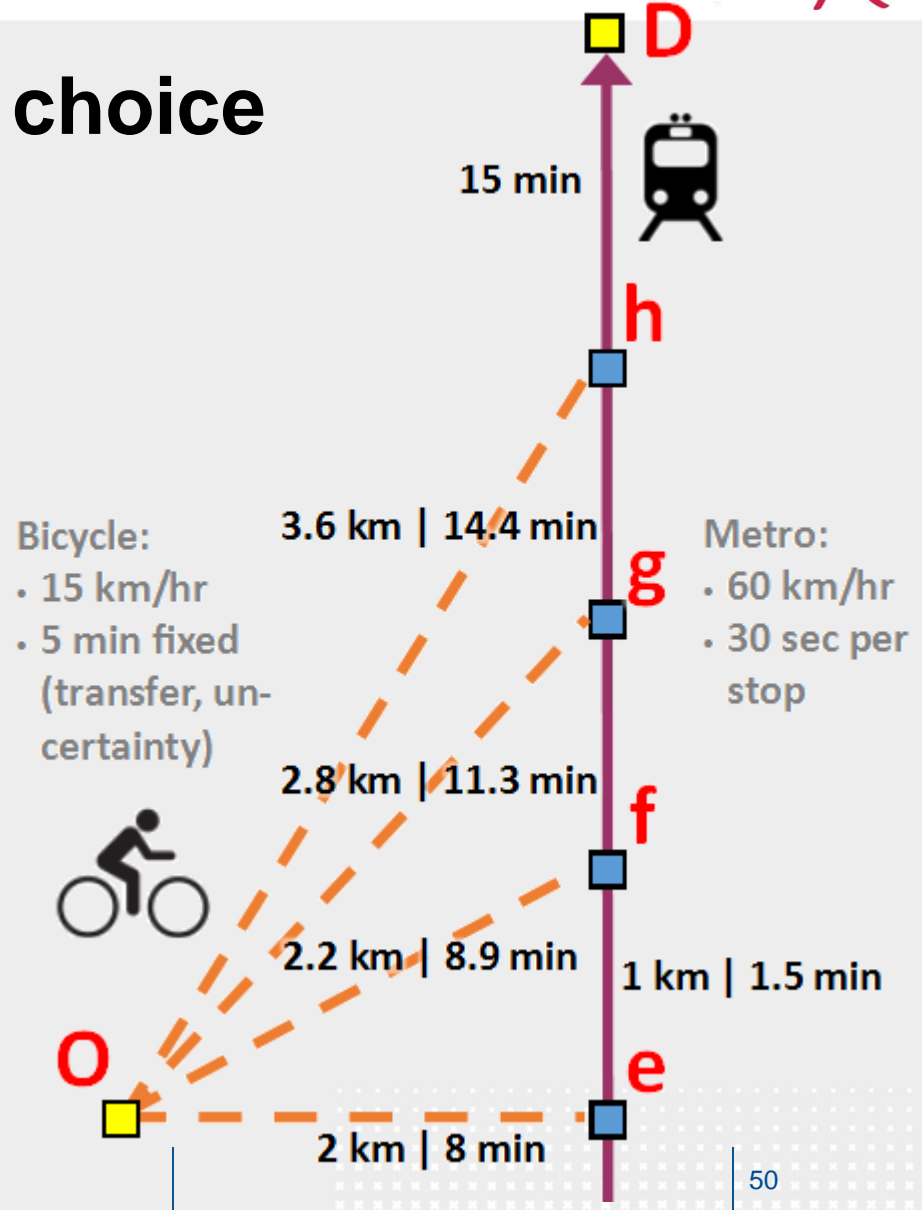
# The option of station choice - in practice

via	O->f	O->g	O->h	O->D
h			14.4	34.4
g		11.3	17.8	32.8
f	8.9	15.4	16.9	31.9
e	14.5	16.0	17.5	32.5



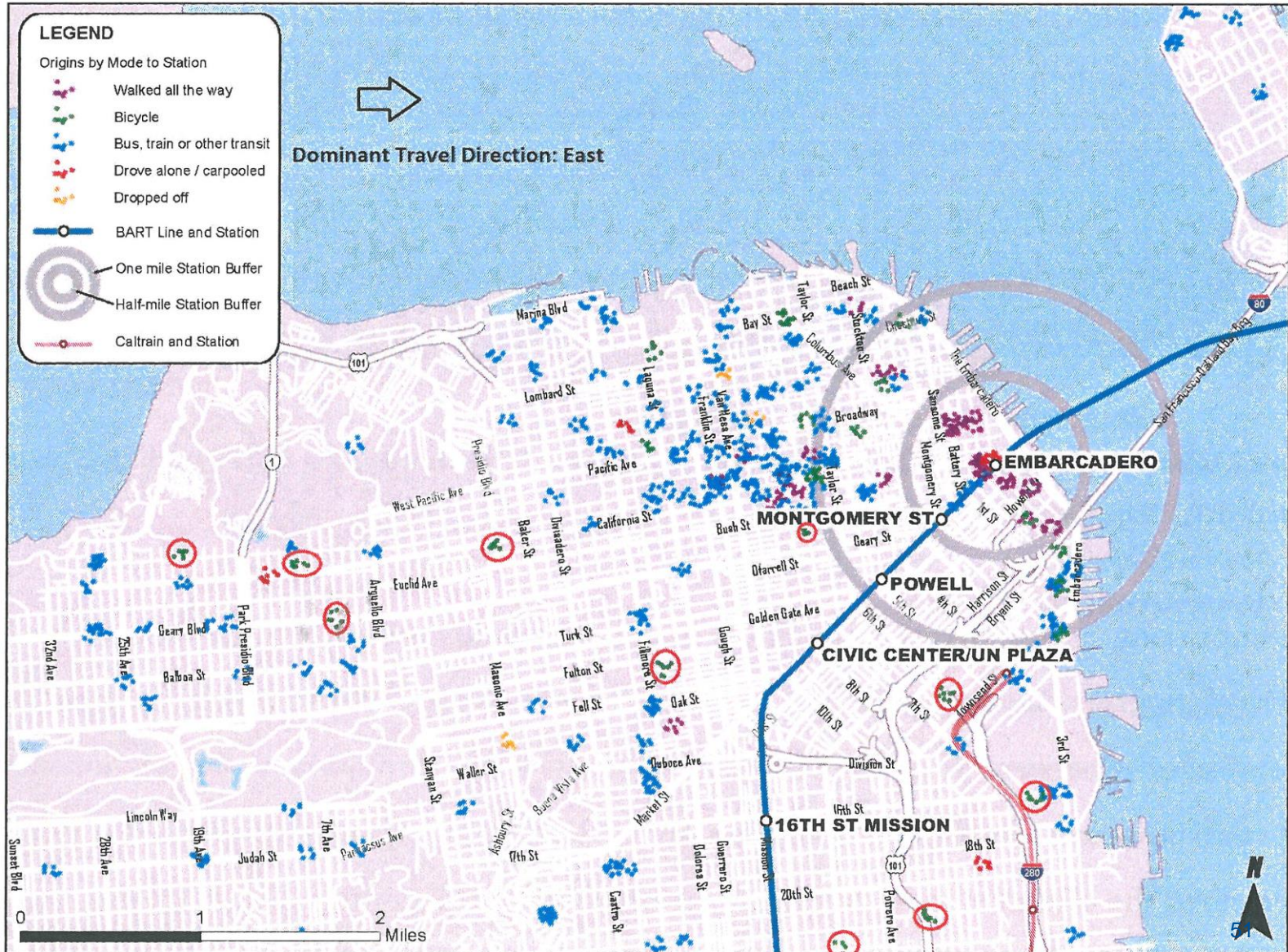
For a cyclist all stations are the same in travel time!

... but not in other aspects...  
= strength of system  
+ opportunity for optimisation





## Embarcadero Station: Home Locations of BART Riders by Mode

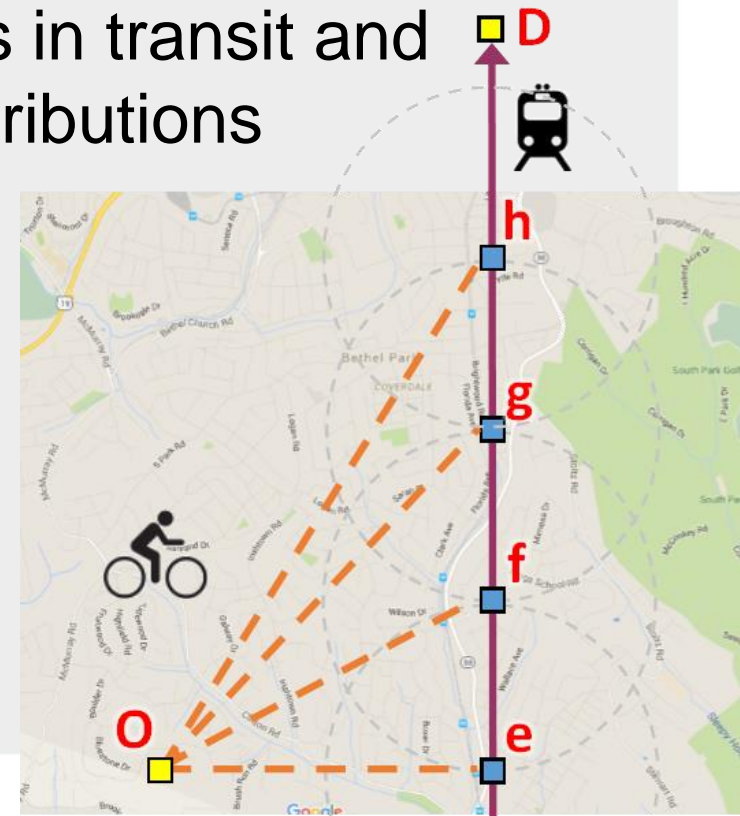


Data Sources: ESRI, 2008 BART Station Profile Study (weekday only; data are weighted from survey sample to represent average weekday ridership)



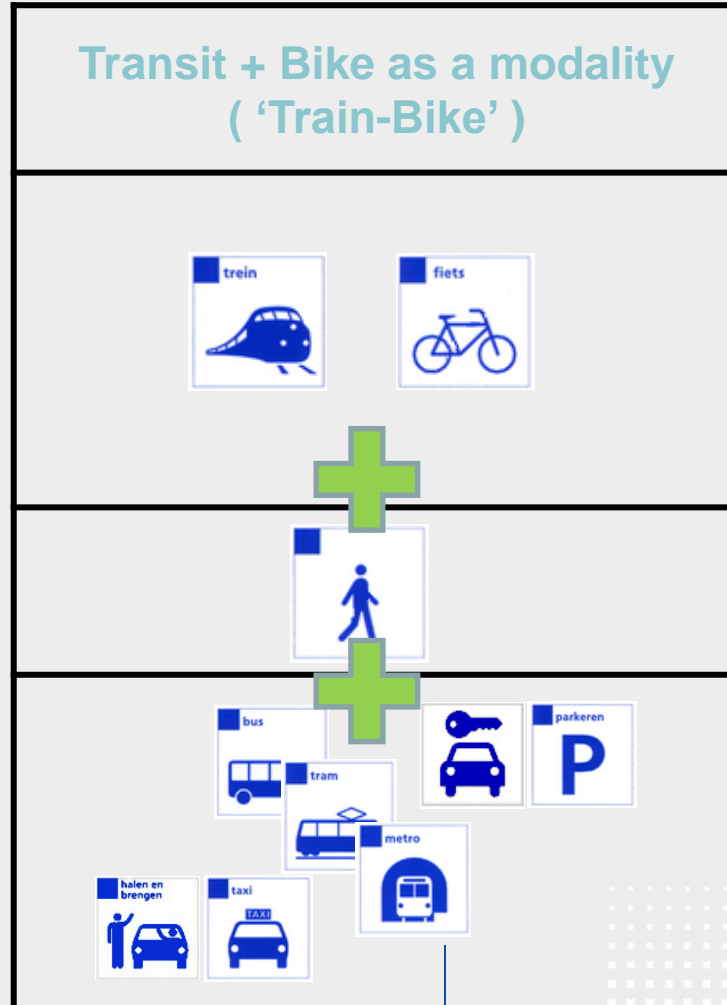
# Potential application

- Consider synergetic effects between cycling, transit and urbanity: ‘1+1=4’
- Consider to balance investments in transit and cycling in similar geographic distributions
- Be selective but targeted when considering investment in bike-train facilities
- Consider terminal stations, stations with multiple services, long stretches, quick-wins

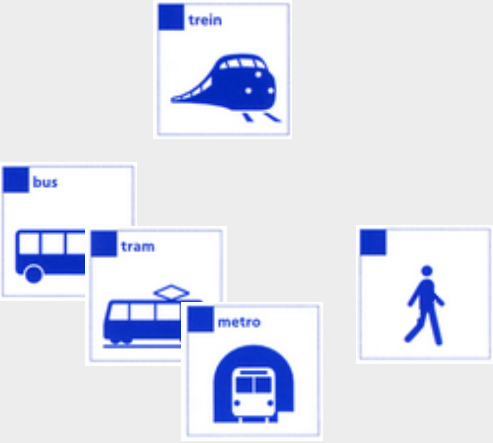



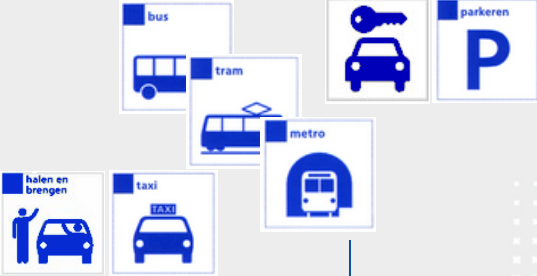





# BikeTrain as a modality → How do we understand and model this modality?

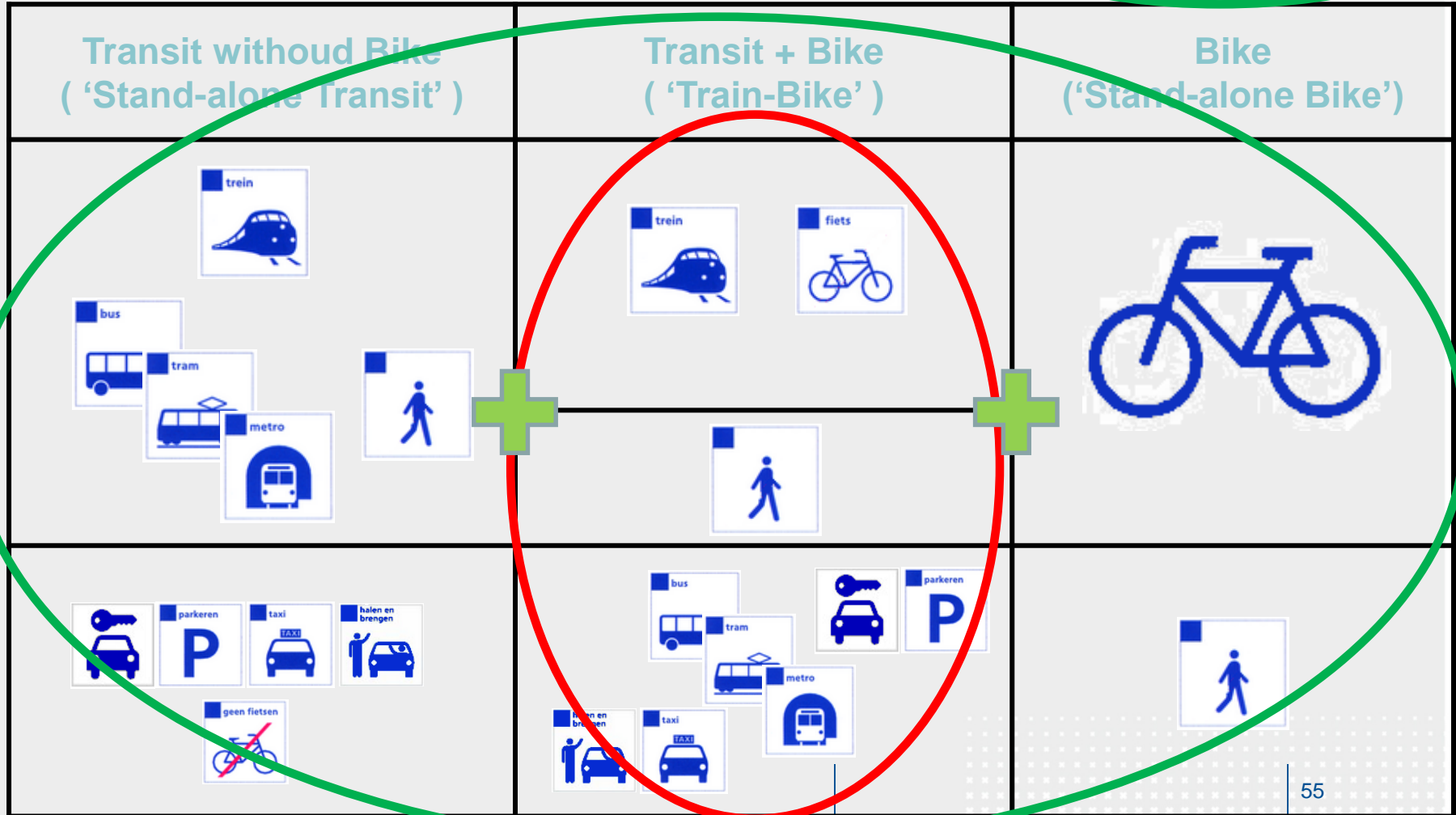


# 'Stand-alone' transit vs. BikeTrain modality

Transit without Bike ( 'Stand-alone Transit' )	Transit + Bike ( 'Train-Bike' )	Bike ( 'Stand-alone Bike' )
		
		



... and from **BikeTrain modality** → To **Transit-Bike-based mobility**



## A. Car-based *mobility*

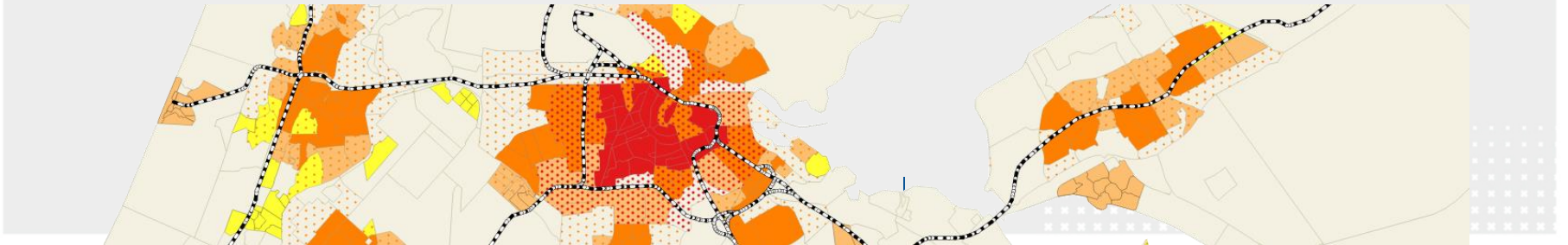
(n.b. car = own car)

Auto (evt. in keten)	OV	Fiets (‘Stand-alone Fiets’)

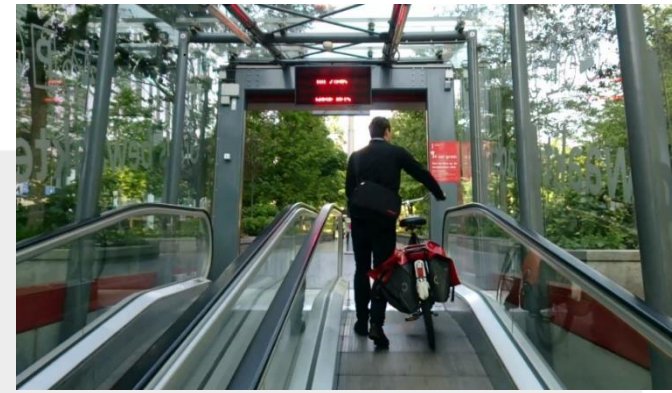
## B. Transit-Bike-based *mobility*

OV zonder fiets (‘Stand-alone OV’)	OV + fiets (‘Trein-Fiets’)	Fiets (‘Stand-alone Fiets’)

## C. Land-Use, in particular: Urbanisation, Agglomerations







# Competition or Synergy

Better cycling options	Better train options	Effects on cycling levels	Effects on level of train use
↑	0	↑↑↑	↑
0	↑	↑	↑↑↑
↑	↑	↑↑↑↑	↑↑↑↑

Better cycling options to access station	Better cycling options from egress station	Effects on feeder use to access station	Effects on feeder use from egress station
↑	0	(↓)	↑(↑)
0	↑	↑(↑)	(↓)
↑	↑	(↑)↑ + (↓)	↑(↑) + (↓)





**Train-Bike as a modality?**







9%



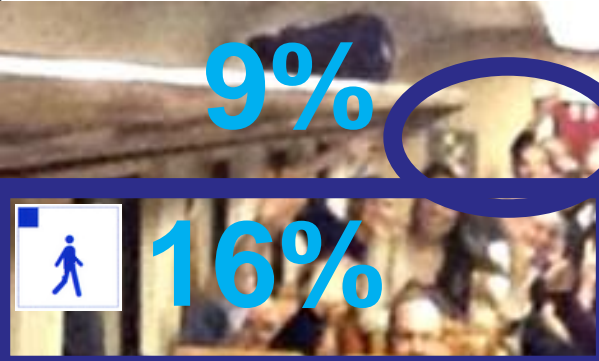
16%

47%



# Train-Bike as a modality !!!

28%





# De Telegraaf

laatste nieuws

Het nieuws van ons land

- port
- DFT
- MijnBedrijf
- OverGeld
- Vrouw
- Uitgaan
- Reizen
- Varen
- Autovi
- Buitenland
- Gezond
- Weer
- Verkeer
- Horoscoop
- TV
- Specials

## Fietsinfarct door politiecontrole

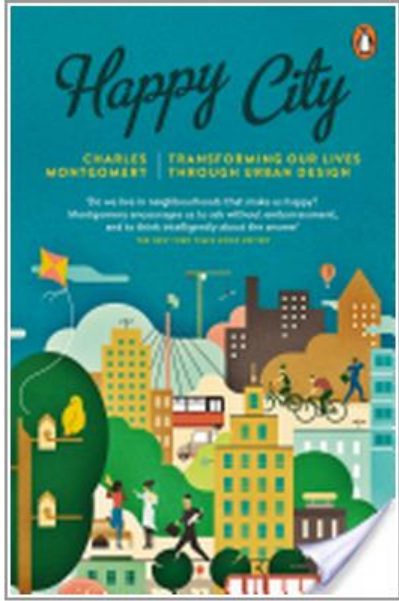
Veel Utrechters die dinsdagochtend dachten even snel de fiets te pakken naar werk of school kwamen bedrogen uit. De politie had besloten om in het centrum een zogeheten roodlichtcontrole uit te voeren. Dat zorgde voor een waar fietsinfarct.



# Train-Bike as a modality !!!







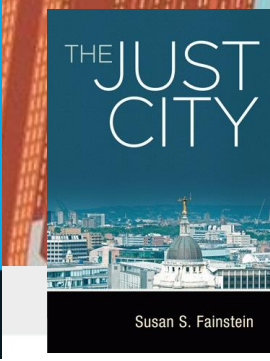
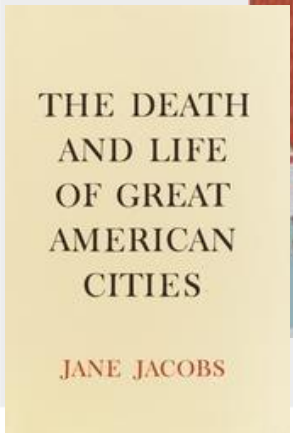
'A masterpiece'  
Steven D. Levitt, co-author of  
FREAKONOMICS



?? %



# Train-Bike as a modality !!!



# Thanks for your attention!

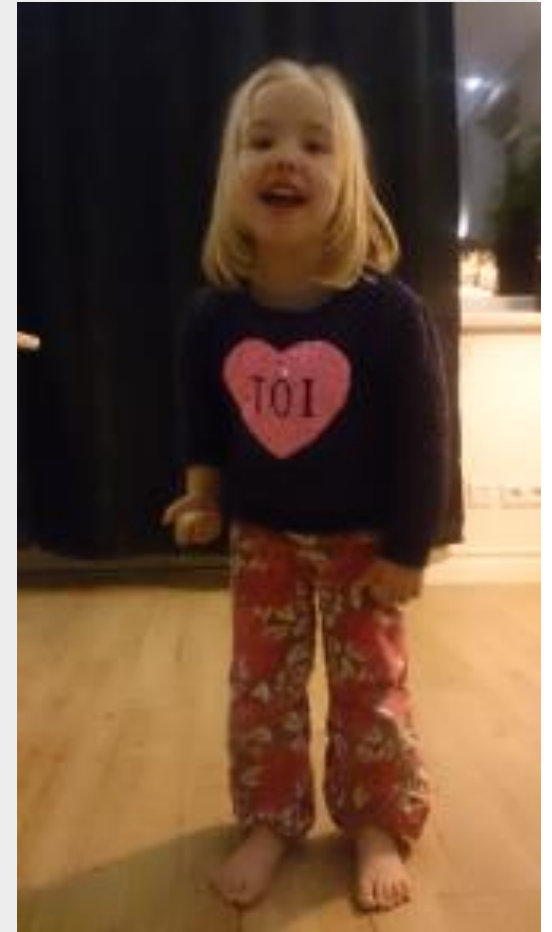
**Roland Kager, Luca Bertolini,  
Bram Fokke, Marco te Brömmelstroet,**

University of Amsterdam,  
Centre for Urban Studies

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Various deliverables: <http://www.linkedin.com/in/rolandkager>

Urban Cycling Institute: <http://uci.strikingly.nl> | [@FietsProfessor](https://www.instagram.com/FietsProfessor)





# IMPLICIT UNDERSTANDING... (?)

(powered by Google)



let me Google that for you

# What is... 'Verkeer' ?



... educatie, systeem, regelingen ?



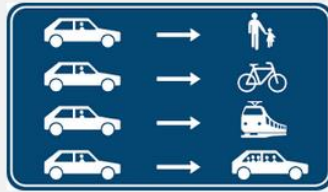


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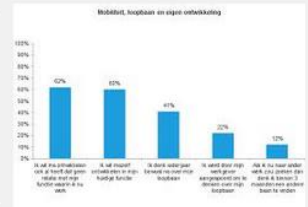
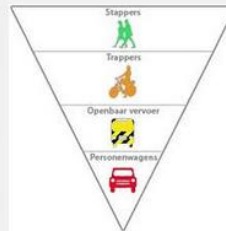
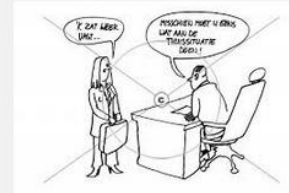
# What is... 'Mobiliteit' ?



Q3 ik wil niet maar zou wel kunnen	Q4 ik wil en ik kan
Q1 ik wil niet en ik kan niet	Q2 ik wil wel maar ik kan niet

kunnen ↑

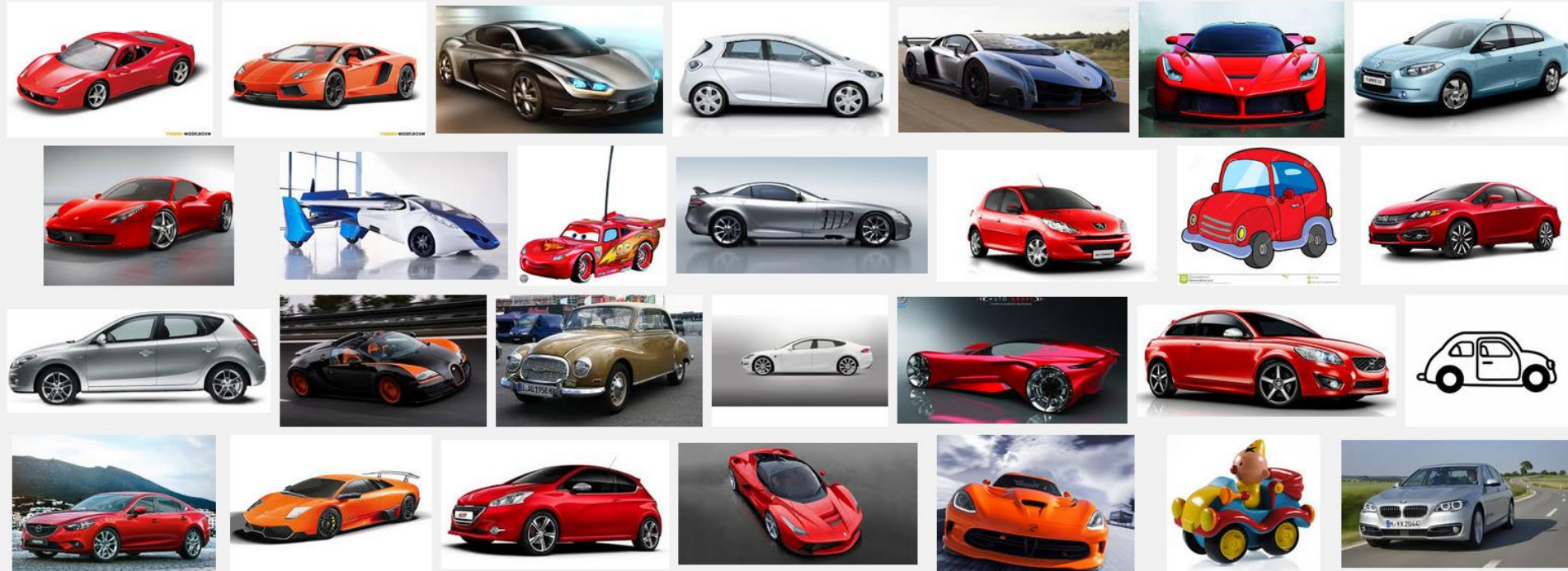
willen ←



... een concept, iets om over na te denken, keuze ?

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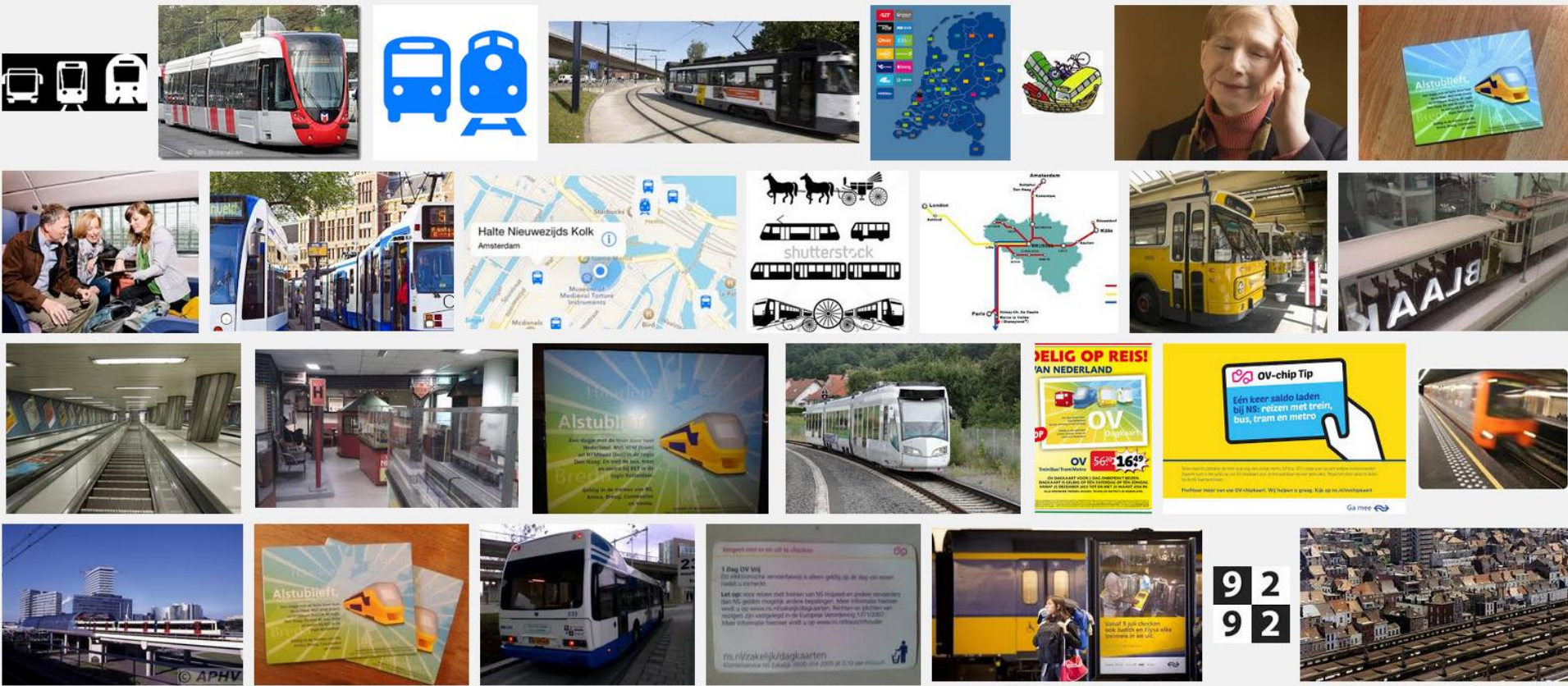
# What is... 'Auto' ?



... een ding ? (en dan vooral rode dingen?)



# What is... 'Trein Bus Tram Metro'?



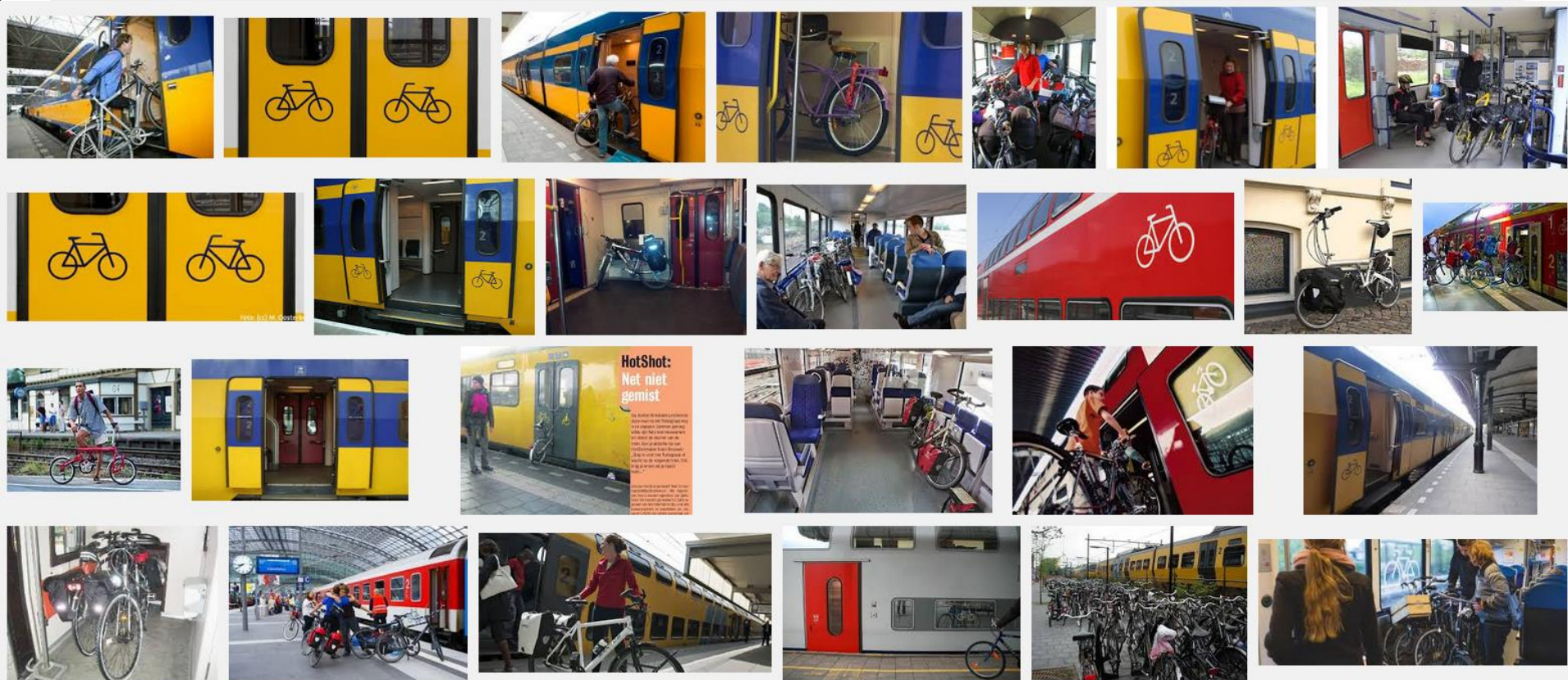
... kaartjes, reisinfo, lijnkaarten, pictogrammen, geïntegreerde systemen ?<sup>87</sup>





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# What is... 'Trein Fiets'?



... gebruikservaring? de fiets moet vooral *in* de trein? → maar 'systeem' ontbreekt?



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# What is... 'Trein Auto'?



... variaties op thema: auto op de trein of (vooral) auto voor de trein...