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Rail Freight for Urban Logistics: Dream or Reality?

Sustainable City Logistics Conference

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- New innovative rail freight paradigm (dream &reality)
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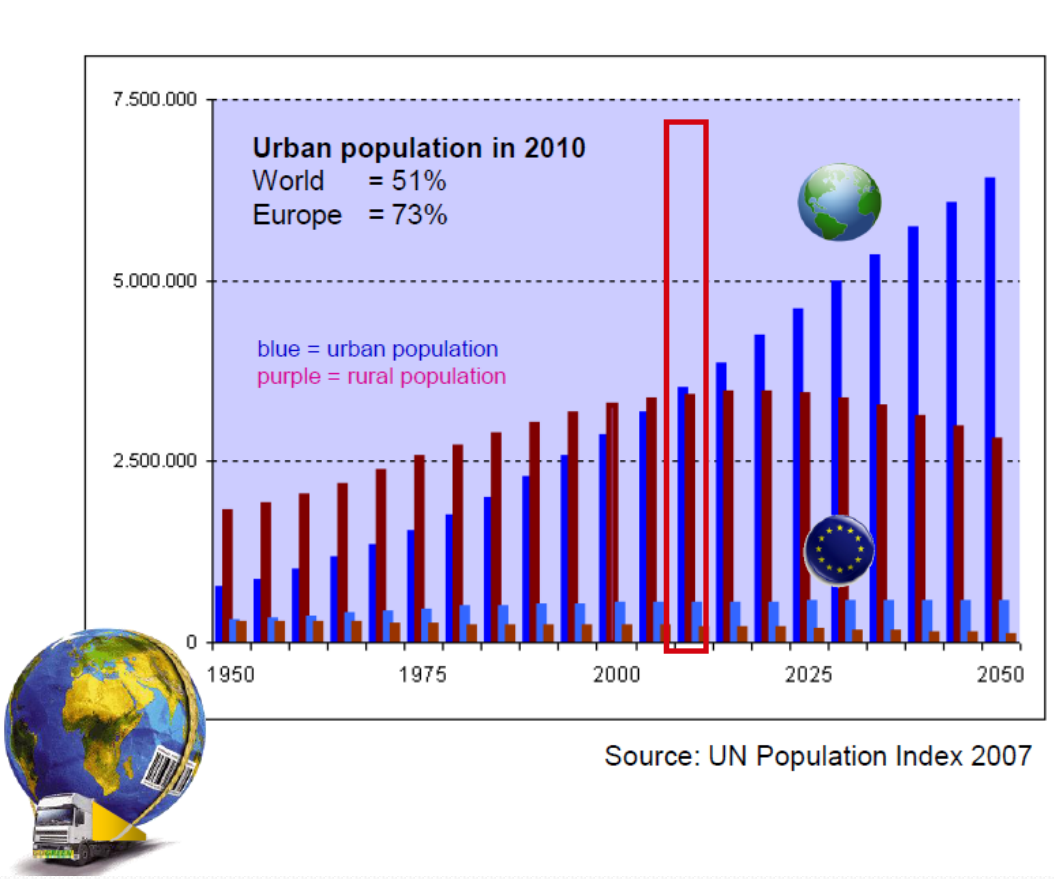
- New Rail freight paradigm and **city logistics !**
- Concussions

Increasing Importance of City Logistics - Growth of Urban Population

- Urban population (2010):
  - Europe 73%
  - World 51%
- Expected **trend of** development:
  - Further **growth**
  - **22** megacities by **2020**
- Expected **increase** in **demand** for personal and goods **mobility in urban** areas



City Logistics today

- Municipality of **1 000 000** inhabitants:
  - **2300** delivery **addresses**
  - **9000** suppliers
  - **Suppliers** responsible for **transport and deliveries**
  - On average:
    - **3-4** deliveries/day per customer or
    - **15-20** per week

Source: *DB Schenker, Ingvar Nilsson, Sustainable city logistics, Future Urban transports, Goeteborg 2009*

City logistics today - Impact of Commercial Vehicles in Urban Areas

- **Commercial vehicles** in urban areas account for:
  - **10%** of traffic **volume**
  - **40%** of **energy** use and
  - **50%** of pollutant **emissions**

City logistics today - current state

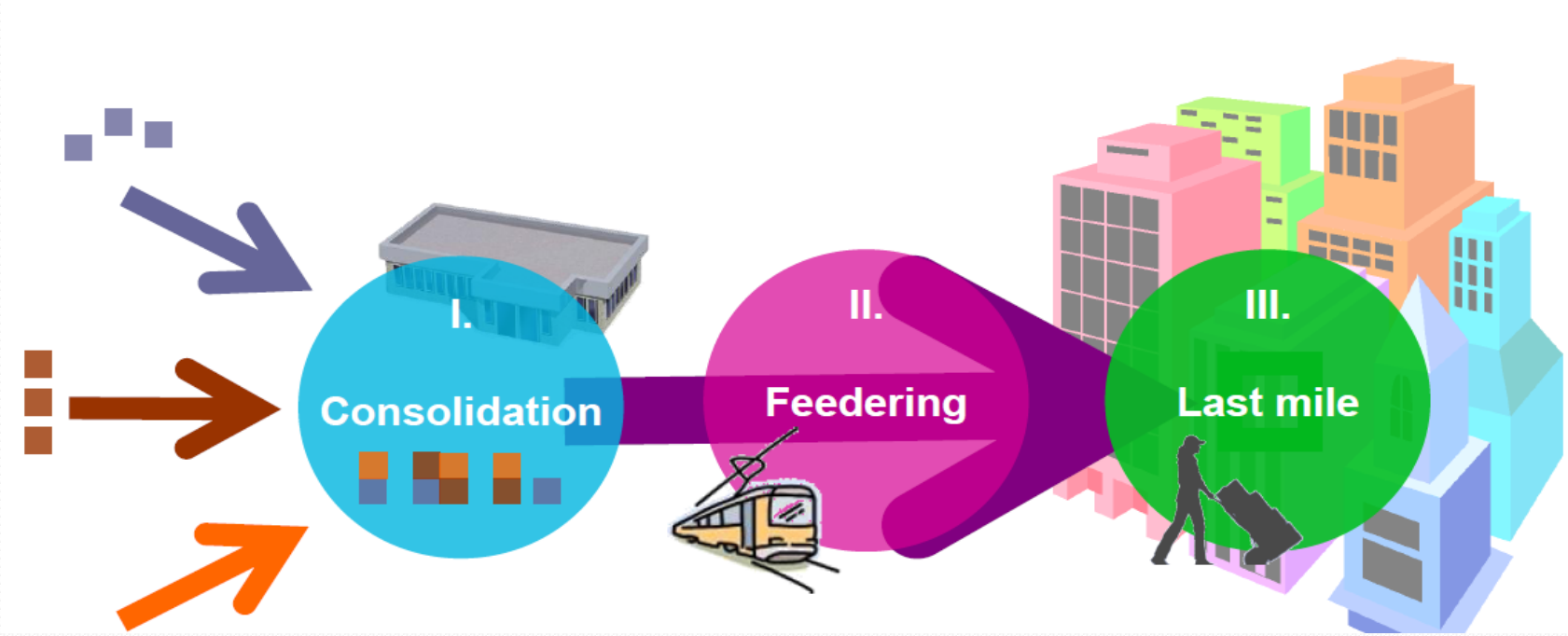
- City **delivery costs**:
  - **50% (and more)** of the **total costs** in the logistics networks
  - **Logistics operators** aim to **optimise the efficiency** of city logistics operations in **all respects** in order to:
    - **reduce trips** and **congestion**
    - save **costs**
    - to minimise **emissions**

City Logistics today e.g. City of Paris

- **2,2 million** inhabitants
- **32 million ton** of city transport /year
  - 1 mil. ton railways **(3%)**
  - 2,5 mil. ton waterways (7,8%)
  - **28.5 mil. ton /road (89 %)**
- **Great potential for railways !!**
  - **Provided the appropriate technology is developed and applied !**

Source: Bestufs, Amsterdam, 2005

City Logistics - Core Strategic Development Elements



City logistics – consolidation (centres)

- **Bundling of individual shipments !**
  - **Shipments are consolidated:**
    - to maximise **vehicle utilisation on the "last mile"** and
    - to make a **reduced** number of **deliveries** at agreed times (partialy train)
    - Typical savings of more **than 70%** of the original delivery possible
  - **Consolidation before final distribution is common practise** for:
    - **intra-logistics** in indutrial compounds, e.g. automotive, chemical, construction, airports (train ?)
  - **full loads** and **express** items are **not consolidated (train ?)**

City logistics - feedering

- **Collective transfer** of consolidated **volumes into city area**
- Bundled shipments can be transferred **collectively** from a **consolidation centre** into the city area with:
  - trucks, trams, **rail** or barges
- **Direct delivery** of full loads to **large receivers** (retail outlets), or
  - **drop-off at transfer points** from where final delivery is made to small receivers

City logistics - feedering

- **Examples** for **collective feedering** to urban areas:
  - Monoprix **shuttle train** for supermarkets in **Paris,**
  - VW **Cargo Tram** in Dresden
- **Challenges:**
  - generation of **steady volumes** and
  - availability and affordability of **urban space for loading** ramps and **transfer points**
- Great potential for innovative rail freight solutions !
  - Sidings, raiway tracks,....

City logistics - last mile solutions

- **Local distribution** from **transfer** point **to end receiver (not for rail)**
- **Traditional deliveries** can be augmented with **new practises** to cope with accessibility and availability **constraints**
- **Self collection by receiver** at attended **pickpoints**
  - or from unattended lockerboxes (DHL Packstation)

Rail Freight

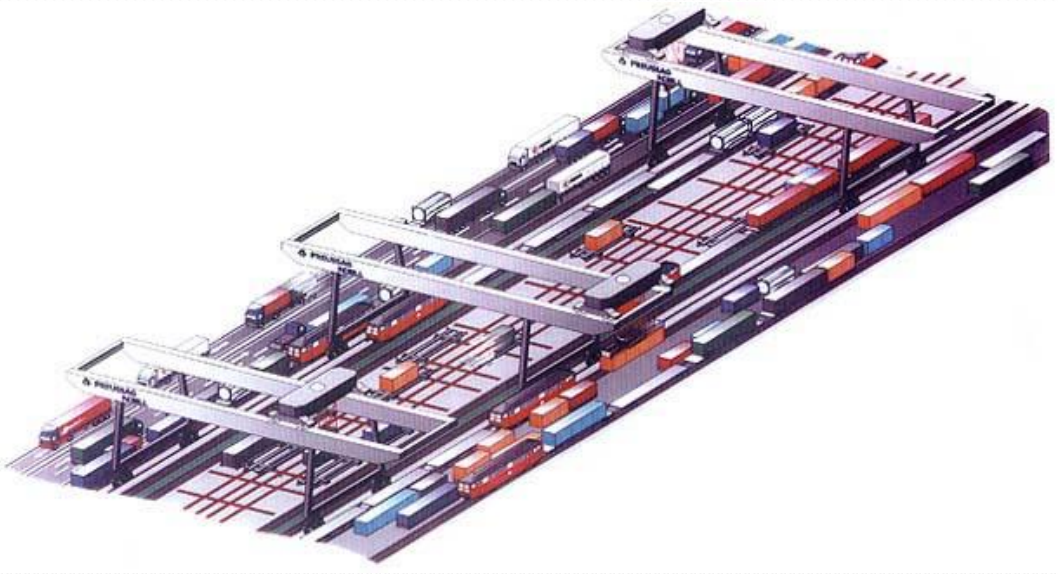
- **Mismatch:**
  - Freight Market **Needs** and
  - **Existing rail** freight paradigm

Existing Rail Freight Paradigm

- **large** volumes of **low value** goods,
- **long** distances (over 500 km)
- **fixed** schedules,
- long trains,(**1000-1500 tons**, shunting and marshalling required)
- **powerful** locomotives, (front power)
- relatively **slow freight** trains

Existing Rail Freight Paradigm

- large **investments & capacities**
  - large **shunting areas** for classical terminals
  - large **specialized terminals** for intermodal transport etc.



Freight Market Requirements

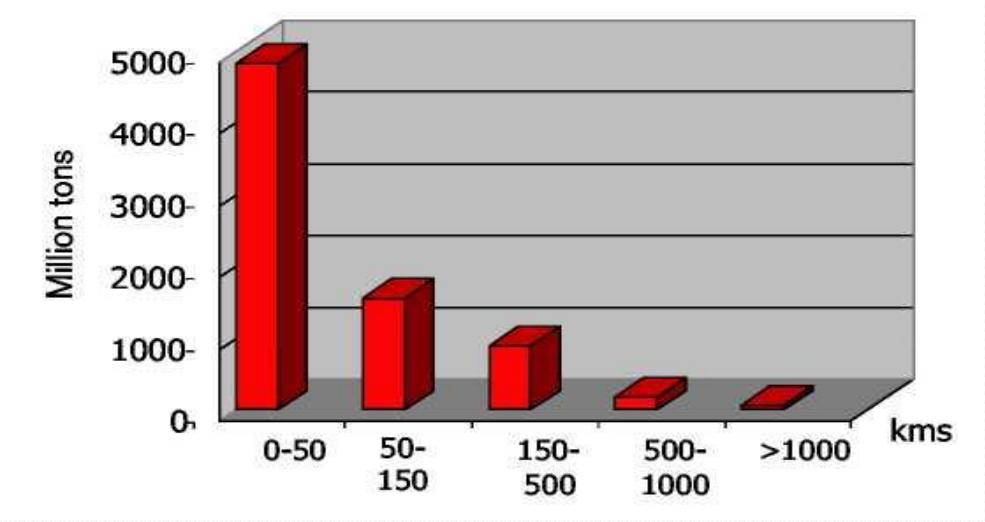
- **Door to door** services
- **Smaller** quantities
- More **frequent** deliveries
- **Shorter** delivery **time windows**

Freight Market Requirements

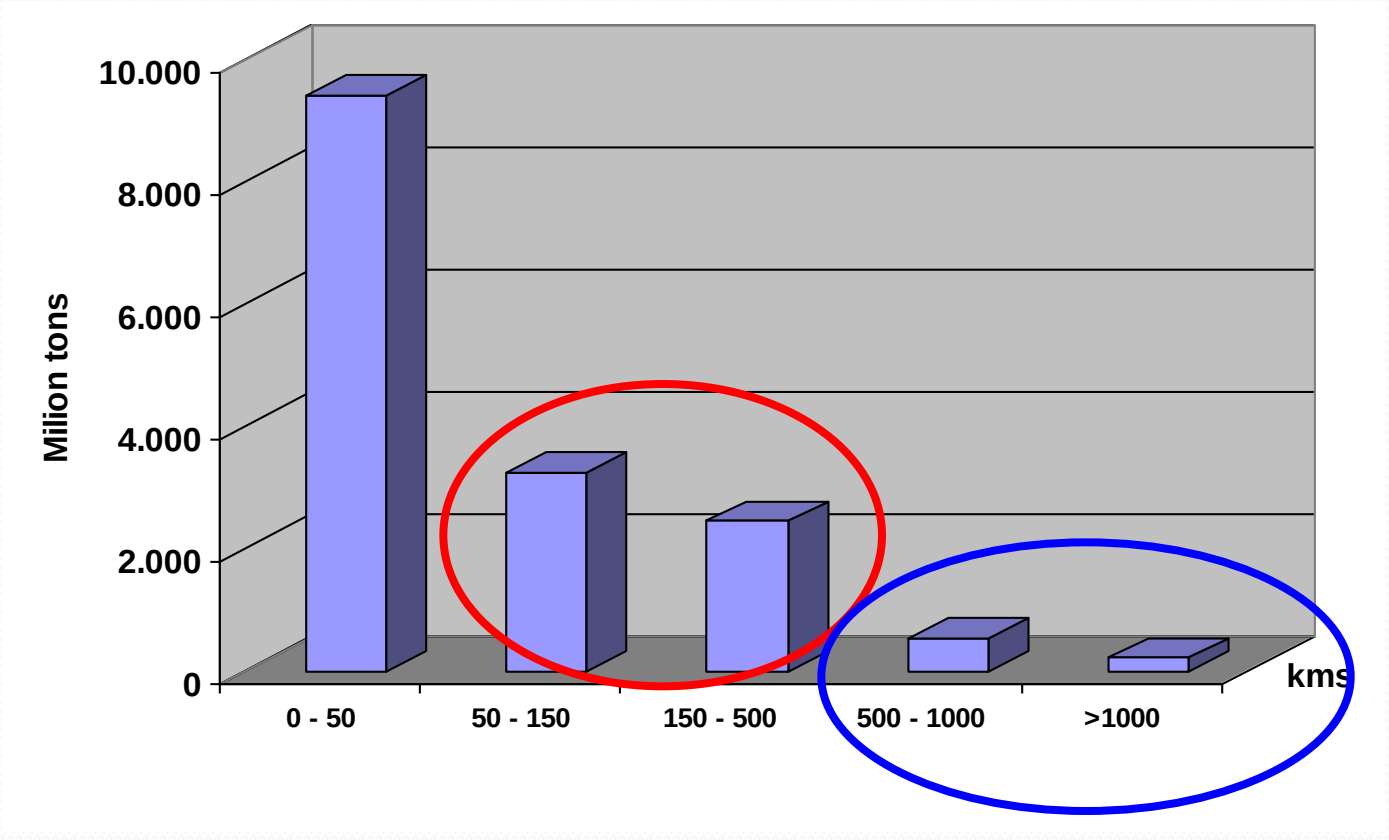
- **JIT** deliveries:
  - **lean** manufacturing,
  - **min. stock** management policy …
- Flexibility
- Availability
- Reliability
- Low risk…

Freight Market Requirements

- **The distance structure of the freight transport market needs:**
  - Prevailing **Shorter** transport distances
  - Railways –over 500 km



RAIL FREIGHT MARKET POTENTIAL



Source:: EUROSTAT

Market Niches For the Rail Freight Services

- **Urban** transport
- **Regional** and **local** transport**, (feeder** lines)
- Market **niches:**
  - **valuable** goods,
  - **perishabl**e goods
  - **small** consignments,
  - In (general) shorter **distances…**

What is Needed for The new Market Niches

The New Rail Freight Paradigm !

- **Innovative train** concept:
  - **Competitive** with road vehicles **performance**
  - Comparable with road vehicle **costs**
- Innovative **transhipment** technologies

The New Rail Freight Paradigm: What is Needed?

- **Free access** to the vacant rail infrastructure
- **Equal** train running **priority of:**
  - **Passenger** trains and
  - **Freight** transport (JIT, valuable and time sensitive goods)
- **Approved vehicles** – available on demand of customers **(Standardised** vehicles**)**

The New Rail Freight Paradigm: What is Needed?

- Dream ……

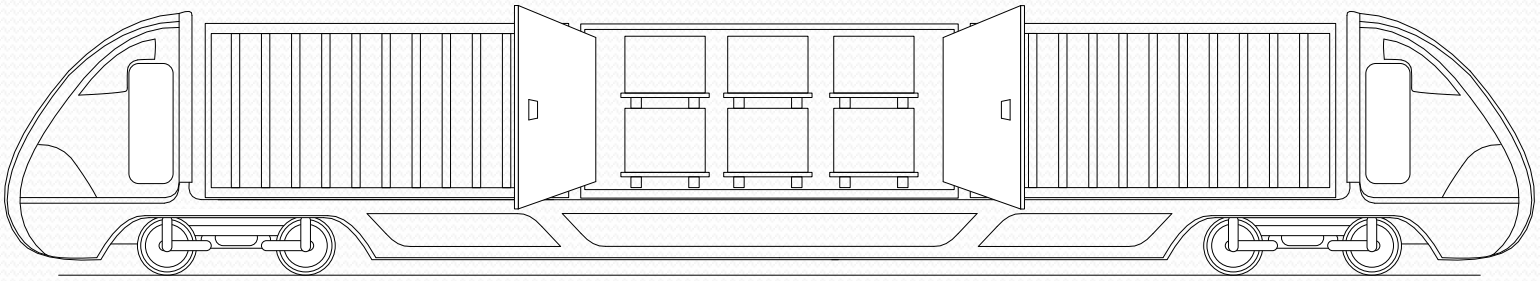
The New Rail Freight Paradigm: The Train

Ideal technological solution:

- a combination of the **truck** (high flexibility)
- **on the rail** (mass production), which is:
  - self-propelled,
  - **fast** moving **“railway-truck”**
  - **bi-**directional formation,
  - with **automatic coupling** solutions...

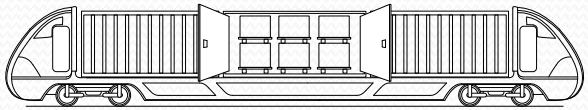
The New Rail Freight Paradigm: The Train

- Small **“Co-modal”** train unit
- Capacity (about) **3 TEU**
- Speed 80-160 km/h
- **Diesel / electric** drive traction motors on each axle.
- **Driving cabs** on both **ends** (avoids shunting, marshalling)

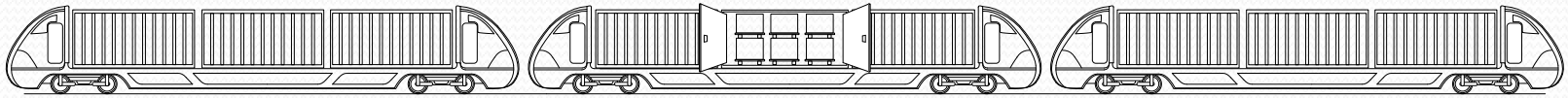


Truck train – transport options : corridors, feeder lines, …

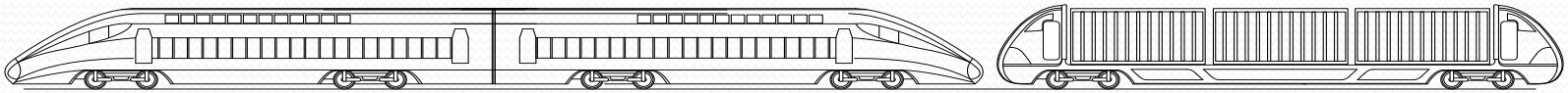
- Single "truck train" unit (sidings, feeder service)



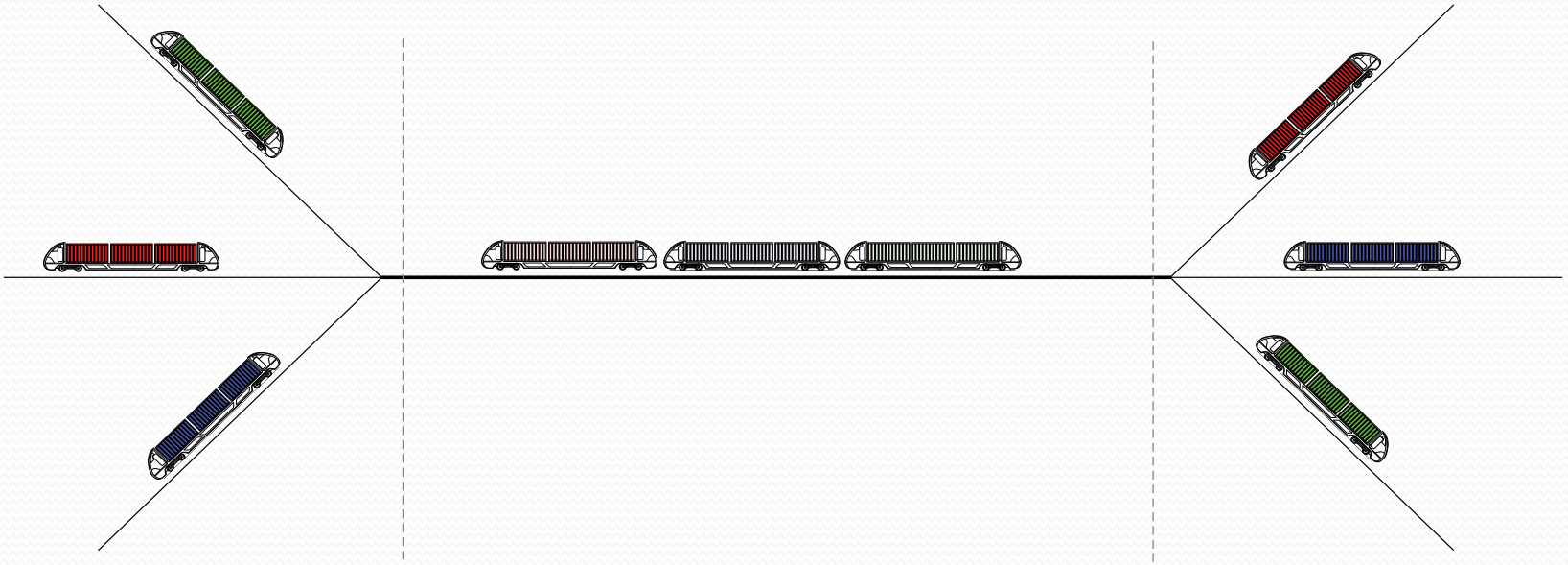
- Several "truck train" units together - truck lines



- Passenger train + "truck train" unit



HUB&SPOKE – LAST MILE – CORRIDOR – CO-MODAL SOLUTION

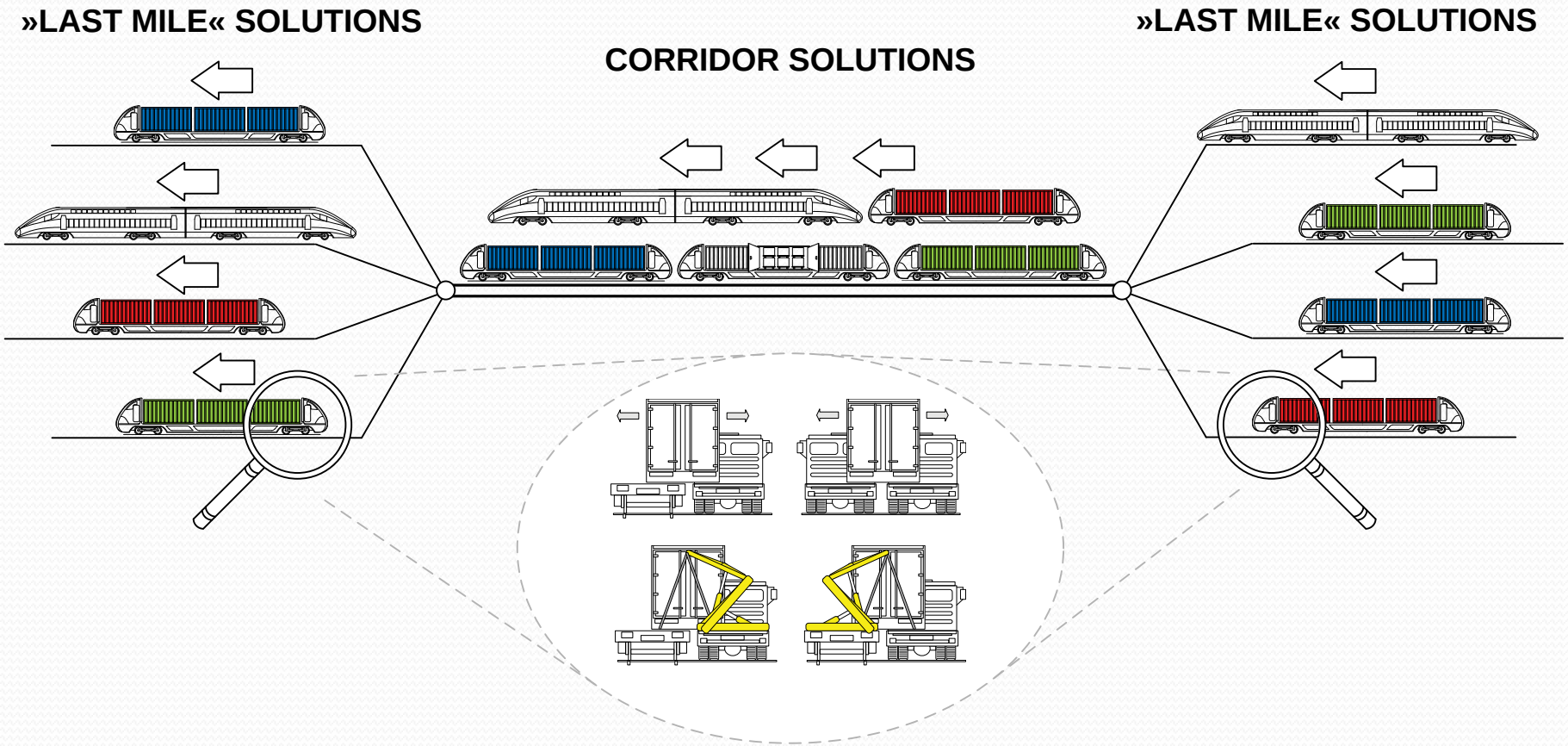


New innovative rail freight solutions
Short distances
(pick up and delivery)

Traditional rail freight paradigm
Trains 1500 – 1800 T
Long haul

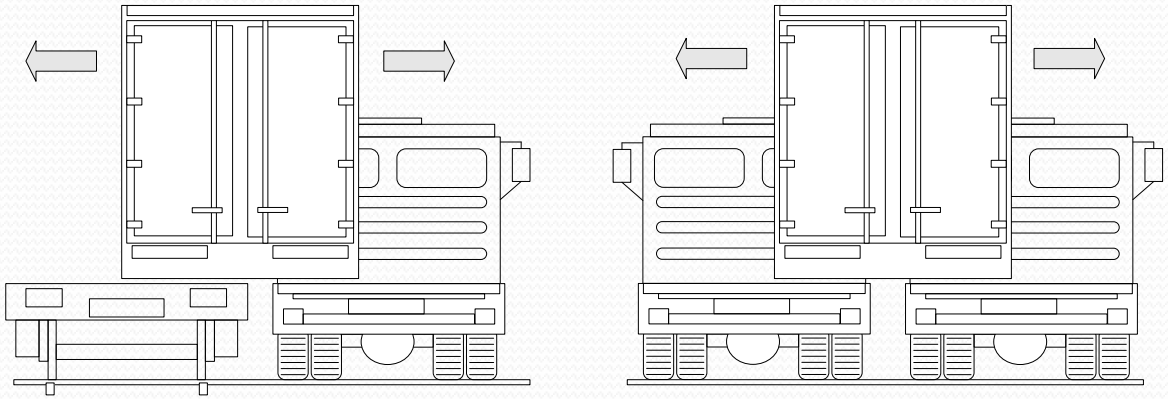
New innovative rail freight solutions
Short distances
(pick up and delivery)

HUB&SPOKE – LAST MILE – CORRIDOR – CO-MODAL SOLUTION



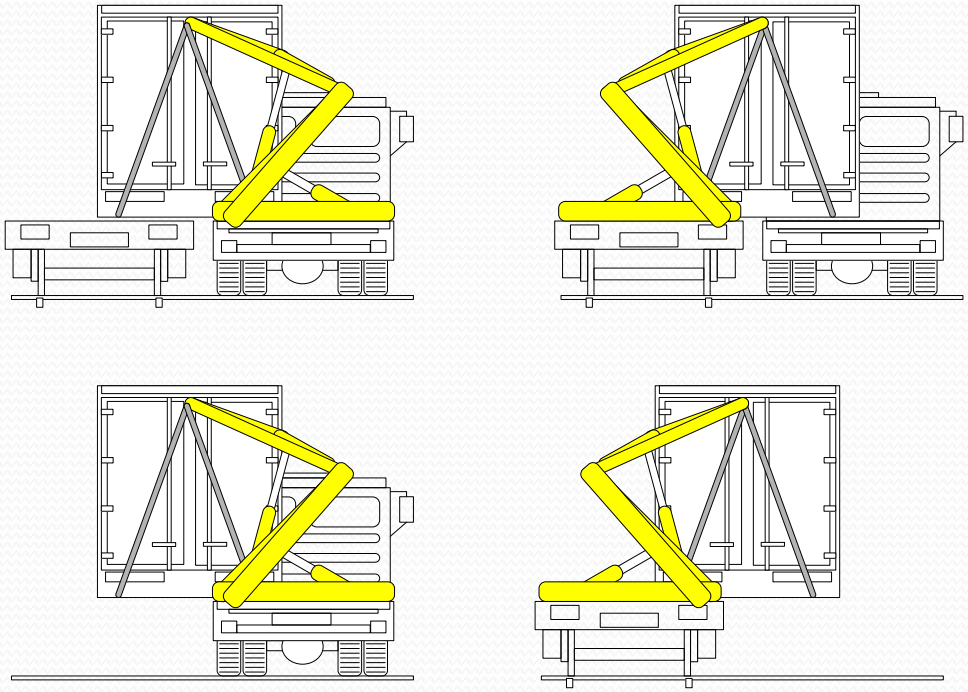
The New Rail Freight Paradigm: Transhipment technology

- **Horizontal** transhipments:



The New Rail Freight Paradigm: Transhipment technology

- On train and/or the truck



The New Rail Freight Paradigm: Transhipment technology

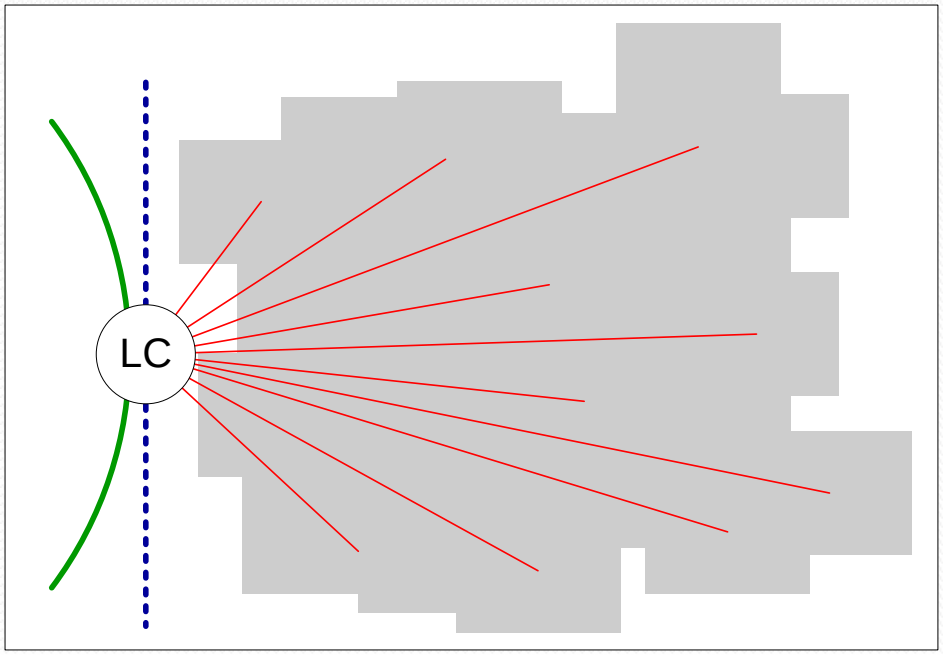
- **Flexibility:** transhipment along the whole railway network (sidings, free tracks…)
- **All** the available tracks = **co - modal terminal in the city**
- **Short** transhipment process: **5 - 10 minutes**
- **Low investment** costs (EUR 35 000 - 200 000)
- **Short** distances...

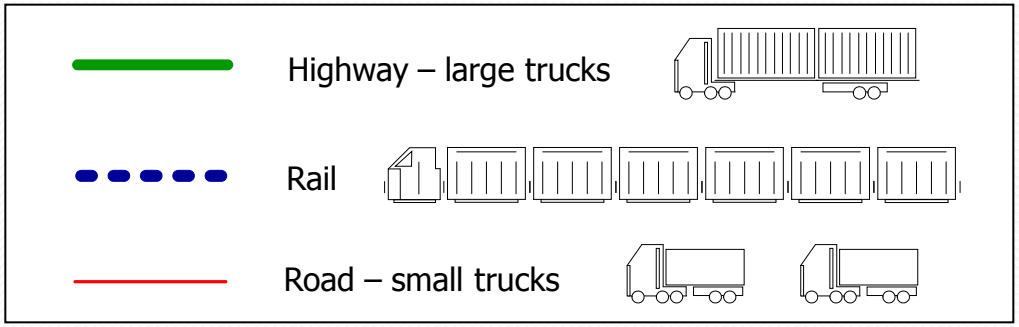
The New Rail Freight Paradigm: Free Access to The Vacant Railway Infrastructure

- **Software** solutions for the “on line” **time table** setting **available ! (Free access...)**
- **Big organisationa chalange for the railways..**

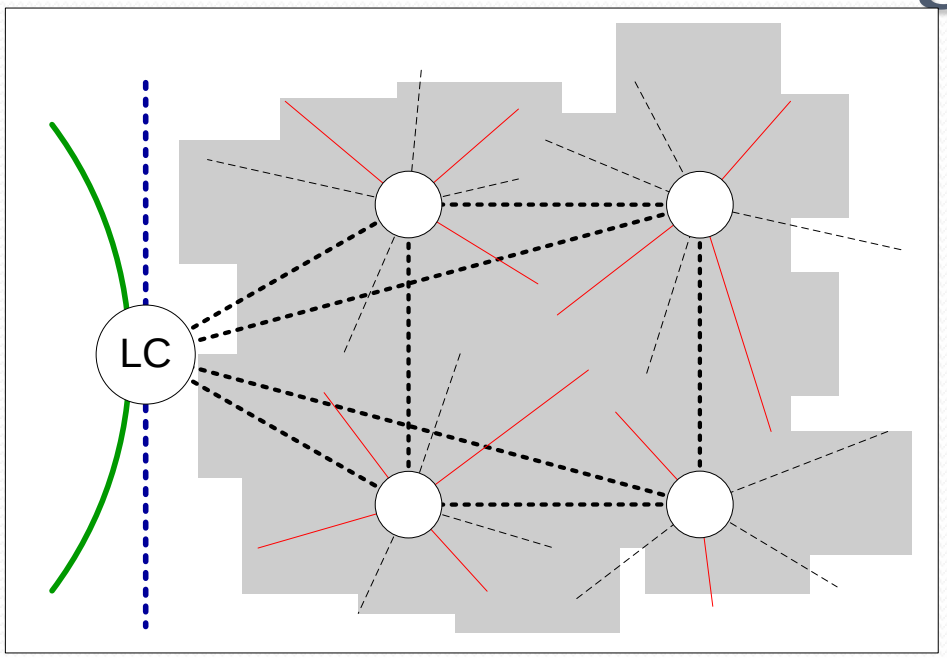
- New Rail freight paradigm and **city logistics !**

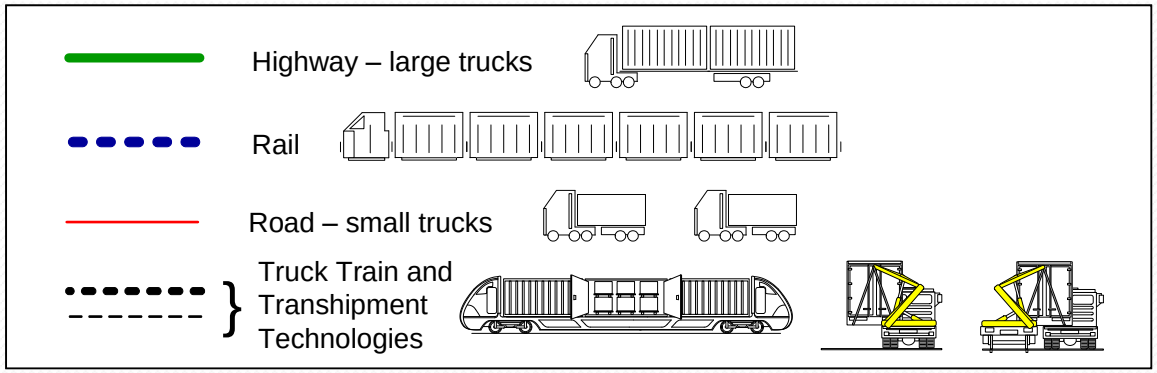
Rail and Urban Logistics – today





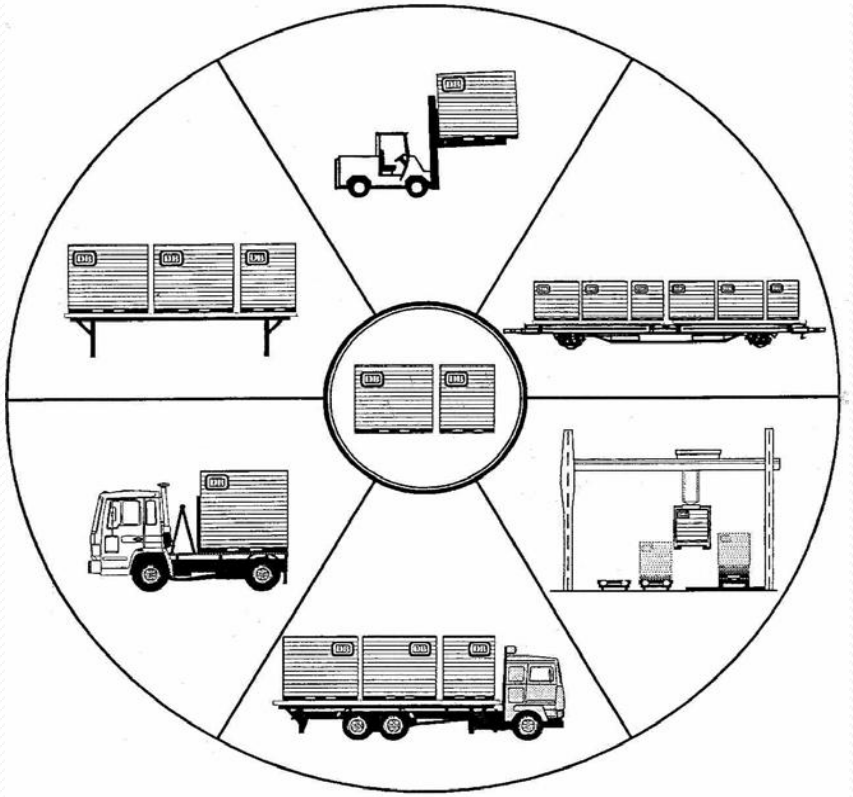
The New Rail Freight Paradigm: For Urban logistics





Possible solution: Transport units

- DB – logistics box concept
  - No success ?
- Is standardised **Intermodal small Container** system for **city Logistics still** an option?



Source: J. Woxenius, Intermodal transhipment technologies – an overview, 1998

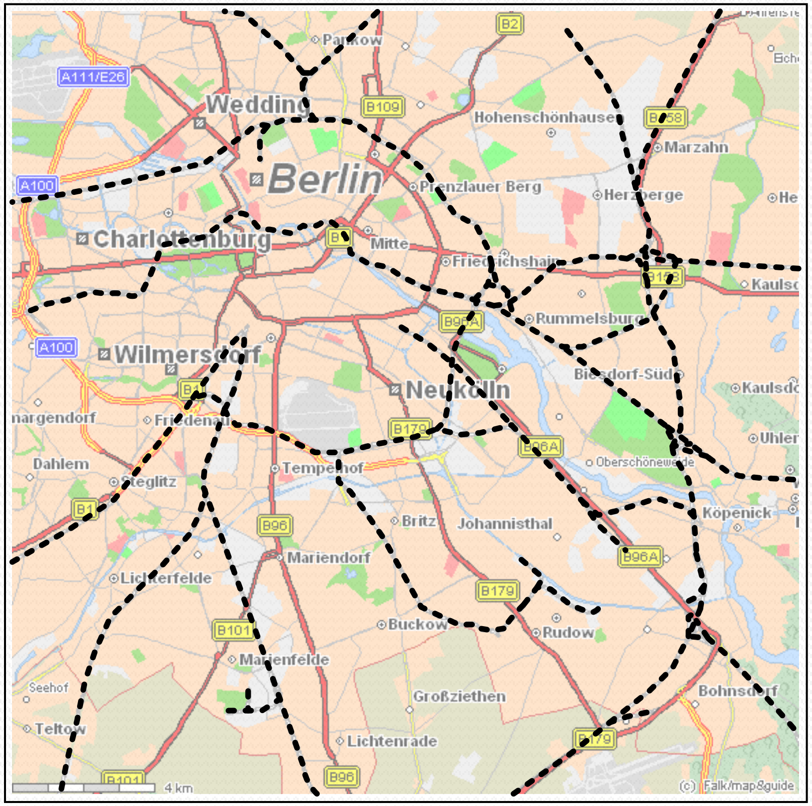
The New Rail Freight Paradigm: For Urban logistics

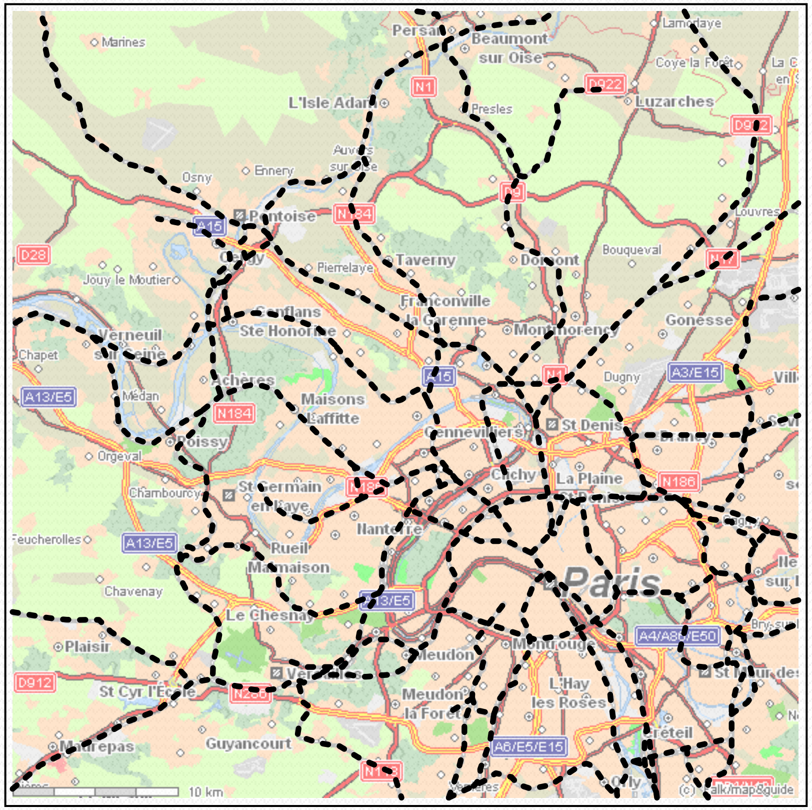
Advantages of the new rail freight paradigm in the urban areas:

- Use of **all available** railway **infrastructure** in the urban areas (**sidings, free tracks, warehouses**...)
- Day and **night** deliveries
- **Polycentric** delivery concept **- less congestion** on the urban roads

The New Rail Freight Paradigm: For Urban logistics - potential

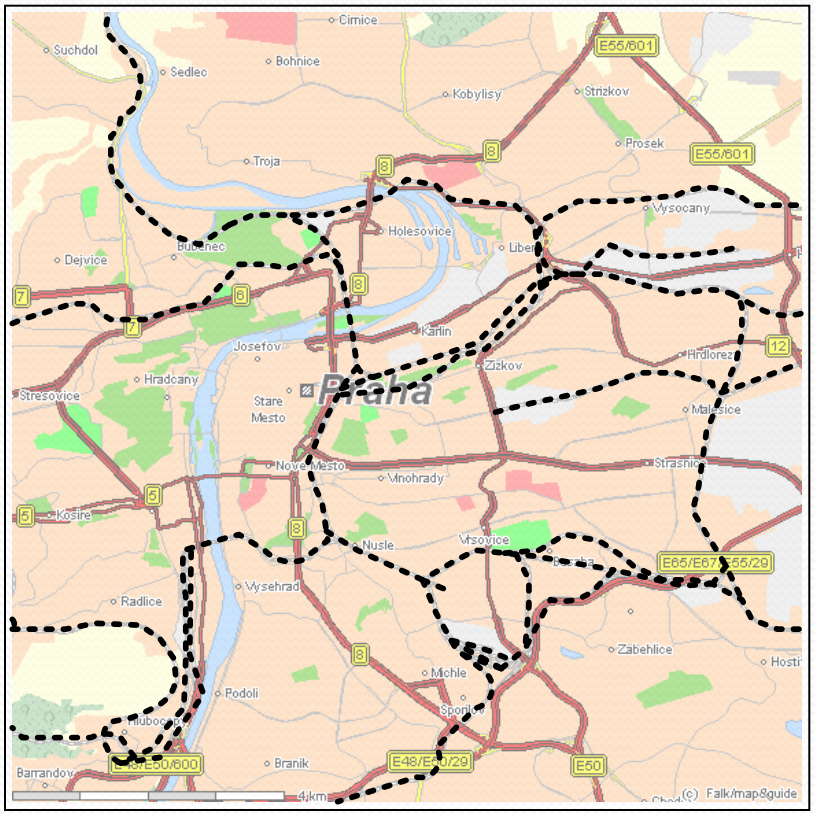
- Berlin, Paris

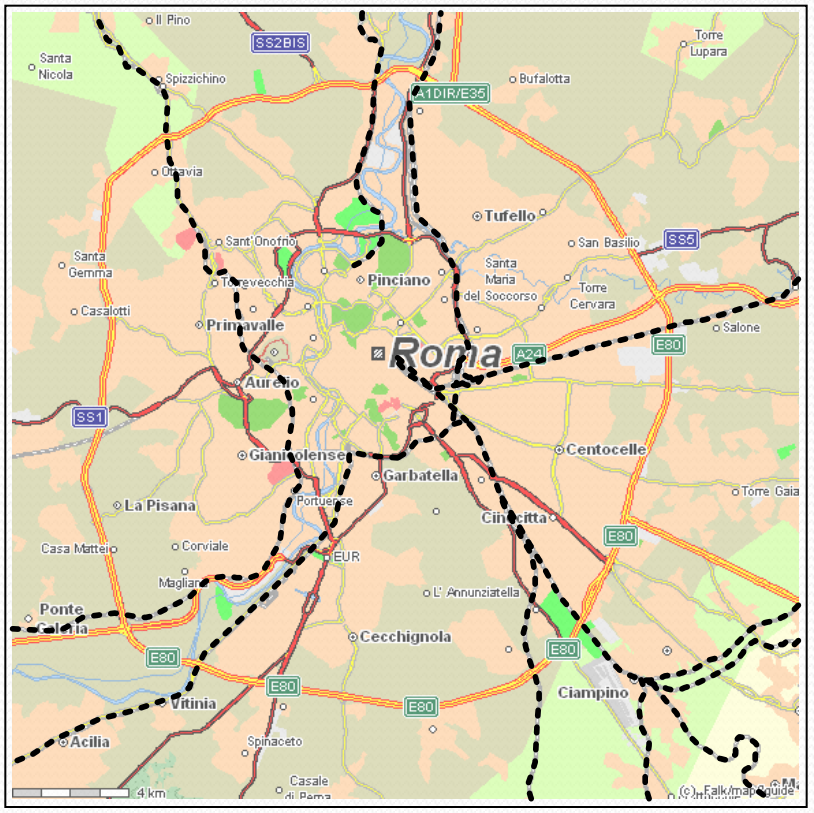




The New Rail Freight Paradigm: For Urban logistics - potential

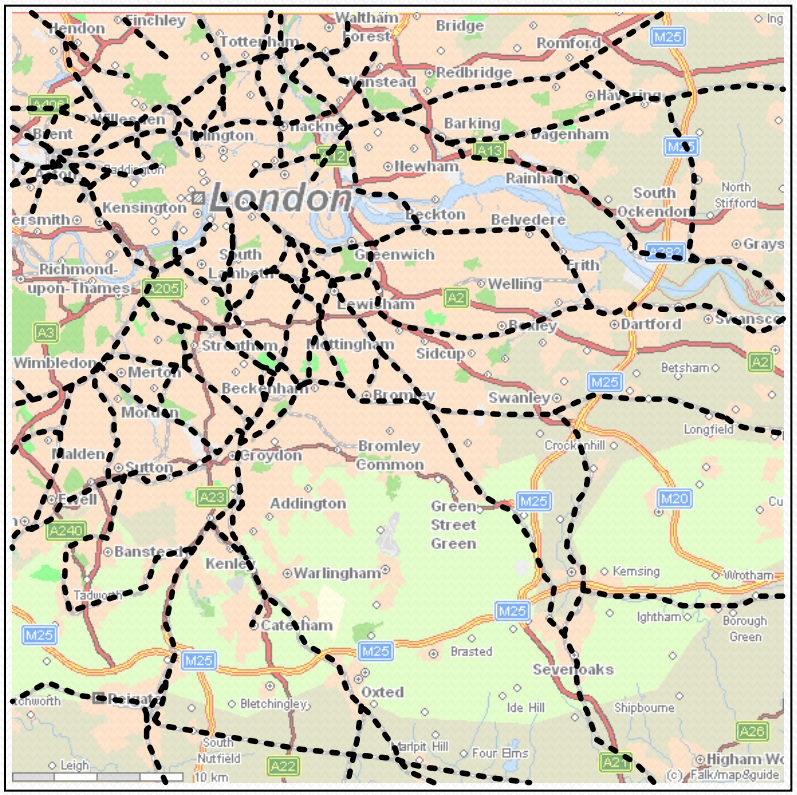
- Prag, Rome

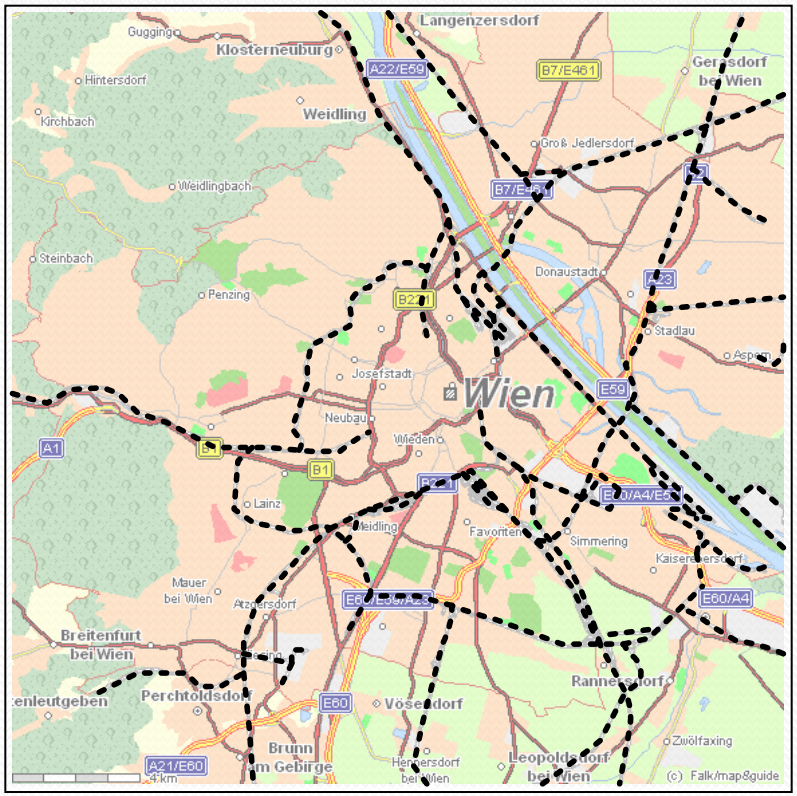




The New Rail Freight Paradigm: For Urban logistics - potential

- London, Vienna





- **The New Rail Freight Paradigm: For Urban logistics - Reality**

The New Rail Freight Paradigm: For Urban logistics - Reality

The New Rail Freight Paradigm: For Urban logistics - Reality

The economics of the "Truck train":

- **savings** of over **27%,** against the **road** transport:
  - less than **200 km,**
  - on an **annualised** transport value of ~**EUR 2.5** million.
  - Investment **recovered in** less than **three** years.

SOURCE: Sheffield Advanced Railway Research Centre

The New Rail Freight Paradigm: For Urban logistics - Reality

The New Rail Freight Paradigm: For Urban logistics - Reality

Conclusions

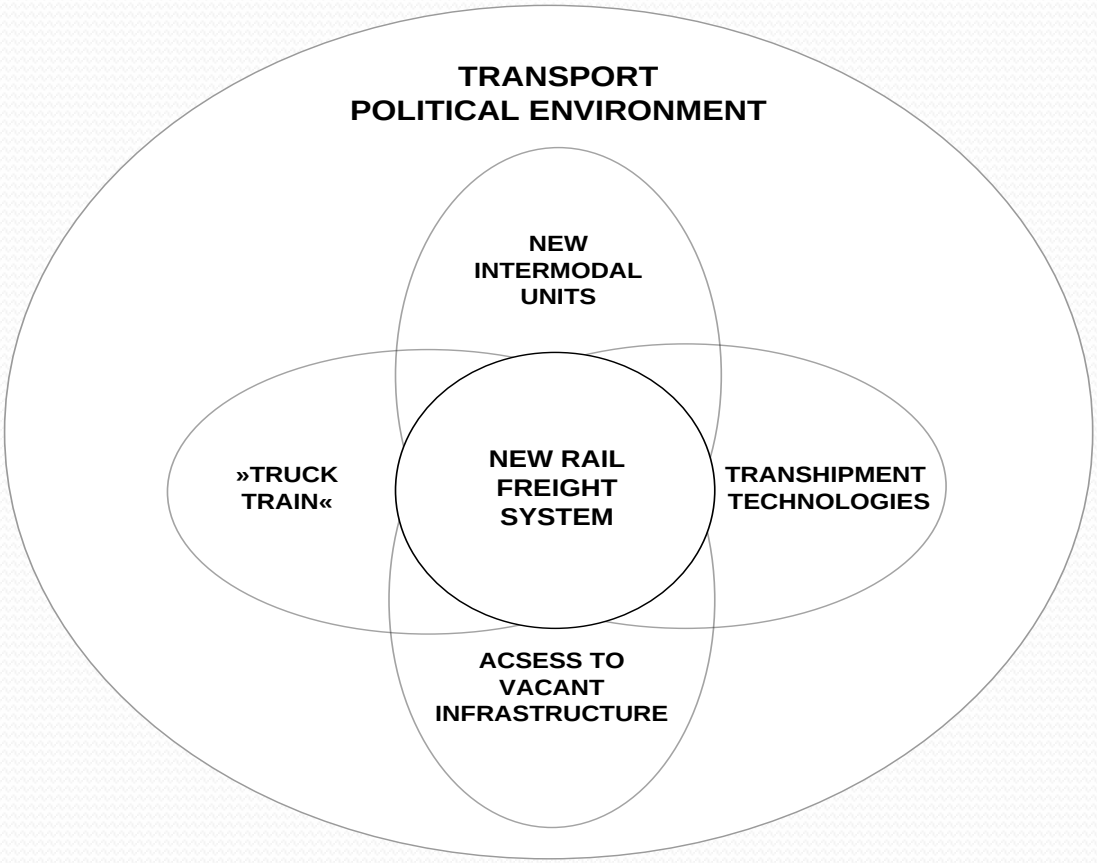
- Prospective **market niches** for the innovative **rail freight** transport paradigm are:
  - **Urban logistics** and
  - **feeder lines**…
  - For **transport** of:
    - small shipments (valuable, perishable goods),
    - short distances

Conclusions

- What is the problem?
  - **Existing** freight paradigm of railways
  - **Lack** of implemented **innovations**
  - **Non flexible,** monopolistic, (state owned) **railway** companies

Conclusions:

For new rail freight paradigm (city logistics) – coordinated approach is needed



Conclusions

- **Conditions** for Efficient Freight Transport in Cities:
- **Efficient city logistics** schemes call for **supportive:**
  - **policies**
  - commitment of:
    - **public** bodies
    - **receivers**
    - **suppliers** /logistics **operators** and
  - **Infrastructure**
  - **Innovative transport technologies**
    - **Some of them are already available…but….?!**

Thank you for your kind attention !

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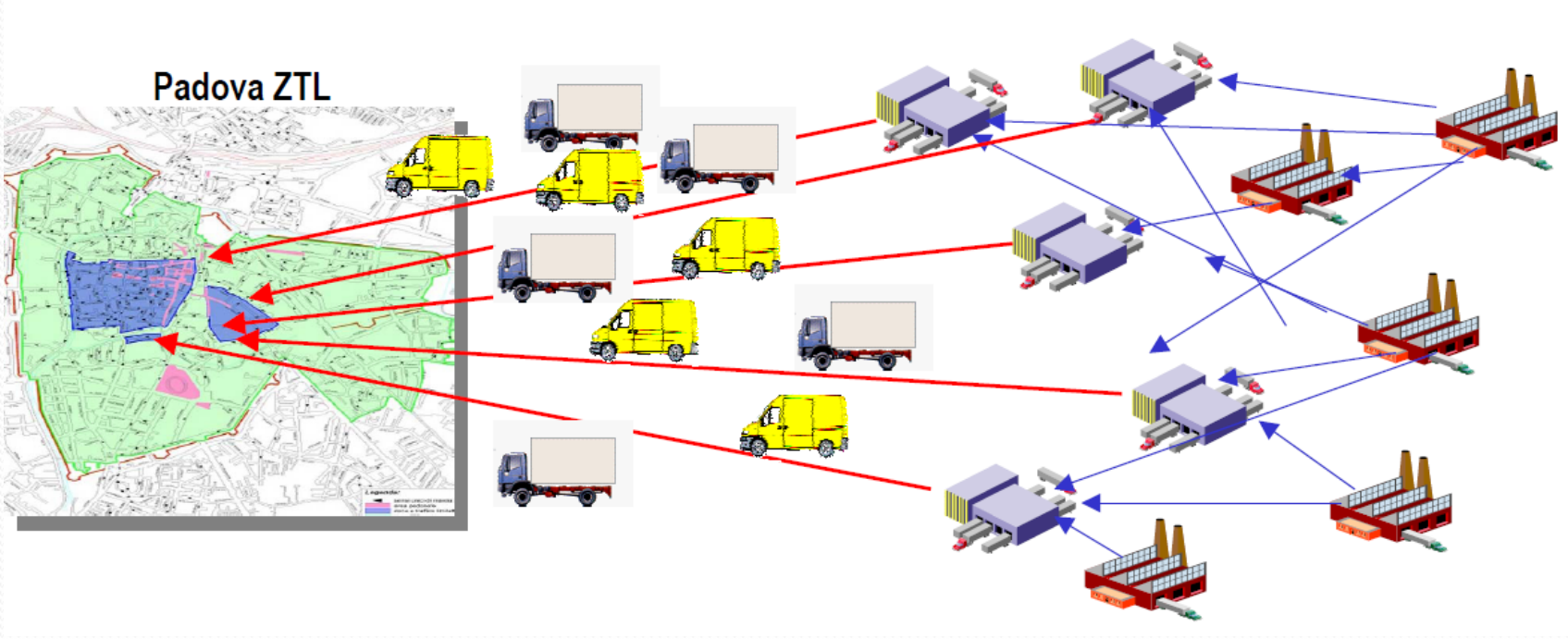
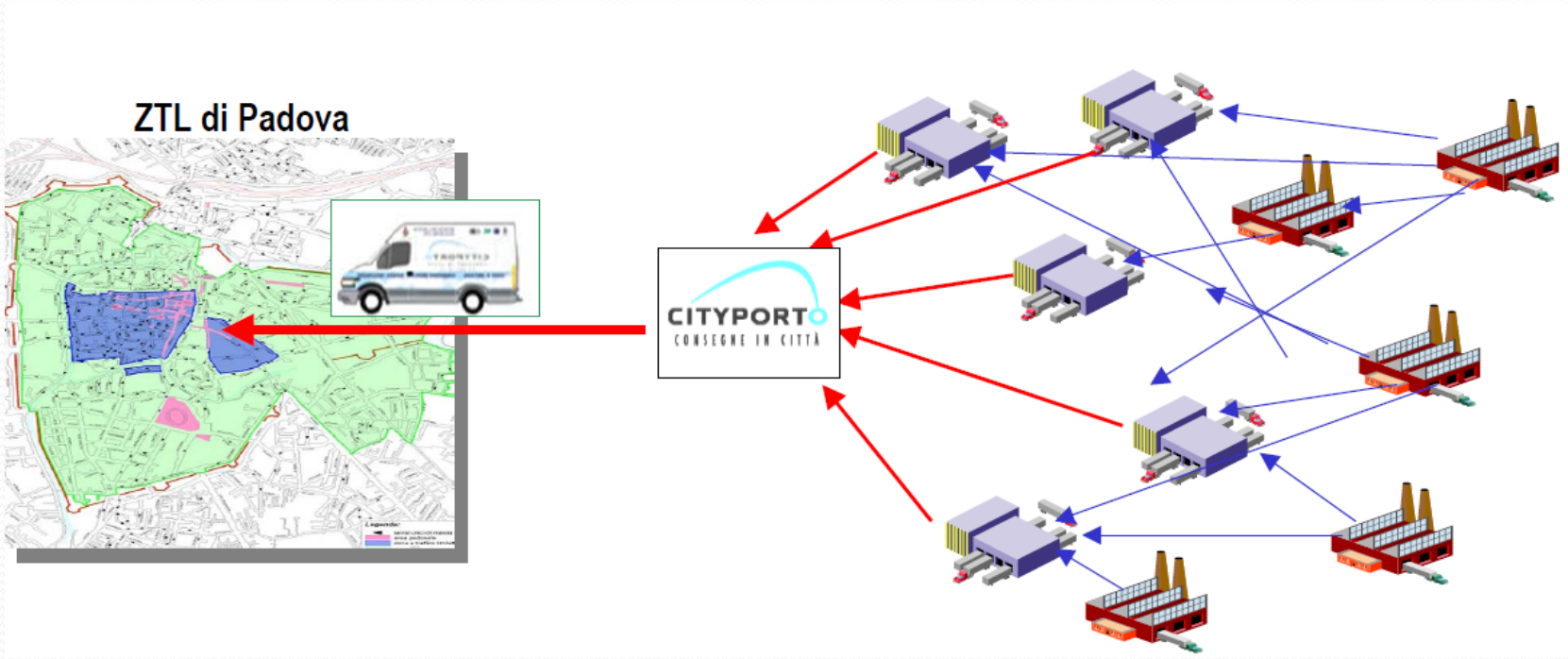
Possible solution: PADOVA – before 2004



Source: Carlo Vaghi, 5th Bestufs II Conference, Wien, 2006

Possible solution: PADOVA – after 2004



Source: Carlo Vaghi, 5th Bestufs II Conference, Wien, 2006

- Routing – delivery optimisation