

 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

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Mechanics of the seminar

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- ❖ 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:
 - ❖ Use Adobe Connect to receive the audio (PRIMARY method)
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CoE-SUFS

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- ❖ 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



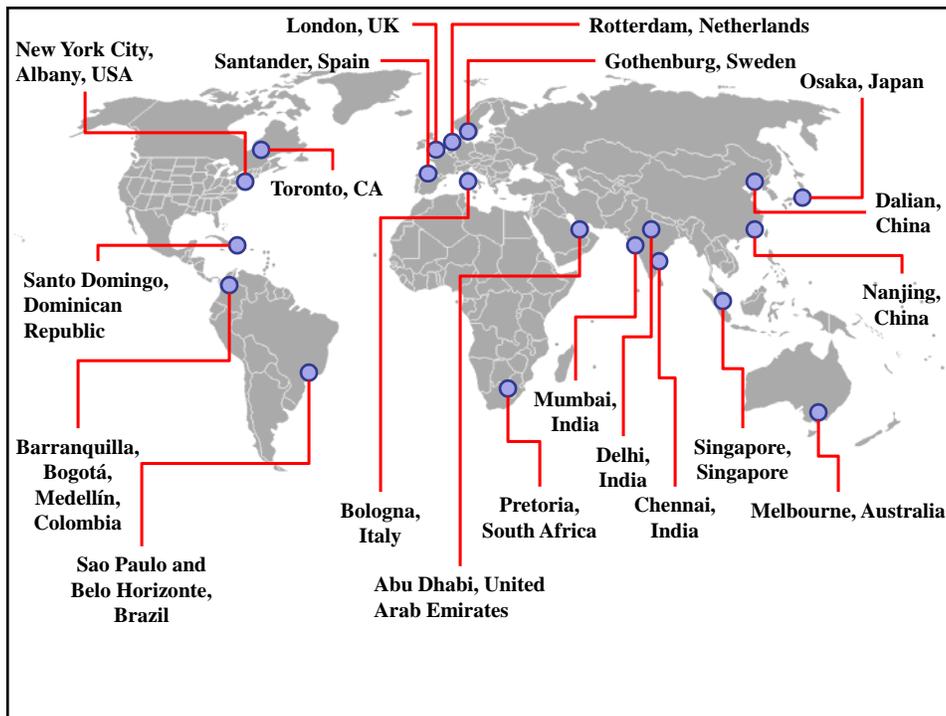
UNIVERSITY OF
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TU Delft

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CoE-SUFS Dissemination Programs

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- ❖ **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)



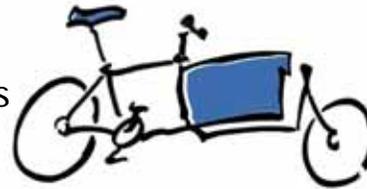
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Agenda

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- ❖ 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



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be  Berlin

messenger,



Relevance of cargo cycles for public authorities



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messenger,



Different cities, different sizes, different economic environment...

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

Challenges...

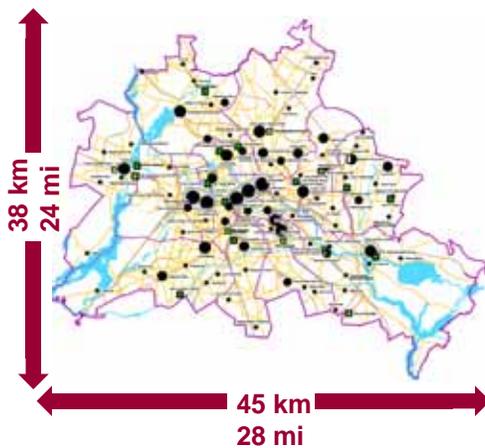
- ❖ Noise
- ❖ Pollution
- ❖ Greenhouse gases
- ❖ Traffic safety / accidents
- ❖ Congestion

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...

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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)

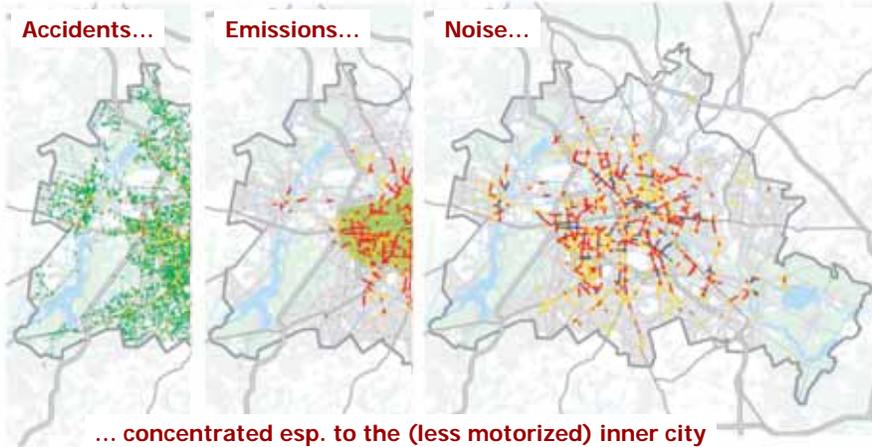
Unemployment rate: approx. 11%

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

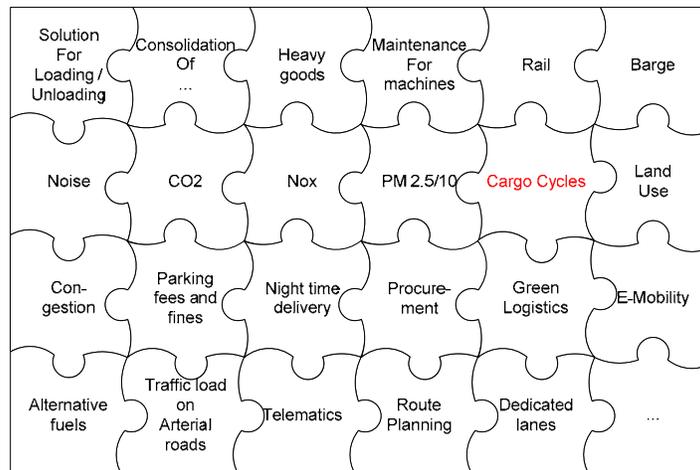
Polycentric city / short journeys

There are significant negative effects of traffic...¹³

Verkehrsunfälle im Hauptverkehrsnetzraum in der Verkehrsbedingte Luftschadstoffbelastungen durch Verkehr Lärmbelastung im Hauptverkehrsnetzraum (2011)



Is there *one* simple/single solution?¹⁴



How is urban freight reflected?

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- ❖ 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 together

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

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- ❖ Something new or a renaissance of something old?

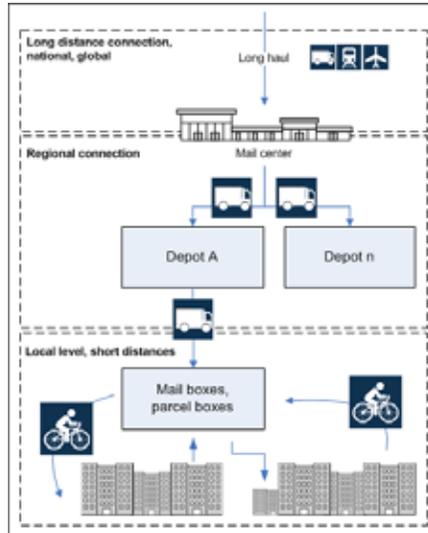
Cycling service men at Berlin-Potsdamer Platz in 1906



Source: Missmann 1987, S. 94

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

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Micro depots for mailmen

Potential and limitations of cargo cycles in urban freight

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- ❖ 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, NO_x, PM₁₀ and PM_{2.5}, 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

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- ❖ 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!



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Transport market segments with cargo cycle use

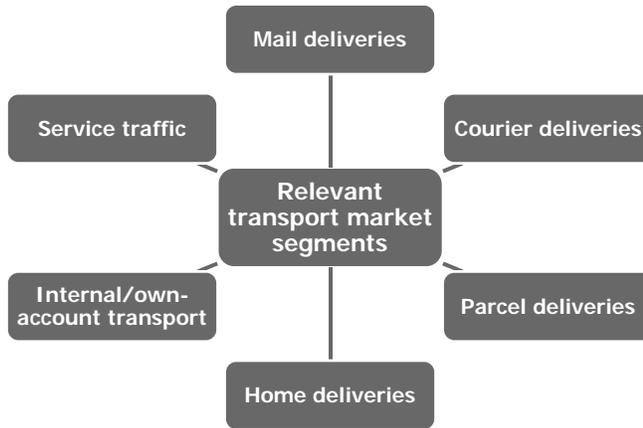


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Fields of application for cargo cycles

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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

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Foto: H&C



Foto: Deutsche Post



Foto: githara alliance.de



Foto: Postbox



Foto: Tagespiegel



Foto: St. Petal Blog



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Courier deliveries

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Foto: DLR



Foto: Hamburger Abendblatt



Foto: Papst München



Foto: Völgels



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Parcel deliveries

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Foto: DPD



Foto: DHL



Foto: DHL



Foto: UPS



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Home deliveries

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Foto: Endreika Tea



Foto: Botsch



Foto: Polard Magalie Kammerling Albrecht



Foto: Ben Schmeier



Foto: K&M



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Internal/own-account transport

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Foto: Dieter Debus / Evonik



Foto: n.A.



Foto: BASF



Foto: Bundeswehr



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Service traffic

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Foto: B&B Online



Foto: W&B 24



Foto: B&B Online



Foto: Stadtteil Hamburg



Foto: Telekom



Foto: Weißbuche Nachrichten



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Cargo cycles and city logistics



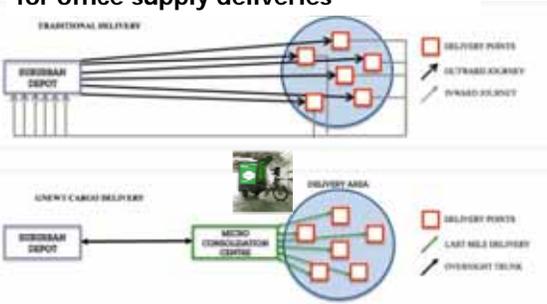
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Cargo cycles as part of city logistics schemes

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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

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Berlin: Cooperation - The EU project CityLog



Is it that what we want?

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CityLog: The Process

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



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Messenger, a courier company (est. 1989)

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- ❖ 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

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Beginnings around 1900

"Long John" since 1930s



2007



2009



2012

Loading capacity of cargo cycles

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8 shoe boxes
4 copy paper boxes
1 packing case...



1 pallet



...25 shoe boxes...



or even more...



'I replace a car': Vehicles and project partners 38

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:

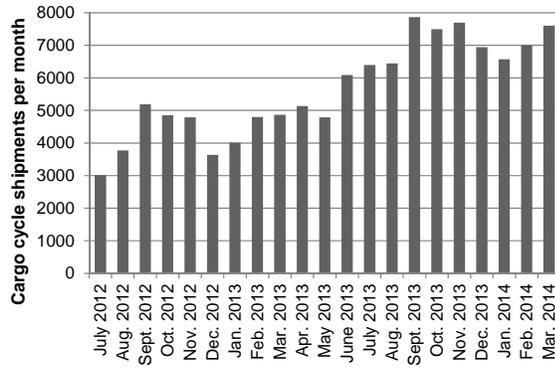
Research and project lead: 

Funding by the German Federal Ministry for the Environment

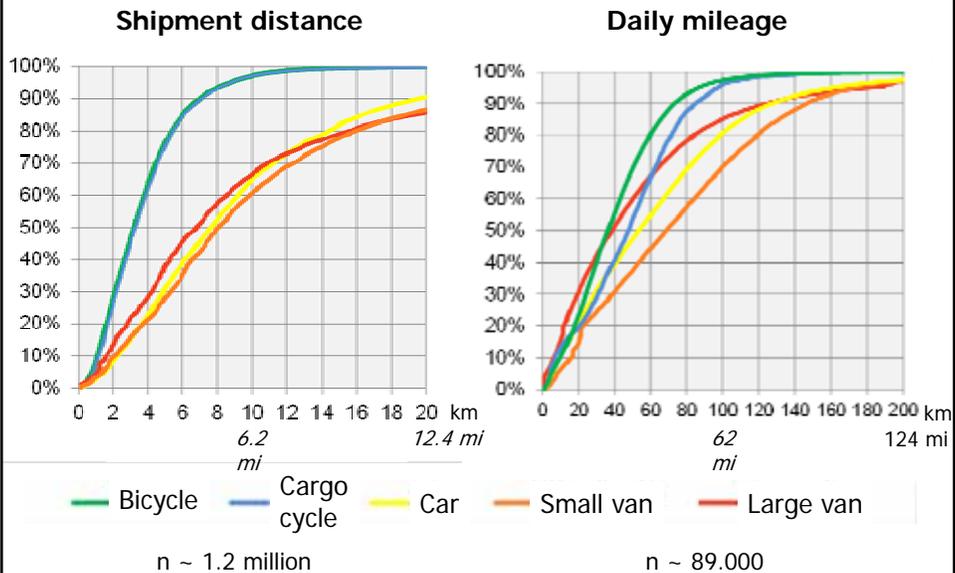
'I replace a car': Cargo cycle usage

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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 mileage⁴⁰



'I replace a car': Car substitution potential

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



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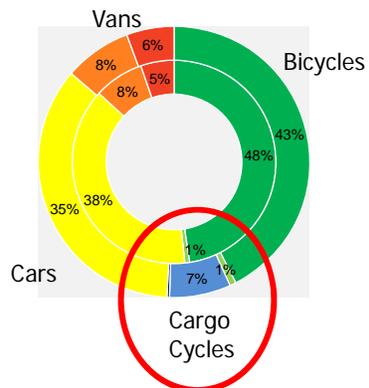
messenger



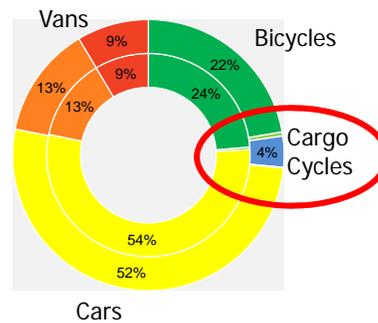
'I replace a car': Change in modal split

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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 ⁴³

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 ⁴⁴

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-demographics	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 circumstances	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
n=362	Constant	3.315	0.000	-2.725	0.000	-0.508	0.465
	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

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Environmentally specific factors

- Regulative framework conditions
- Socio-spatial context
- Economic framework

Company-specific factors

- Type of fleet decision-making
- Companies' strategic orientation
- Individual attitudes of decision makers

Vehicle-specific factors

- 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
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Closing remarks



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messenger



Closing Remarks

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- ❖ 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?

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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?

Achim Beier

messenger Transport+Logistik
achim.beier@messenger.de

Johannes Gruber

*German Aerospace Center (DLR)
Institute of Transport Research*
johannes.gruber@dlr.de

Julius Menge

*Berlin Senate Department for
Urban Development and Environment*
Julius.Menge@SenStadtUm.Berlin.de