Mobility as a Service: what does it mean?

From fixed carriers to virtual carriers

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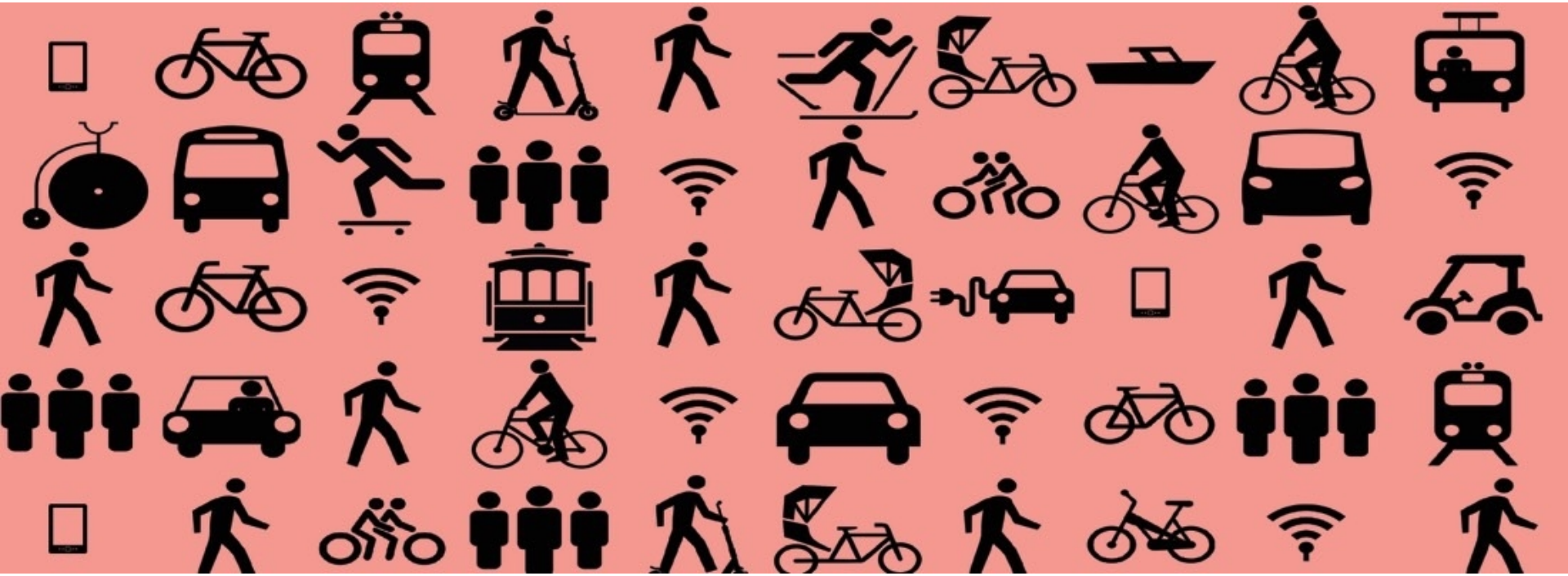
Mobility issues

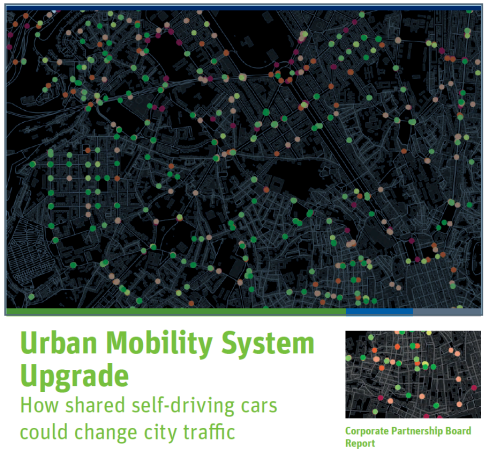
- Small parcels, pallets, containers, … for goods
- Single person, families, masses ... for people
- Real MaaService need: point-to-point
- Space and time (+ energy) are resources
  - Density in space and time is the issue
  - Measured in mass&volume payload / m2 road @ speed
- Today:
  - Multi-modal, space and time inefficient
  - Connection points are bottlenecks
  - Multiple carriers needed

Is this the solution?



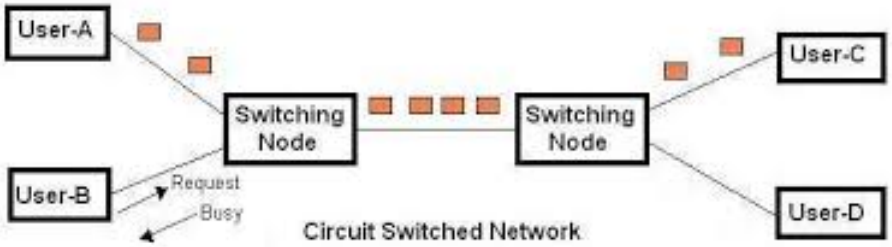
Or is this the solution?

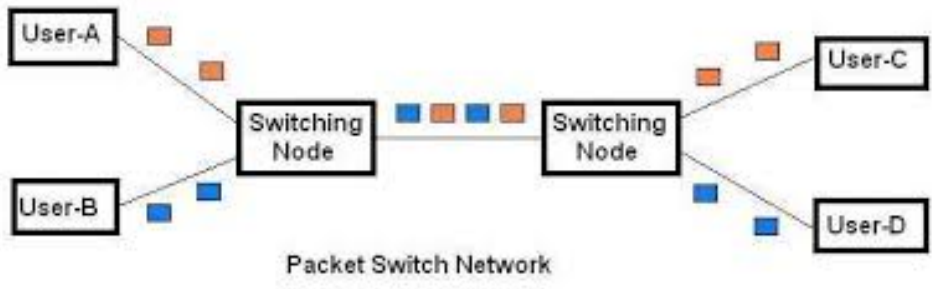
- No more cars/vans in city and replaced by TaxiBots ?
  - http://www.internationaltransportforum.org/cpb/projects/urban-mobility.html (OECD)
  - 90 % less vehicles, 80% less parking space needed
  - Mobility increases with up to 89% (in km)
  - Less air, heat, noise pollution
  - Enormous economic consequences: MaaS



What did telecom do?

- Before: circuit switching = fixed physical paths
- Now: packet switching = virtual paths
  - Time and space partitioning
- Result:
  - Marginal cost of communication close to zero
  - Multi-service: voice, data, anywhere, anytime



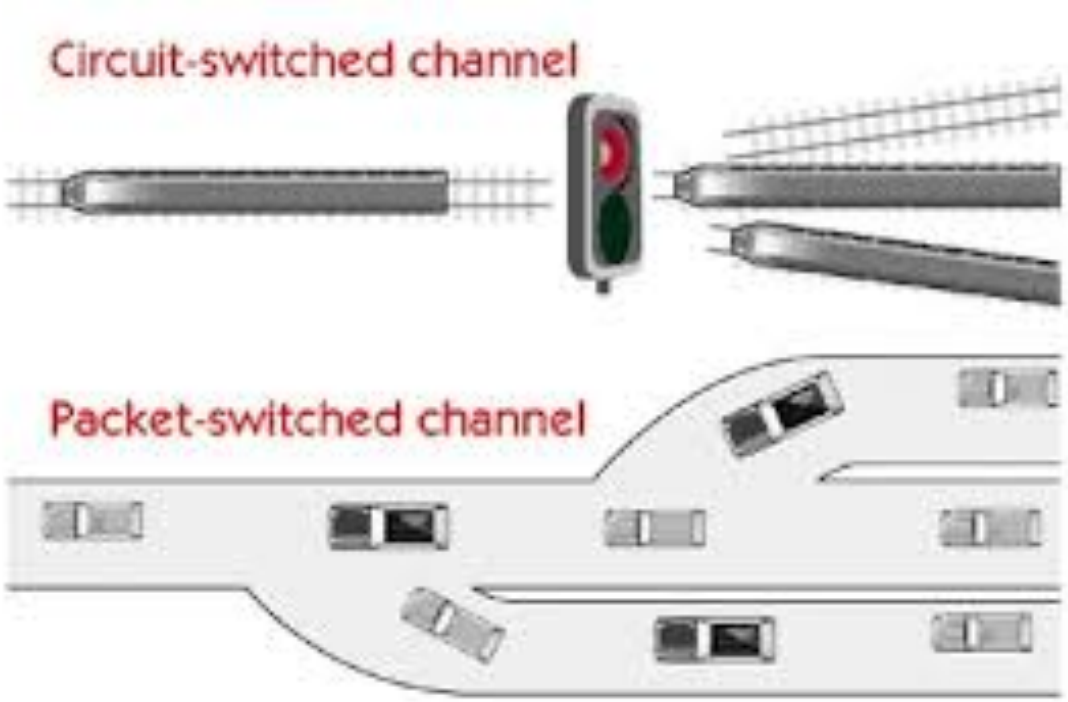


Comparison

Circuit switching	Packet switching
Dedicated	Best effort (QoS)
Fixed bandwidth, not scalable	End-to-end virtual circuit
Monopolises the route	Scales with technology progress
Idle capacity wasted	Redundancy
Externally controlled	Packets route themselves
QoS collapses when circuits full	Congestion reduces QoS

Packet switching in mobility

- Trains: circuit switching
- Roads and cars: packet switching ?
  - Half-way: car is packet but payload capacity underutilised



Objectives of MaaS

- Increase density in space and time
- Sustainable:
  - Free up space
  - Increase availability of resources
  - Increase Quality of Service:
    - Move more in less time
    - More comfort
    - Flexibility
  - Decrease pollution (air, heat, noise)
- Shall we go electric?

City mobility vs. open road

- City:
  - Less space available, dense infrastructure
  - Shorter distances traveled, lower average speed
  - More idle time (parking)
  - Density is more of a pollution issue
- Conclusion1:
  - An e-car for the road is not a e-car for the city
- Other issues:
  - How to bring the e-energy to the vehicles?

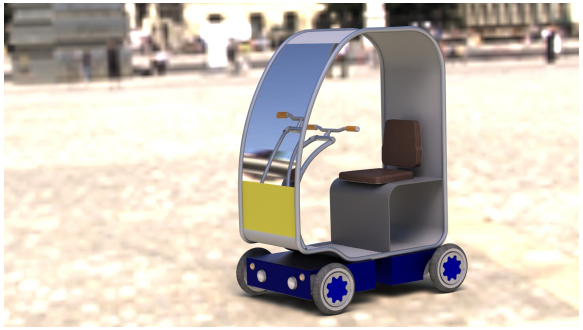
Solution approaches

- Cost/vehicle/ride sharing schemes:
  - Reuse idle/empty capacity in time and space
  - Mix people and goods (parcels in the trunk)
  - Works with existing vehicles
- Create versatile vehicle for urban mobility:
  - One example: KURT e-vehicle
  - Safety and cost benefit: (semi)-autonomous
  - No need for another Tesla
- Distribute the charging infrastruture

1. Cost/ride/vehicle sharing

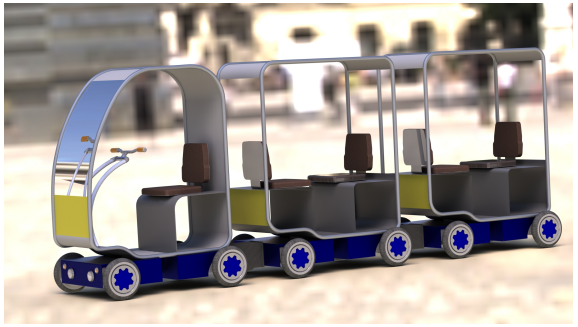
- Cost sharing = incentive
- Ride sharing = better use of capacity
- Vehicle sharing = better use of resources
- Results:
  - Saves money!
  - Low investment: App + marcom
  - Reduces traffic, congestion, pollution, …
  - Improves Quality of Life

2. Modular and scalable urban mobility: a versatile approach to deliver



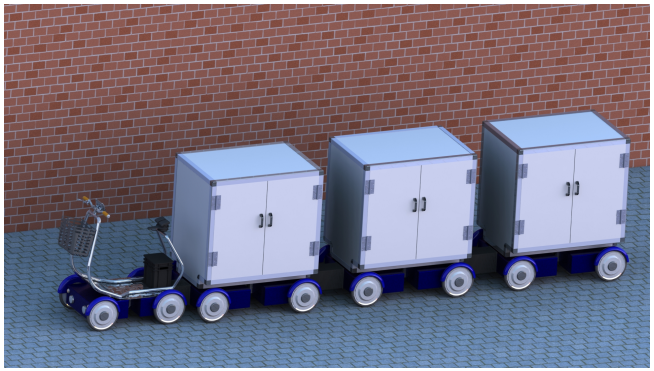
KURT-S-1P-90

KURT S-1P-90 + 1C-90



KURT-S-1P-90 + 2x 2P-90

KURT-M-1P-90-1C-90 -pallet



KURT-S 1P-78 + 3x 1C-90

KURT-M 4P-100

One standardised self-propelled platform + modular/scalable superstructure

3. Distributed charging

- Each KURT vehicle has:
  - Batteries to last a full day in city
  - A few KWh is enough (“Ceci n’est pas une Tesla”)
- Charging infrastructure already exists:
  - Each building has spare e-capacity
  - Often parking space in front or in garage
  - Slow charging during the night is OK
  - Fee for using the charging connector
- Complement with carports and solar panels?

The floor is yours

- Many initiatives are on-going
  - Is this a valuable roadmap?
  - Is this holistic enough?
  - Is this cost-efficient?
  - Is this realistic?
  - What else is needed?
- Motto: Keep It Simple but Smart!
- Feedback welcome