



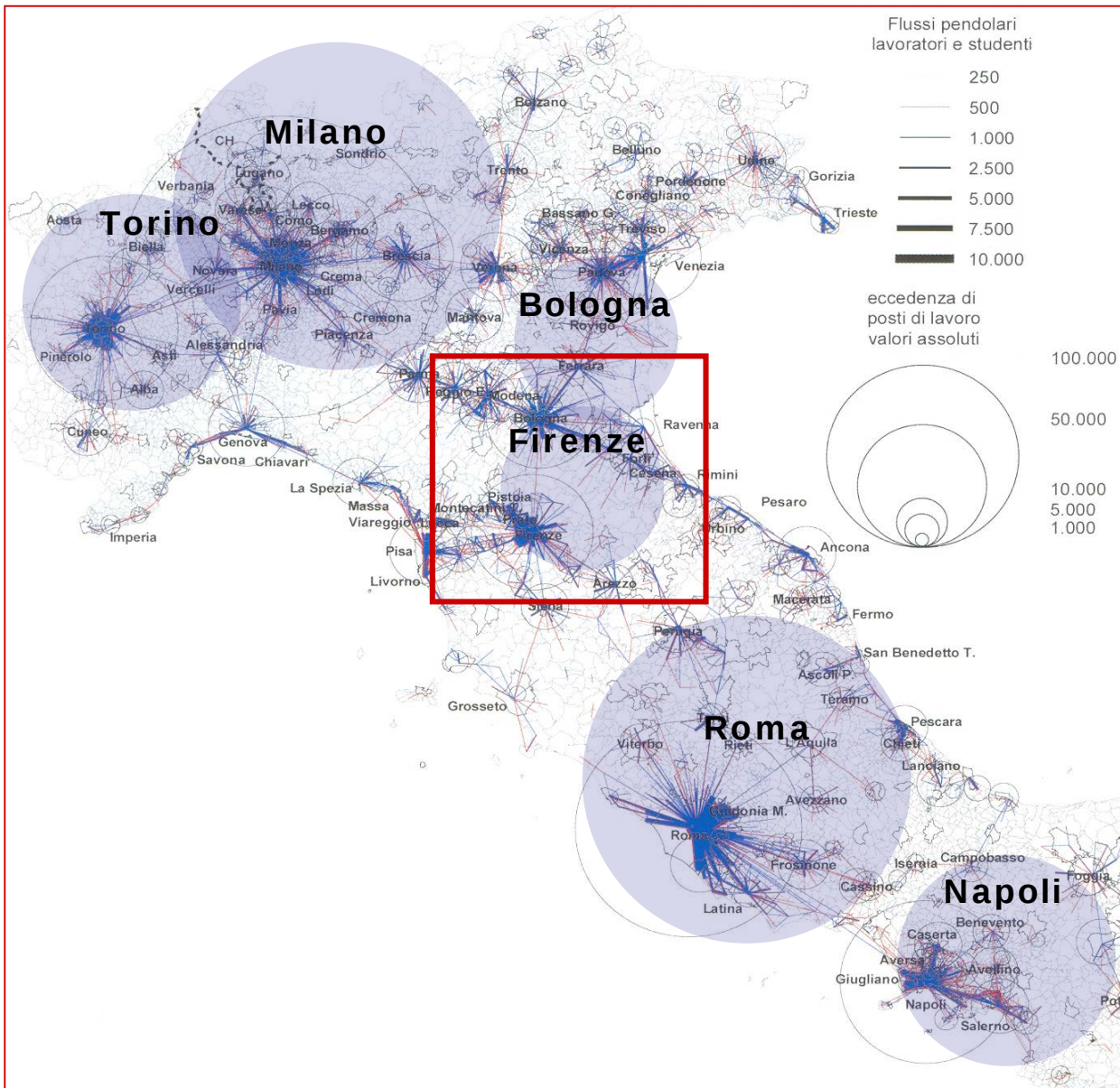
# Florence Transportation System

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RESOLUTE meeting

*Firenze - December 15, 2015*

# Florence Metropolitan Area

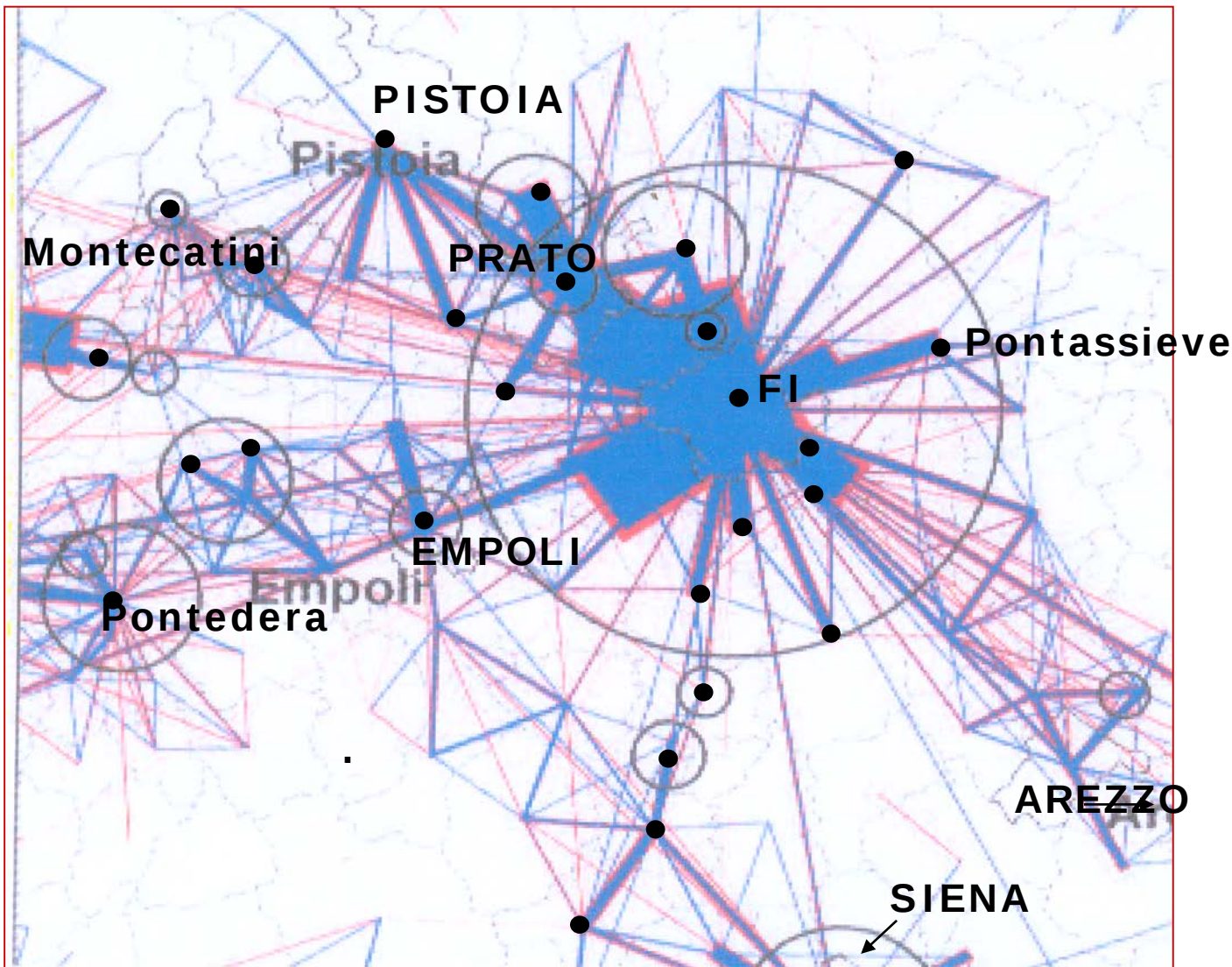


The Metropolitan Area of Florence is a typical middle-size European metropolitan area

It is the fifth metropolitan area in Italy considering dimensions and complexity after Milan, Rome, Turin, Naples and Bologna.

- 20 municipalities
- 966.423 inhabitants

# Florence Metropolitan Area transportation demand



## Commuters inside the Metropolitan Area

75% of total transport is by car

## Fluxes inside the metropolitan area

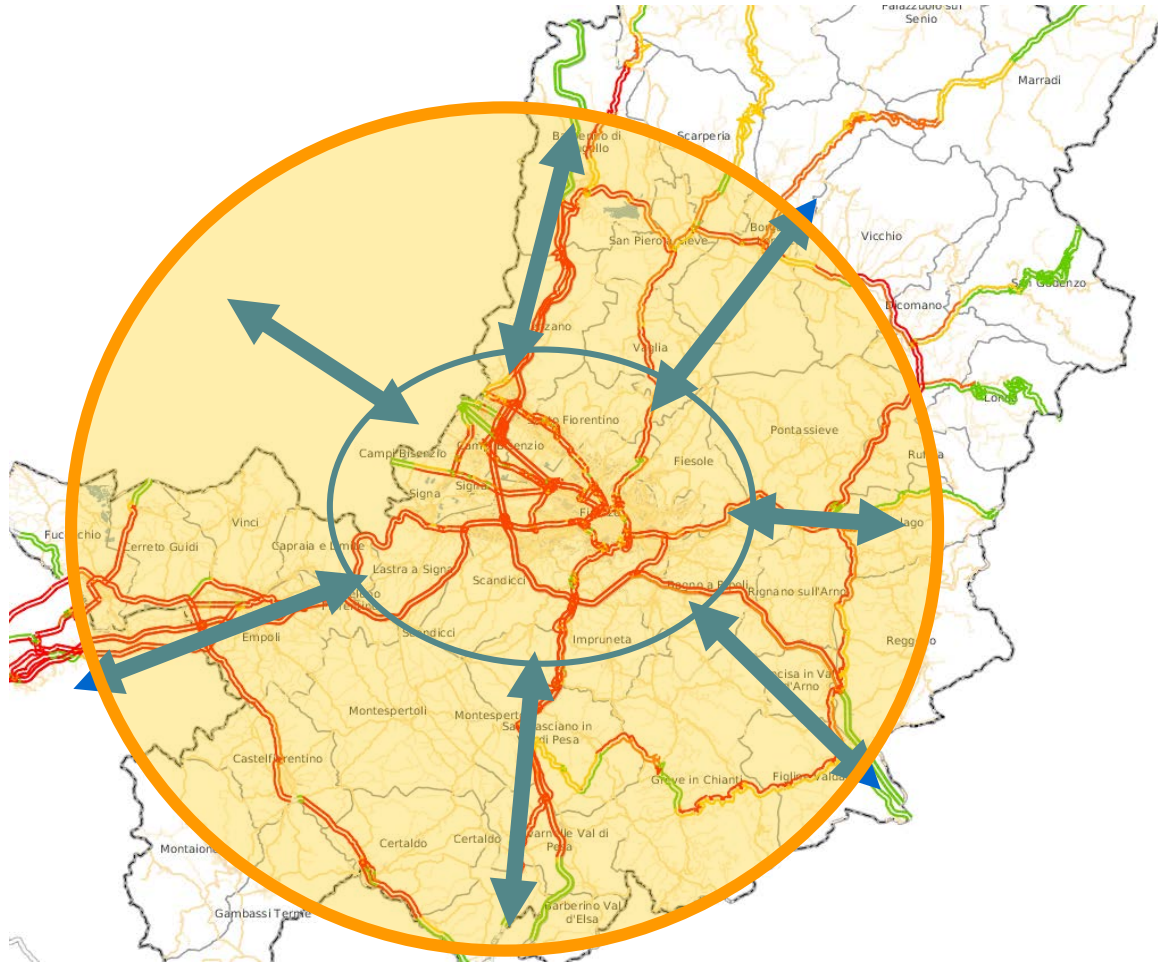
- around 480.000 cars circulating in the mornings
- around 690.000 people moving by car

# Florence Metropolitan Area transportation demand

**Morning rush hour 7 – 11 am**

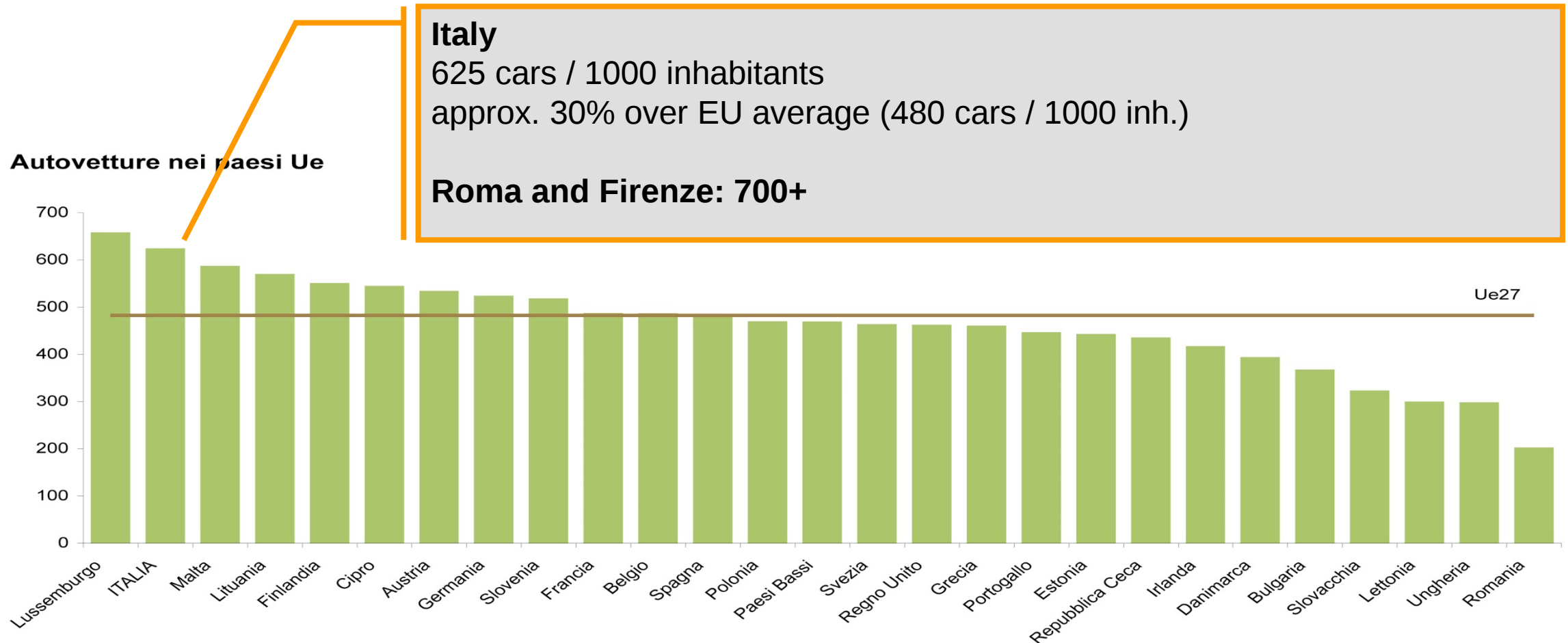
**ENTRANCE TOTAL: 79.700**

**EXIT TOTAL: 68.200**



80 kilometers

# Florence Metropolitan Area transportation demand



Fonte: Elaborazioni Istat su dati Commissione Europea

(a) I dati si riferiscono alla fine dell'anno, ad eccezione del Belgio per il quale si riportano al 1° agosto. I taxi sono generalmente inclusi.

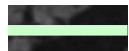
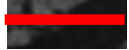
# Road network

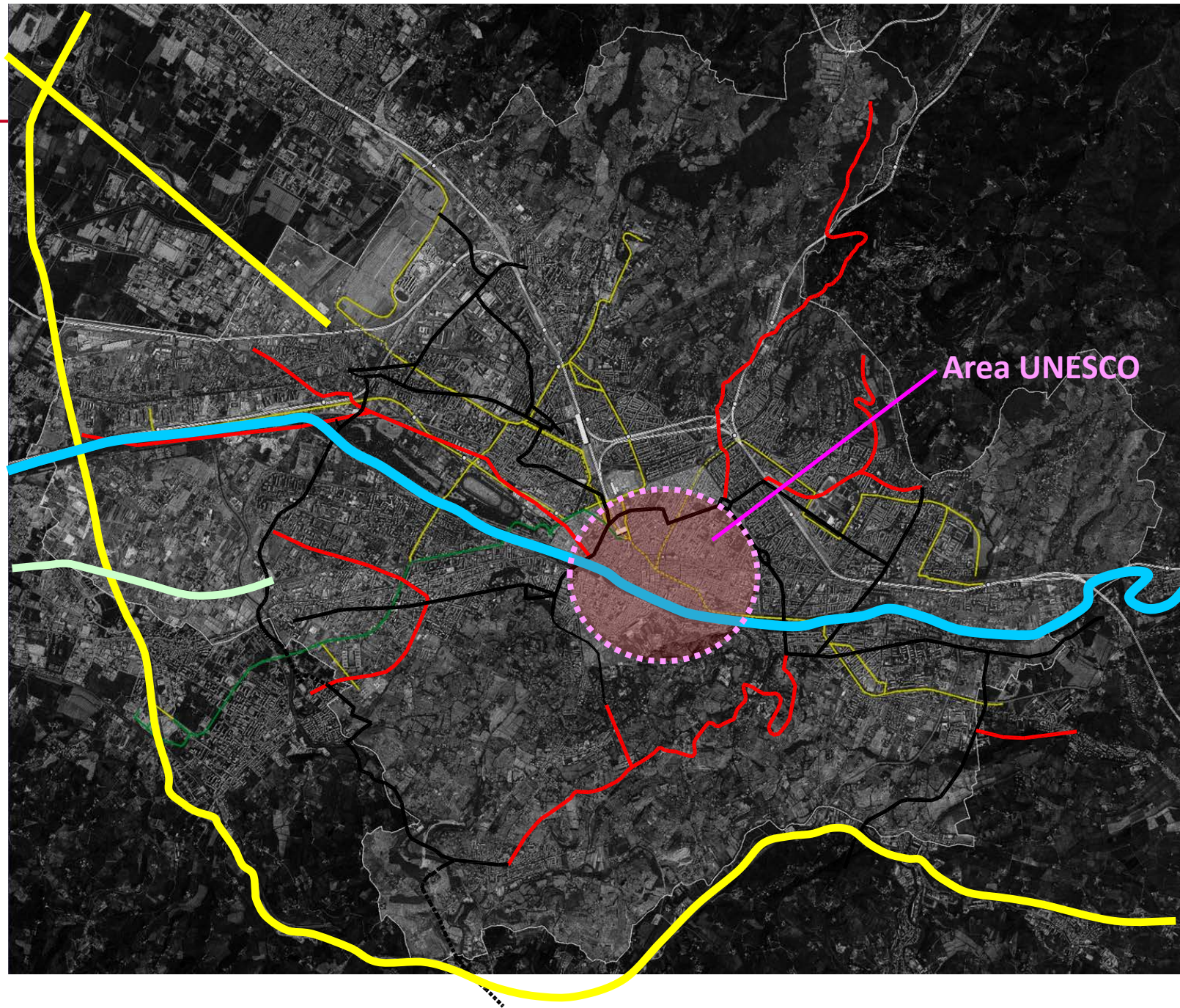
The road network is characterised by a big anomaly: the lack of a ring road which redistribute fluxes

The A1 motorway is too far from the city to gather urban fluxes in an efficient way

The result is that traffic, regardless the origin and destination area, concentrates into the boulevards ring that is the very limit of the historical centre and UNESCO area.

LTZ = Unesco area

-  **Motorways**
-  **Extra-urban roads**
-  **Main urban roads**
-  **Secondary urban roads**

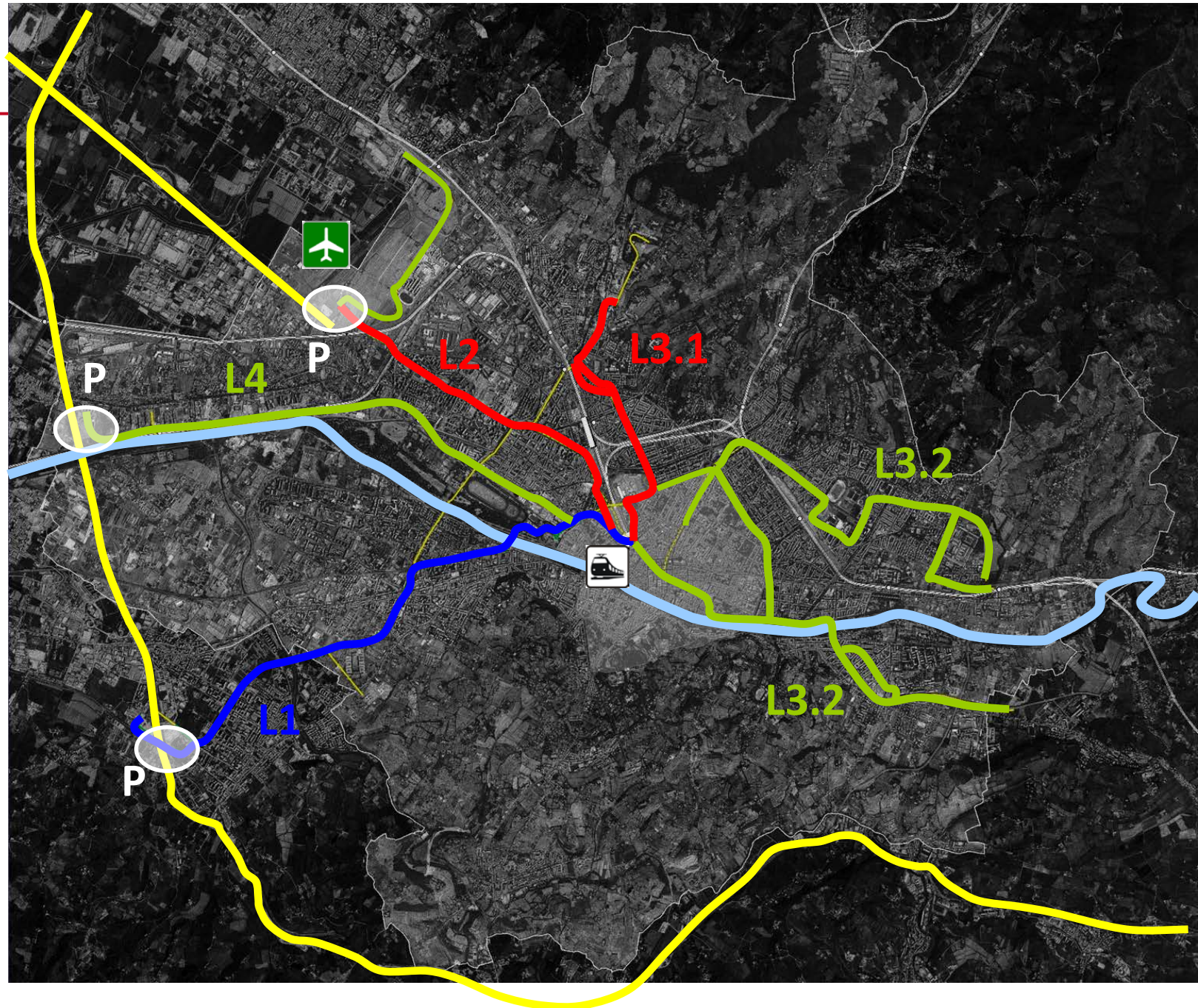


# Tramway system

-  **Motorways**
-  **Line 1**
-  **L2, L3.1 (under construction)**
-  **L4, L3.2 (design phase)**

The tramway network is radio-centric.

Intermodal exchange is allowed with the motorway through big parking (under construction)



# Bus lines

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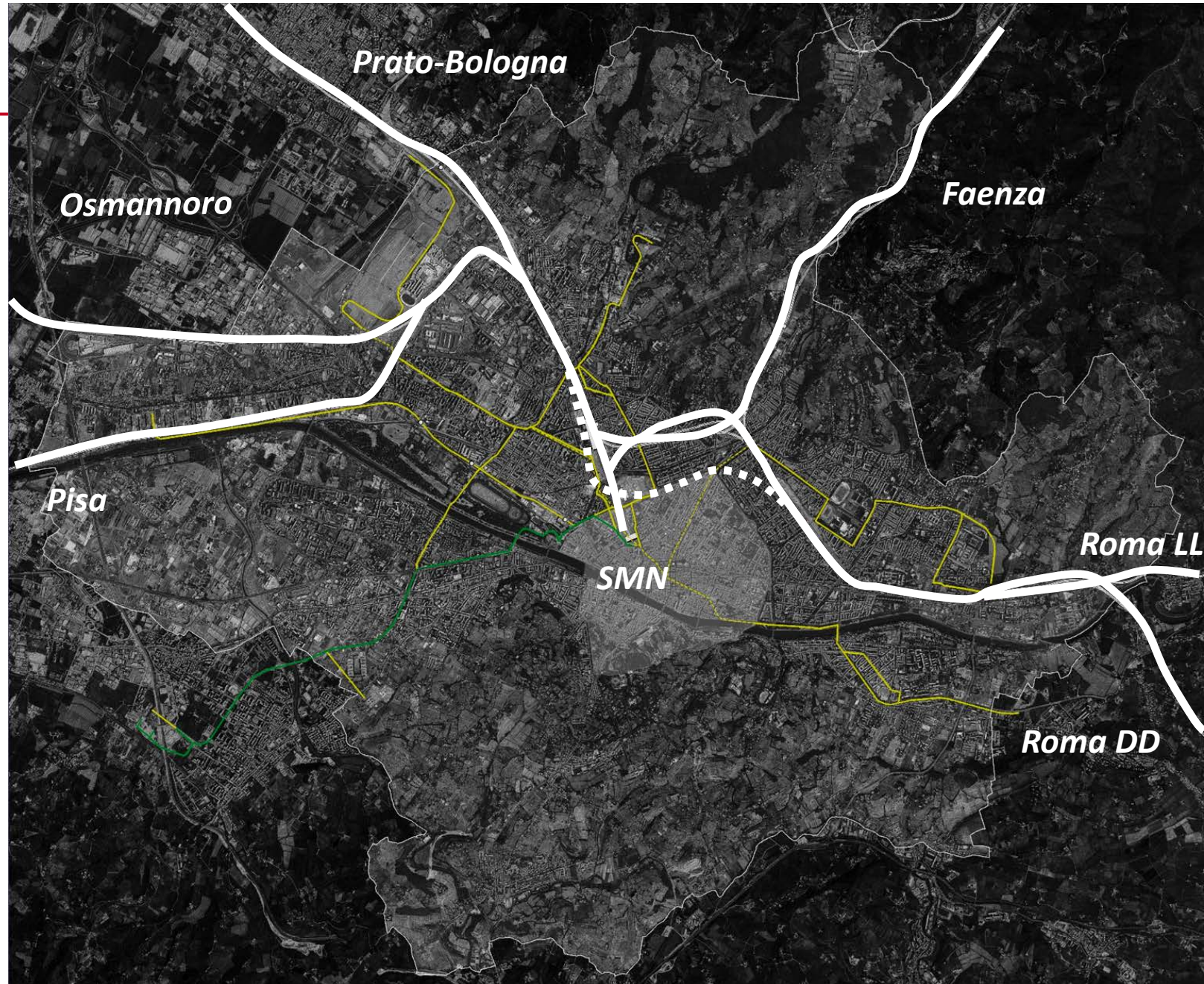
It is a radial structured network with the main lines of force that cut the historical centre .

Most of the vehicles are equipped with a fleet management systems (AVM)



# Railway

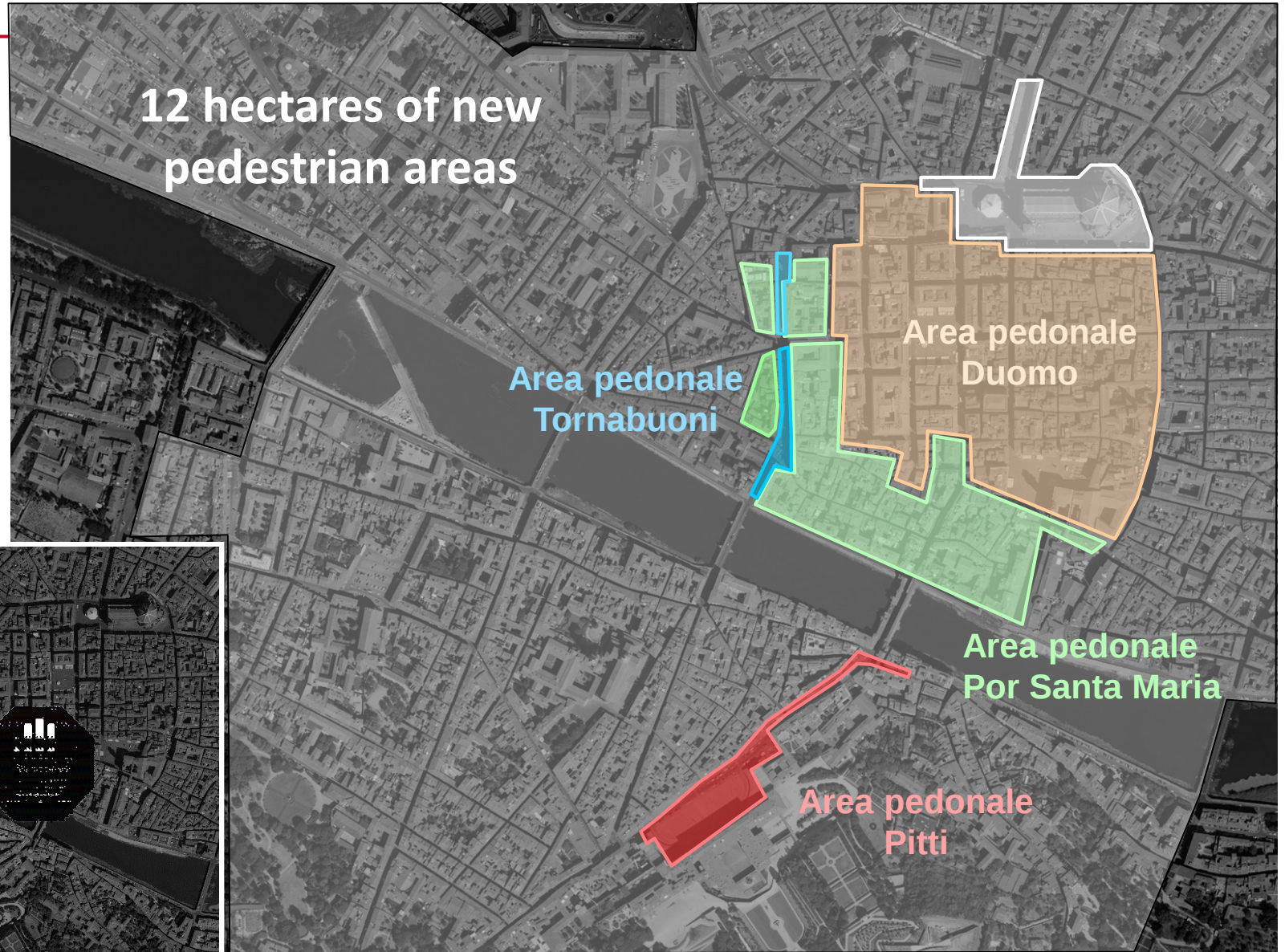
The completion of the High Speed line, the new station *AV Belfiore* and the underground segment (dashed line) will allow using the surface lines for a metropolitan high frequency train service



# Limited traffic zones

The historical centre is almost entirely covered by a Limited Traffic Zone with controlled gateways

Pedestrian areas are protected with automatic, removable or fixed bollards



# Areas with high concentration of people

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Trains and stations  
Roads and tramways  
Touristic sites  
Touristic bus  
Universities  
Hospitals



Firenze – Piazza Del Duomo

# Critical points

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- Narrow streets
- Two city halves split by the river and few bridges
- Lack of a ring road encircling the city
- Lack of alternative routes connecting different areas of the city
- Several big worksite areas inside the city centre over the next years (tramway line 2 and 3)
- 180.000 city users and 30.000 tourists per day in addition to residents

# Risk factors

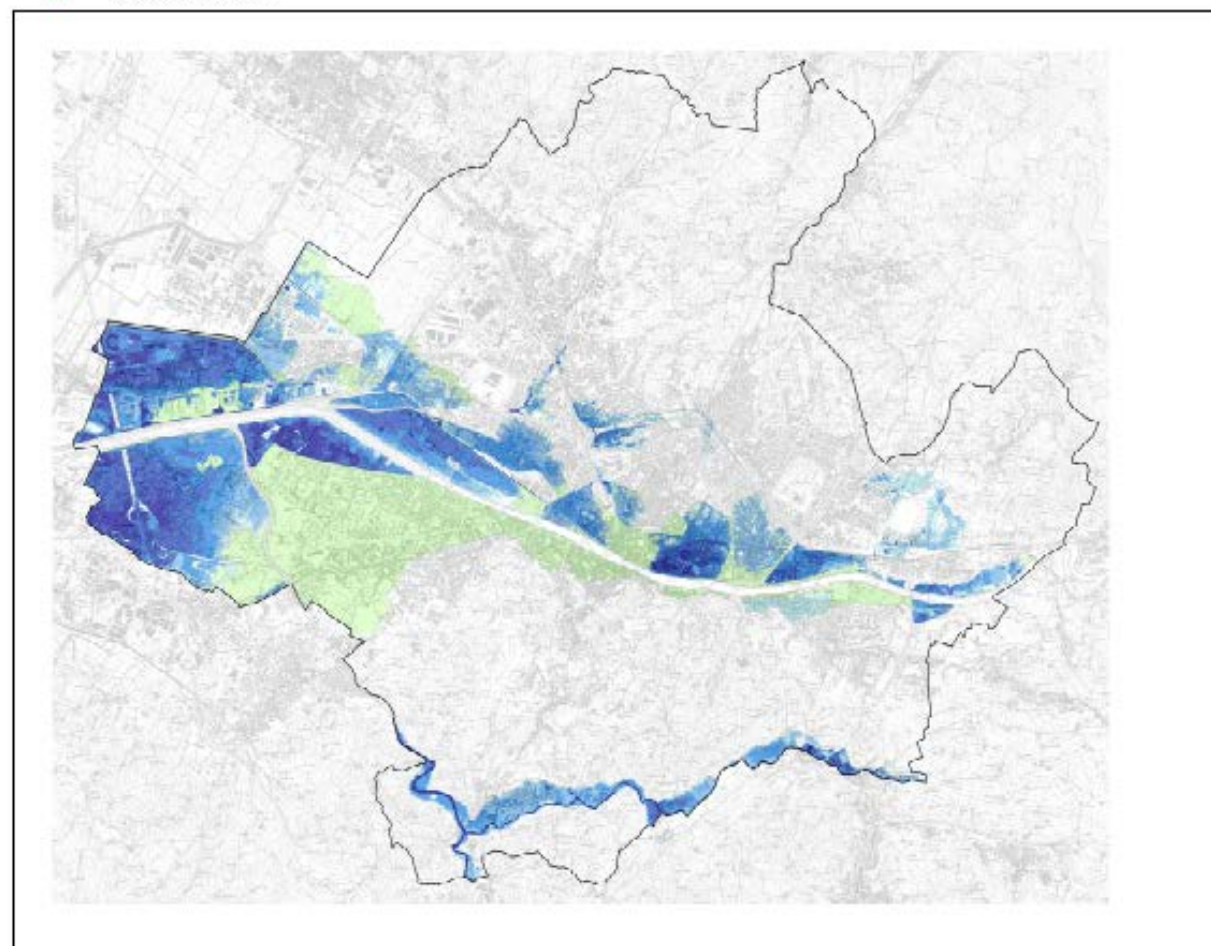
Flood of the Arno river  
and its tributaries  
(predictable)



Carta Aree Allagabili per T.R. 200 anni

Variante al PS 2010  
 Approvazione deliberazione C.C. n. 2015/CI0025 del 02/04/2015

Scala 1:21000



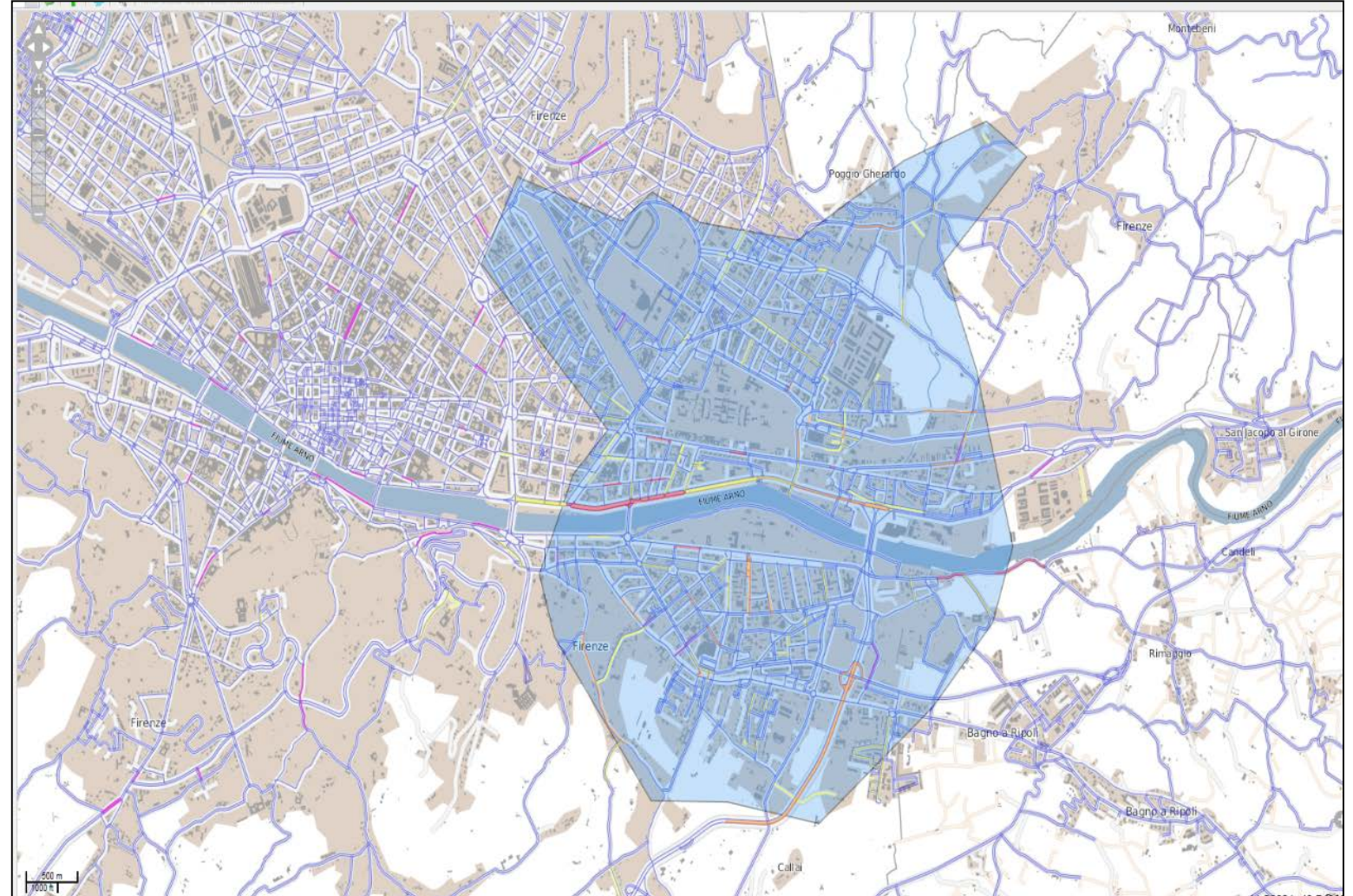
Altezza d'acqua di esondazione

- 0,00 mt < h ≤ 0,30 mt
- 0,30 mt < h ≤ 1,00 mt
- 1,00 mt < h ≤ 2,00 mt
- 2,00 mt < h ≤ 3,00 mt
- > 3,00 mt

aree di transito per Tr.200 anni  
(altezza convenzionale 0,30 mt)

# Risk factors

More recently, water bombs involving limited areas of the city (unpredictable)



Summer 2015

# Risk factors

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Water bomb (august 2015)

Very intense rainfall together with strong wind caused the fall of many trees that blocked the traffic over the south-east area of the city.



Summer 2015

# Risk factors

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Wind storms and  
downbursts



# Risk factors

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Snowfall (even not so heavy) has an extremely negative effect on traffic as most of the cars are not equipped with suitable tires or snow chains



17/12/2011

# Risk factors

Flash floods, short and intense rainfalls  
(unpredictable)



31/10/1992

# Other risk factors

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- Other unpredictable natural disasters (earthquake)
- Human factors (unpredictable)

# Transport modelling for increasing resilience

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1. Defining the scenarios
2. Building a model for each scenario with the **traffic hypervisor tools**: modified road network and modified transport demand
3. With an iterative process, running the traffic assignment model and **changing the circulation rules** until you find the configuration that allows **to manage the modified traffic demand with the modified network**
4. **Defining actions** that must be done to change circulation rules and drive involved people behaviour (communication to users)
5. Using the model and the procedures for **real-time management** when the event takes place

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# Thank you

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