CitiesDemonstratingAutomatedRoadPassengerTransport

CityMobil2 shuttles: an innovative urban mobility solution for elderly people

Pierre Schmitz
CityMobil2 Advisory Board Member

SEVENTH FRAMEWORK PROGRAMME

www.citymobil2.eu

The CityMobil1 project (2006-2011)

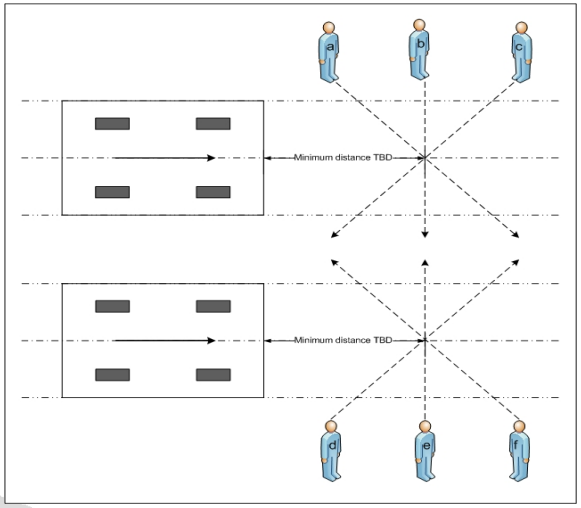
- CityMobil1 has demonstrated how automating road vehicles can lead to different transport concepts which can make urban mobility more sustainable.
- CityMobil1 has also highlighted three main barriers to the deployment of these vehicles:
  - ✓ the legal framework
  - ✓ the implementation framework,
  - ✓ the unknown wider economic effect.

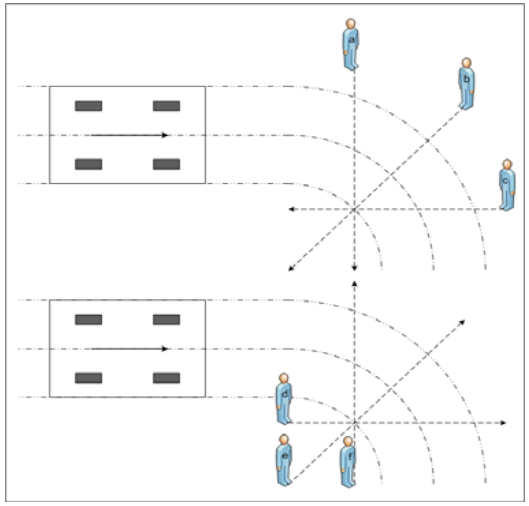
The CityMobil2 project

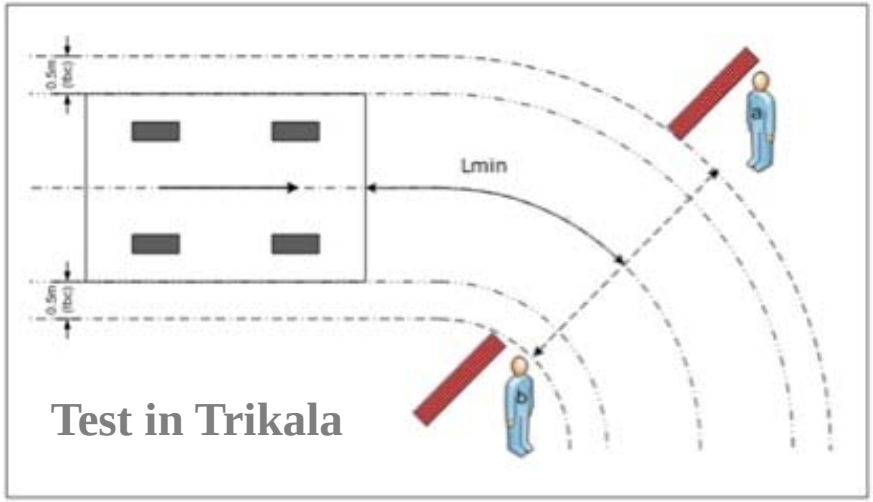
- European research program
- Continuation of CityMobil1
- Promotes the integration of automated road transport systems (ARTS) in urban areas
- 12 candidate cities which have to prepare a proposal for an implementation (demonstration for the 5 better)
- 3 main issues:
    - Technical & operational developments
    - Legal concerns related to the deployment of fully automated urban vehicles in Europe (-> Directive)
    - Local demonstrations & cost studies

Current status for ARTS

- Operation of ARTS usually accepted in private sites
- Specific derogations/laws given for experiments
- Usually an operator must be on board (or remote)
- Must « demonstrate » safety







Legal concerns

- Technological evolution allows the implementation of road systems based on fully automated drive solutions.
- Nevertheless, there is no harmonised regulations in Europe in order to ensure the setting of these automated road transport systems.
- The European Union is in sore need of a Directive ensuring the harmonised regulation of ARTS.

Needs and Purposes for a Directive

<u>The needs</u>: How do we interpret the law !

- If it is not forbidden, it is legal (USA)
- If it is not allowed, it is forbidden (France)
- If it is forbidden, then it is still permitted (Italy)

<u>The main purposes</u>

- Harmonising the type-approval procedures
- Harmonising the authorisation procedures for testing & development of ARTS
- Setting rules on civil liability

Principles of the CM2 certification procedure

- Consider not just the vehicle but infrastructure and control system in the certification procedure based on the rail technical standard EN50126
- Divide the infrastructure in sections which, together with the designed systems and the other users, become use-cases
- Perform a risk assessment, on each use-case, to verify that the proposed system minimises risks and eventually implement infrastructural, technological or control counter measures
- Each “certified” use-case can be replicated everywhere without the need of re-certification which decreases certification burden

Principles of the Directive Technical annex

- Based on EN50126's vehicle and infrastructure certification through a risk assessment
- Reduces the burden of certification by standardizing the use-cases
  - ✓ Use cases: specific interaction situations between vehicles, infrastructure, road users and surrounding environment
  - ✓ A certified use case doesn't require another certification if the same conditions repeat

Minimal Safety Distance (MSD)

- The vehicle must stop if it deviates from its trajectory by a set distance (see specifications)
- For safety evaluation, it is important to see if there is any probability to hit a dangerous obstacle
- This depends on the MSD and the speed of the vehicle
- We selected the maximum speed of the vehicle according to the MSD on each section

Maximum safe speed

Max Speed	MMODD	3 to 5m	5 to 10m	10m +
MMOS				
<15km/h		15	15	15
15 to 30		10	15	15
30 to 50		5	10	15
>50		5	5	10

MSD	<1m	1-2m	2-3m	3m+
Max Speed	0	5	10	15

Use cases

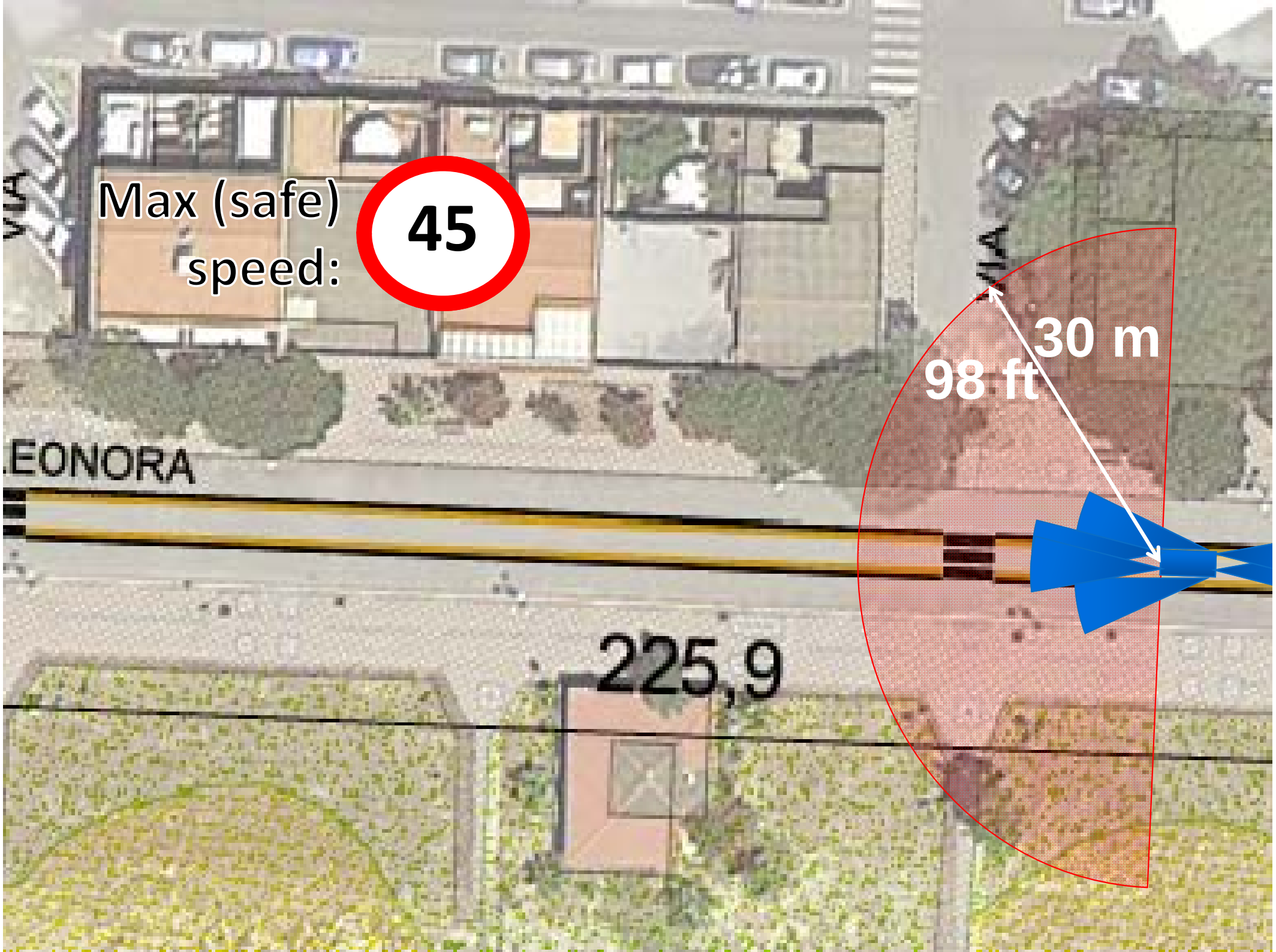
Code		MMODD	MMOS
SPF	Straight path, flat	3, 5, 10m	15, 30, 50km/h
CPL	Curved path left	3, 5, 10m	15, 30, 50km/h
CPR	Curved path right	3, 5, 10m	15, 30, 50km/h
SXS	Street crossing with Stop	10m	30km/h
SXL	Street crossing with Light	10m	30km/h
ASt	Approaching station	10m	15km/h
LSt	Leaving station	10m	15km/h
ESL	Entering single lane	10m	15km/h
LSL	Leaving single lane	10m	15km/h

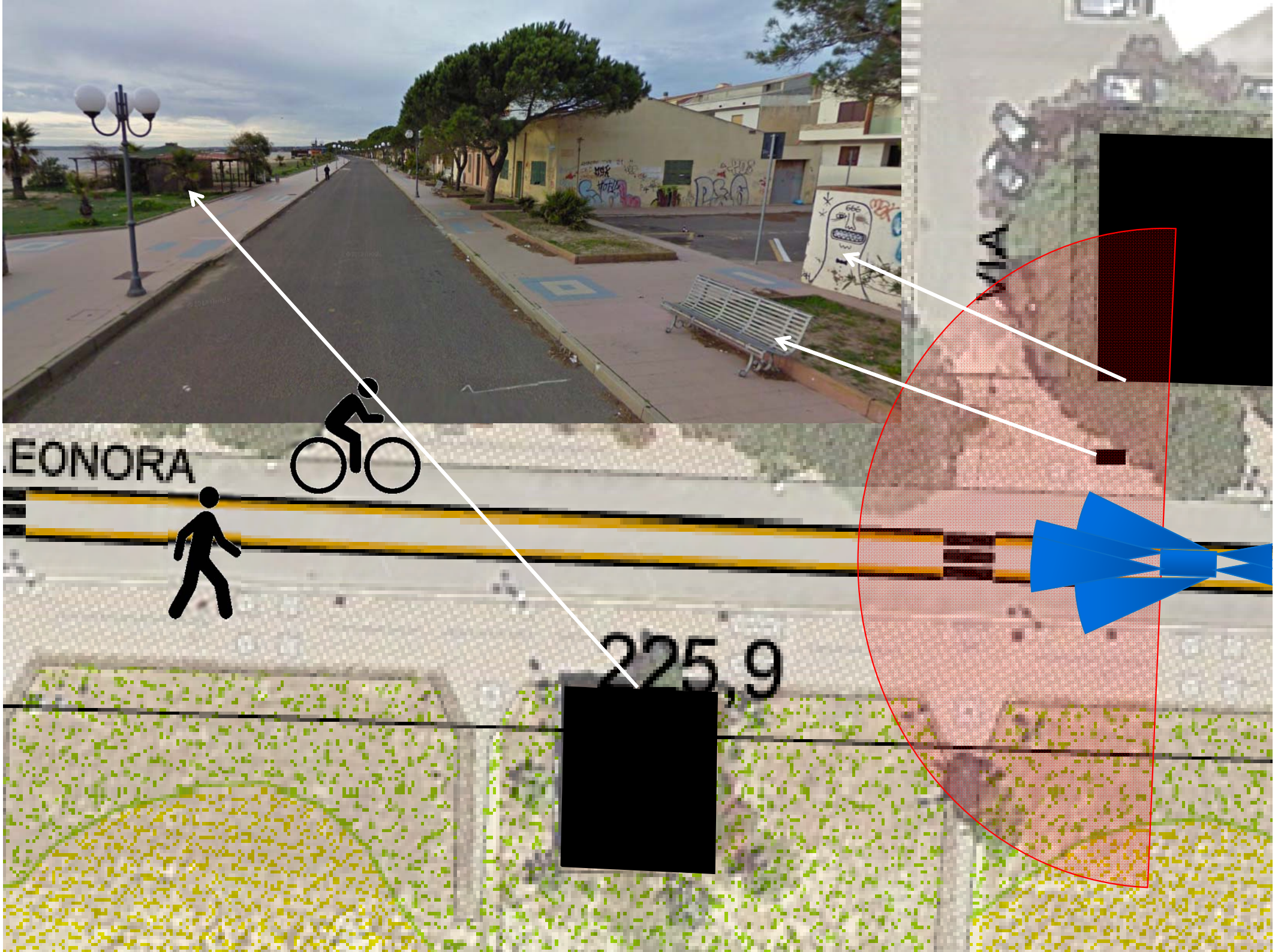
Local demonstrations (7 selected cities)

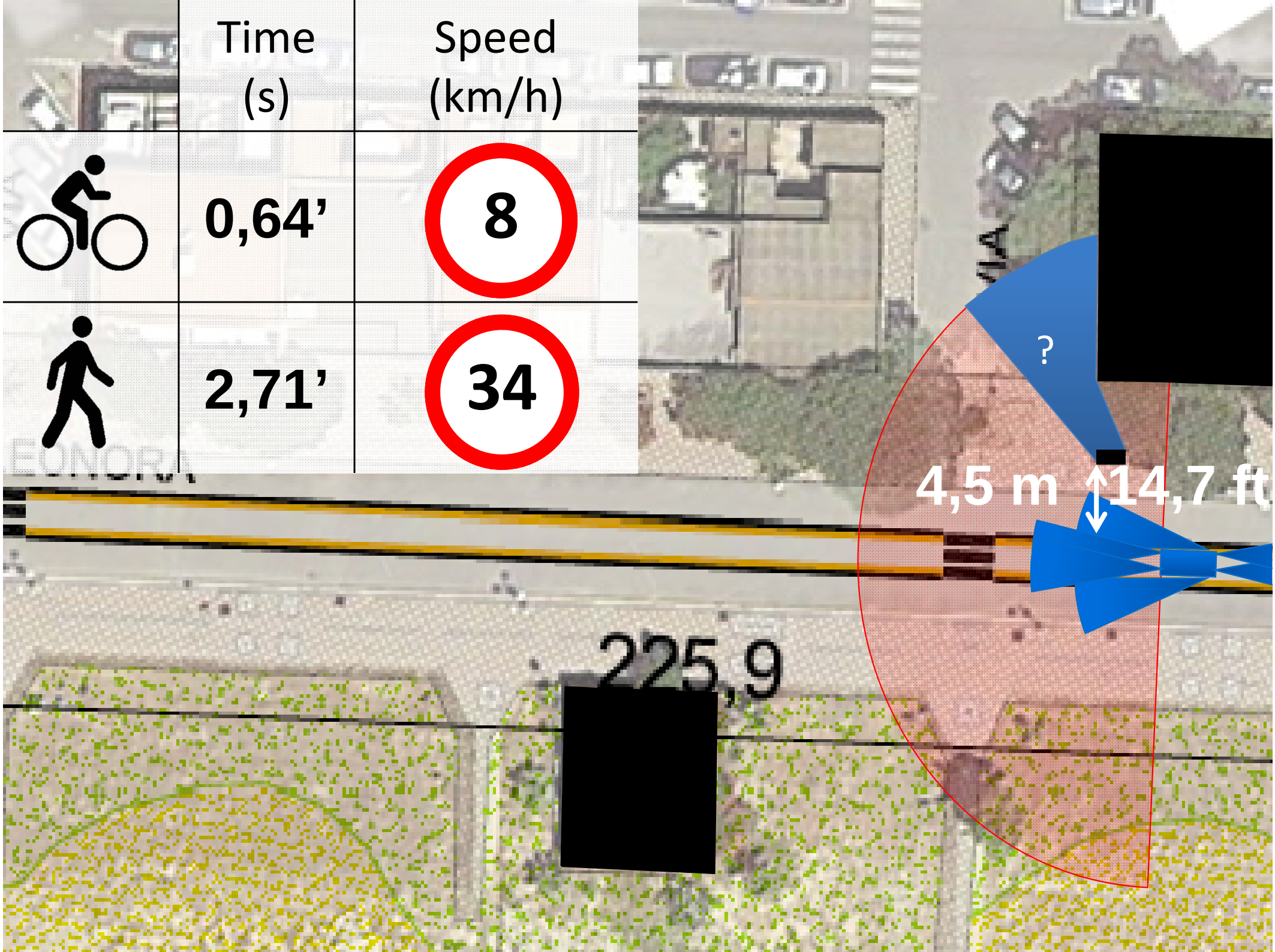
- Campuses: San Sebastian, Sophia Antipolis, EPFL
- Leisure site: Oristano
- Exhibition site: Vantaa
- **City centers: La Rochelle, Trikala**

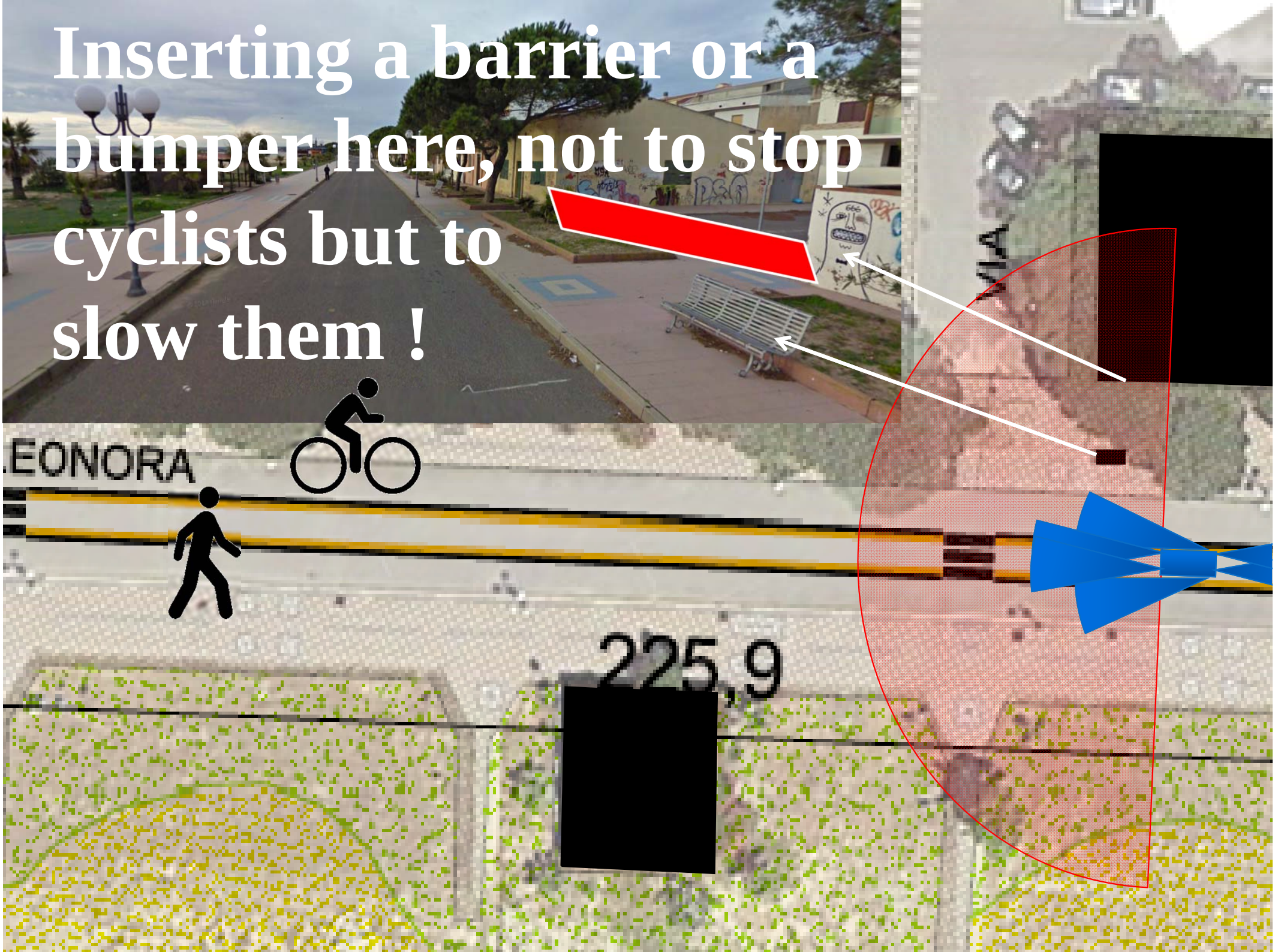
Oristano : a demonstration in a leisure site

CityMobil2

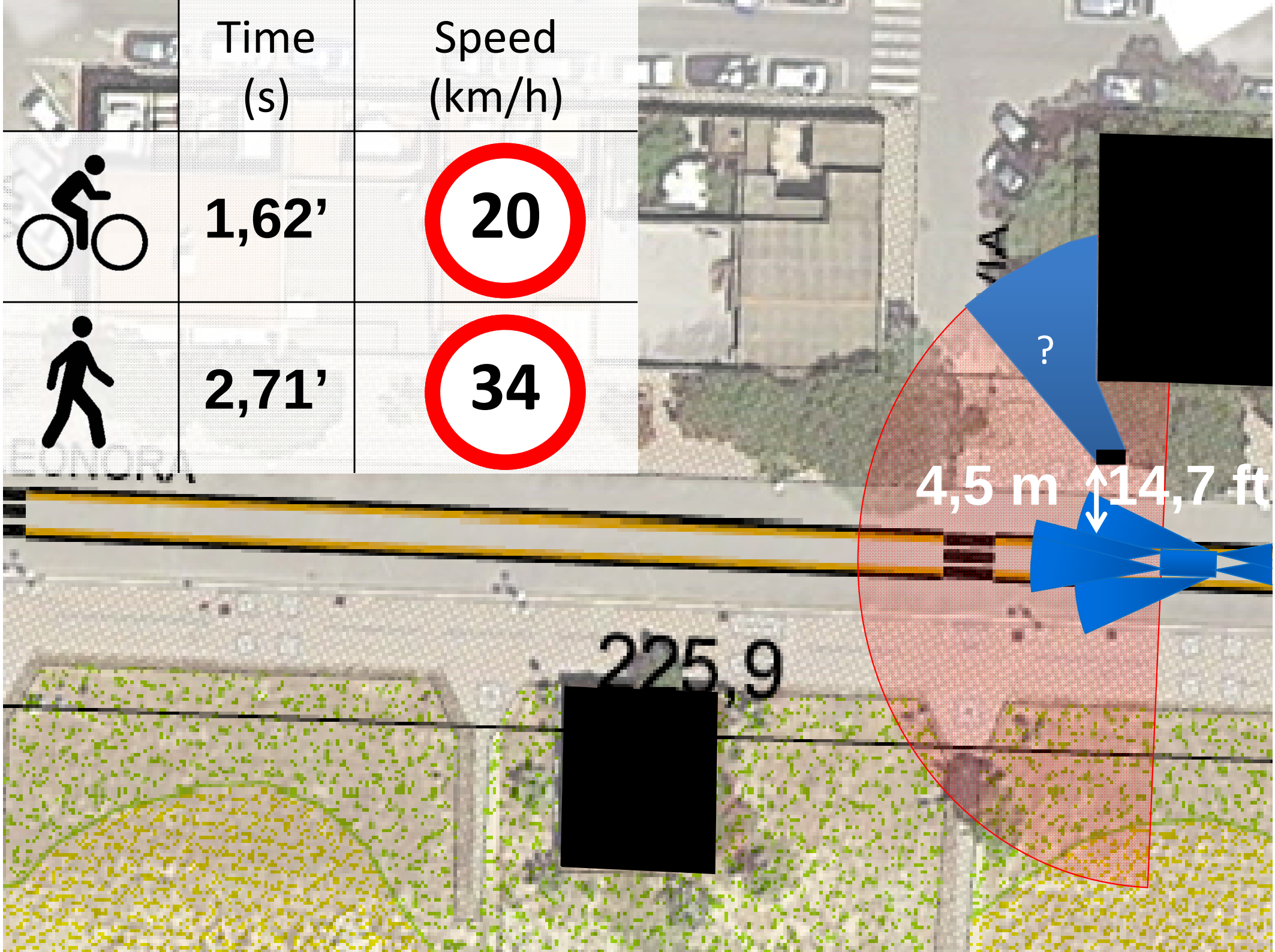

Max (safe)
speed:
45
30 m
98 ft
EONORA
225,9


EONORA
225,9


Time (s)
Speed (km/h)
0,64’
8
2,71’
34
?
4,5 m
14,7 ft
225,9

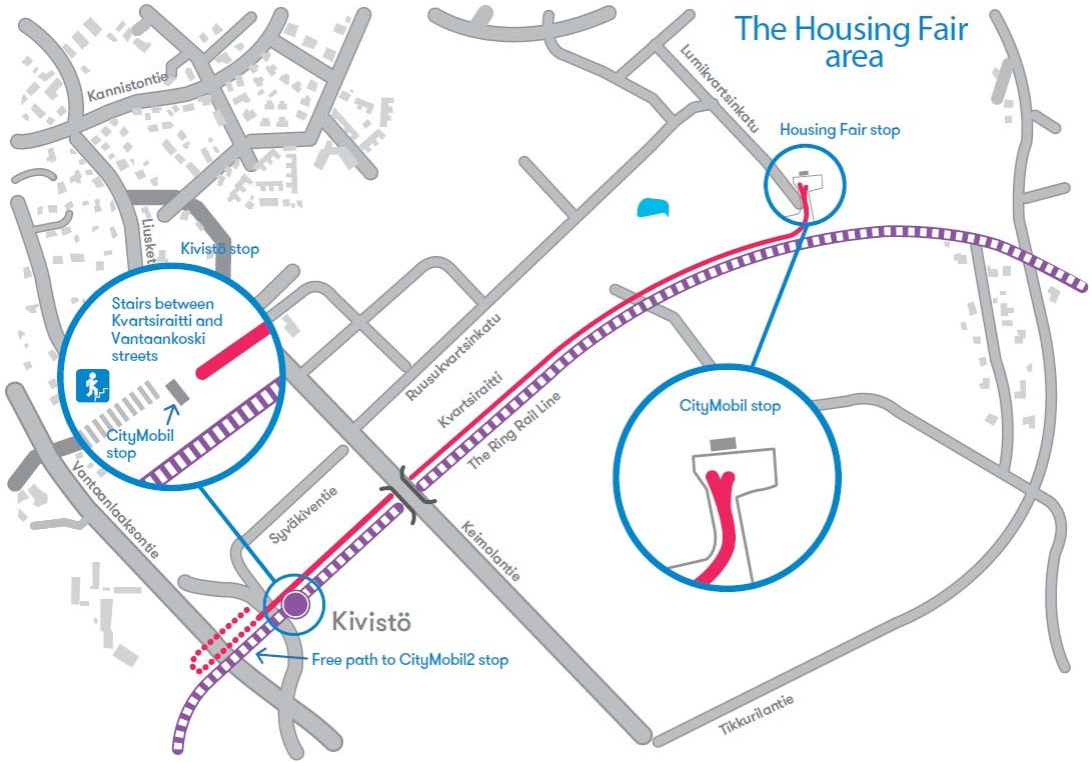

Inserting a barrier or a bumper here, not to stop cyclists but to slow them !
EONORA
225,9

	Time (s)	Speed (km/h)
	1,62’	20
	2,71’	34



Vantaa : to promote a new suburban centre

- Was held during the Housing Fair 2015, 10.7.-9.8.2015
- 2 stations: at the Kivistö train station and at the Housing Fair entrance
- Route length 1 km/direction



Sophia Antipolis : demonstration in a campus

San Sebastian demonstration

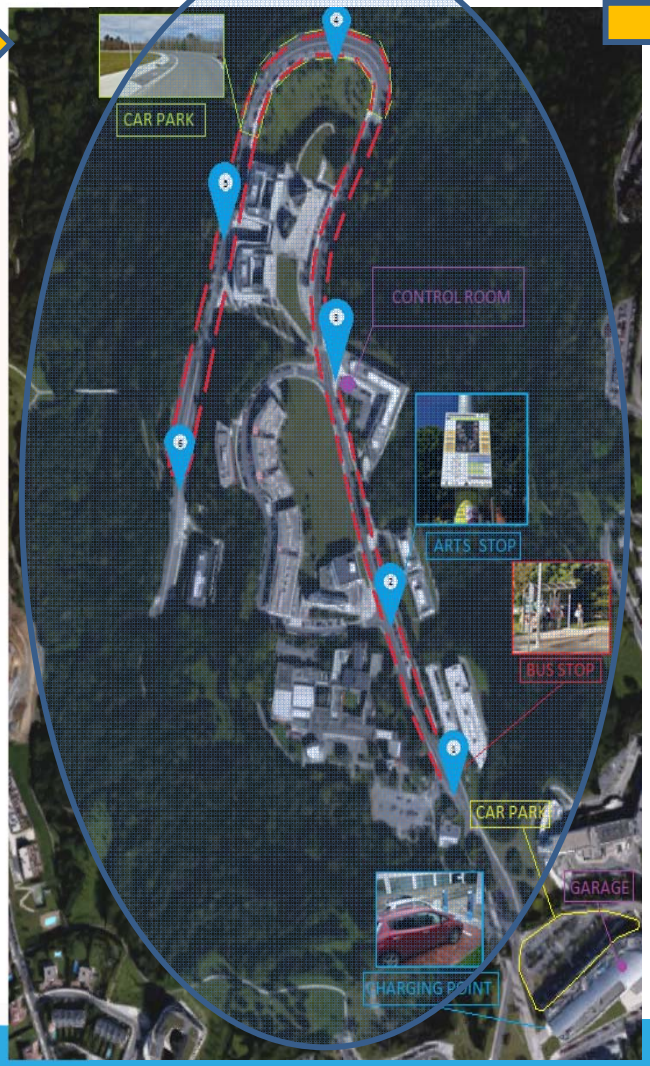
✓ **Routes:**

Site 1

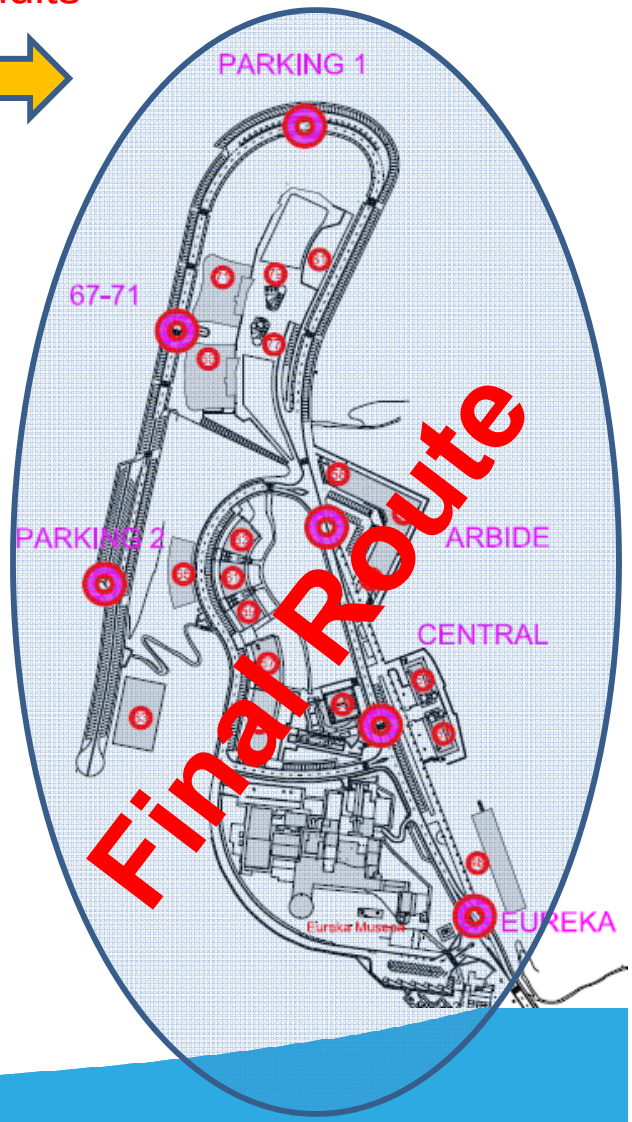
Site 3

Site 2

Site selection



Audits



Brussels (non selected & no demonstration)

Metro station

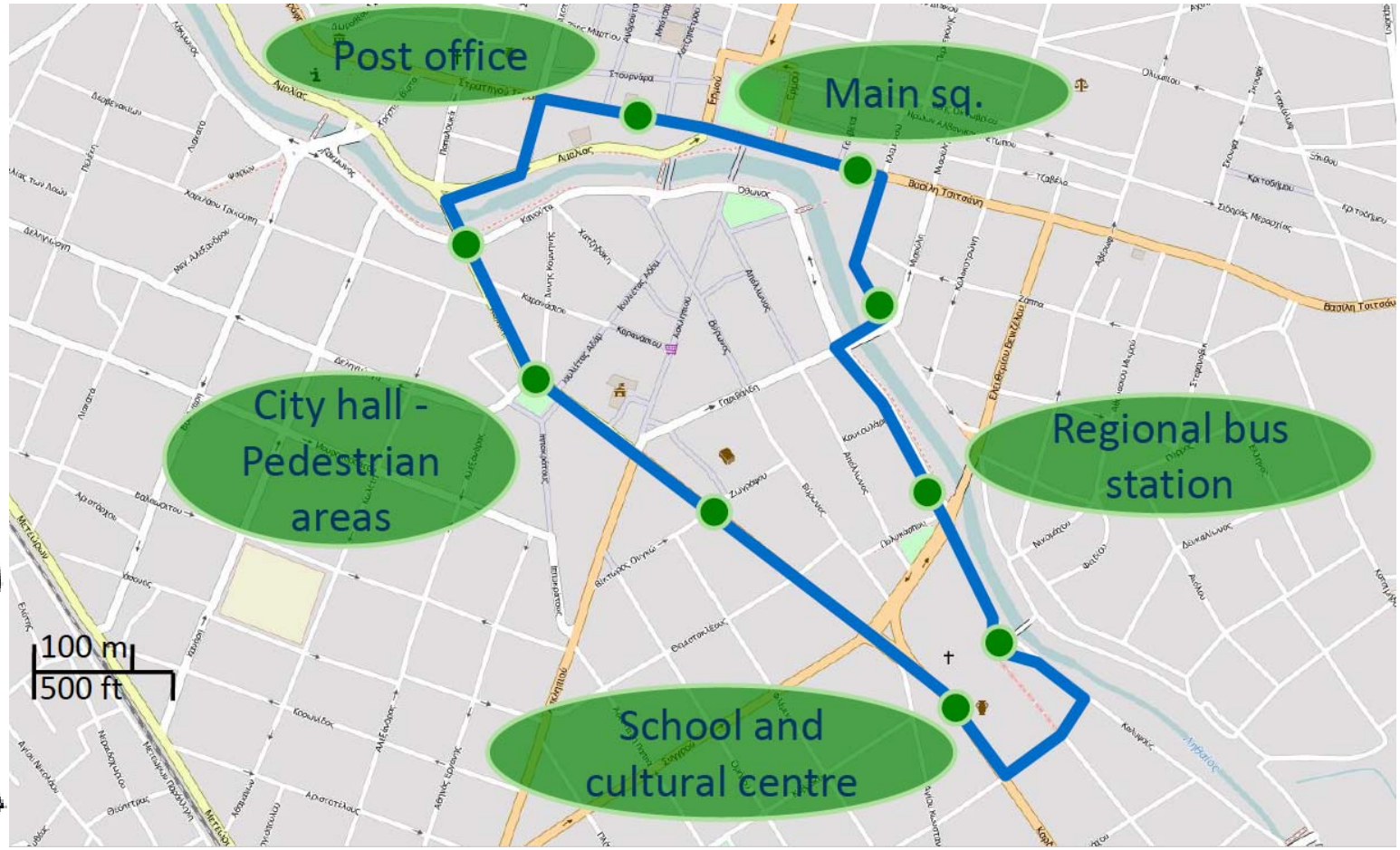
Bus stop

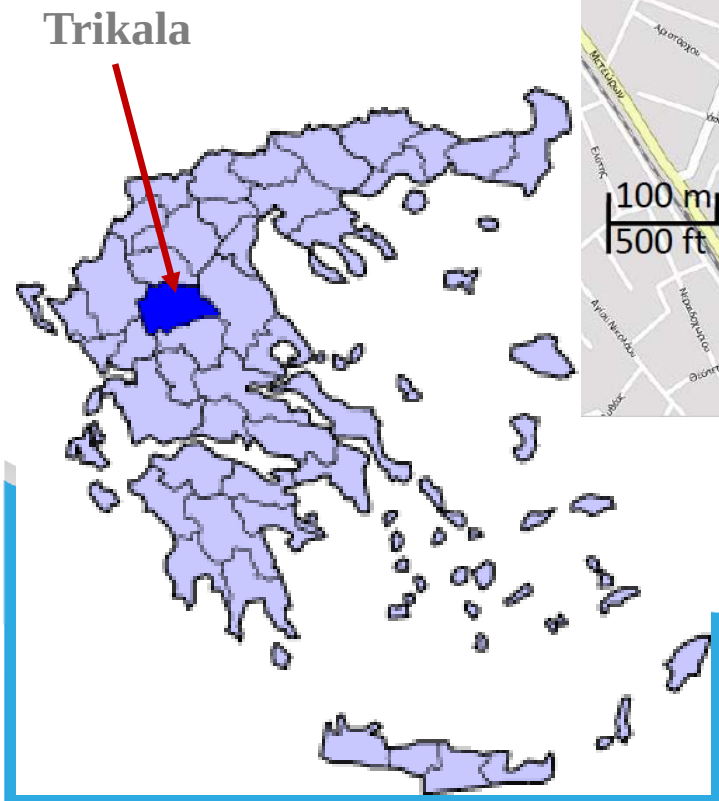
Proposed itinerary

Path

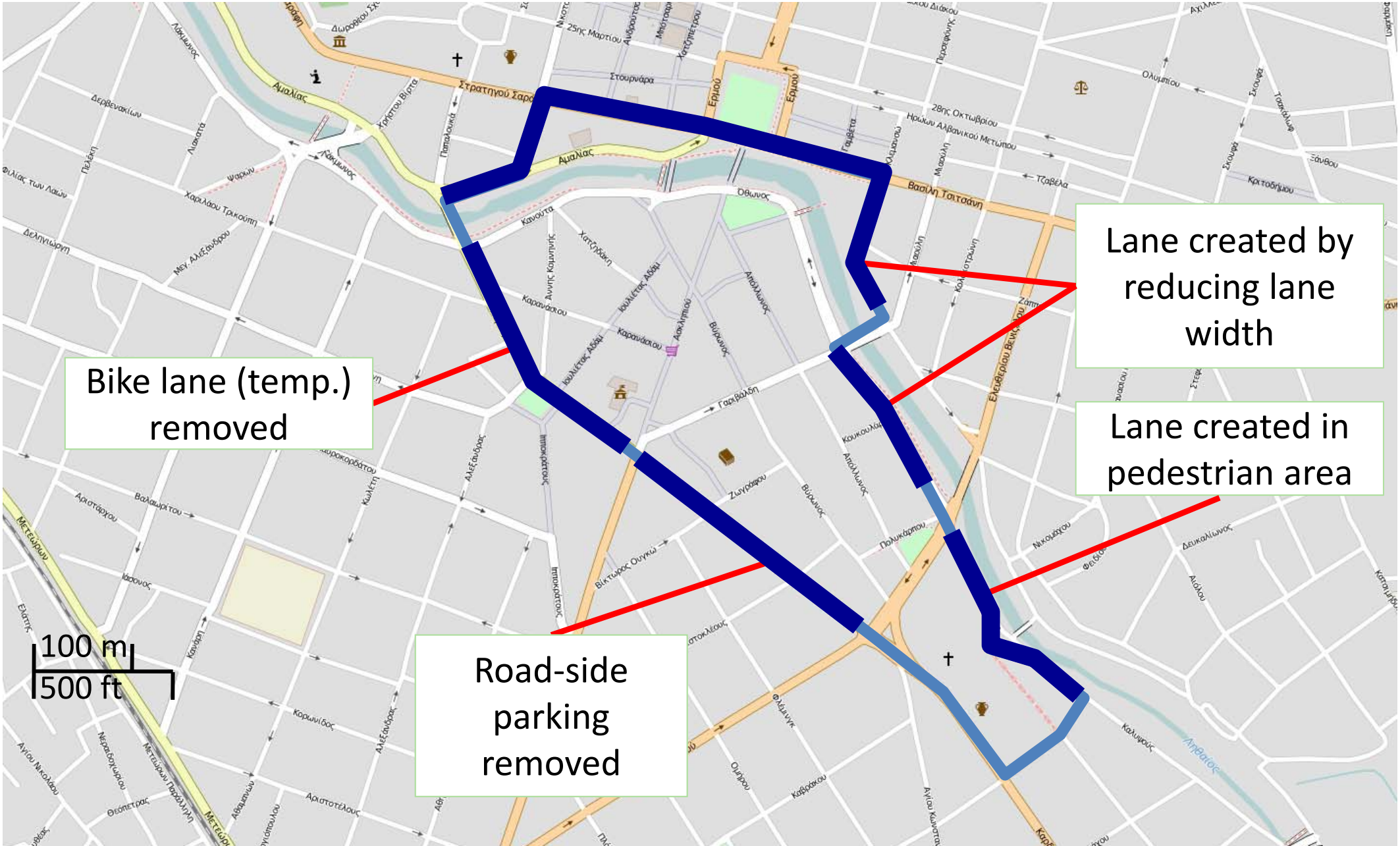
Stop

Trikala Demo (Greece) – Bus lane & stops

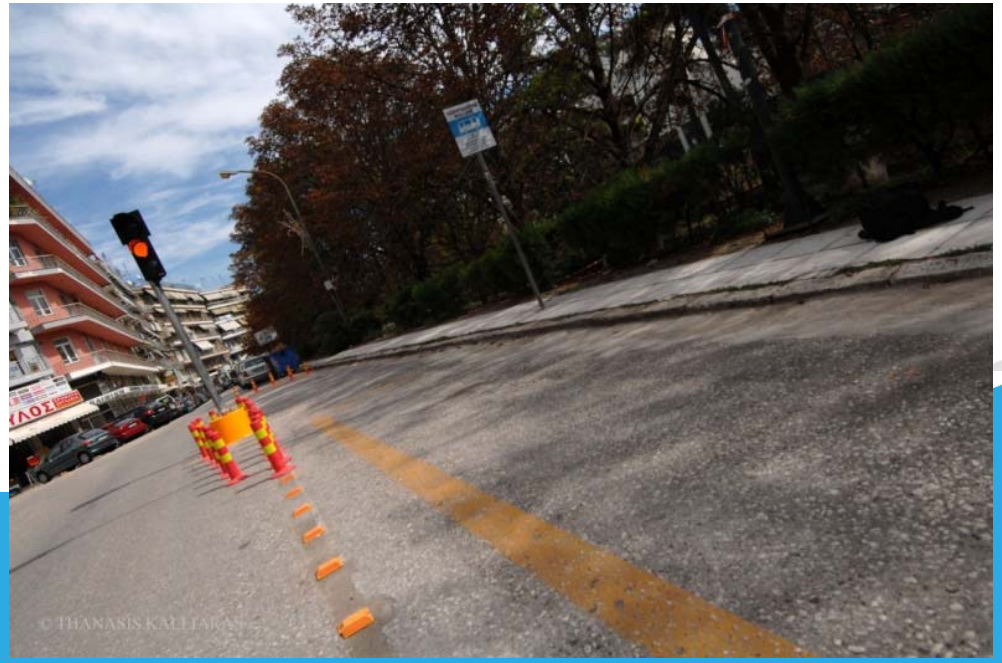




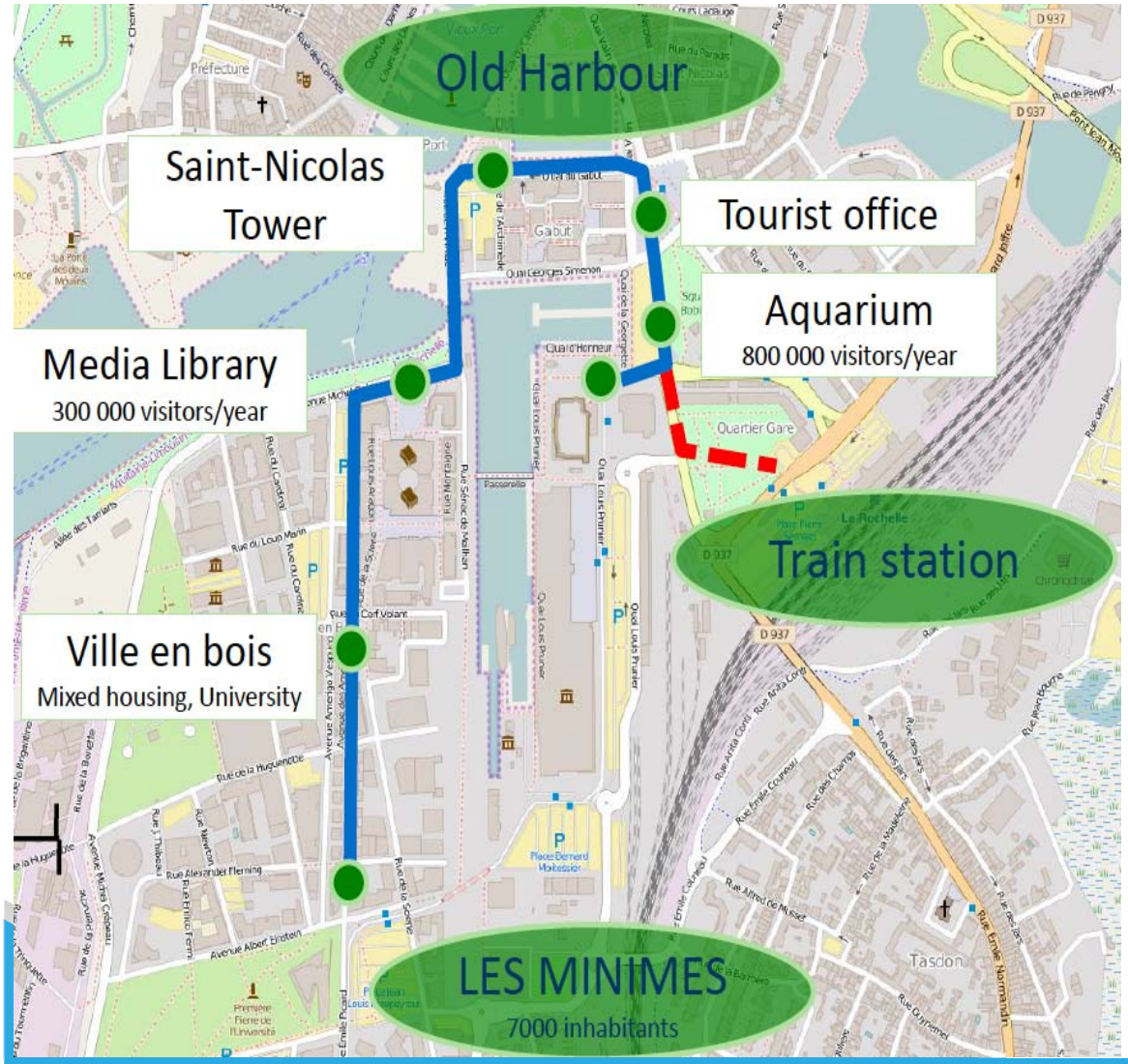
Trikala route design and urban integration



Trikala demo : photos



La Rochelle demo in brief



Campus EPFL (Lausanne) demo in brief

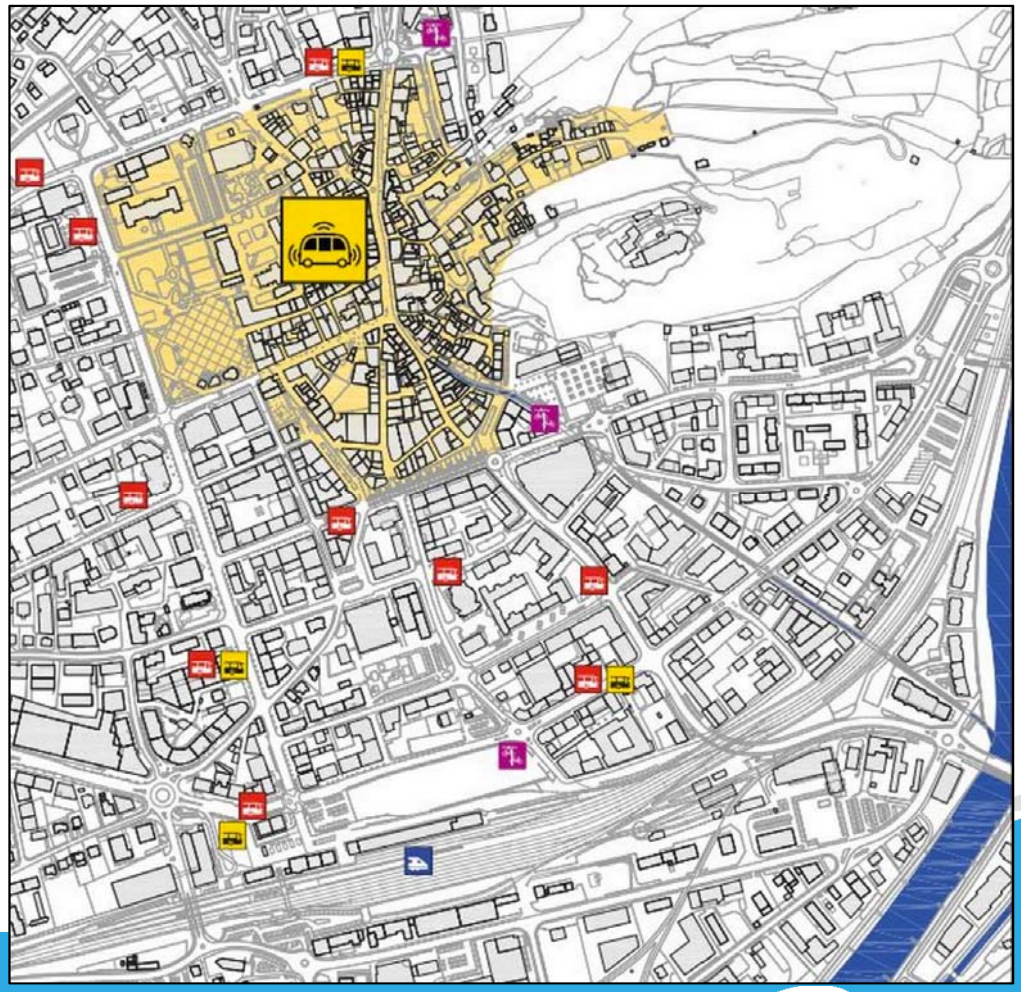
Campus EPFL (Lausanne)

Campus EPFL (Lausanne)

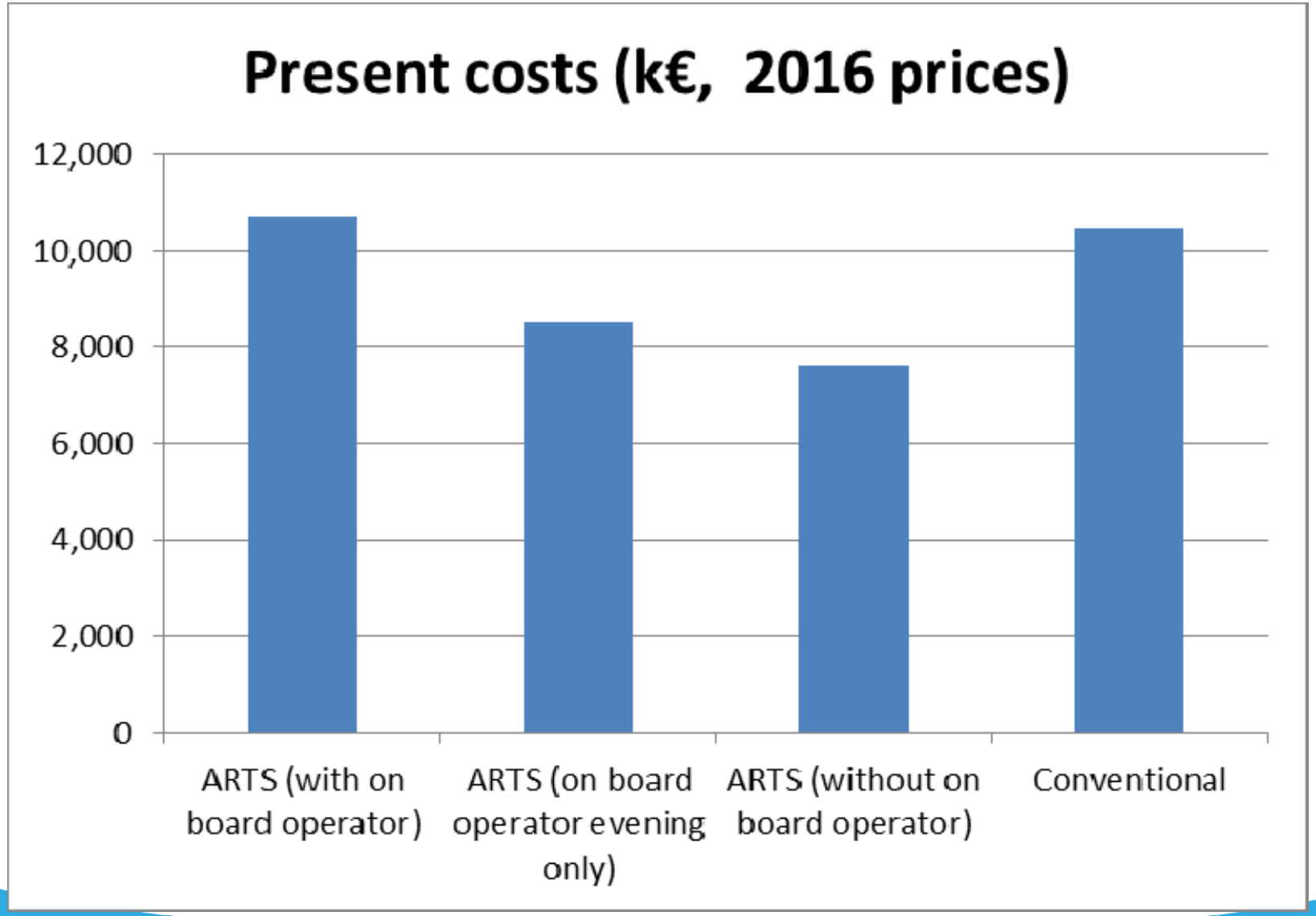
A new private initiative : Carpostal (CH) in Sion

Carpostal (CH) in Sion (start in June 2016)

1) Big operator
   + City support
2) Zone 20



Cost effectiveness analysis

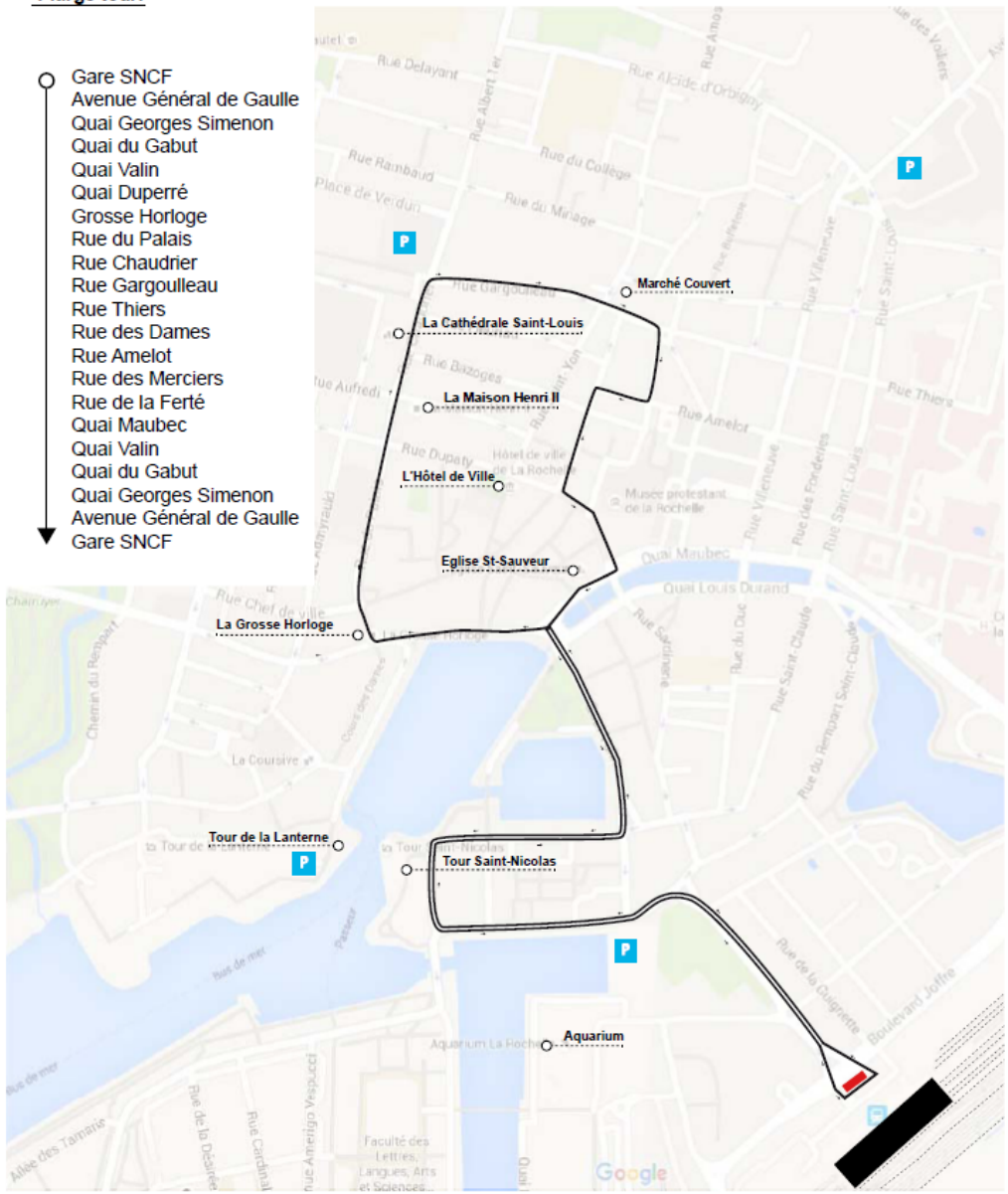


Study for future La Rochelle deployment

Short term proposal

1 large tour:

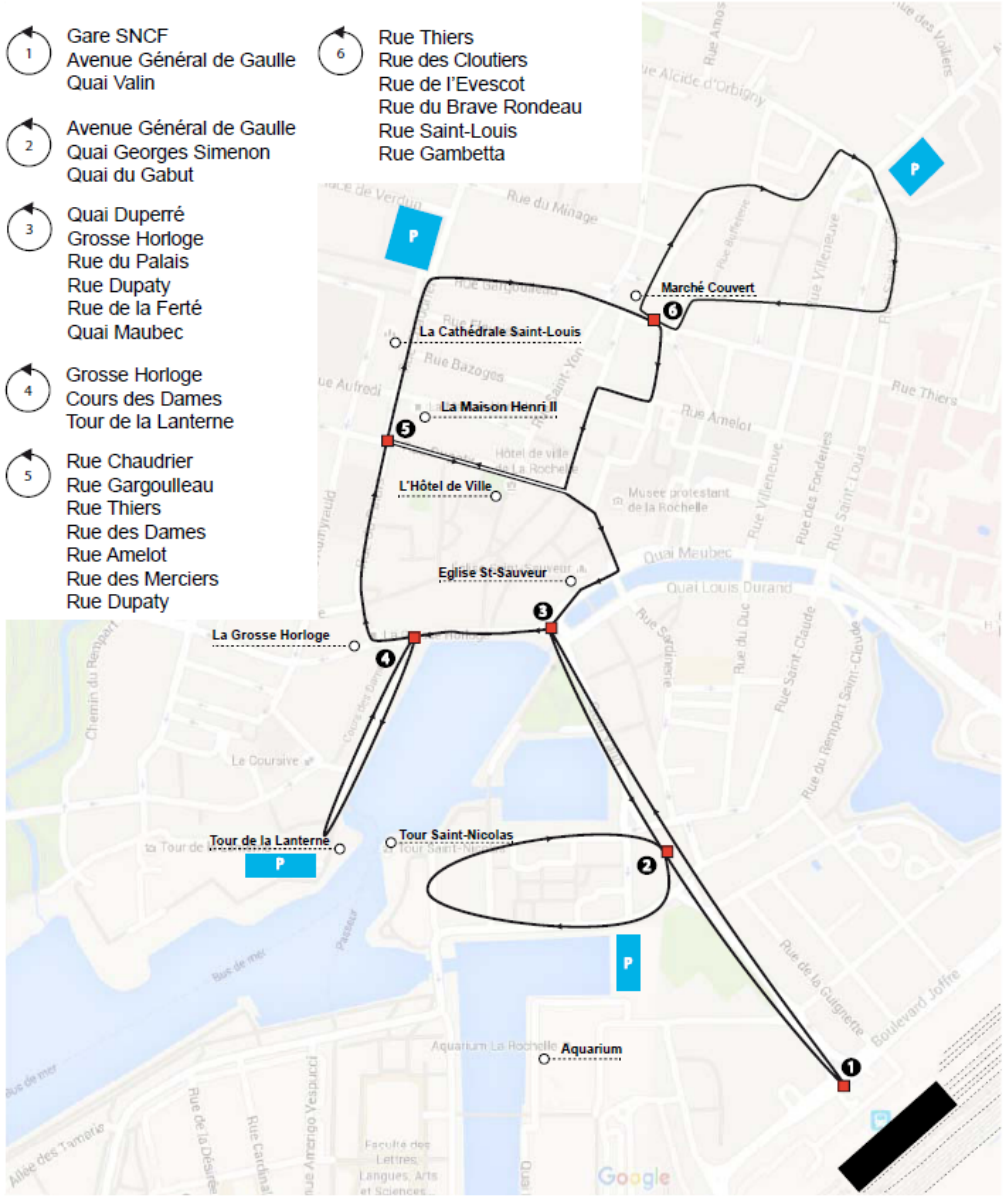
- Gare SNCF
- Avenue Général de Gaulle
- Quai Georges Simenon
- Quai du Gabut
- Quai Valin
- Quai Duperré
- Grosse Horloge
- Rue du Palais
- Rue Chaudrier
- Rue Gargoulleau
- Rue Thiers
- Rue des Dames
- Rue Amelot
- Rue des Merciers
- Rue de la Ferté
- Quai Maubec
- Quai Valin
- Quai du Gabut
- Quai Georges Simenon
- Avenue Général de Gaulle
- Gare SNCF



Long term proposal

5 shorts tours:

1. Gare SNCF
   Avenue Général de Gaulle
   Quai Valin
2. Avenue Général de Gaulle
   Quai Georges Simenon
   Quai du Gabut
3. Quai Duperré
   Grosse Horloge
   Rue du Palais
   Rue Dupaty
   Rue de la Ferté
   Quai Maubec
4. Grosse Horloge
   Cours des Dames
   Tour de la Lanterne
5. Rue Chaudrier
   Rue Gargoulleau
   Rue Thiers
   Rue des Dames
   Rue Amelot
   Rue des Merciers
   Rue Dupaty
6. Rue Thiers
   Rue des Cloutiers
   Rue de l'Evescot
   Rue du Brave Rondeau
   Rue Saint-Louis
   Rue Gambetta

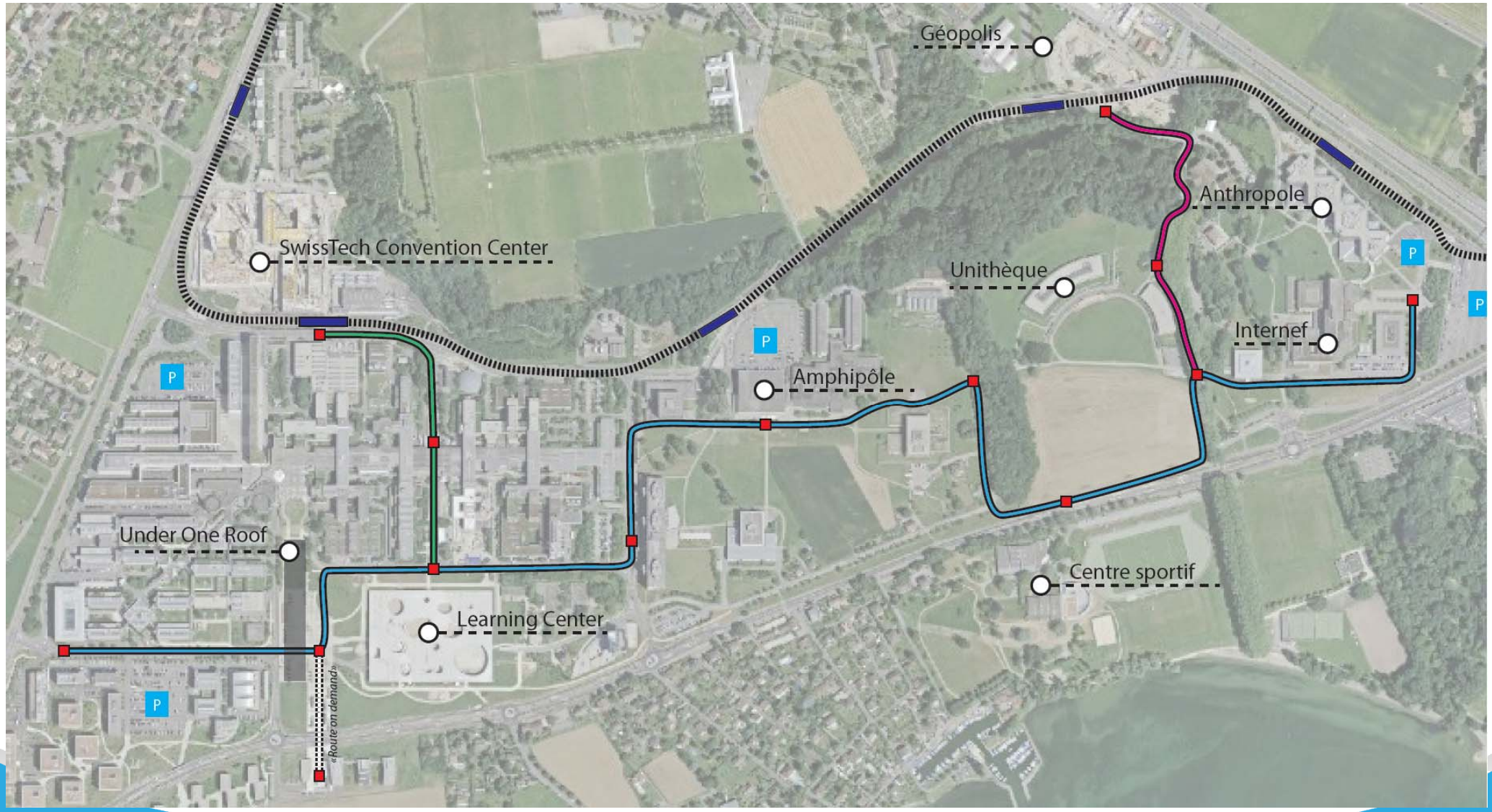


Actual deployment scenario in La Rochelle

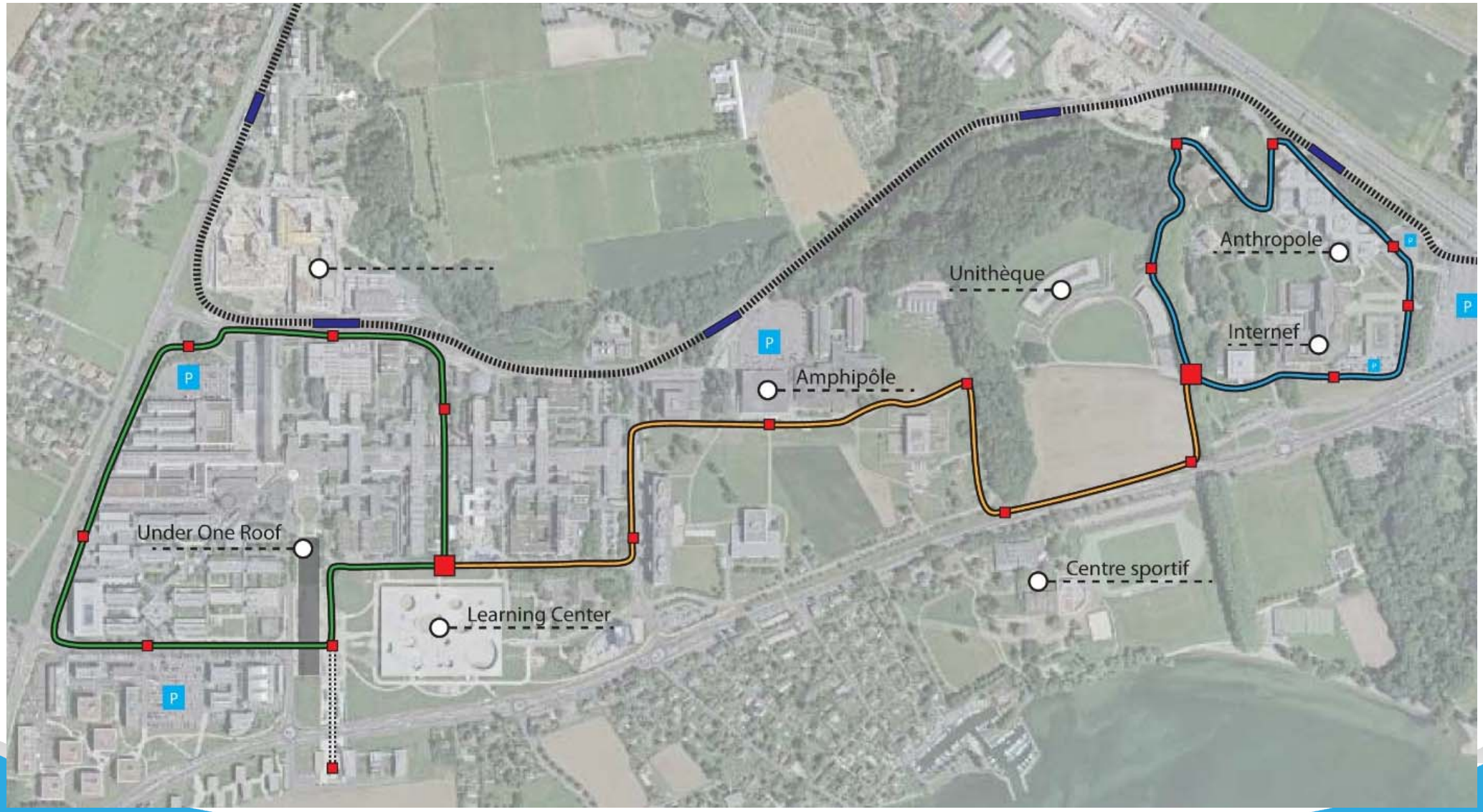
- Transport service for tourists
- 4.5 km route
- 9 stops
- A vehicle every 10 min
- 10am-10pm (Apr – Oct)

  10am-7pm (Nov – Mar)
- Free to users

EPFL deployment study



EPFL deployment study



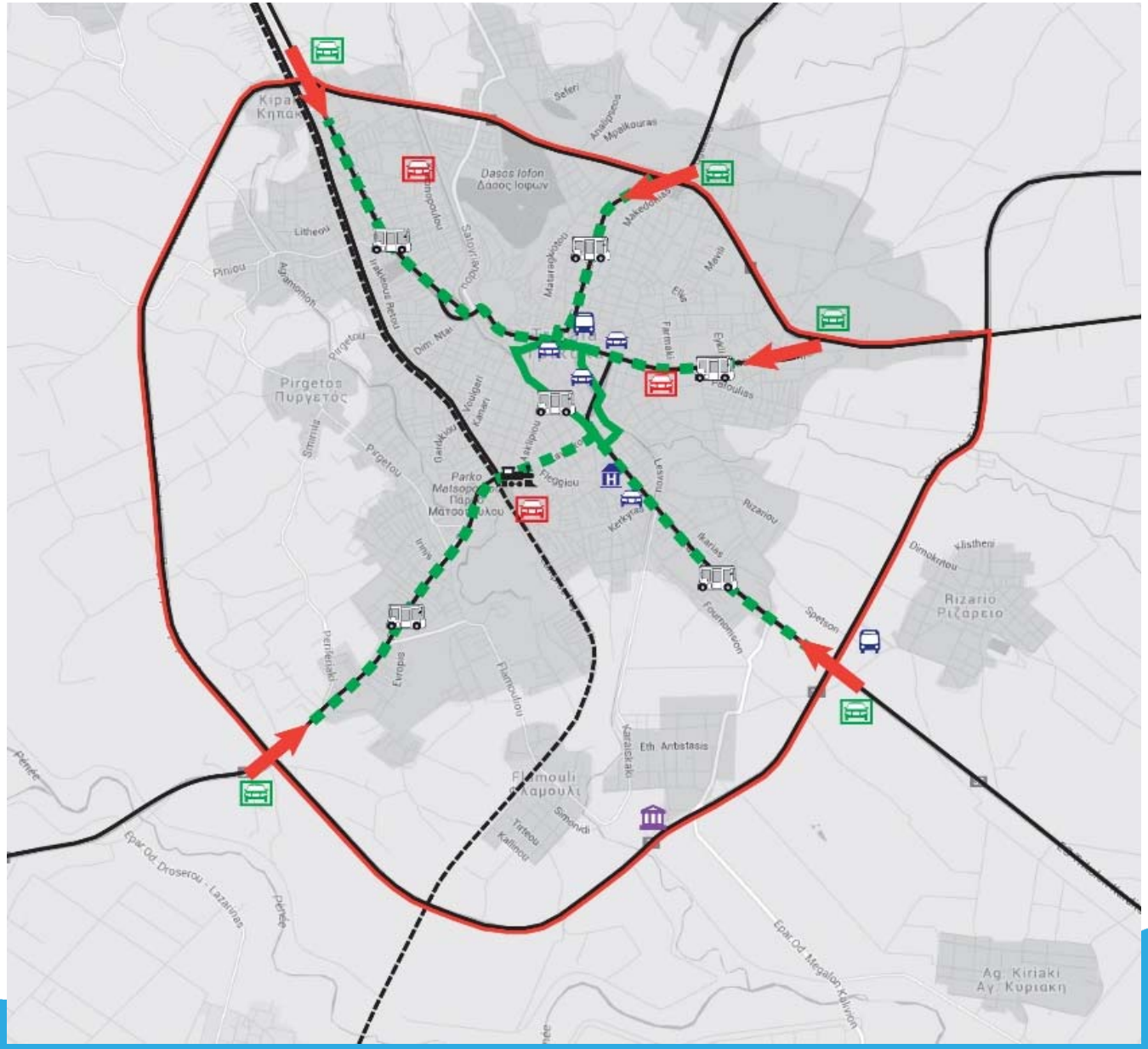
Trikala deployment study

Existing

- Public parking
- Main entrance
- Railway station
- Bus terminal

Scaling up

- Center loop
- Feeder path
- Park and move
- Peripheral parking
- ARTS



How many passengers carried so far?

- Oristano (Italy) 2 580
- La Rochelle (France) 14 660
- Lausanne (Switzerland) 7 000
- Vantaa (Finland) 19 000
- Trikala (Greece) 12 150
- Antibes (France) 4 000
- San Sebastian (Spain) Counting
- Total 60 000+

What did CityMobil2 achieve ?

- Users are enthusiastic
- Cities are ready to commit
- 4 EU Members states have now regulation allowing trial deployment
- However ARTS do need cities willing to invest in this dream; ready to give the right space to ride safely at higher speed

What is the next step and when ?

- Legal frameworks in more MS (France, UK, Spain and Italy under discussion)
- Some investment is needed for our small industries to become large ones
- We need to demonstrate the

  “business case”

When: during the next relevant EU call !

European

CityMobil2 Final Conference,
Donastia San Sebastian, 2nd June 2016

The EC Perspective on road automation & H2020

Patrick Mercier-Handisyde
European Commission
DG Research & Innovation
Transport Directorate

HORIZON 2020

Automated Road Transport

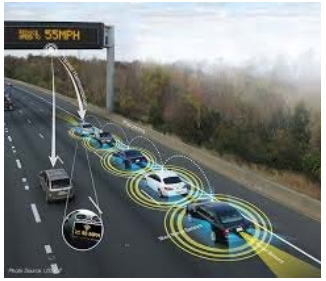
European

Detect vehicle location and environment

Vehicle-driver interface

User and social acceptance

R&I priorities



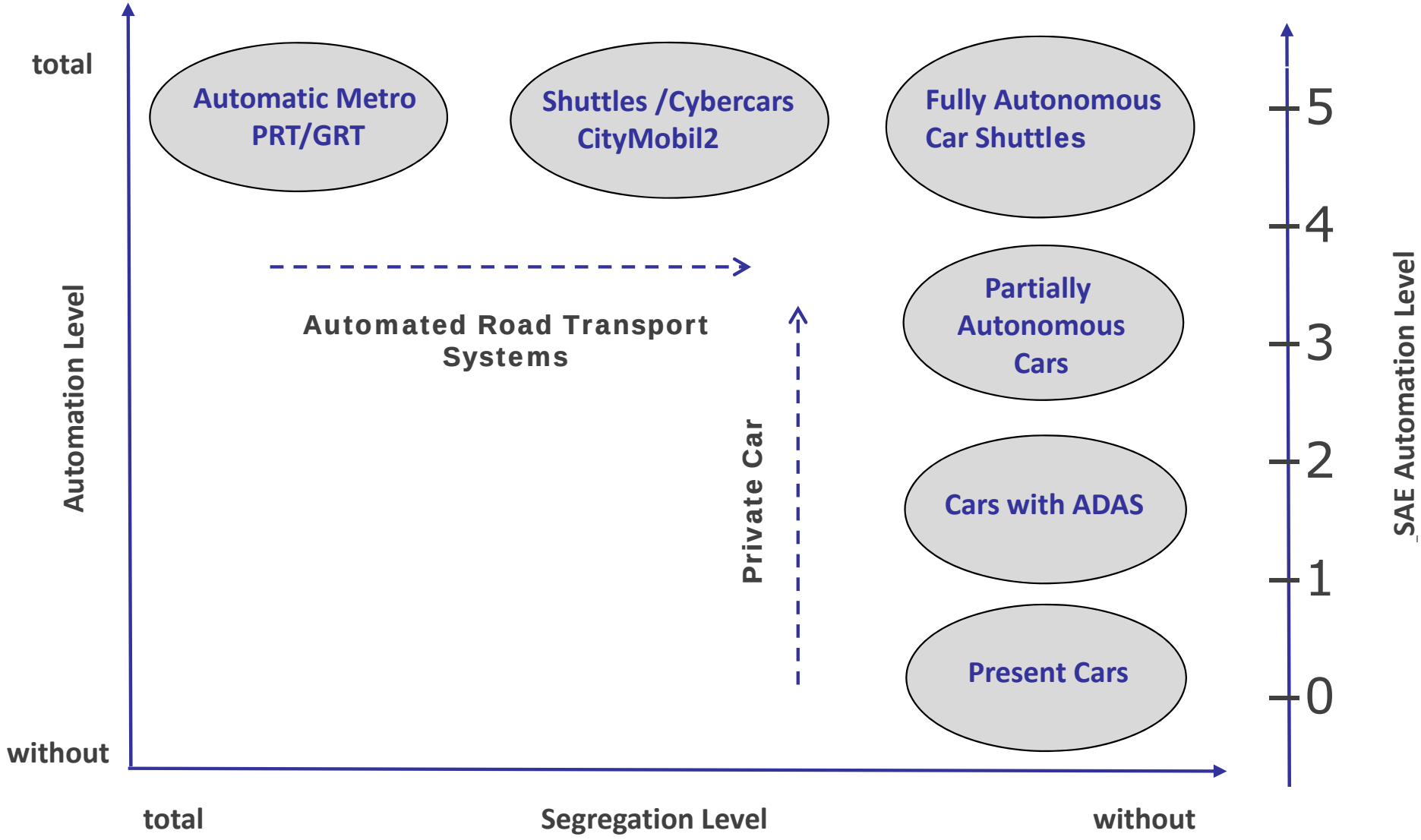
Connectivity for advanced level of automation

Safe AD systems in complex traffic situations

Automation Pilots

Road infrastructure

Two main trends in road automation



EC initiatives on Connected and Automated Mobility

European Commission

Amsterdam Declaration
on "automated and connected driving

Signed by EU transport ministers on 14 April 2016

GEAR 2030 roadmap
Focus on financing tools / legal & policy issues
Focus on road
Actions to achieve fast roll out (short term)
Strengthen competitiveness of EU car industry

C-ITS Platform
Action plan for the interoperable deployment of C-ITS in Europe
relevant for road automation: actions on e.g. Data protection, Cyber-security, Access to in-vehicle data, Digital infrastructure, traffic management, Road safety

STRIA roadmap on CAT
Focus on **defining R&I agenda**
Addresses all modes
Long term perspective
Link to Energy Union

Oettinger Roundtable
digital aspects of CAT, such as network coverage, standards, interoperability, cyber-security, etc.
proposal for a pan-European, large-scale project that will provide enabling connectivity

Call "Automated Road Transport" topics and budget

European Commission

Topic	Title	Action type	Stages	Budget (EUR Mio) 2016	Budget (EUR Mio) 2017
ART-02	Automation pilots for passenger cars	IA	2	48	
ART-04	Safety and end-user acceptance aspects of road automation in the **transition period**	RIA	2		
ART-05	Road infrastructure to support the transition to automation and the **coexistence of conventional and automated vehicles on the same network**	[illegible]	[illegible]	[illegible]	
ART-06	Coordination of activities in support of road automation	[illegible]			
ART-01	ICT infrastructure to enable the **transition** towards road transport automation	IA	2		50
ART-03	Multi-Brand platooning in real traffic conditions	IA	2		
ART-07	**Full-scale demonstration of urban road transport automation**	**IA**	**2**		

20 Sep'16: Calls opens
26 Jan '17: Stage I
27 Sept'17: Stage II

CSA = Coordination and Support Action
IA = Innovation Action; RIA = Research and Innovation Action

Full-scale demonstration of urban road transport automation

European Commission

Topic ART-07-2017 (IA)

Challenge

- Proving reliability, safety, robustness of fully automated road transport in complex scenarios in urban areas

Scope

- Demonstrate fully automated vehicles in urban areas in full-scale tests at Pan-European level
- Fully integrated into existing public transport systems
- To be tested in urban/suburban areas in complex traffic scenarios
- Assess user acceptance and effects on transport demand and modal transfer

Expected impact

- Contribute to the development of modern, more efficient urban transport systems with reduced impacts on climate change, air pollution, noise, health, accidents.

Estimated budget per proposal: EUR 10-15 Mio

SMEs participation encouraged – Twinning with the US

Relevant information related to CityMobil2

Webpages

- http://www.citymobil2.eu/en/
- http://www.citymobil2.eu/en/City-activities/Reference-Group/
- http://www.citymobil2.eu/en/City-activities/Reference-Group/
- http://www.citymobil2.eu/en/City-activities/Large-Scale-Demonstration/West-Lausanne-region/
- http://www.rts.ch/info/regions/valais/7226958-les-premieres-navettes-carpostal-sans-chauffeur-seront-testees-a-sion.html
- https://www.youtube.com/watch?v=vNTBCuE5rRM
- https://www.youtube.com/watch?v=CR7MXwb14IE
- https://www.youtube.com/watch?v=aXkPRViGWb0
- https://www.youtube.com/watch?v=q-twmTpe_2M
- https://www.youtube.com/watch?v=U1_0PAhSWeY
- http://easymile.com/
- http://www.robosoft.com/products/people-transportation/robucity.html
- http://www.2getthere.eu/

Contact persons

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It is time to think about…

CityMobil3

THANKS FOR LISTENING

SEVENTH FRAMEWORK PROGRAMME

CityMobil2 demo in EPFL Lausanne