ESPRIT - a public car system

presenters:
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Advisors to the ESPRIT project

• Horizon 2020 funded project
• 2015-2018
• 18 EU partners
- a public car system?

one-way carsharing ... with a means of re-distribution
the Netherlands
UM PRESÉPIO DIFERENTE
DOS IRMÃOS BARAÇA,
ARTES&ETC
€80
+ 20 years
ESPRIT: Easily diStributed Personal RapId Transit

- trains
- commuter town
- suburban activity centre
- city centre
- free-floating areas
- urban areas
- principal distribution routes
private cars

from 50 cars / 1.000 people to 500 cars / 650 people
public space

Mariahilferstrasse, Vienna - 2011  today
Pooling. Sharing (and language confusion)

Carpooling
⇔ Fill the cars

Carsharing
⇔ Increase the use rate of cars

Transported passengers

efficient for long distance.
not working for commuting or short trips

a solution for short distances / last mile?
a solution for commuting to work?

Bla Bla Car

Carsharing Vehicles & Members (World), 2010-2020

Worldwide nearly 31.2 Million subscriptions expected by 2020

FROST & SULLIVAN

ESPRIT
Connecting Transport

ECOMM
UPPSALA 2018
one-way carsharing

1,600,000 one-way carsharing users in Germany

return to base carsharing
one-way carsharing - problems:

1. *unreliable vehicle supply*

2. *restricted operating areas*

3. *dependent on sponsorship*
unreliable vehicle supply

no cars for 1 kilometre
In central Paris - Autolib

car clusters by train stations
central Amsterdam – Car2go

cars unused for 5 days
Montreal - Comunauto

about one relocator is employed for each five cars, to drive the cars one-by-one to where they are needed. This logistic difficulty often limits one-way carsharing to central city districts only.
dependent on sponsorship (examples)

<table>
<thead>
<tr>
<th>operator</th>
<th>sponsor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car2go</td>
<td>Daimler</td>
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<tr>
<td>DriveNow</td>
<td>BMW</td>
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<tr>
<td>Multicity</td>
<td>Citroen</td>
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<tr>
<td>Autolib</td>
<td>Bolloré</td>
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- city transport funding
- electrical companies (utilities)
ESPRIT offers:

1. efficient vehicle distribution
2. extensive operational areas
3. viability for all operators
efficient vehicle distribution

city centre free-floating operation

redistribution during afternoon rush hour

redistribution during morning rush hour

ESPRIT stations

an ESPRIT station
extensive operating areas
viability for all operators

estimated efficiency:

- from 6 up to 30 cars/ relocator
- from 5 up to 15 trips/ car/ day

fares:

- from 6€ down to 2€ / trip

one-way carsharing

ESPRIT system

trips/ car/ day
Conclusion - ESPRIT provides:

- efficient vehicle supply
- extensive operational areas
- viability for all operators

i.e. a public car system
complex onboard technology
as it will look like...
tests
tests

video of experimental prototype
tests

video of docked prototypes
demonstration events, tests and exploitation

ESPRIT road train demos:

- Lyon 29/30 August
- Glasgow 11/12/13 September
- L’Hospitalet (Barcelona) 25/26 September

- operational tests are anticipated for 2020
- commercial exploitation by 2022
ESPRIT vs. automated cars

• maintenance checked by relocators
• creation of local employment
• early market deployment, 3-4 years

• difficult integration with pedestrians, etc.
• vulnerable to IT failure / hacking
• long term market deployment, 10-30 years
co-authors

co-authors:

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Centre for Transport Research, University of Aberdeen

website: http://www.esprit-transport-system.eu
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Complementary slides
ESPRIT Rationale and vision

- Transportation both in urban and suburban areas is unsustainable in terms of congestion, environmental and societal aspects.
- Shared, electric car systems now offer an alternative for personal urban mobility, such as Car2go or Autolib - there are two million* users in Europe today and expected take up 30% of the market within the next 20 to 30 years*.
- However, vehicle supply is unreliable – demand cannot be met on time and regular use is unaffordable for most people, due to the high cost of one-by-one redistribution and extensive charging infrastructure.
- By the 2030’s driverless cars may have an answer with the infrastructure needed to enable redistribution of cars to where they are needed*, however ESPRIT will be able to do so by the early 2020’s and with a safer system.

- The ESPRIT project* is developing a light-weight, L category, electric vehicle with an innovative coupling mechanism that enables roadtrains of up to 8 vehicles to be redistributed easily, thereby assuring availability, affordable use and enabling widespread implementation.
ESPRIT operational advantages

ESPRIT cars will have autonomous functions and could be driverless, but the manual redistribution of the roadtrains has important advantages over the independent redistribution of driverless cars:

- ESPRIT services could be operating 10 or more years before the public use of driverless cars is possible.
- Roadtrains take up a fraction of the road and parking space of that needed for platooning and parking of driverless cars.

- A roadtrain of 8 ESPRIT cars can be charged from a single charging point and also balance battery charges among cars while redistributing.
- Roadtrains do not depend on ITS* and can be manoeuvred more efficiently, faster and cars can be checked regularly for damage and maintenance.
- ESPRIT systems employ local people, about 25* per fleet of 300 cars

* ITS: Intelligent Transport Systems

**cars can be delivered where and when they are needed**
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**
Planned development of the ESPRIT vehicle and system

- **ESPRIT** (H2020 Research & Innovation action)
- **ESPRIT2** (H2020 Innovation action)

**Product development and number of ESPRIT vehicles in circulation**

- TRL5: 3x (3 vehicles in circulation – summer 2018)
- TRL8: 50 (50 vehicles exist at end of 2021)
- TRL9: 200 (200 vehicles in circulation at end of 2022)
- 2000 vehicles in circulation at end of 2025
- Full deployment in follower sites
- Production capability = 0.5 vehicles/day
- 1st full scale show case operational trial in Glasgow, Lyon or L’Hospitalet
- 1st series of production vehicles produced (60 vehicles exist at end of 2021)
- ESPRIT transport system deployed in several countries
- 2000 vehicles in circulation end of 2025

**Recommendations**

- Implementations
- Tests & justifications
- ESPRIT transport system local approval achieved
- Full deployment in follower sites
- Production capability = 0.5 vehicles/day

**Additional studies**

- Proof of concept of vehicle validated (3 vehicles in circulation – summer 2018)
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ESPRIT final demonstration

- Events will last two days and include:
  - Vehicle testing
  - Focus groups
  - Exhibitions
  - Stakeholder workshops

- Lyon demonstration event
  Date: 29th and 30th August 2018
  Venue: Confluences, Lyon, France

- Glasgow demonstration event
  Date: 1th 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
Study Area: L’Hospitalet, Barcelona

Data about the city:
- 261,310 inhabitants (2nd largest city in Catalonia, and 16th in Spain)
- One of the most densely populated city in the UE
- 12.49 km²
- 7 Administrative districts and 12 neighbourhoods
Study Area: L’Hospitalet, Barcelona
Potential ESPRIT Areas

- L’Hospitalet demonstration site would be located in a 2 km² economical-industrial district, called GranVia.
- GranVia is the second major business district of Barcelona, second largest trade fair and exhibition centres in Europe. It is also an industrial area in its southern part. It is adjacent to “Ciutat de la Justícia de Barcelona i l’Hospitalet”, that hosts most of the legal departments of the Barcelona metropolitan area.

Two other working areas, mainly industrial, where ESPRIT could be needed.
Demo Area: L’Hospitalet, Barcelona
Public Transport
Study Area: L’Hospitalet, Barcelona

Proposed Charging Stations

- Major users of ESPRIT would most likely be:
  - Obligate mobility: Workers coming from outside to L’H by trains or metro
  - Punetual mobility from the business park to the city center

- Carsharing available:
  NO carsharing available in l’Hospitalet

ESPRIT pilot charging station

- ESPRIT charging station (proposel)
- Metro
- FFCC Medium distance