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IHUB: HYPERCONNECTED ELECTRIC MOBILITY EXPLOITING PHYSICAL INTERNET HUBS

MARCEL HUSCHEBECK PTV GROUP


We plan and
optimise everything
which moves
people and goods
worldwide
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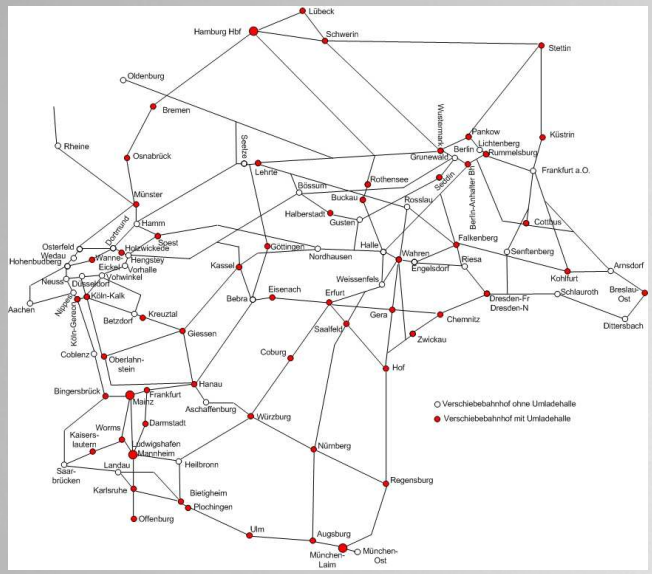
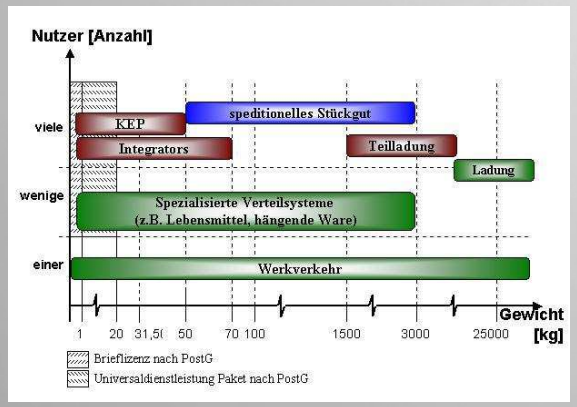
…VIEW INTO THE PAST





LTL network of the German railways in 1933 was designed of 65 hubs

- 38% in direct delivery
- 62% via transhipment hubs, e.g. Munich via Nuremberg to North Germany

Problems:

- Hubs create bottlenecks, 400 m train length alongside, queuing of incoming and outgoing trains, bad service quality
- Truck based LTL networks proved better flexibility and service quality

MODERN HUBS: A LOOK FROM OUTSIDE

LTL Standard services

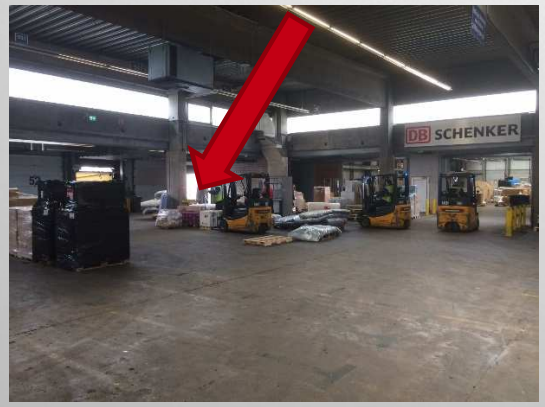
- D2D on B2B level
- Geographical definied area
- Reliable lead times
- Tracking and tracing
- Industry terms and conditions

Not included:

- Standard price
- ETA
- Special goods

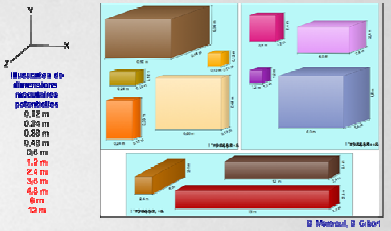
MODERN HUBS: A LOOK FROM INSIDE

Improve planning procedures for urban logistics



Approaching the Phyisical Internet

MODULUSHCA
Modular Logistics Units in Shared Co-modal Networks



HUB REQUIREMENTS

- Dimensioning: no bottleneck in the delivery chain
- Efficiency: Through put is determined by handling time of cross dock processes
- Sustainability: Hub is main point to include electric and low emission verhicles

EXAMPLES FOR HUB ENERGY MANAGEMENT

Greenport: hinterland port of Magdeburg

Hybrid Loko for port of Magdeburg and Volkswagen, allowing 50 to 75% of operations in electric mode

EXAMPLES FOR ELECTRIC TRUCKS

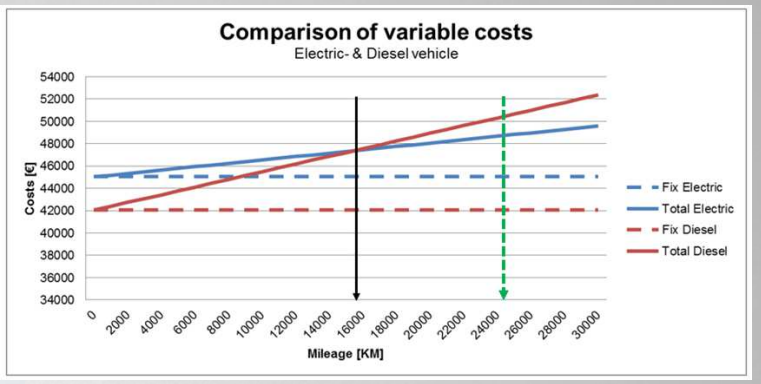
Strength of electric trucks are presently in inner city distribution
Electric trucks are characterised

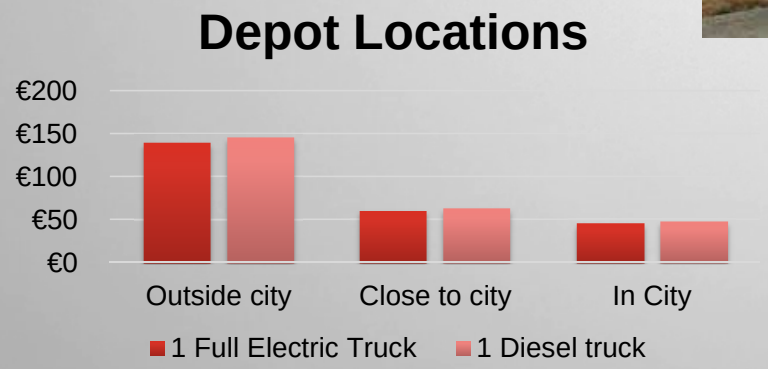
- Limited operation range
- Less payload due to heavy batteries
- Advantages in accelerations

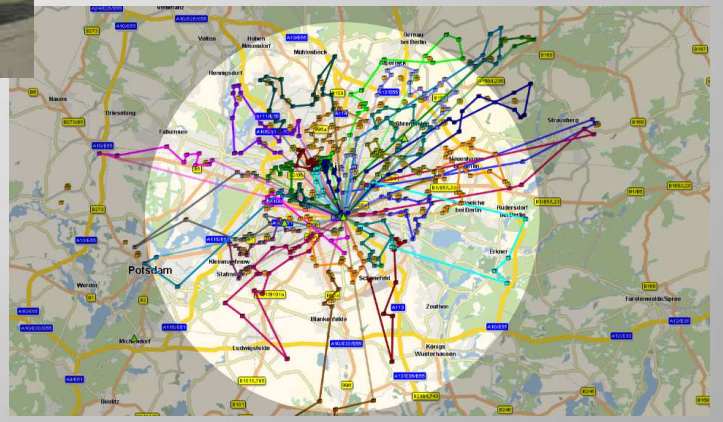
=> Electric trucks will lead to new hub structures and vehicles profiles that will need to be taken into account within a trip planning optimisation

ELECTRIC VEHICLE COST STRUCTURE

- Milage and depot location are key parameters on elctric fleet efficiency
- Almost no commercial offer for vehicles >7,5 t





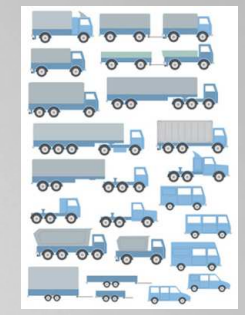


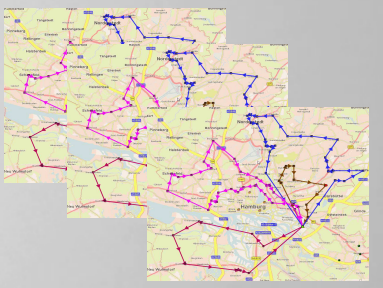
TRIP OPTIMISATION FOR MIXED FLEETS

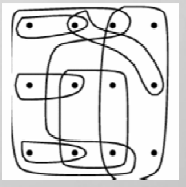
Specific Algorithm to optimise mixed fleets of electric and Diesel propelled trucks

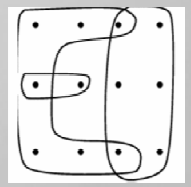
1. Identify different vehicle profiles of costs, capacity, operation range
2. Vehicle Routing Problem per vehicle profile
3. Cost assessment of the resulting trips
4. Solving a „set cover problem“, building of subsets of trips at cost minimum. Solving of „overlapping“ of double visits

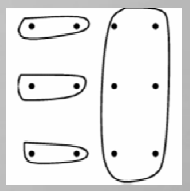
Cost savings of 2,4 up to 12%!





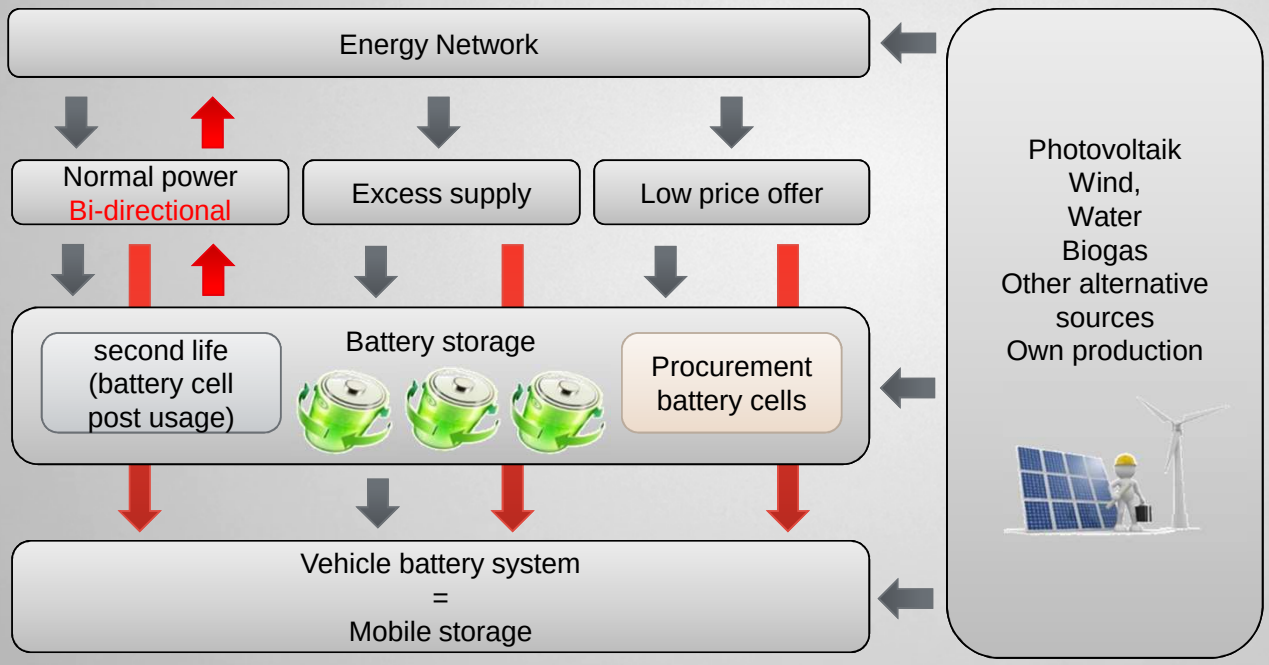






EXTENDING THE APPROACH TOWARDS HYPERCONNECTED HUBS

Set up of a Hub Management System



institut für postfossile logistik

FRAMO ET FUTURE TRANSPORTATION

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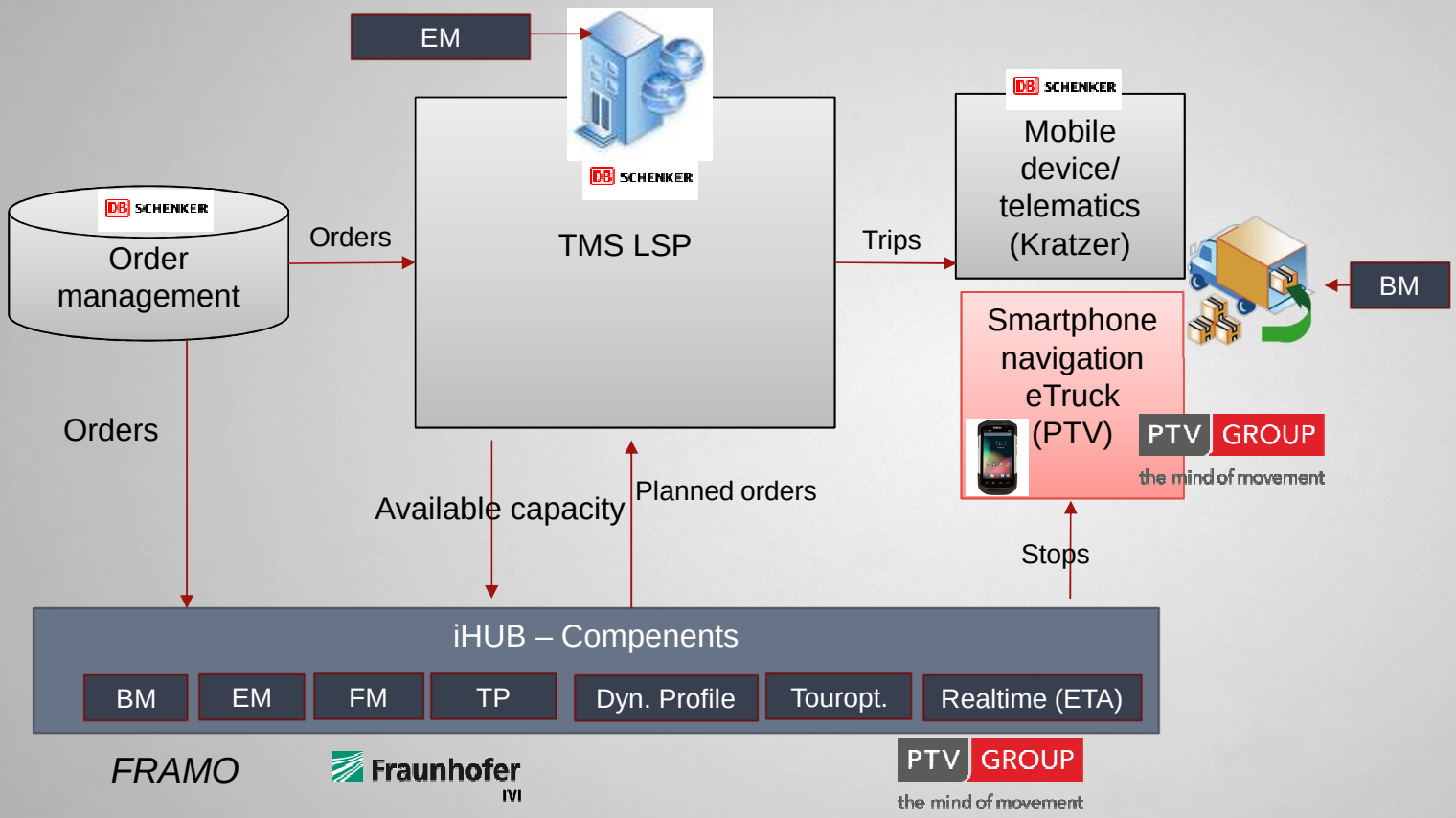
SET UP A FULL COMMUNICATION PLATFORM FOR IHUB



BM= Battery management; EM: Energy management; TP: Trip Planning ; FM: Fleet management

…APPROACHING THE PYSICAL INTERNET

- Fast loading, undloading and handling
- Enabling many/continous delivery waves
- „CO2-free“ transfer to urban distribution
- Modular and standardised
- Paving the way to autonomous delivery

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