Innovative Fright Delivery in Urban Space

First Results of
Hanover Field Tests

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Motivation and Background for the concept

- 80% of deliveries in urban areas
- 10% of vehicles, but 20% of traffic and 50% of environmental effects
- Policy of local authorities based on restrictions, or access control
- Extra costs and less efficiency
- Propose innovative solutions to distribution logistics

Objectives

- Support an innovative approach to the organisation of urban freight transport, in line with political strategies to safeguard the « liveability » of cities, while being compatible with efficient logistics.


CENTRO
RICERCHE
FIAT


DHL
EXPRESS


RENAULT
TRUCKS


Hannover


impacts


GRANDLYON
communauté urbaine


Region Hannover


IVECO


TNT


eca


B:SM
Barcelona
de Serveis
Municipals


mizar


IPK
Fraunhofer
Institut
Produktionsanlagen und
Konstruktionstechnik


dsd


UNIVERSITY OF WESTMINSTER

Involved Parties & Boundary Conditions

Public Authorities:
-Traffic
-Pollution
-Safety
-City live

Customer
-Delivery Cost
-Service quality

FIDEUS Solution

Logistics Operator:
-Efficiency
-Low costs
-durability

Vehicle OEMs:
-Standard solutions
-Cost

FiDEUS Project Approach

Efficient urban logistics through:

- **Low-emission, low-noise vehicles**
- **Better ergonomics and safety**
- **organised in compliance with City‘s transport requirements**
- **introducing new vehicle type for last mile**

Issues adressed in Hannover:

- practical experimentation with new logistics for last mile delivery in sensitive urban areas
- Search for new ways to combine ‚urban comfort' for pedestrians with business needs of small shops and stores
- Reduce negative impact on traffic flow from delivery vans
- Reduce emissions in terms of noise and air polutants

Three Testcases in Hannover

2nd LANE

2

Reduction of 2nd lane parking and its effects on traffic by implementing dedicated parking zones for delivery vans.

URBAN LIFE

3

An approach to minimize illegal delivery activity within low-traffic zone and emission saving through electronic micro carriers.

CITY HUB

4

A low-noise van in combination with an electronic micro carrier concept for delivery within large pedestrian zones.

CityHub: Problem addressed

- situation during delivery hour
- safety
- damage to pavement
- ‚livability‘

CityHub: Problem addressed

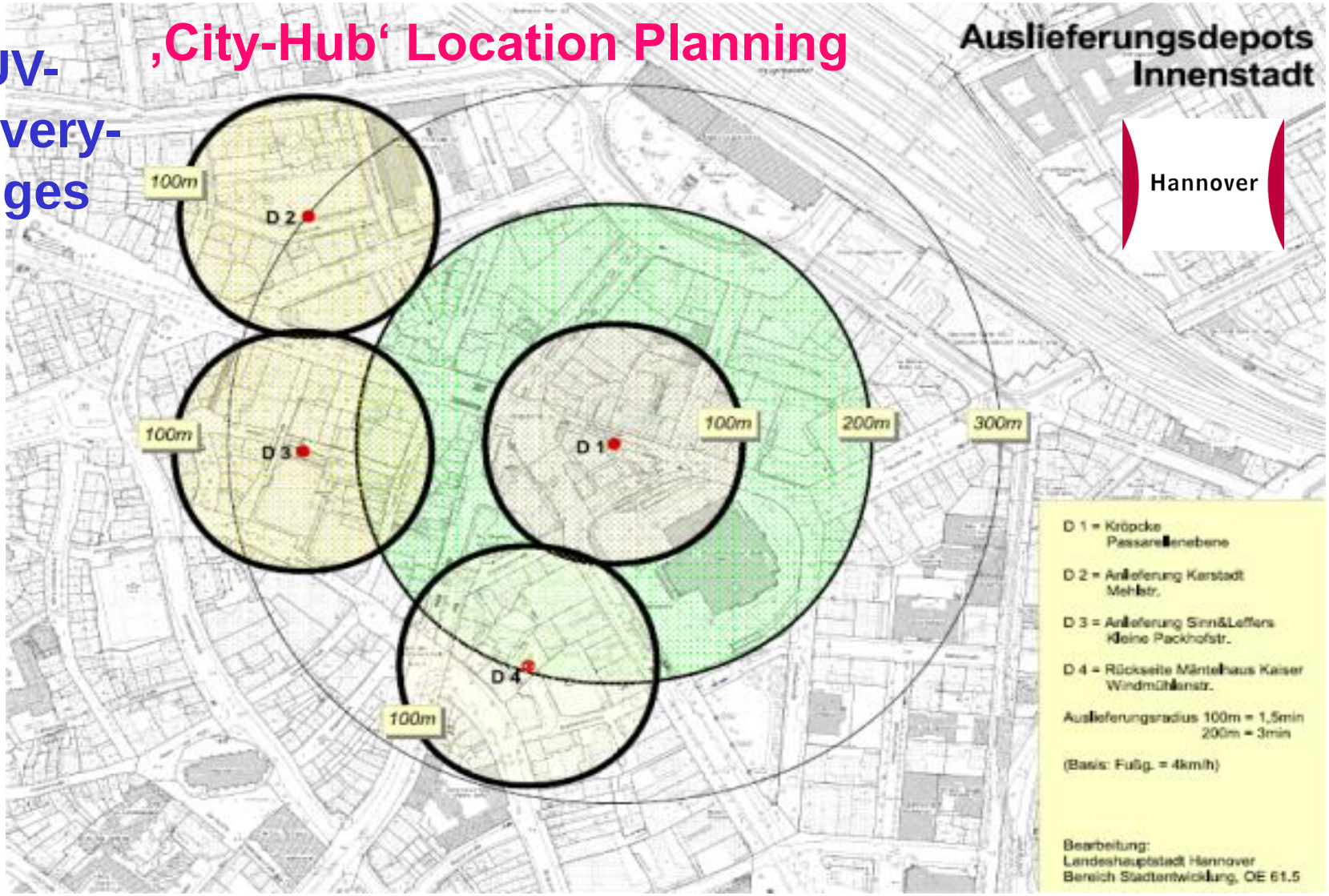
- **Access restriction do not meet delivery requirements**
- **pedestrian zones experience drawbacks caused by lack of logistics services**

Summary Scenario ‚City-Hub‘

- Time-extension for distribution (reduces number of vehicles) by placing a feeder-vehicle close to the pedestrian area, which feeds walker, biker, microcarrier.
- Legal aspects: extension of access times for pedestrian zone, permission microcarrier, reservation of feeder-space and enforcement

uCUV-Delivery-Ranges

‚City-Hub' Location Planning



Delivery for Level -1 via stairs,

sometimes several vans approaching -1

Dense structure of small businesses and shops at Level -1

Reserved parking space for loading/unloading of MCUV-containers:

Hannover

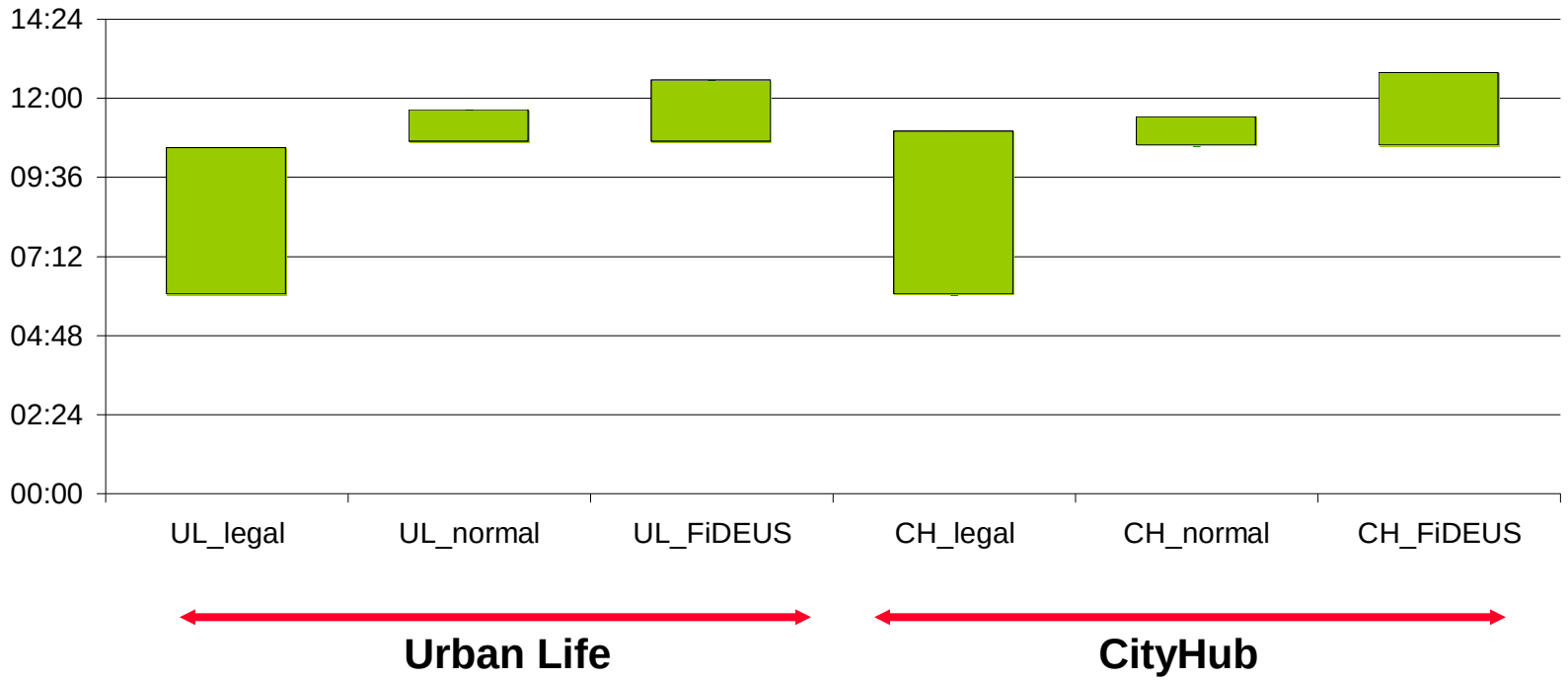
Depot D 1

Kröpke
Level -1

Delivery at -1

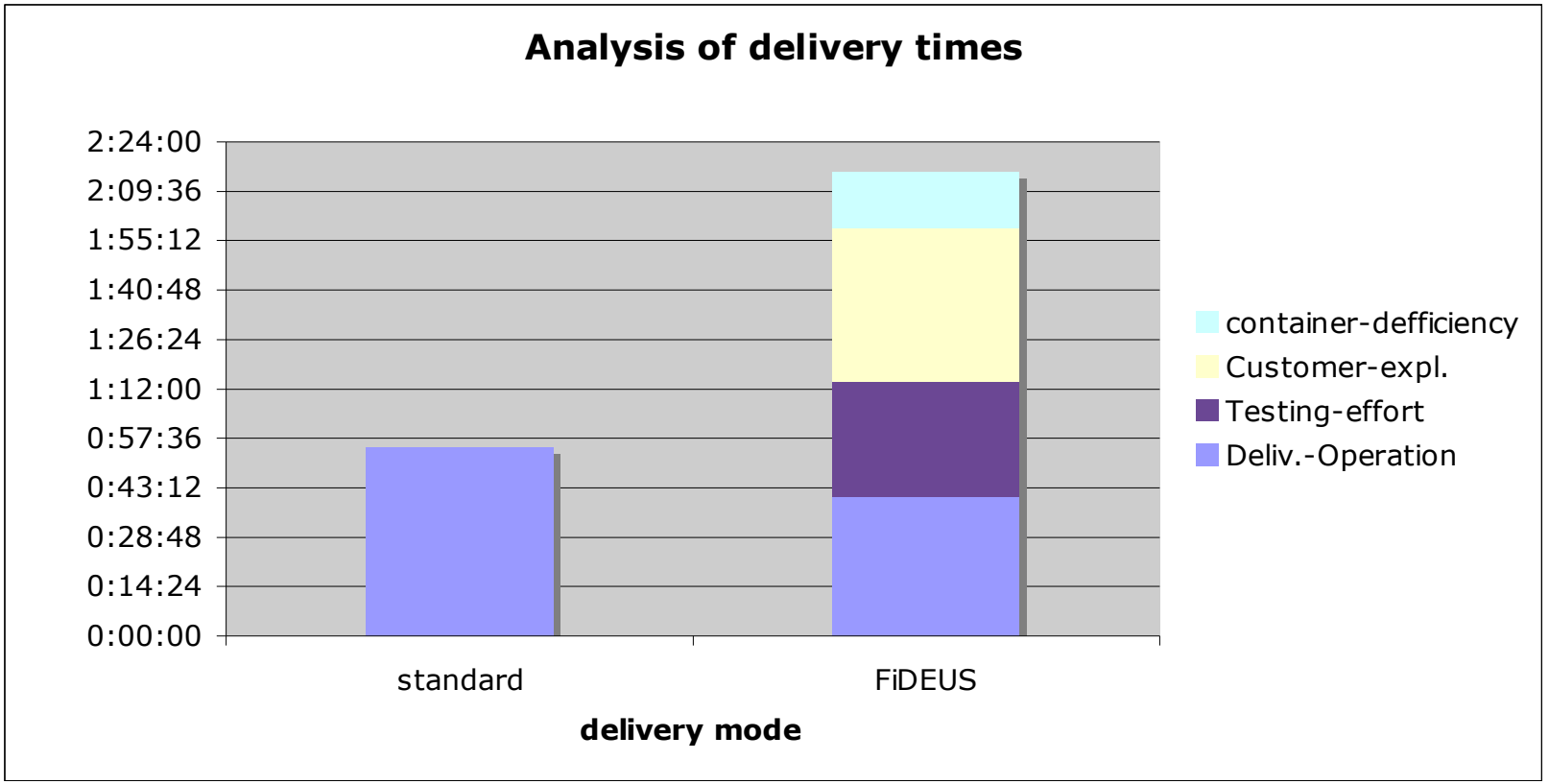
Results concerning delivery times

Duration of entries compared to permitted entry-times



- Elimination of illegal access by applying MicroCarrier
- Time extension of delivery with MCUV by factor 2,43 - see next slide!

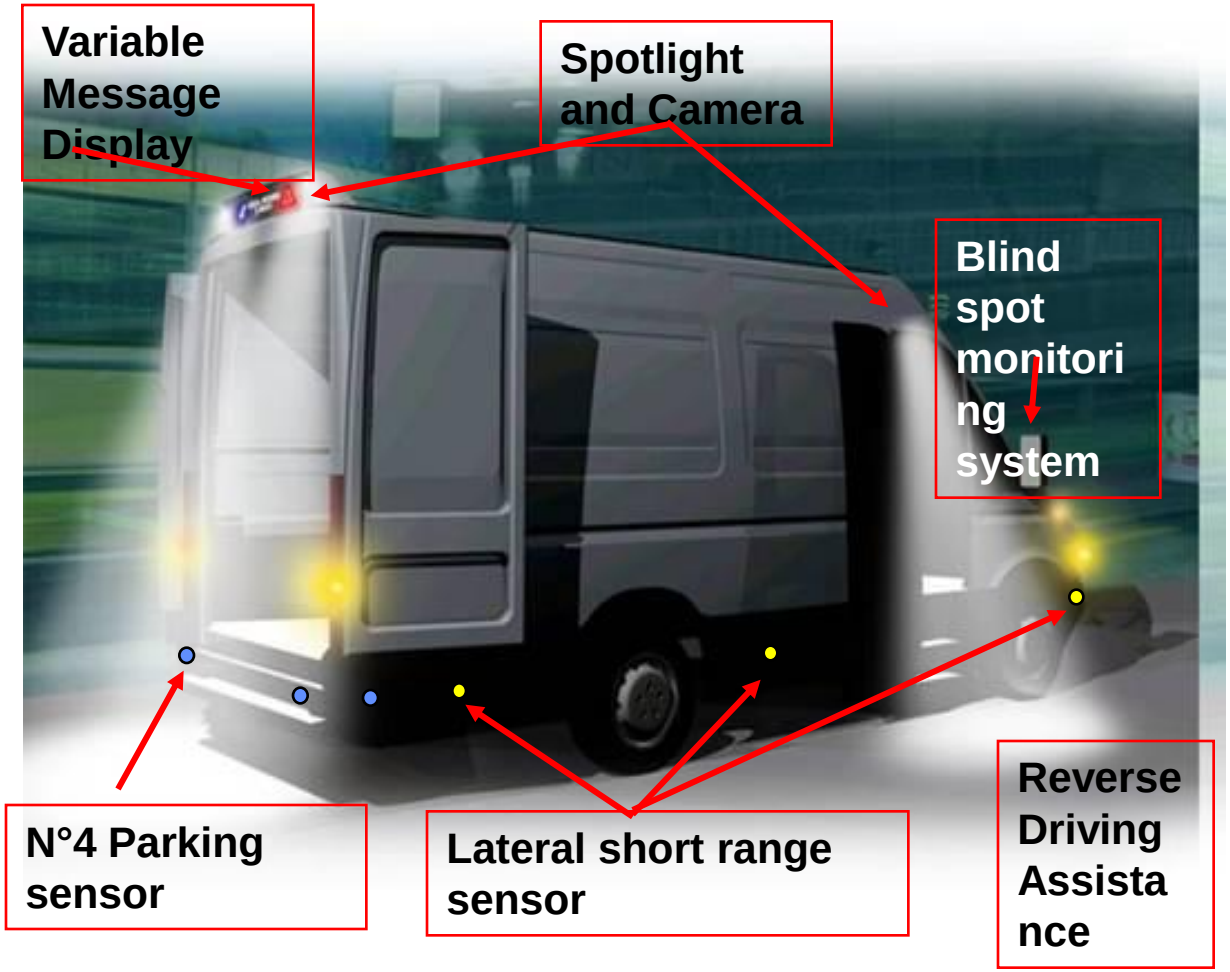
Results concerning delivery times (2)



- **Actual delivery operation reduced by approx. 20%**
- **Only delivery process considered - no hub-operation included (sorting to containers)**

Scenario 2b:
Level zero delivery (ground level):

- the Iveco is a CNG-van, noise reduced with a range of safety features for operation close to pedestrians



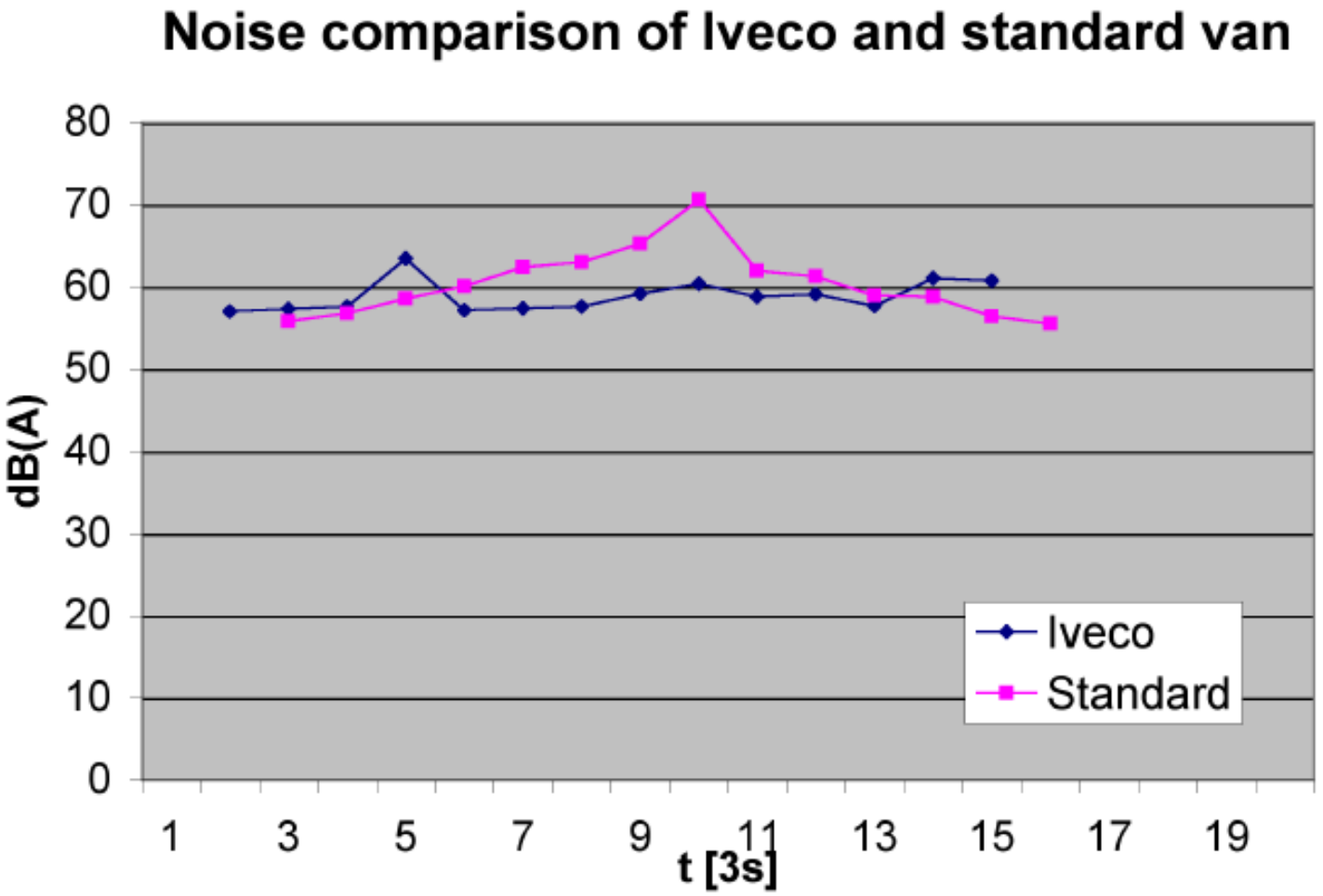
Scenario 2b:

Level zero delivery (ground level):

the Iveco also is used to deliver bulk packages/ goods that would not fit into the CityContainer of the Microcarrier

Noise comparison between Fideus Van (Iveco) and standard van in pedestrian zone:

Average -7db/A
Peak -10db/A



Summary Scenario: ‚Urban Life‘

Characteristics

- Pedestrian zone
- mix of shopping, small business, recreation, public living space
- Tram only, bike-lane available, delivery trucks have to park on pedestrian area (very annoying to the public, illegal and risky)

Solution:

mid-size truck is parked at reserved place, uC travels on bike-lane along entire Limmerstr

MCUV passing along Limmerstr.
Between Tram and pedestrian foot walk

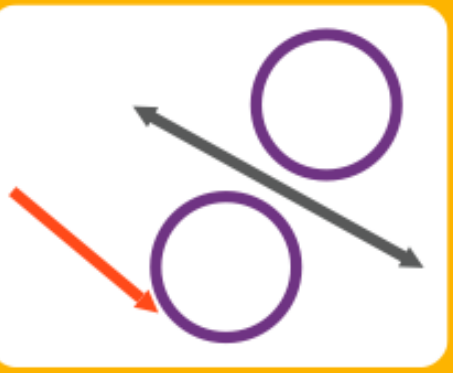
Operational area of Microcarrier:

1. Limmer only
2. Limmer plus surroundings

Loading zone Limmerstr.

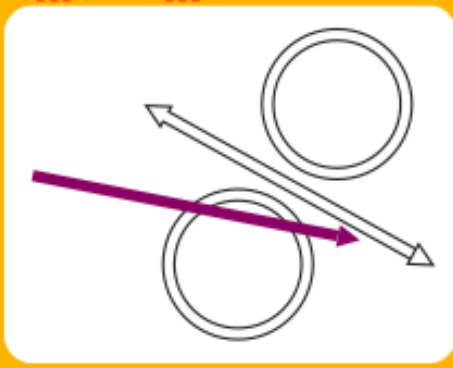
4 different logistic cases for analysis

0) standard delivery

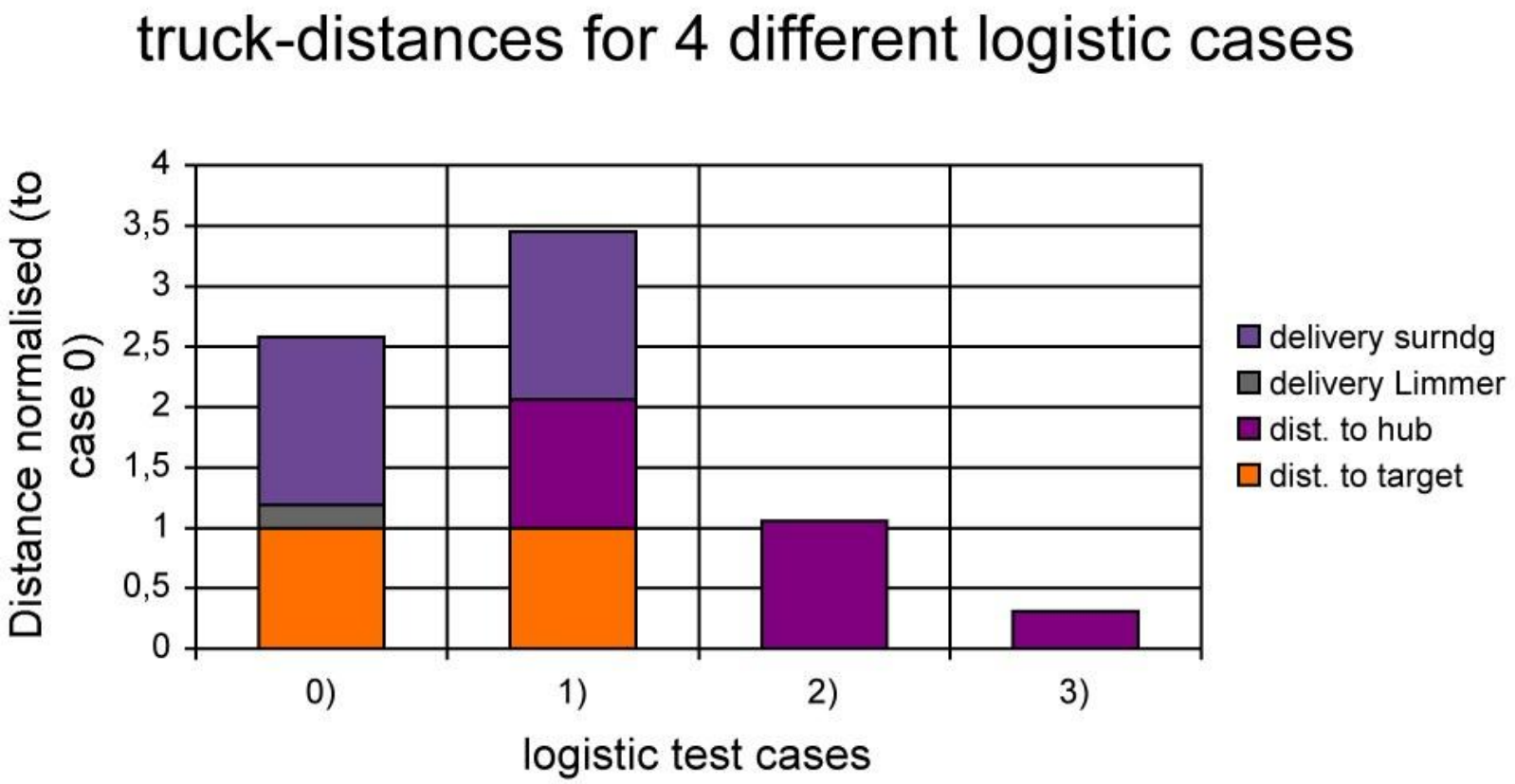


1) partly µCUV use

2) full µCUV use / 3.5t to hub

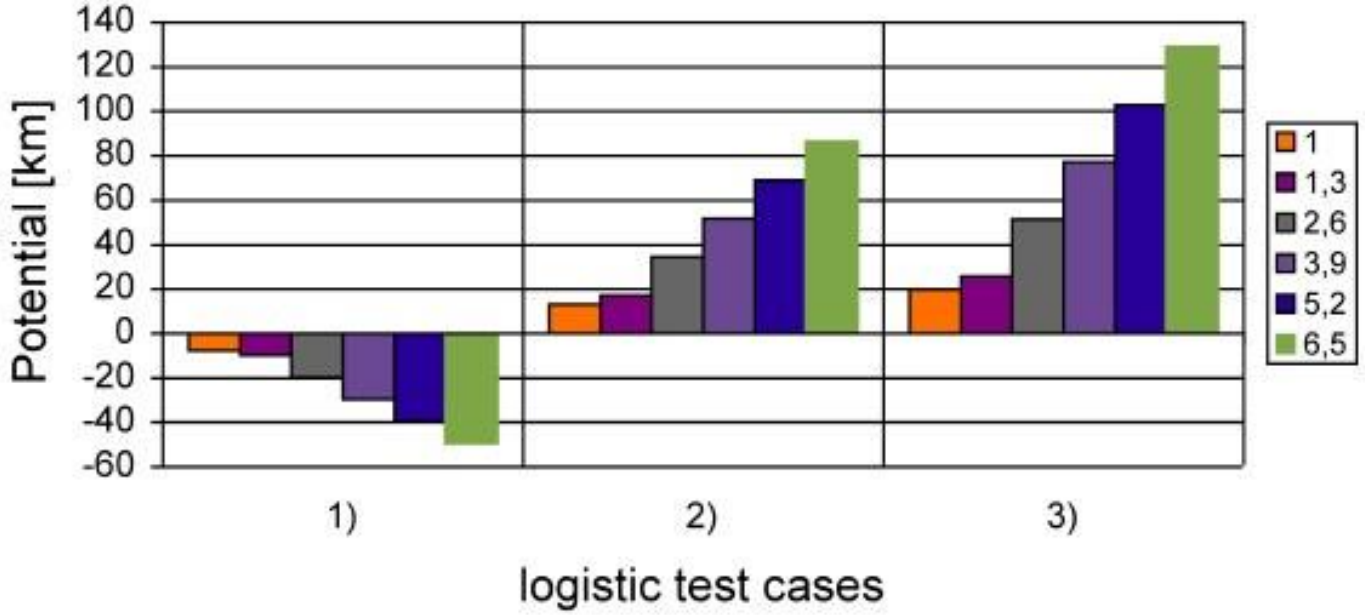


3) full µCUV use / 12t to hub



- **Savings in distance (km) only if MCUV serves entire surrounding**
- **Increase of capacity of feeder (3) and MCUV employment delivers best savings**

Potential of savings per day and vehicle Limmerstr. only



- **value 1 (orange) represents data of 1 DHL truck, operated in 3 different cases**
- **All other values are extensions to all DHL, all KEP, incl Food, incl other small business deliveries**

Summary ‚2nd Lane Stop‘

Characteristics:

- main road (Arterial)
- 2 lanes each direction,
- traffic impact from parked vehicles (congestion, safety, legal aspect)

Summary Scenario

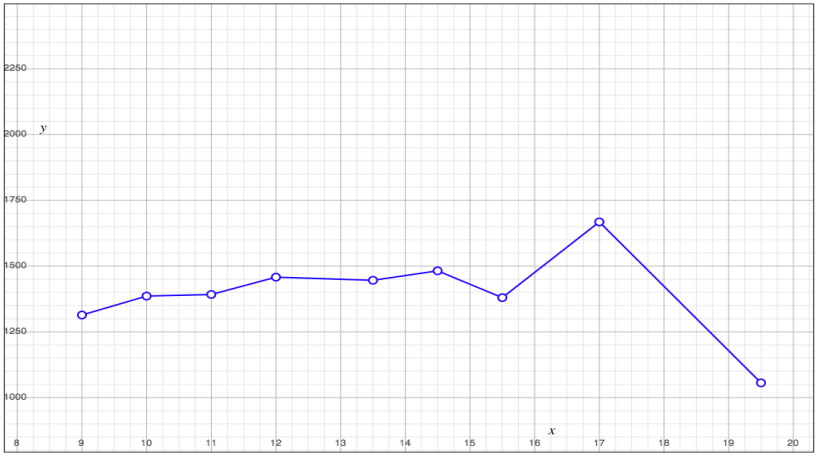
2nd Lane Stop

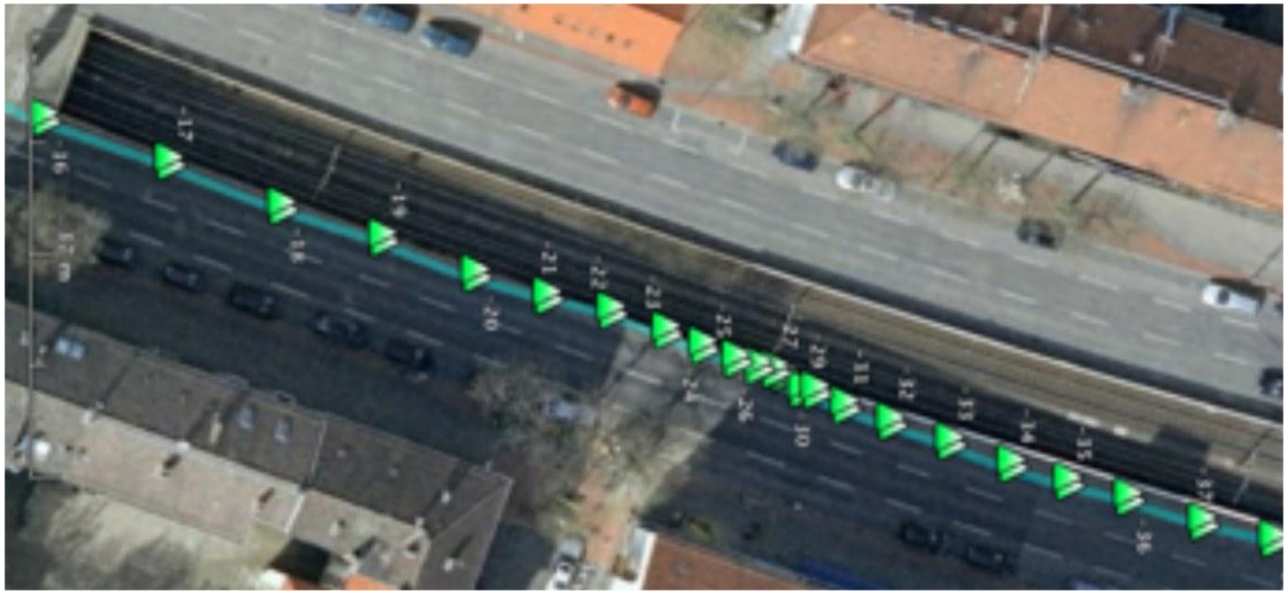
Solution:

- **parking place reserved to delivery trucks (time window only), with yellow marks on ground and signposts for enforcement**
- **Additional ways for operator**
- **Problems with enforcement**

Characteristics:

- Daily profile almost flat
- 1400 Vehicles/hour
- Recording of traffic profile surpassing 2nd Lane Parking with ‚Floating Car‘





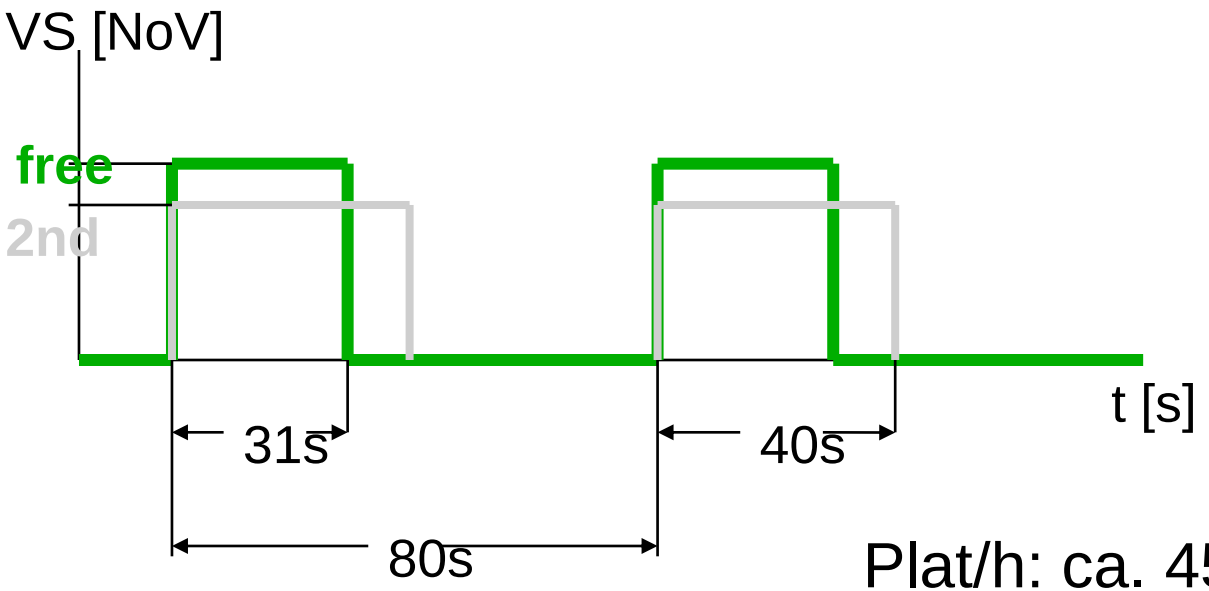
Results 2nd lane

88,7 of traffic in platoons

33% time loss with 2nd lane occupation

1242 vehicles affected per hour

Tagesschnitt	
1398	FzG/h
45,33	Pulks/h
80,03	s (Intervall)
27,53	FzG/Pulk
1242,54	FzG_Pulk/h
20,71	Fzg_Pulk/min
88,74	%
30,83	s (frei)
39,36	s (2nd)



Plat/h: ca. 45

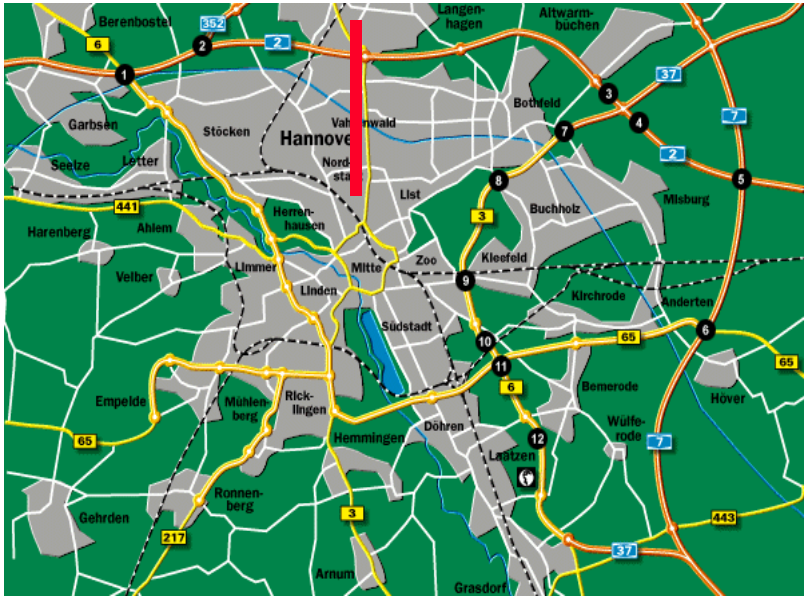
2nd lane occupation time (h	5
annual delivery days	200

10,8926586	*l*	Verbrauch pro Tag bei Haltezeit X Stunden (Beispiel 10h)
2178,53172	*l*	Verbrauch bei X Tagen... (Beispiel 200)
2,32	*kg/l*	Benzin: CO_2 nach Messung Bayerisches Landesamt
2,62	*kg/l*	Diesel: CO_2 nach Messung Bayerisches Landesamt
5,38097335	t CO2	bei 50/50 Diesel/Benzin und 200 Tagen mit je 10h Haltezeit Schätzung Hannover Streckennetz: Faktor 5 realisitisch!
44841,4446	km	Kilometer Normalfahrzeug bei 120g/km EU Grenzwert

2200 liters of additional fuel per year

5,4 tons of CO2 (50/50 gasoline/diesel, 200days)

45.000 km equivalent travel distance based on 120g/km EU-emission-limit



Conclusion

- Measurement of emission savings provide a ‚solid tendency' for 2nd lane environmental impact;
- Extrapolation on entire urban area is possible with location specific structural data
- For more reliable emission data long term observation with more sophisticated sensor equipment required
- The MCUV concept appears promising concerning traffic reduction and service improvement but requires improvement of logistics concepts to meet commercial criteria
- These findings will be brought to the regional environmental action plan by the Region and the City of Hannover