



The **ESPRIT** one-way electric vehicle car-sharing system

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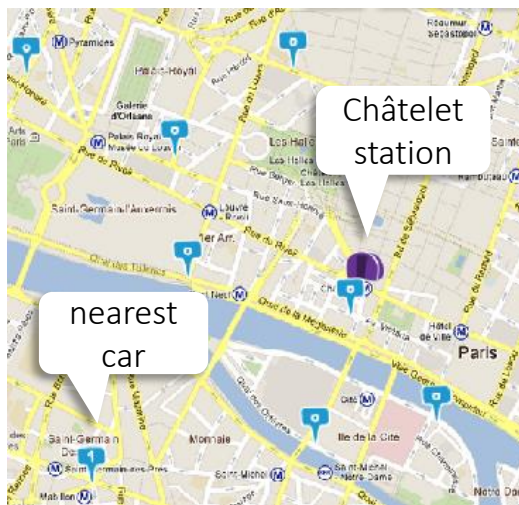
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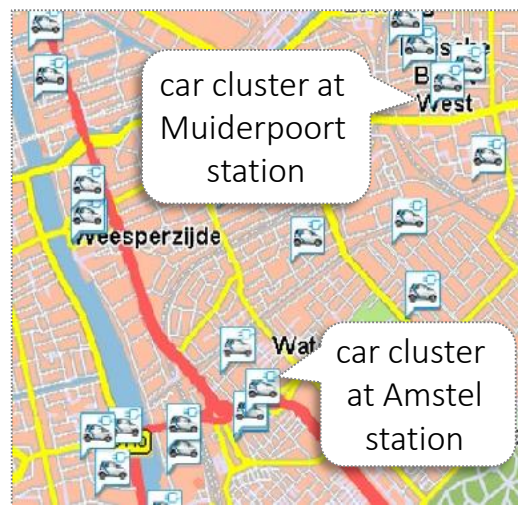


One-way car-sharing

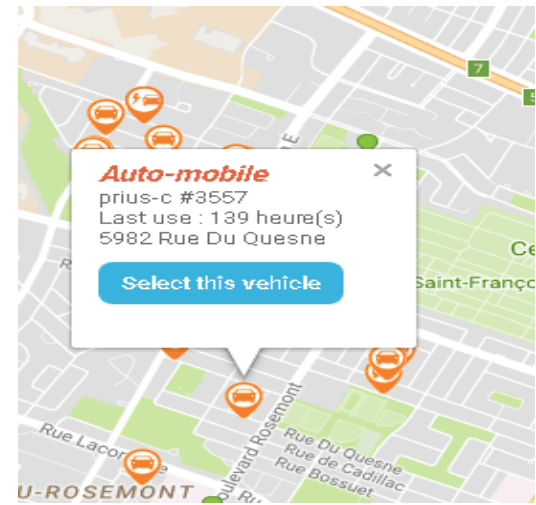
- Users make one-way trip in a car rented from an operator
- 2 million one-way car-sharing users in Europe today (e.g. [Car2go](#) and [Autolib](#))
- Predicted to rise to around 30% of the market in the next 20 to 30 years
- One-way car-sharing has some problems:
 - Vehicles become unbalanced over time:
 - no vehicles where there is demand
 - vehicles where they are not needed
 - Vehicle redistribution is costly when done one-by-one



no cars for 1 kilometre
In central Paris - Autolib

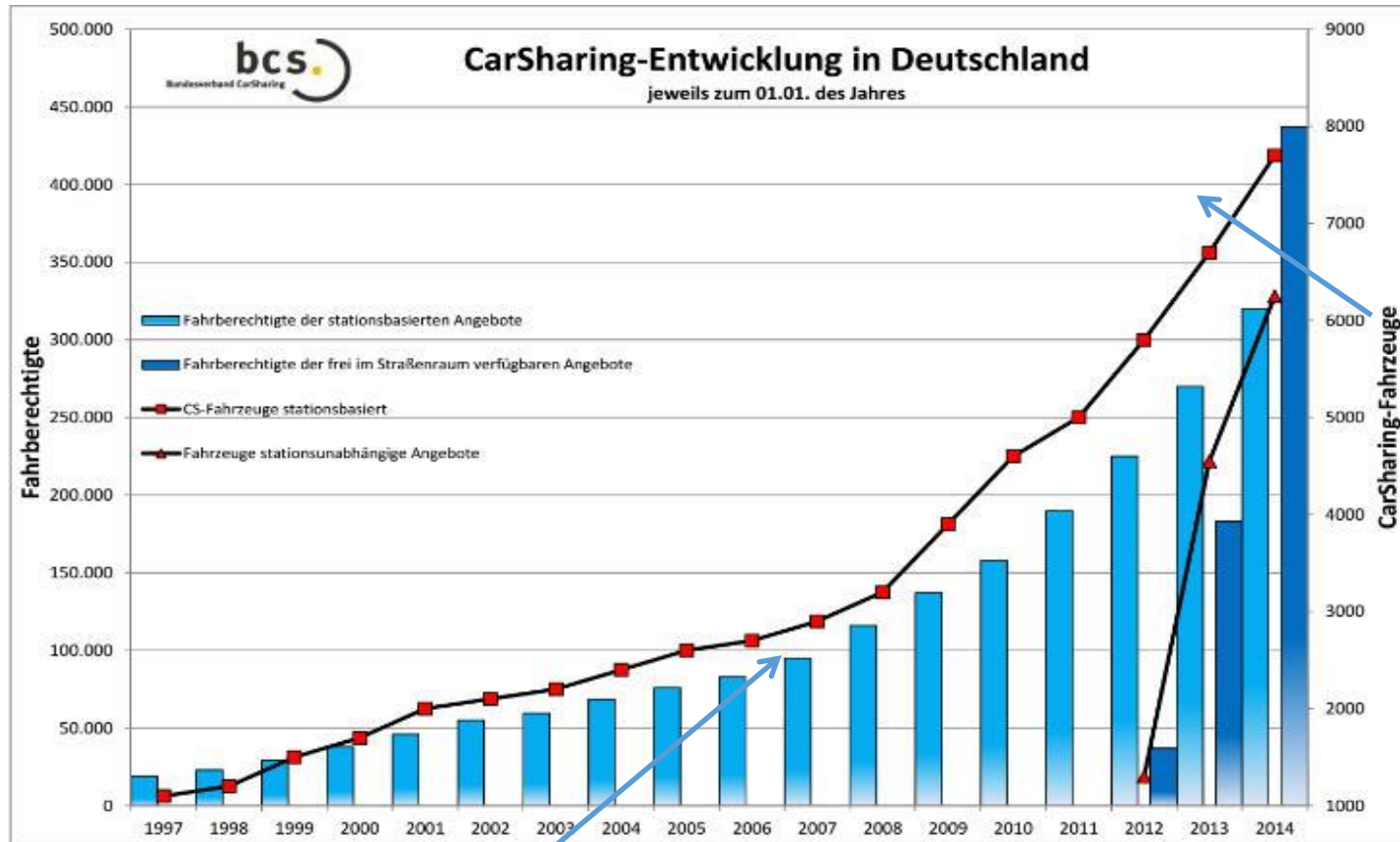


car clusters by train stations
central Amsterdam – Car2go



cars unused for 5 days
Montreal - Comunauto

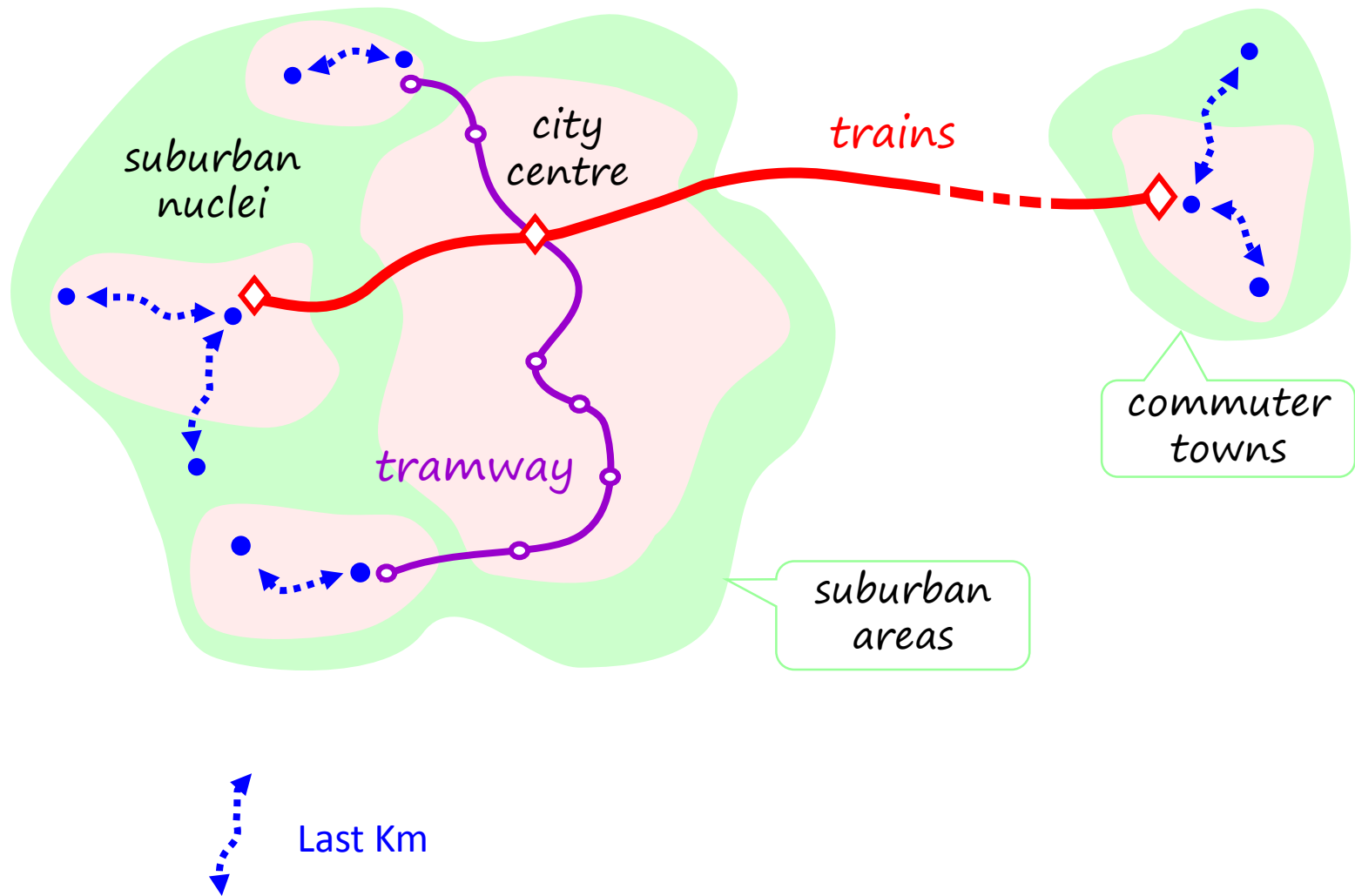
One way car sharing: the service meeting the demand



Conventional car sharing

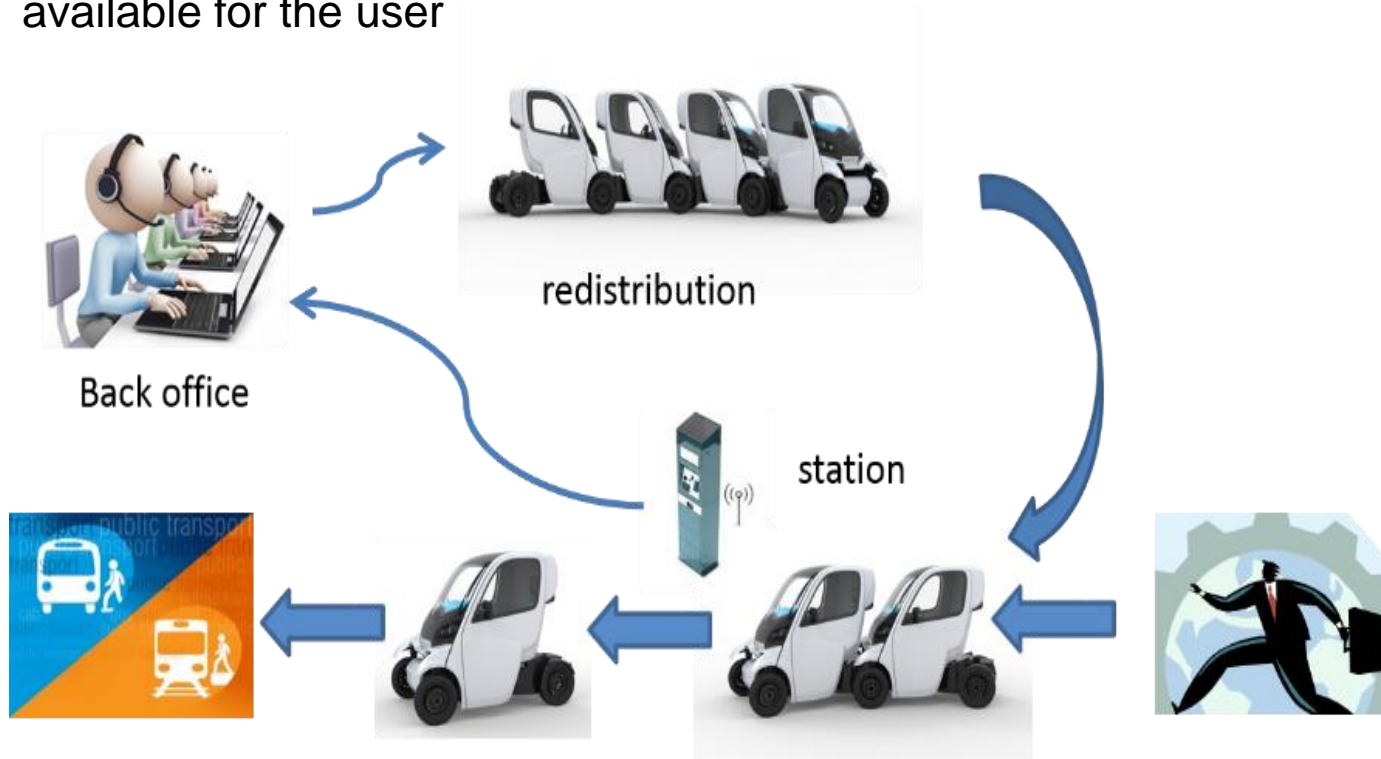
One way
car sharing

Typical suburban last mile problem



The **ESPRIT** system

- Lightweight electric vehicles
- Innovative coupling mechanism allowing upto 8 vehicles to link together to form a road train
 - Road trains can be driven by a single operator
 - Entire road train can be charged from a single charging point
- Back office handles vehicle redistribution ensuring that vehicles are available for the user



ESPRIT: societal benefits



- Modal shift away from conventional private car
- Increased use of public transport due to ESPRIT being complementary to (and integrated with) public transport
- Reduced pressure on parking
- Reduced emission resulting in better urban air quality

How **ESPRIT** works

ORIGIN



1-WAY CAR-SHARING



SYSTEM IS READY. ESPRIT VEHICLES
ARE CHARGING AT STATIONS



USER MAKES 1-WAY
TRIP IN ESPRIT



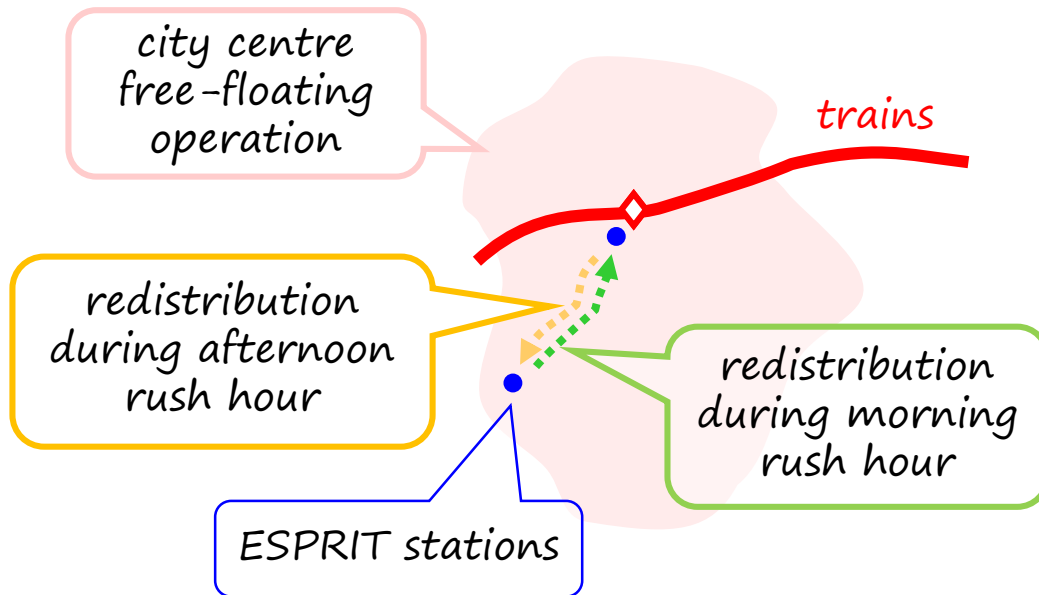
REDISTRIBUTION IN ROAD TRAIN

STATION VEHICLE DISTRIBUTION
HAS BEEN REBALANCED

DESTINATION



ESPRIT: efficient vehicle redistribution



an ESPRIT station

- Redistribution of the ESPRIT vehicles can be adapted to match the demand
- To maintain the supply of cars extra staff are only needed during rush hours
- This is unlike micro-bus shuttle services that need to run empty sometimes to keep the service open (and are often subsidised)

ESPRIT: from the user's perspective



ESPRIT: a multimodal solution

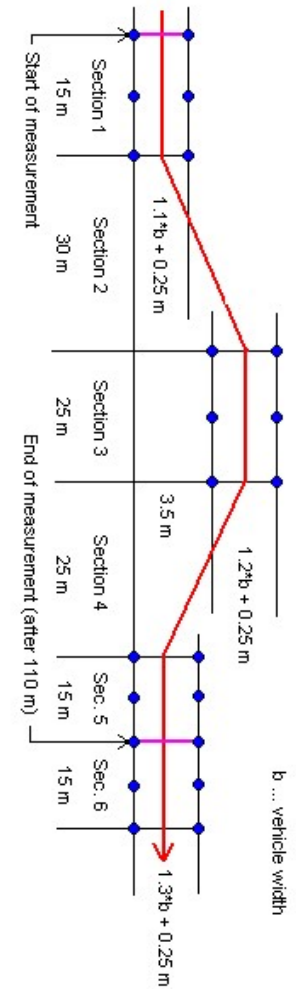
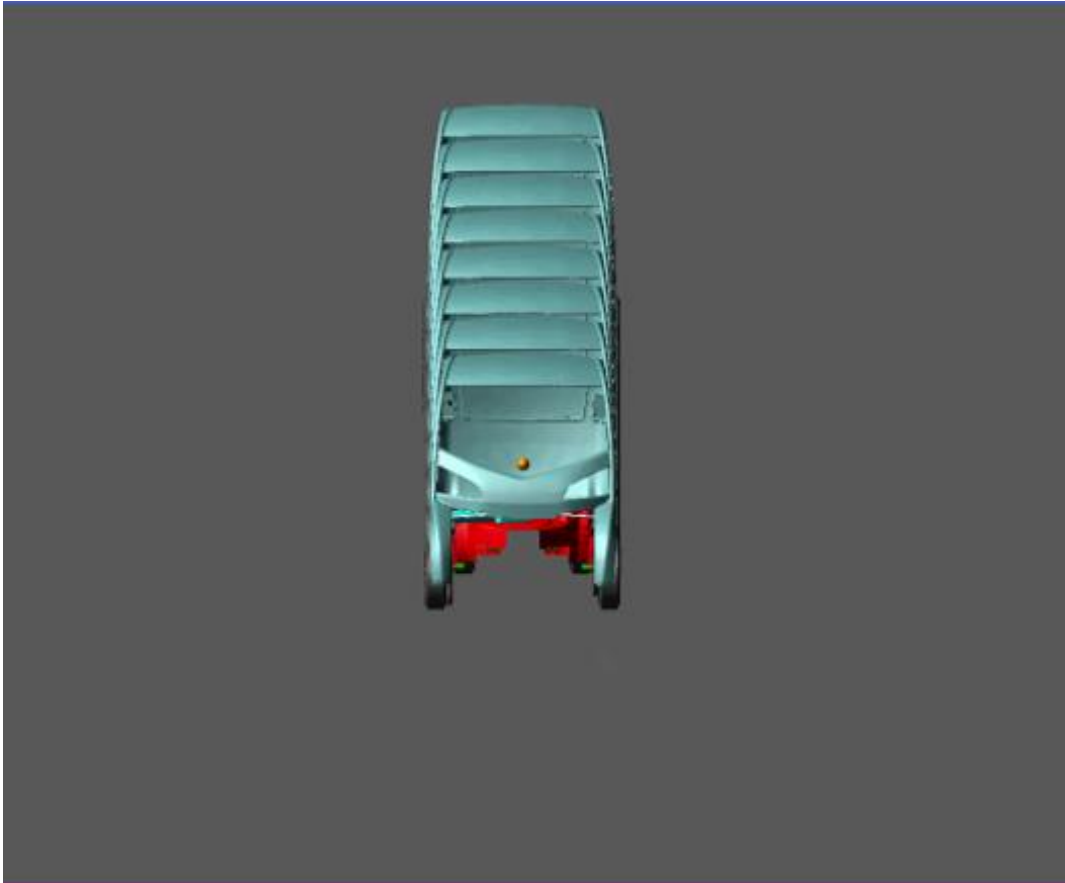


Redistribution by the operator

A 3D simulation of a roadtrain on a city street. The roadtrain consists of a white lead vehicle followed by seven blue and green passenger cars. It is stopped at a white rectangular station on the side of the road. Several pedestrians are walking on the sidewalk and crossing the street. In the background, there are other vehicles, including a white car and a white truck, and some greenery. The text "THE OPERATOR CAN TAKE A COMPLETE ROADTRAIN TO AN EMPTY STATION" is overlaid on the bottom half of the image.

THE OPERATOR CAN
TAKE A COMPLETE ROADTRAIN TO
AN EMPTY STATION

Road Holding

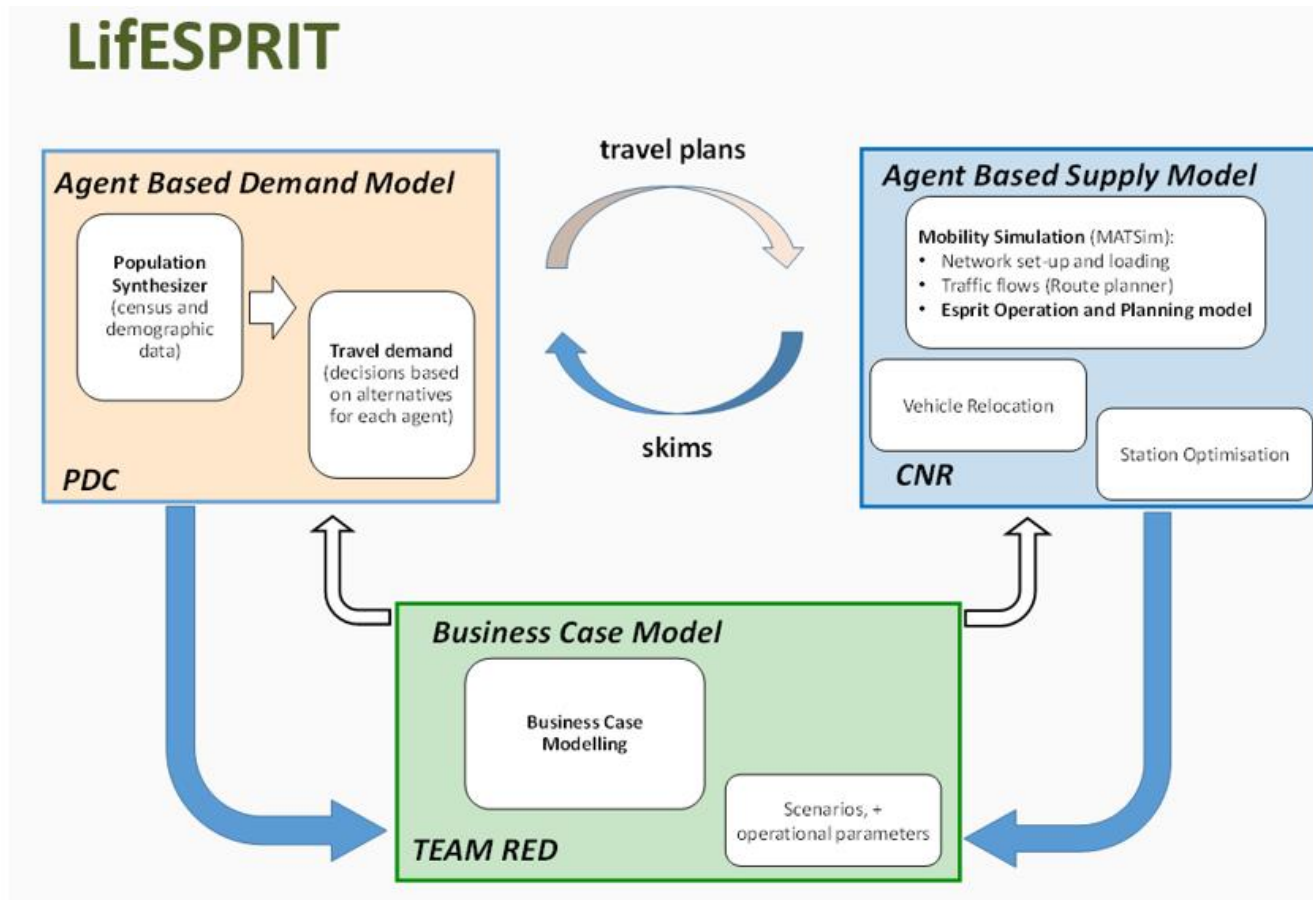


VDA 'elk test' at 45 Km/h (max road train speed)

Road Holding

Road train tests

Modelling the **ESPRIT** system



- Synthetic **population of agents**
- Production of a **travel plan for each agent**
- Simulation model fits demand to the system and calculates journey times (skims).
- **Demand model** uses **zone system** but **operational model** works with **very detailed spatial representation of the area**.

ESPRIT Model: Some key findings

- Results varied between the 3 sites (Lyon, Glasgow and L'Hospitalet)
- Predicts modal shift to ESPRIT
- Some of the shift is from private car and some from public transport (mainly trips using ESPRIT with public transport)
- Relocation is much more efficient using the ESPRIT road train

ESPRIT final demonstration events

- Events lasted two days and included
 - Vehicle testing
 - Focus groups
 - Exhibitions
 - Stakeholder workshops
- Lyon demonstration event
 - Date: 29th and 30th August 2018
 - Venue: Confluences, Lyon, France
- Glasgow demonstration event
 - Date: 11th and 12th September 2018
 - Venue: Hillington Park, Glasgow, UK
- L'Hospitalet demonstration event
 - Date: 25th and 26th September 2018
 - Venue: near Smart City Expo Centre, L'Hospitalet de Llobregat, Spain



ESPRIT final demonstration event: Confluences, Lyon, 29th and 30th August 2018



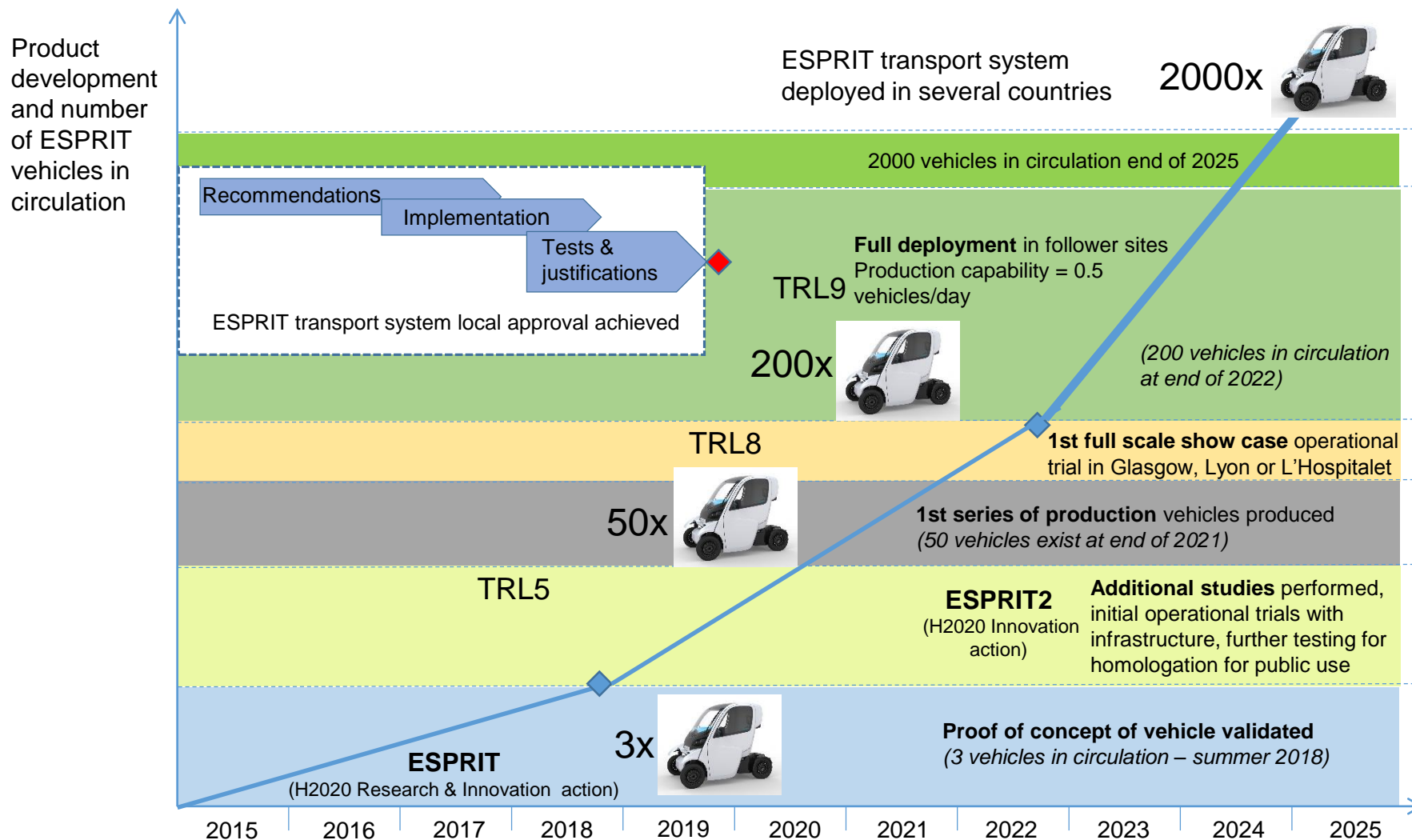
ESPRIT final demonstration event: Hillington Park, Glasgow, 11th/12th September 2018



ESPRIT final demonstration event: L'Hospitalet, 25th and 26th September 2018



Planned development of the **ESPRIT** vehicle and system



ESPRIT Project Partners



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