

Looking ahead: Autonomous driving as a challenge to cities' resilience

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**Freie
Hansestadt
Bremen**



Bremen

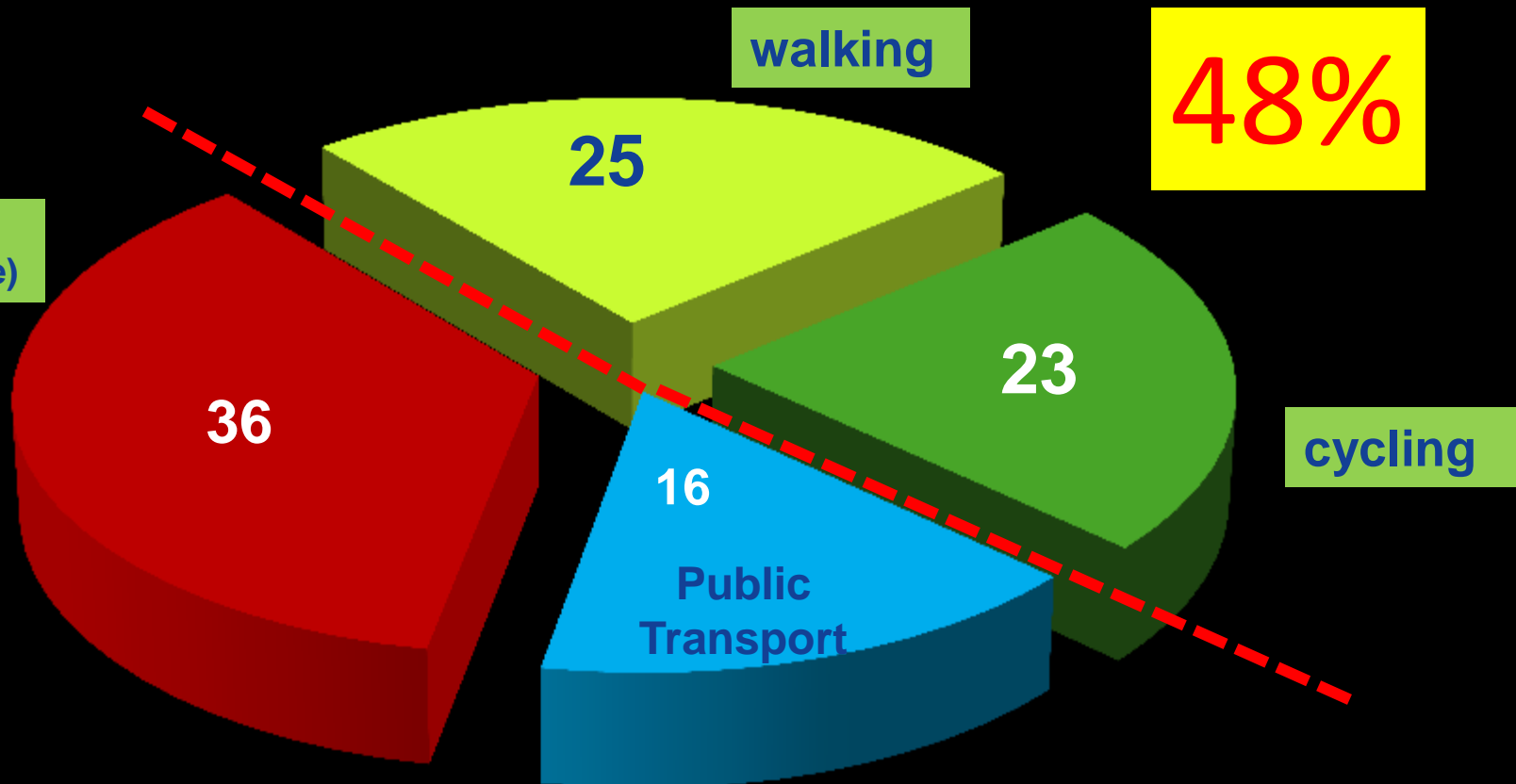
Bremen



Role of non-motorised modes

Bremen

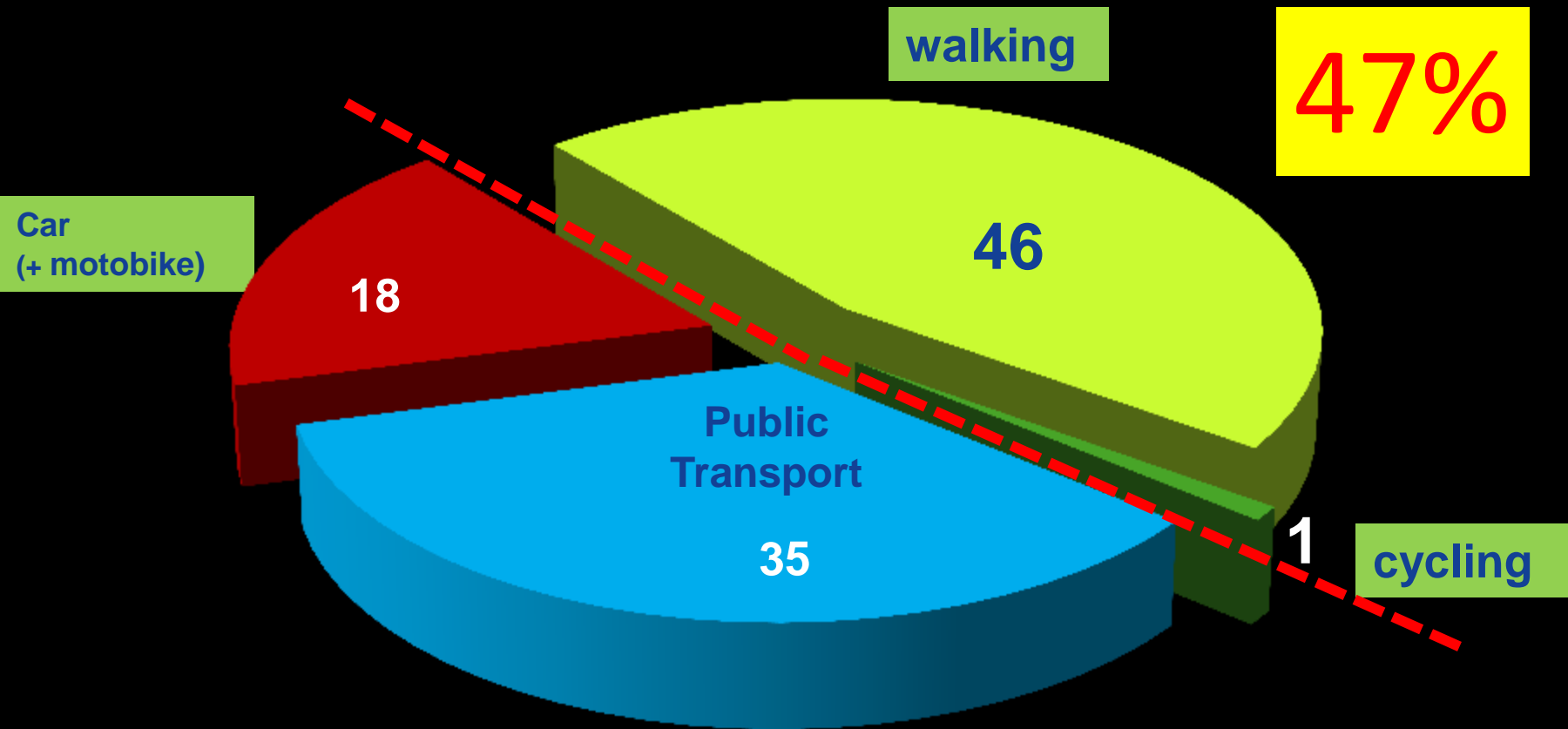
48%



Role of non-motorised modes

Barcelona

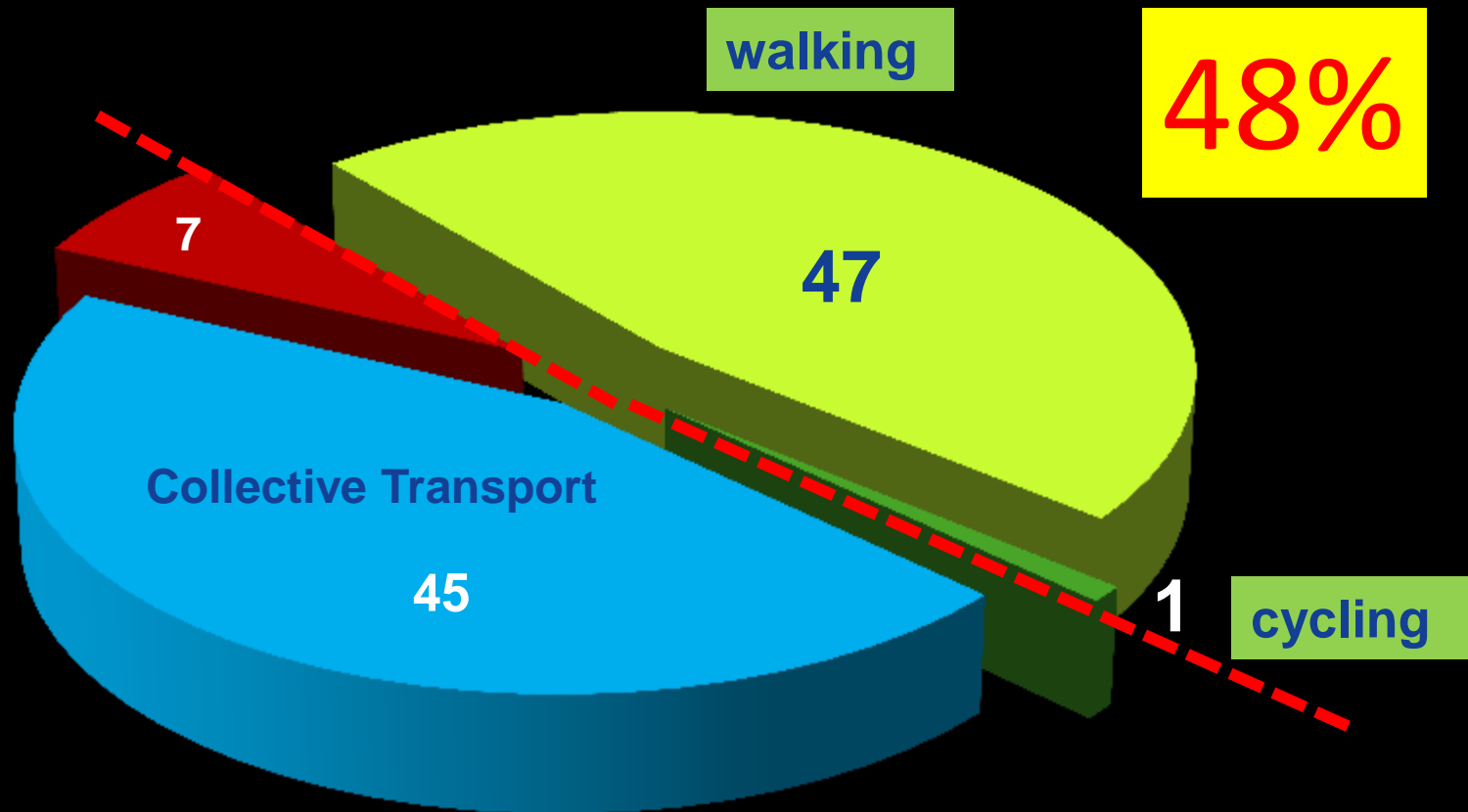
47%



Source: Modal Split in Barcelona
2012, PASTA Project

Role of non-motorised modes

Nairobi



Source: Data 2011 in Non motorized transport Policy, Nairobi City County Government



Bremen



Lagos



Chennai

**„How self-driving cars
shall solve the transport problems“**

12. Mai 2017, 18:54 Uhr Mobilität der Zukunft

Wie selbstfahrende Autos die Verkehrsprobleme lösen sollen



Stadtvision fast ohne
Parkplätze: Lediglich im









Resilience and the transport system ?

...not just

autonomous cars...





Discoveries

Flying cars are coming, and they'll be autonomous

AIRBI



under test: robot delivery

...where do these vehicles belong?...



..already in
operation



2008 / Castellon



Concorde

M 1
Château
de Vincennes

529

Concorde



S1 RA-529

Informational sign with text and a small image.





In (driverless) operation since 1986

*The
Skytrain*

A photograph of a high-speed train, possibly a Shinkansen, stopped at a station platform. The train is blurred, suggesting motion. The platform has a yellow safety line and several people waiting. There are digital screens and posters on the wall. The scene is indoors, with artificial lighting.

DRIVERLESS operation:

More frequent services with smaller units

- Smaller infrastructure
- More vehicles
- Very user friendly (less waiting time)

Operating on
street space
is different

...when not having physical separation...





Economic advantages only when
really driverless (level 4 / 5)

Low operational speed is still limiting factor



It's sneaking in...

...in today's cars...



Source: Volvo cars

Benefits in road safety...

...when cars become
more careful...

(than today's drivers)

Benefits in road safety...

...when speedlimits
are kept automatically...
(,adaptive speed-limitation')

Benefits in road safety...(?)



CARS

Image Source: Tesla

Tesla removes Autopilot speed limit after users whine on Twitter

...making congestion more convenient...



Der Passat. Mit optionalem Stauassistent.

DER PASSAT. JETZT BESONDERS
GÜNSTIG MIT 1,99 % FINANZIERUNG
FÜR 249 € MONATLICH.



Volkswagen

[illegible]

Volkswagen advertisement for congestion assistant at Frankfurt main station

Next steps of car sharing:

the car comes to you



From automated

to

autonomous / driverless

SAE-Levels

Level 0: No automation

Level 1: Driver Assistance

Level 2: Partial Automation

Level 3: Conditional Automation: driver can safely turn their attention away from driving tasks

Level 4: High Automation: When enabled, driver attention is not required, driverless operation in certain areas

Level 5: Full Automation
driverless operation from A to B





Urban Mobility System Upgrade

How shared self-driving cars
could change city traffic



Corporate Partnership Board
Report

- Up to 90% of road vehicles can be replaced
- Study Lisbon: streetspace equiv to 170 football pitches to be reclaimed



Urban Mobility System Upgrade

How shared self-driving cars
could change city traffic



Corporate Partnership Board
Report

- High-volume collective transport (e.g. metro, light rail) furtheron necessary
- Low volume (bus) services to be replaced

We don't have to wait

for autonomous cars

Car-Sharing is available today

... as alternative to car ownership!





4

reasons

why traffic volume will increase
(even with fewer cars)

Robotaxis:

- **most convenient** way of travelling door-to-door
(= modal shift)
- **New user groups** (as no driving licence required)
- Travel time is **not “lost time”** (= perception of travelling will change)
- More **sprawl** (?)

HEAVEN

HELL

Scenarios for autonomous cars

Single ownership



No reduction of cars
More (empty) trips

Fleet based services



Fewer cars
intense use,
reclaiming streetspace



Risk:
modal shift from
PT and NMM



good integration of
all modes:
VMT+/- :
very efficient



The **human**
is the **disruptive** element
of autonomous transport

A photograph of a city street scene. In the foreground, a wide red running track runs alongside a grey concrete sidewalk. A green metal railing is on the right side of the sidewalk. In the background, a blue pedestrian bridge spans the street. To the left of the bridge, there are modern buildings, including one with a sign that says "外資通り 西新橋一丁目". To the right, a building has a sign for "OLD Agency". The street is mostly empty, with a few cars visible in the distance. The text "Segregation ?" is overlaid in yellow on the red track.

Segregation ?

Acceptance by „human drivers“ ?

Consumers Don't Really Want Self-Driving Cars, MIT Study Finds

May 25, 2017

By [Zeninior Enwemeka](#)

[Share](#)



<http://www.wbur.org/bostonmix/2017/05/25/mit-study-self-driving-cars>

Self-driving cars: The solution people don't want

[Bob Collins](#) May 26, 2017, 1:52 PM

There is a ton of people who still don't want to ride in self-driving cars, says survey

- Survey indicates more than half of consumers don't want to ride in fully autonomous cars
- Significantly more would accept a partially autonomous car
- Mobility service users more likely to accept autonomous tech

[Robert Ferris](#) | [@RobertoFerris](#)

Published 3:45 PM ET Thu, 24 Aug 2017 | Updated 7:38 PM ET Thu, 24 Aug 2017

[CNBC](#)

Long-distance (freight) transport
on highways

less complex (highways)



business case

long distance (**freight**) transport....

Highways = less complex than urban

Only with **driverless operation** (level4/5)

- Security / Robustness / cyber attacks?
- Privacy? Big Brother is with you....
- Who could be a provider of large scale fleet services?



Today's transport problems
won't be solved by
(waiting for)
autonomous transport.



Thank you for your attention

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