CoE-SUFS

VREF CENTER OF EXCELLENCE FOR
SUSTAINABLE URBAN FREIGHT SYSTEMS

Peer-to-Peer Exchange Program

NEXT UP

Cargo Cycles for Urban Freight:
The European Experience

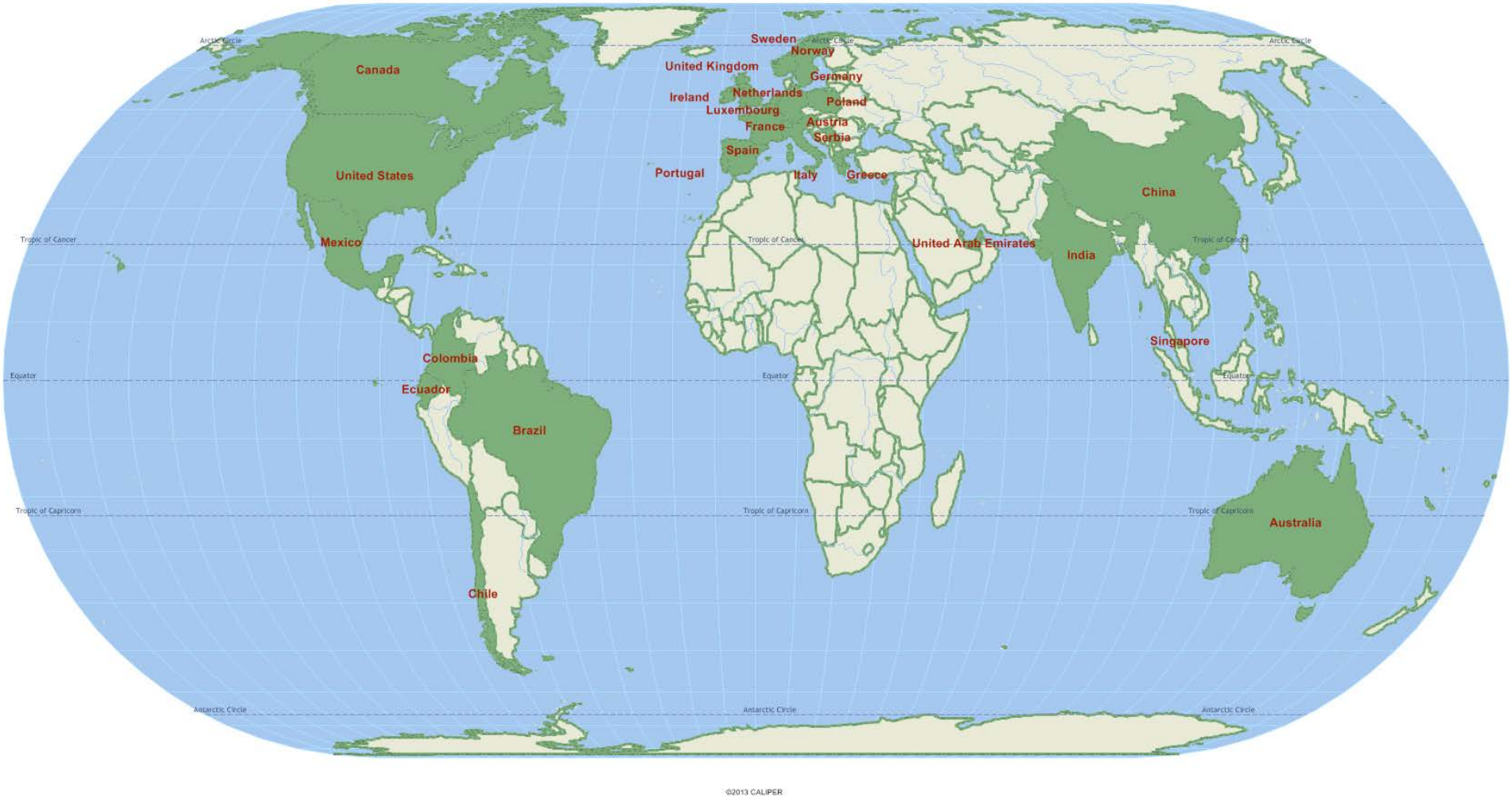
June 10th, 2015 ::11am (EST)

Achim Beier

Julius Menge

Johannes Gruber

Webinar Participants



Mechanics of the seminar

- The webinar is being recorded, the URL will be sent out to participants and posted at www.coe-sufs.org
- Participants from the US and Canada can:
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CoE-SUFS

- Funded by the Volvo Research and Educational Foundations (VREF)
- Main Goal: To jumpstart an integrative process, involving cities, private sector, and researchers to develop new freight systems paradigms that:
  - Are sustainable
  - Increase quality of life
  - Foster economic competitiveness and efficiency
  - Enhance environmental justice

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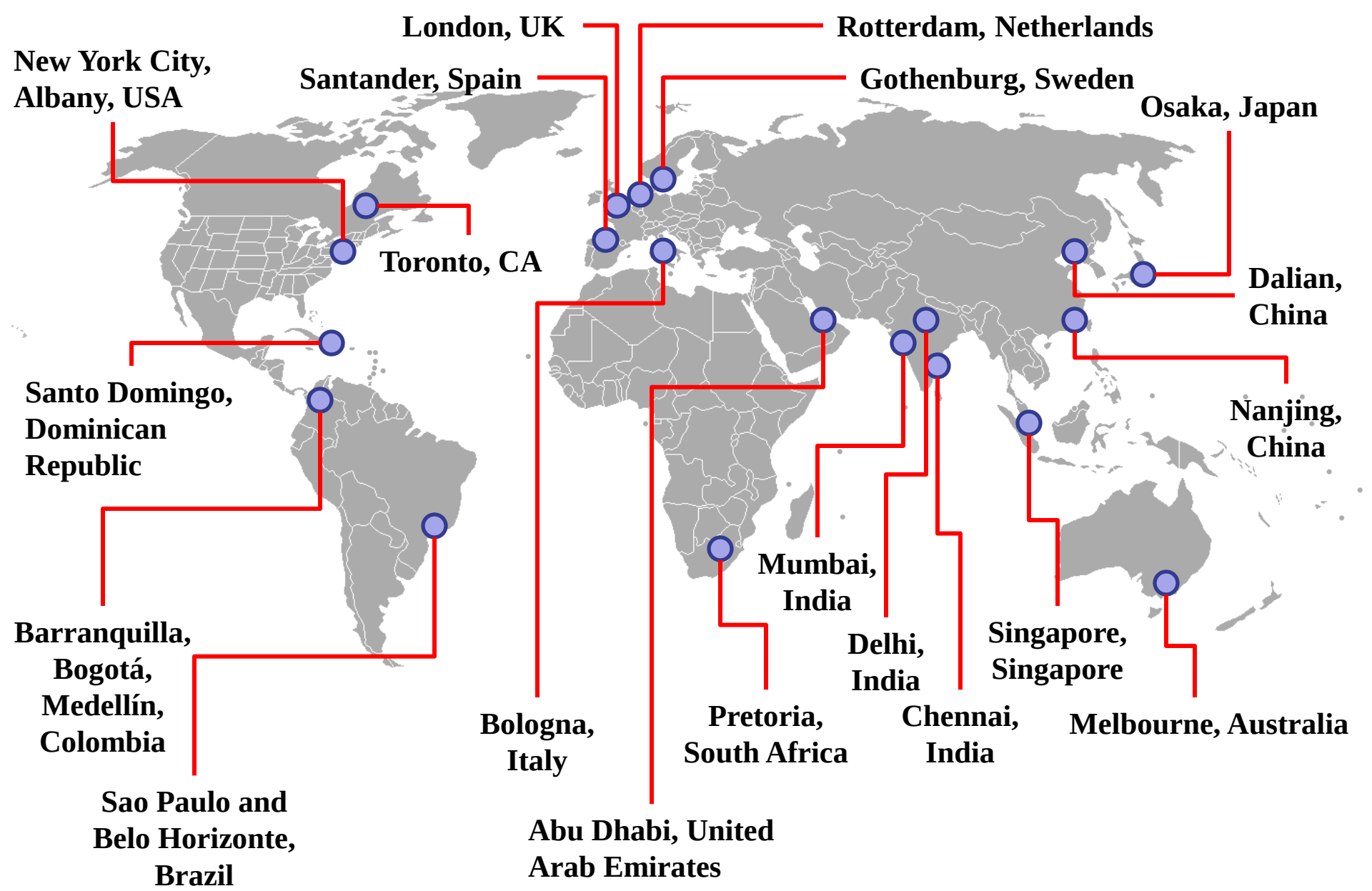
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CoE-SUFS Dissemination Programs

- **Peer-to-Peer (P2P) Exchange** to share global best practices and real world examples of sustainable urban freight systems
- Next P2P (August, 2015):
  - Cargo Cycles for Urban Freight: The American Experience
- **Workshops** to bring together public/private sectors and academia, to jointly work to address urban freight issues
  - Already held at: India, Brazil, Colombia, Canada, Mexico, Chile, and Australia

Cargo Cycles for Urban Freight: The European Experience

Achim Beier
(messenger Transport+Logistik)

Johannes Gruber
(DLR Institute of Transport Research)

Julius Menge
(Berlin Senate Department for Urban Development and Environment)

DLR Deutsches Zentrum für Luft- und Raumfahrt
German Aerospace Center

Senatsverwaltung für Stadtentwicklung und Umwelt

be Berlin

messenger

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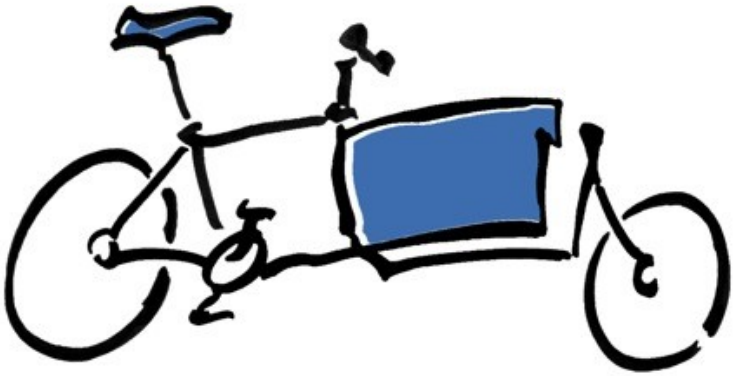
Agenda

- Relevance of cargo cycles for public authorities
- Transport market segments with cargo cycle use
- Cargo cycles and city logistics
- Hands-on perspective: *messenger*, a courier company
- *'I replace a car':* Results from a two-year demonstration project
- Drivers and barriers for companies to use cargo cycles
- Closing remarks



Relevance of cargo cycles for public authorities

Different cities, different sizes, different economic environment…

… but we are all facing the same challenges
(with differences in severity)

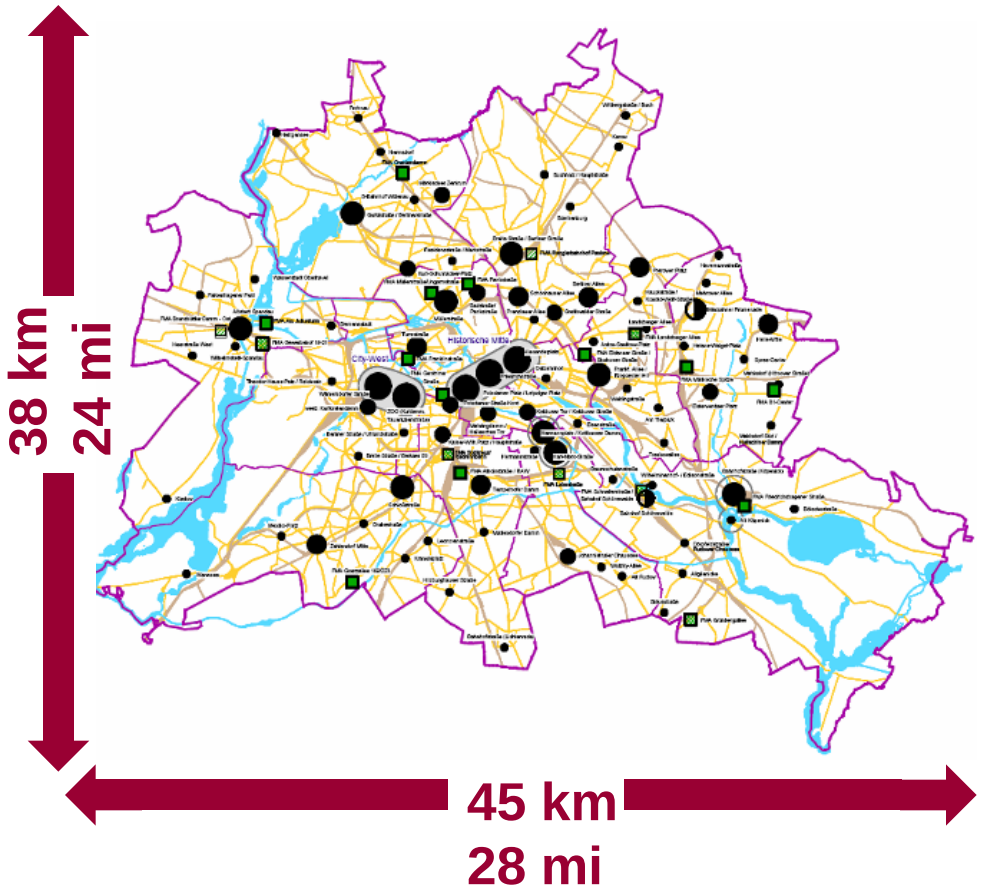
Challenges…

- Noise
- Pollution
- Greenhouse gases
- Traffic safety / accidents
- Congestion

But…

- Just building new infrastructure can not cover problems related to urban freight
- (Infrastructural) Measures are difficult to realize within urban areas
- Question of resources …

Berlin is different…



Surface area: 892 km² / 344 mi²

Inhabitants: approx. 3,450,000

45% of households without a car*

Motorisation: 324 cars/1000 res. *

Employed: 1,700,000 (2011)

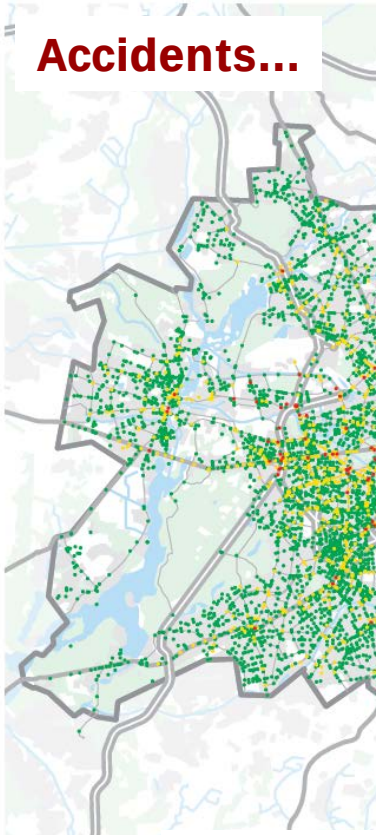
Unemployment rate: approx. 11%

Low commuting rate (290,000/150,000)

Polycentric city / short journeys

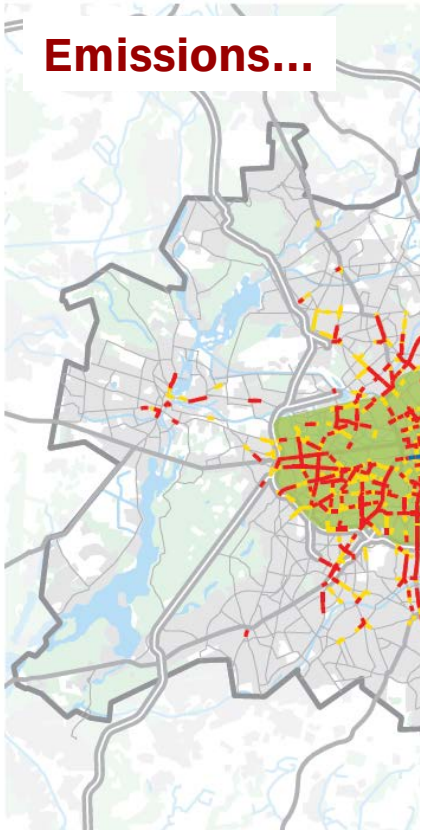
There are significant negative effects of traffic...

Verkehrsunfälle im Hauptverkehrsstraßennetz an de



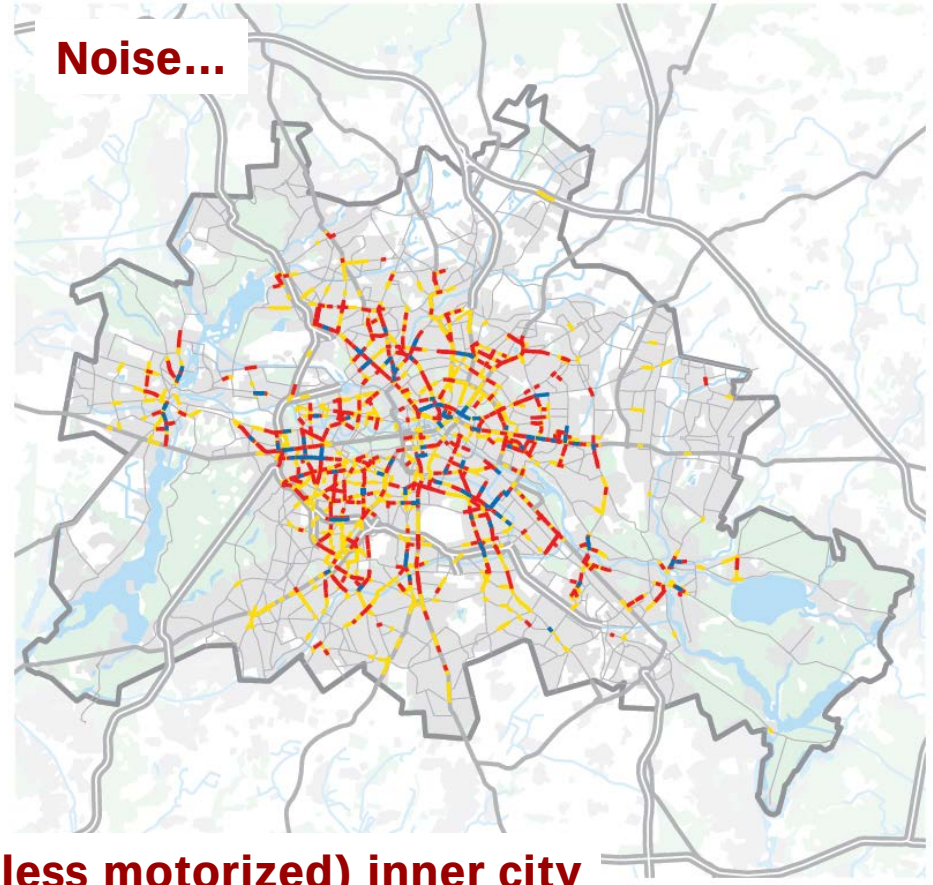
Accidents...

Verkehrsbedingte Luftschadstoffimmissionen durch Feinst



Emissions...

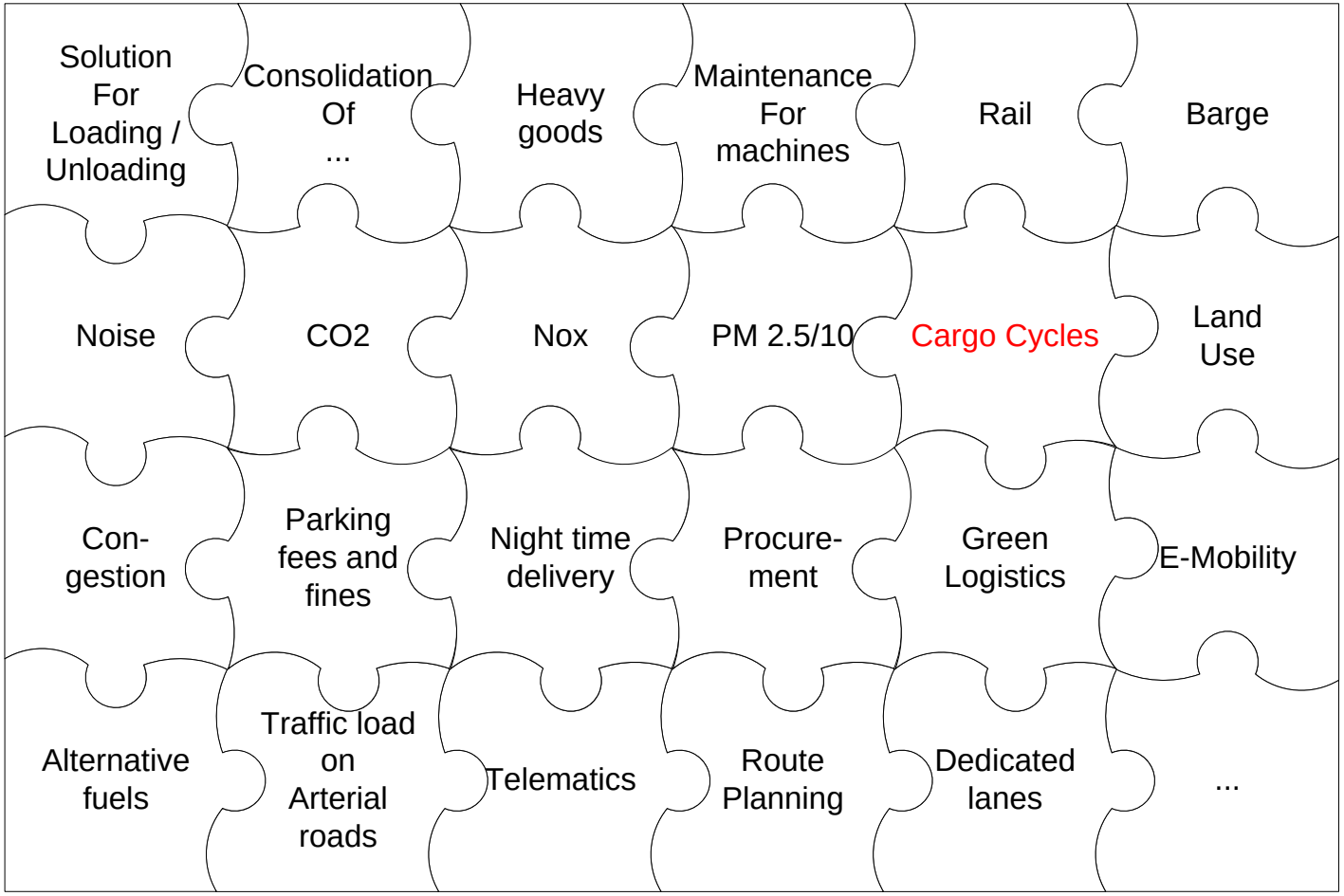
Lärmbelastungsschwerpunkte Straßenverkehr (2007)



Noise...

... concentrated esp. to the (less motorized) inner city

Is there *one* simple/single solution?



How is urban freight reflected?

- Cause of significant negative effects (pollution, congestion, accidents, ...)
- “I can’t sleep at night” / “Why in my neighbourhood” / “Dangerous” / “Ban them from the inner city...”

➔ Problems create a pressure to act instead of pro-actively shaping the system <u>together</u>

Result:

- Lack of awareness, lack of general understanding, limited knowledge about requirements of different stakeholder groups
- Politicians, boroughs, local economy, citizens, authorities, lobby groups: opponents or partners?

Approaches: ...

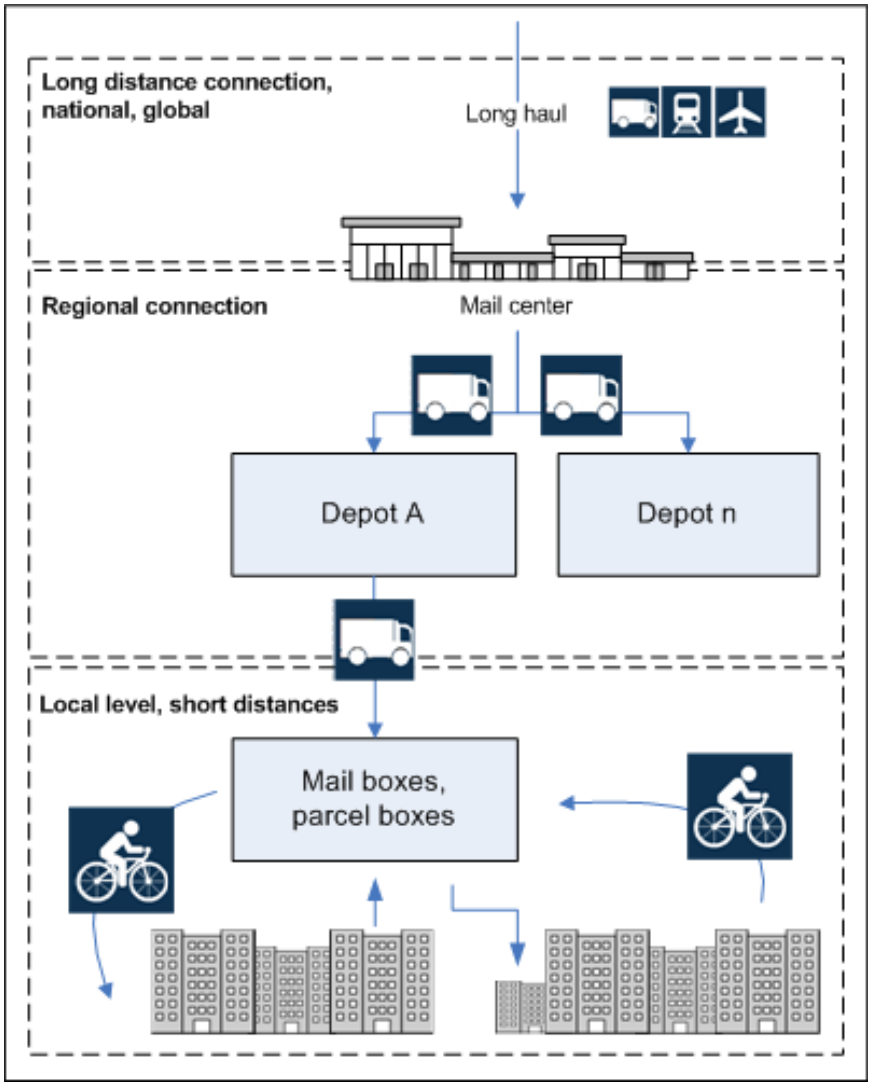
Cargo Cycles in Berlin's commercial transport

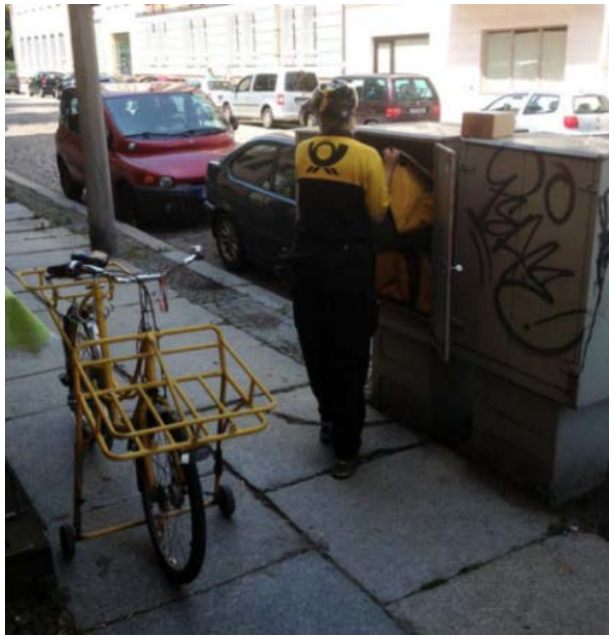
- Something new or a renaissance of something old?

Cycling service men at Berlin-Potsdamer Platz in 1906

Souce: Missmann 1987, S. 94

The shorter a „last mile“ is, the more „sustainable“ it can get...





Micro depots for mailmen

Potential and limitations of cargo cycles in urban freight

- Flexibility, much less dependence on traffic load, door-to-door transport
- Reliability (very important issue for urban logistics)
- Low „total costs of ownership“ (TCO), small initial investment (no fuel, if electric minimal costs, low insurance rates, land use for parking is limited, low maintenance costs)
- Drivers license / demographics
- Limitations for weight / volume / distances
- Truly „green logistics“

Potential from an urban perspective:

- Locally emission free (CO2, NOX, PM10 and PM2.5, noise), but impact is limited (number of trips vs. trip length)
- Uses existing infrastructure → land use
- Enables modal shift (especially for courier, express and parcel deliveries) and innovative logistics concepts

Legal background

- Cargo cycles are legally classified as bicycles, without or with an electrical assistance of up to 250 Watts
- Maximum width = 1 m; 3- or 4-wheelers even wider
- No regulation concerning payload
- No specific regulation concerning use of road space or bicycle lanes
- Parking on sidewalks is legal (without being an obstacle for others)
- Pedestrian zones: Free for cargo cycles if "free for bikes"; otherwise: pushing your bike is necessary!

Transport market segments with cargo cycle use

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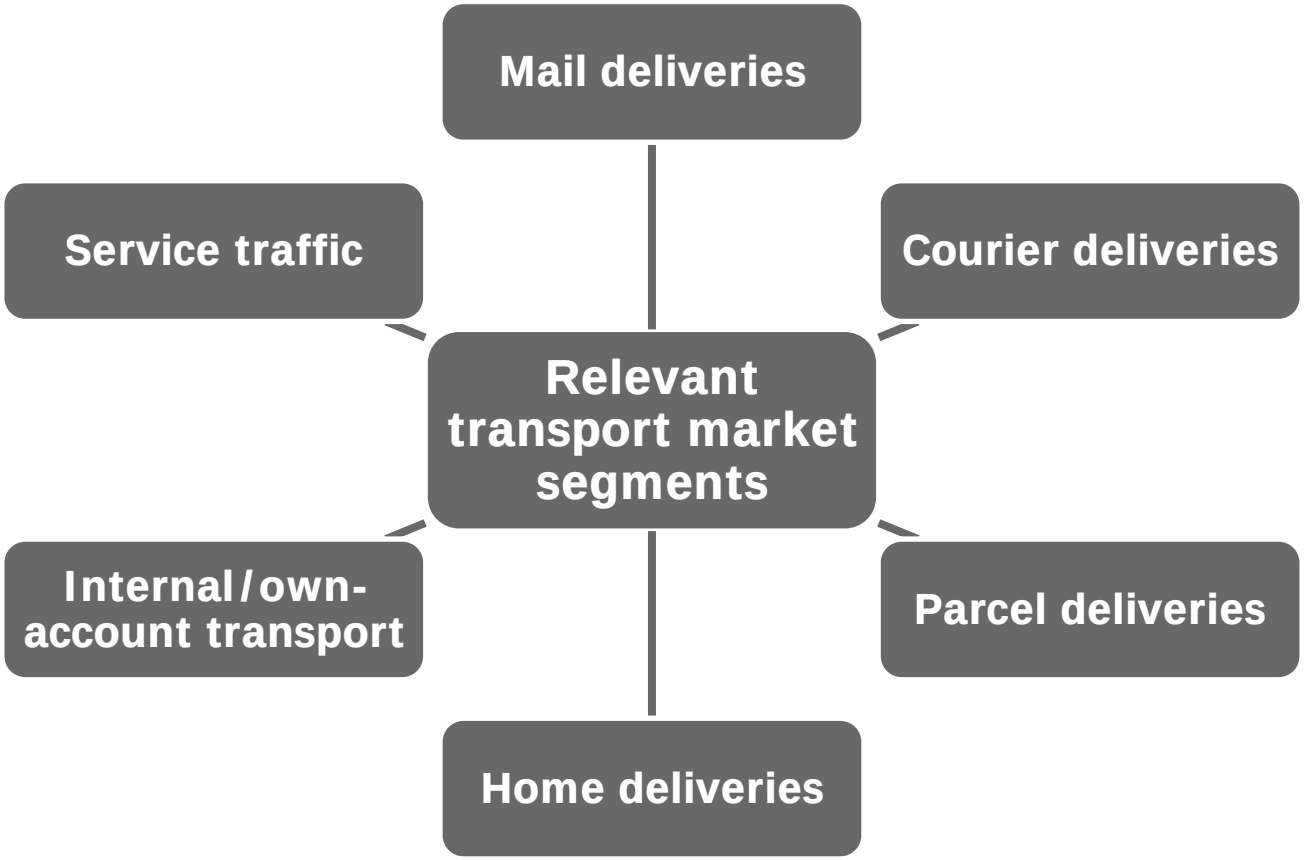
Fields of application for cargo cycles



not taken into account:

private mobility

transport of people

mobile sales stalls

Results of an ongoing research project conducted by DLR Institute of Transport Research
Funding by the German Federal Ministry of Transport and digital Infrastructure

Mail deliveries

Foto: HAZ

Foto: Deutsche Post

Foto: picture alliance dpa

Foto: Postcon

Foto: Tagesspiegel

Foto: St. Pedali Blog

Courier deliveries

Foto: DLR

Foto: Hamburger Abendblatt

Foto: Rapid München

Foto: Velogista

Parcel deliveries

Foto: DPD

Foto: DHL

Foto: DHL

Foto: UPS

Home deliveries

Foto: Deutsche See

Foto: Biobob

Foto: Roland Magunia Hamburger Abendblatt

Foto: Ben Schroeter

Foto: IKEA

Internal/own-account transport

Foto: Dieter Debo / Evonik

Foto: n.A.

Foto: BASF

Foto: Bundeswehr

Service traffic

Foto: EBU Ulm

Foto: WISAG

Foto: sbz-online

Foto: Stadtrad Hamburg

Foto: Telekom

Foto: Westfälische Nachrichten

Cargo cycles and city logistics

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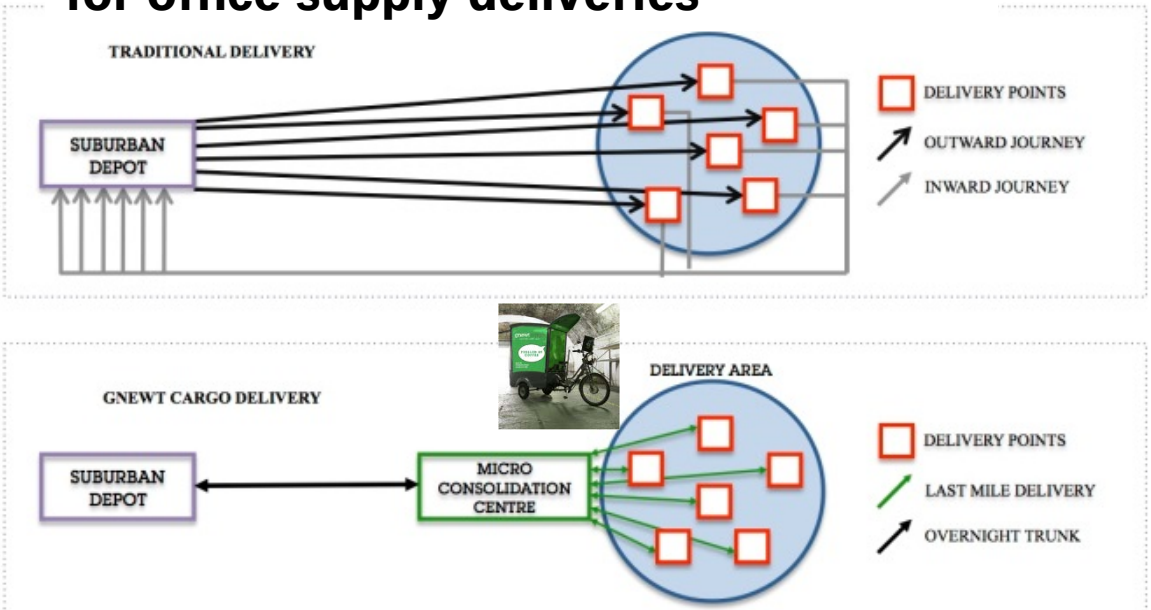
Cargo cycles as part of city logistics schemes

London: Micro-consolidation center for office supply deliveries



Hamburg: Mobile depot

Brussels: Mobile depot

Paris: Urban freight by barge and cargo cycles

Cargo cycles as part of city logistics schemes

Berlin: Cooperation - The EU project CityLog

citylog

sustainability and efficiency of city logistics

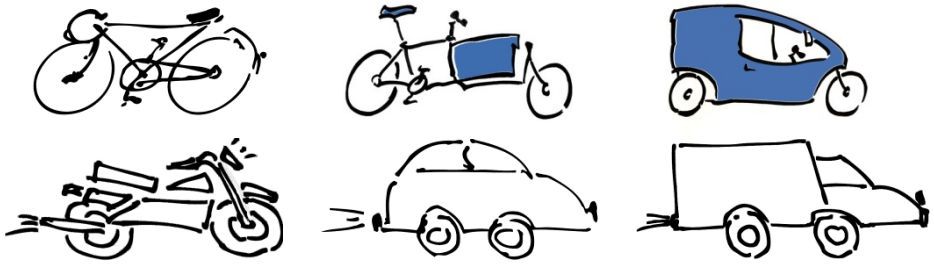
Is it that what we want?

CityLog: The Process

Hands-on perspective: *messenger*, a courier company

Messenger, a courier company (est. 1989)

- Basic philosophy: Sustainable logistics!
- Types of service: City logistics, Express deliveries national/international
- Several types of vehicles:



- Branches in 5 German cities, HQ: Berlin
- Cooperative system with freelance messengers
- Some achievements:
  - First CMC (Cycle Messenger Championships) in 1993
  - “Berlin rides bike” in 1995
  - “Location of ideas” in 2009
  - Pioneers of cargo bikes …

Achim in 1989

Cargo cycles: Usual vehicle for messengers

Beginnings around 1900

"Long John" since 1930s

2007

2009

2012

Loading capacity of cargo cycles

8 shoe boxes

4 copy paper boxes

1 packing case...

1 pallet

...25 shoe boxes...

or even more...

'I replace a car':
Results from a two-year demonstration project 2012-2014

'I replace a car': Vehicles and project partners

Main vehicle: *iBullitt Pedelec* (x40)

250 Watts engine, Payload: 100 kg (220 pounds)
Cargo box volume: 200 l (0.18 freight tons)

Additional vehicle: *CargoCruiser* (x1)

250 Watts engine, Payload: 300 kg (660 pounds)
Cargo box volume: 900 l (0.8 freight tons)

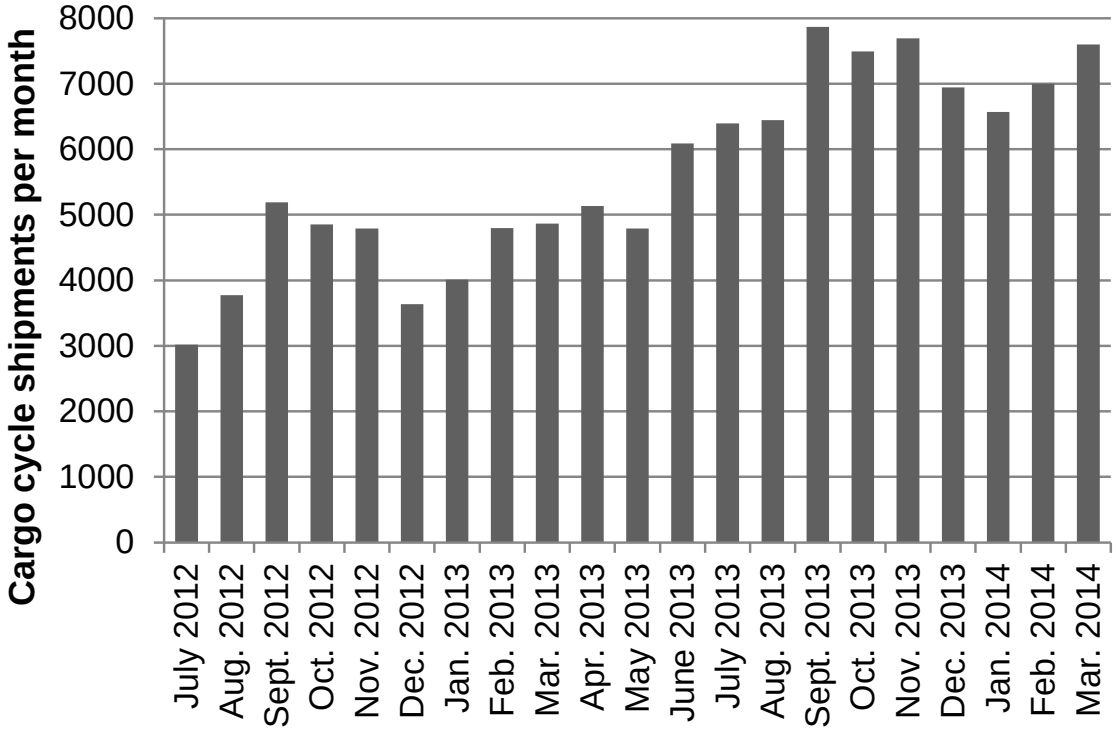
Participating courier companies:

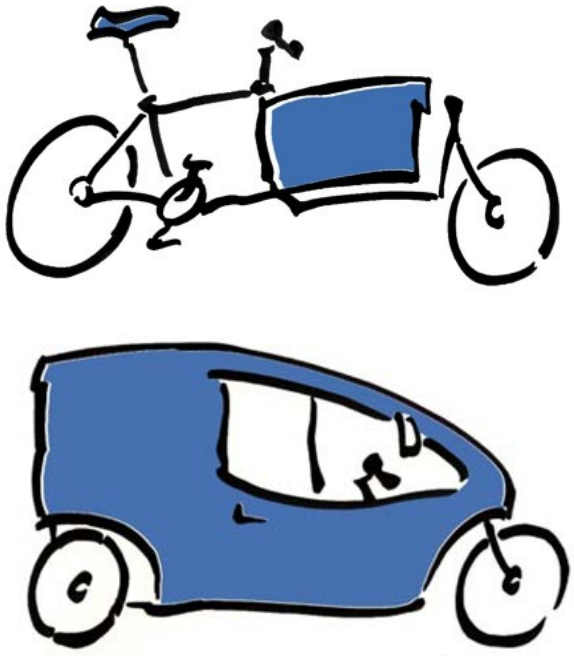
Research and project lead: DLR

Funding by the German Federal Ministry for the Environment

'I replace a car': Cargo cycle usage

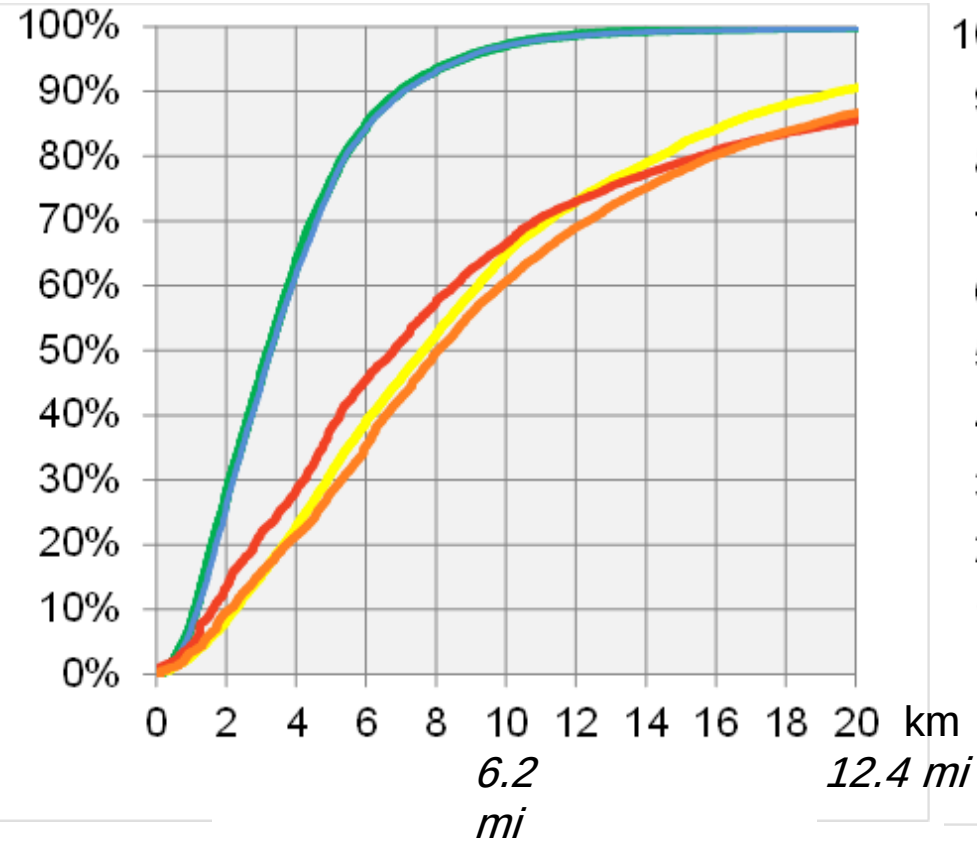
Number of shipments by cargo cycles	Share of all shipments of courier companies	Mean shipment distance (cargo cycles)	Total mileage (cargo cycles)	Share of total mileage of all vehicles
119.000	7.5 %	3,9 km	455.000 km	4 %





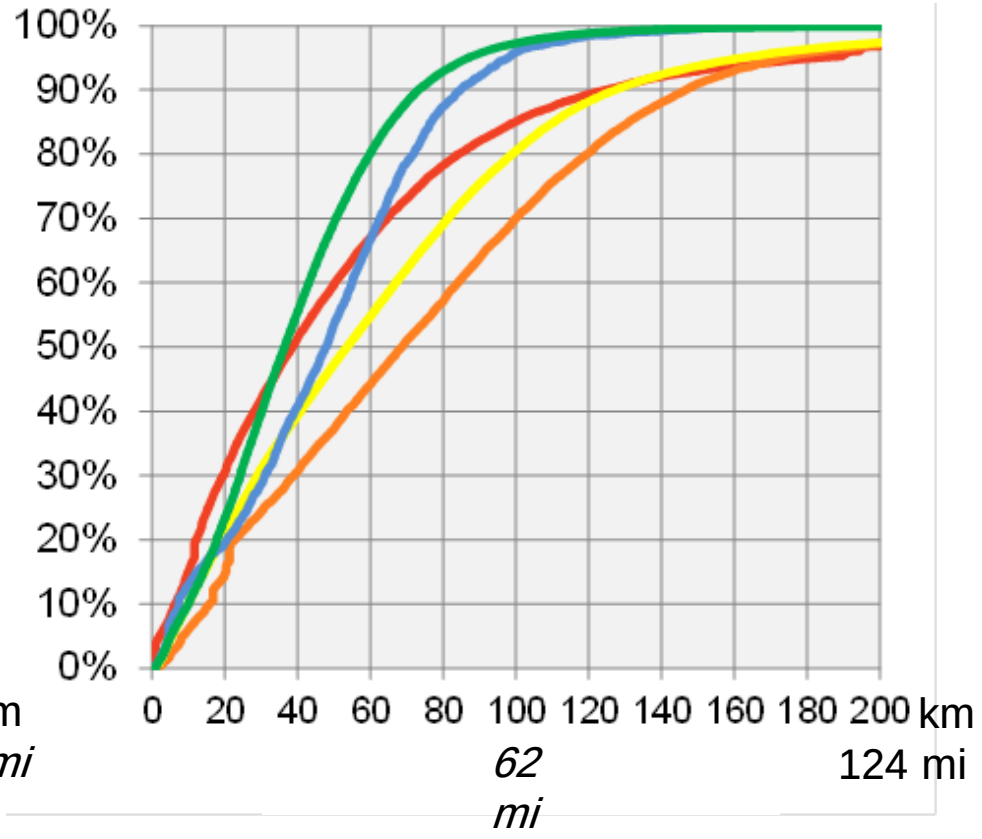
'I replace a car': Shipment distance and mileage

Shipment distance



n ~ 1.2 million

Daily mileage



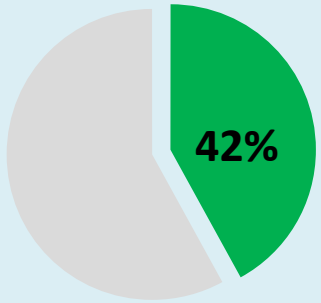
n ~ 89.000

Bicycle
Cargo cycle
Car
Small van
Large van

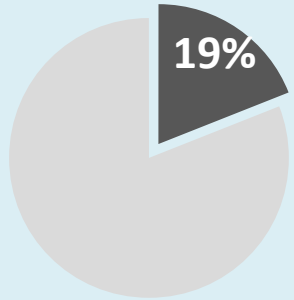
'I replace a car': Car substitution potential

Share of trips below 10km & transportable goods (ex-ante data)

Substitutable deliveries

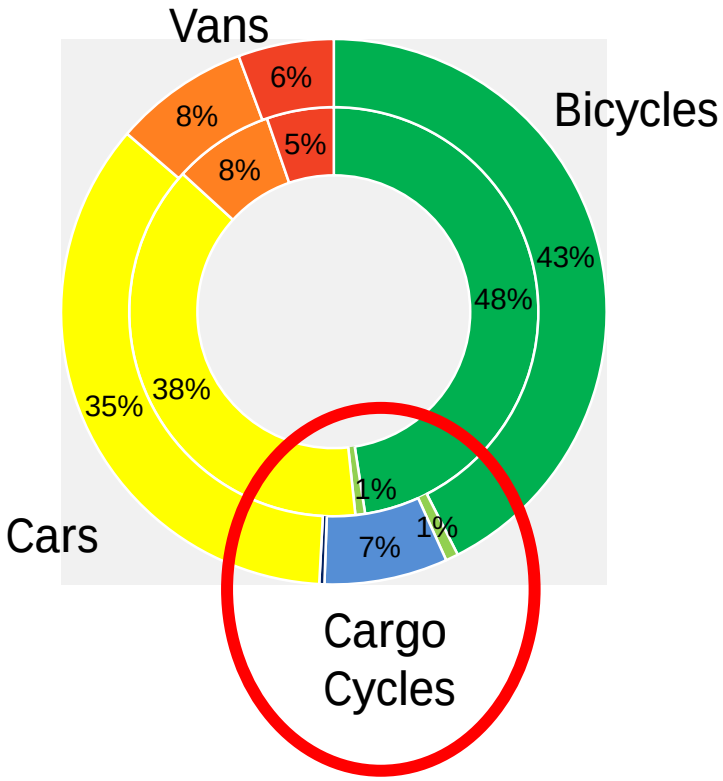


Substitutable mileage

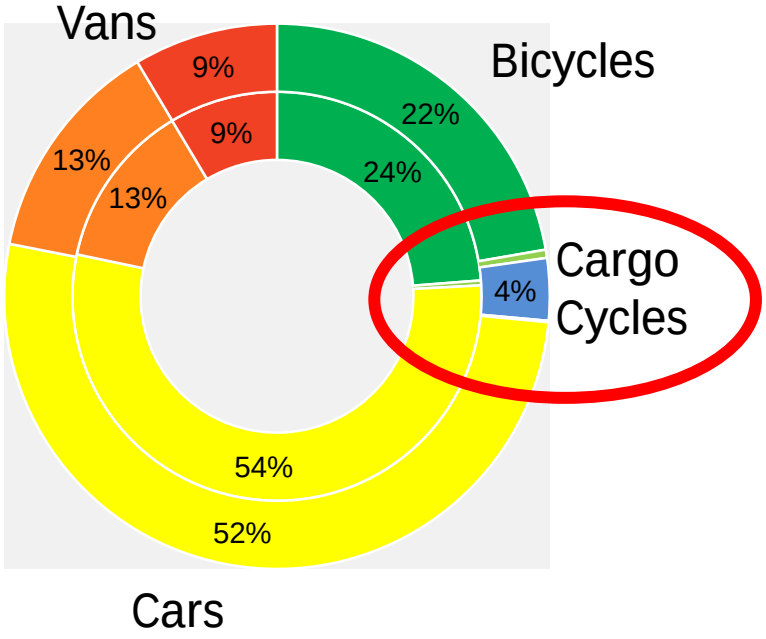


'I replace a car': Change in modal split

Shipments



Mileage



Inner ring: before project (May 2011-June 2012) ~ 1.1 million obs.
Outer ring: during project (July 2012-March 2014) ~ 1.6 million obs.

'I replace a car': Characterization of messengers

n=171		Type of vehicle		
		Bicycle	**Cargo Cycle**	**Car**
	n (t1 survey 2014)	48	46	77
Demographics	Age Ø	39 years	39 years	50 years
	Gender: male	90%	93%	95%
	Education: high (Abitur)	74%	67%	33%
Income	Below 500 €	14%	20%	3%
	2500 € and more	2%	0%	19%
Job organization	Working as messenger only	75%	57%	74%
	Working hours per week Ø	30.1	27.2	47.0
	Using only one type of vehicle	83%	26%	79%

n=63	**Agreement t0**	**Agreement t1**
"Using electric cargo cycles in my city makes sense."	84%	94%
"Electric cargo cycles will generally be successful in courier services."	48%	62%
"There is plenty of information available on electric cargo cycles."	36%	42%

"I replace a car": Factors influencing cargo cycle acceptance of individual messengers

Dependent variable: Rejection of electric cargo cycles
Data: 2 survey among messengers, before and at the end of the field test

negative coefficients: more likely to reject

	Variable	M1		M2		M3	
		coeff.	p	**coeff.**	p	**coeff.**	p
Socio-demo-graphics	Age	**0.056**	0.000	**0.042**	0.001	**0.048**	0.001
	Gender: female	**1.359**	0.003	**1.631**	0.001	**0.991**	0.062
	Net. income: >€2000	**1.036**	0.002	**0.957**	0.006	**0.702**	0.057
	Education: low/medium	**0.628**	0.011	**0.497**	0.056	**0.424**	0.139
Job circum-stances	Car ownership			**0.759**	0.006	**0.549**	0.077
	Possibility to bundle shipments			**-0.797**	0.001	**-0.723**	0.007
Personal attributes	Interest in vehicle technology					**-1.621**	0.001
	"I totally agree that electric cargo bikes attract onlookers' interest."					**-1.272**	0.000
	Experience with cargo bikes					**-1.358**	0.000
	Constant	**3.315**	0.000	**-2.725**	0.000	**-0.508**	0.465
n=362	Log likelihood	**-214**		**-204**		**-176**	
	Pseudo R^2 (McFadden)	**0.125**		**0.165**		**0.279**	

Drivers and barriers for companies to use cargo cycles

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Factors influencing companies' decisions to use cargo cycles

Environmentally specific factors	Company-specific factors	Vehicle-specific factors
• Regulative framework conditions • Socio-spatial context • Economic framework	• Type of fleet decision-making • Companies' strategic orientation • Individual attitudes of decision makers	• Compatibility with transport tasks • Relative advantage/ disadvantage compared to conventional vehicles • Availability (trialability) of cargo cycles

Results of an ongoing research project conducted by DLR Institute of Transport Research
Funding by the German Federal Ministry of Transport and digital Infrastructure

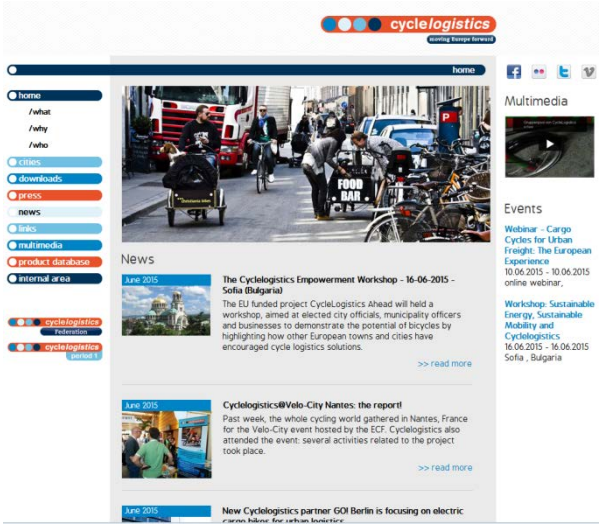
Closing remarks

Closing Remarks

- It´s still a long way to go...
- ...but: cargo cycles have been proven as an established element of urban freight in various European cities
- Market for cargo cycles / cargo cycle deliveries is growing
- Analysis of user acceptance is crucial
- What do we need: (some examples)
  - Awareness of the topic and the different interest groups
  - Sufficient data
  - Partners for the process
  - Clear responsibilities
- Statistics are missing, calculating potentials is an option, but local impact differs → discussion and research is needed
- First projects delivered real and relevant data, not just for cities, but especially for companies
- Perfect potential for synergetic effects between private and commercial bicycle use (e.g. investments into cycling infrastructure)

Do you want to know more?

cyclelogistics.eu (English)



lastenrad.vcd.org (German)

Publications:

Gruber, J., Kihm, A., Lenz, B. (2014). A new vehicle for urban freight? An ex-ante evaluation of electric cargo bikes in courier services. Research in Transportation Business & Management, 11, 53–62. (Link)

Gruber, J., Kihm. A. (2015). Reject or embrace? Messengers and electric cargo bikes. The 9th International Conference on City Logistics, Tenerife (Spain); June 17-19, 2015.

... or ask us !

Thanks from Berlin!
Questions?

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