

XIVth European Transport Safety Lecture

Brescia, 15th November 2012

Safety of pedestrians and cyclists in urban areas



Maurizio TIRA, Full Professor of Town and Regional Planning
University of Brescia - <http://dicata.ing.unibs.it/tira/>

State of the art

The European Union has funded several RTD projects on
Pedestrians

- ADONIS: Analysis and Development Of New Insight into Substitution of short car trips by cycling and walking
- WALCYING: Walking-cycling
- Cost Action 358 “Pedestrian Quality Needs – PQN project”
- PROMPT: PROMote Pedestrian Traffic in cities
- INTRO: Intelligent Roads
- LIVE: Tools to injury prevention
- PENDANT : Pan-European Co-ordinated Accident and Injury Database
- PROMISING: Promotion of mobility and safety of vulnerable road users
- SAMERU: Safer Mobility for Elderly Road Users
- SARAC II: Quality criteria for the safety assessment of cars based on real-world crashes - phase 2
- TRACE : Traffic Accident Causation in Europe

State of the art

The European Union has funded several RTD projects on Cyclists

- ADONIS: Analysis and Development Of New Insight into Substitution of short car trips by cycling and walking
- WALCYING: Walking-cycling
- BIKE PAL: Cyclists' Best Friend
- PROMISING: Promotion of mobility and safety of vulnerable road users
- ROSYPE: Road Safety for Young People in Europe
- SAFECYCLE : ICT applications for safe cycling in Europe
- SAMERU: Safer Mobility for Elderly Road Users
- SMART RRS: Innovative Concepts for smart road restraint systems to provide greater safety for vulnerable road users

State of the art

- The European Union has funded several RTD projects about road safety in urban areas
 - DUMAS : Developing Urban Management And Safety
- eSUM pdf : European Safer Urban Motorcycling
- I&I Days : Information and Initiative Days
- OSSA : Open framework for Simulation of transport Strategies and Assessment
- REVEAL : Remote Measurement of Vehicle Emissions at Low Cost
- ROSACE : Road Safety in cities: change road safety education in europe
- SAU : Urban Accident Analysis Systems (Sistemas de Análisis de Accidentalidad Urbana)
- TRAINER : System for driver Training and Assessment using Interactive Evaluation tools and Reliable Methodologies
- WATCH-OVER : Vehicle-to-Vulnerable roAd user cooperaTive communication and sensing teCHnologiesto imprOVE transpoRt safety
- YOUTH ON THE ROAD

State of the art



The ITF/OECD has recently completed the report “Pedestrian, Urban Space and Health”, addressing the topic of walking from a more comprehensive perspective and is now finalising the report “Cycling safety”.

Why that is still an issue ...

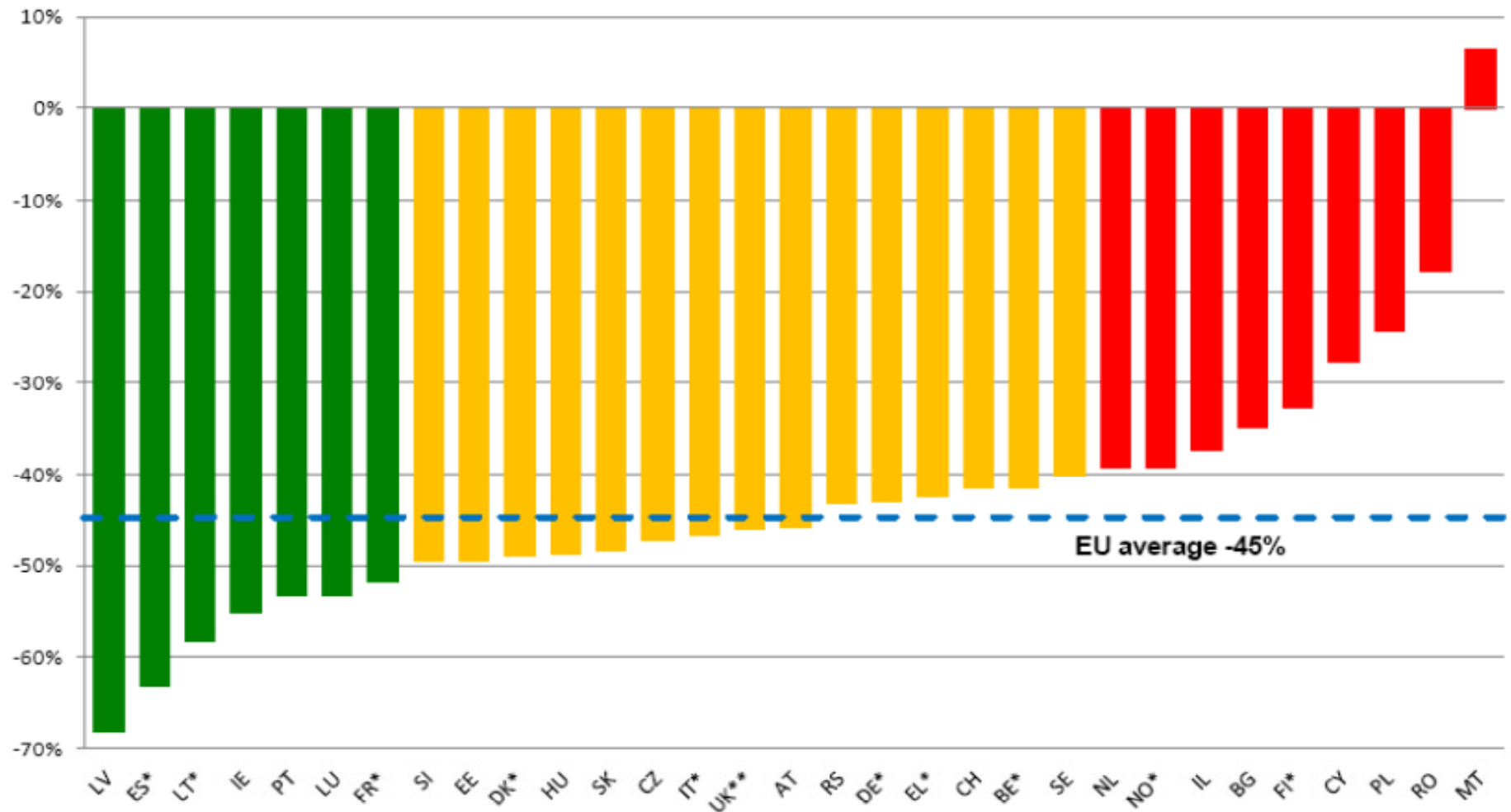
Between 2001 and 2009, some 107,700 pedestrians and cyclists were killed on EU roads, 9,250 of them in 2009 (6,900 pedestrians + 2,350 cyclists).

Within this 9-year period, deaths among this category of road users have been decreasing at a lower rate than for vehicle occupants, respectively 34% compared with 41%.

Pedestrian and cyclist accidents account for 26% of all road fatalities!

What has been achieved so far ...

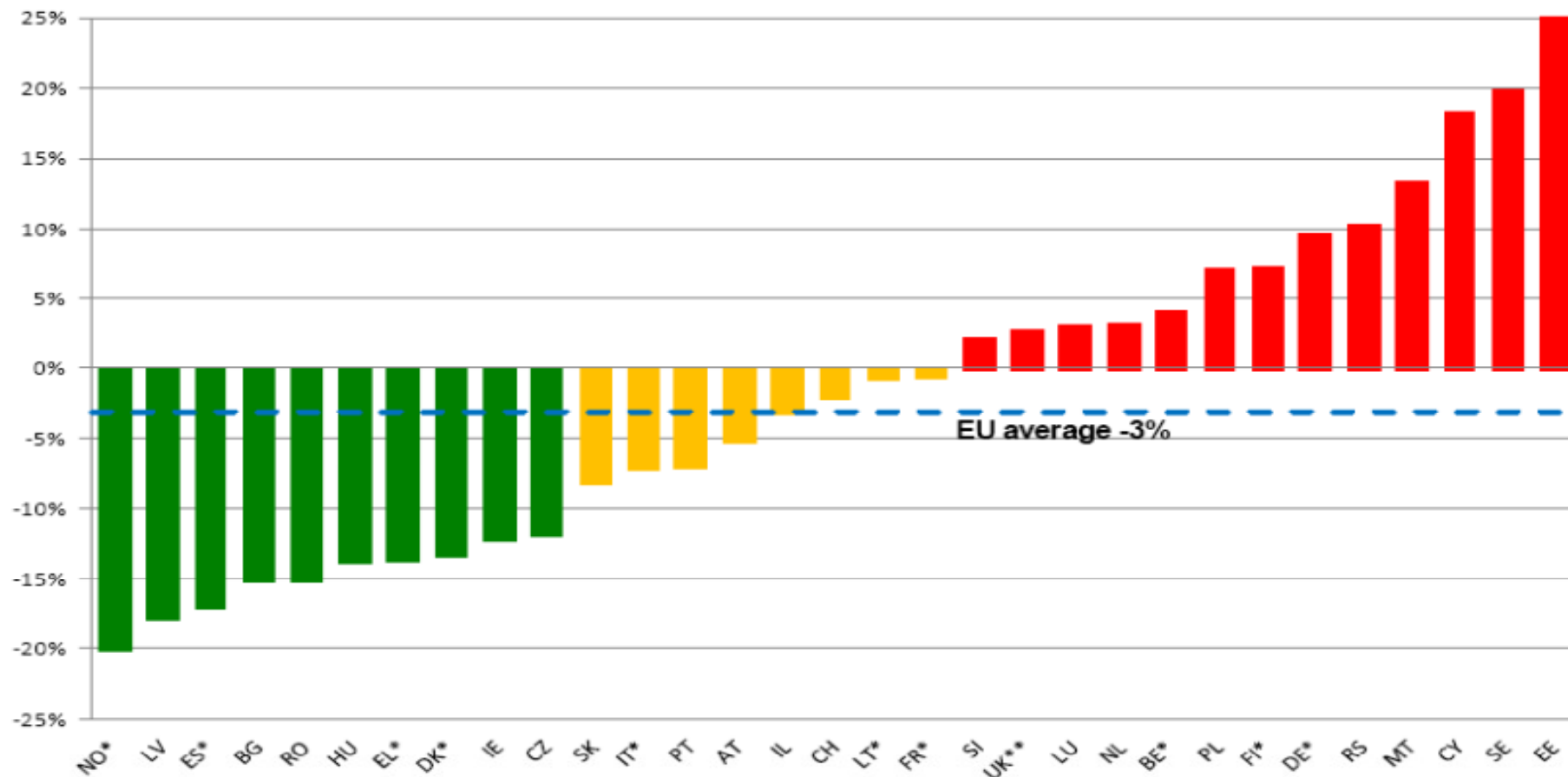
What has been achieved so far (Source ETSC)



Percentage change in road deaths between 2001 and 2011

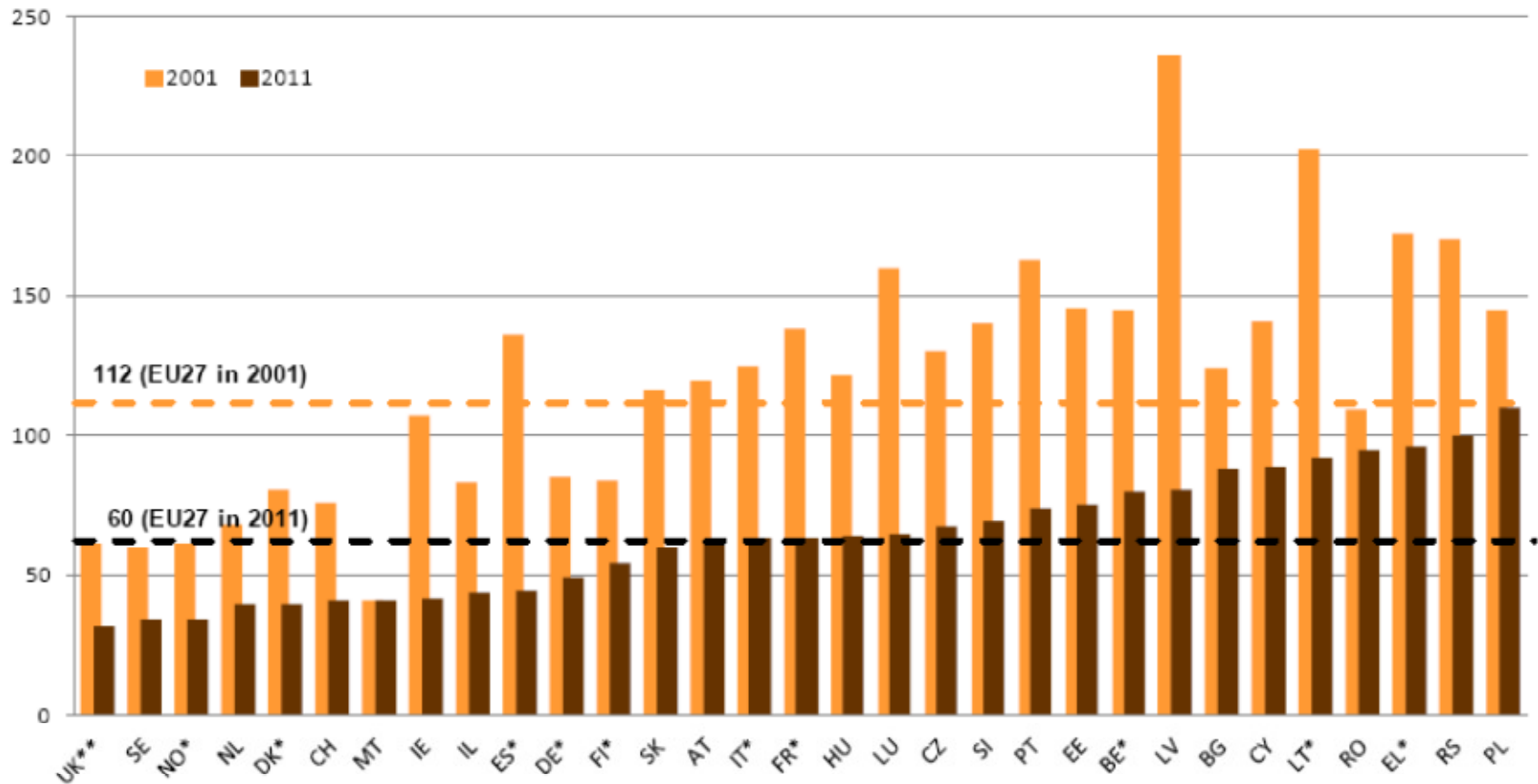
** Provisional estimates for 2011 from now on*

What has been achieved so far (Source ETSC)




Percentage change in road deaths between 2010 and 2011

What has been achieved so far (Source ETSC)

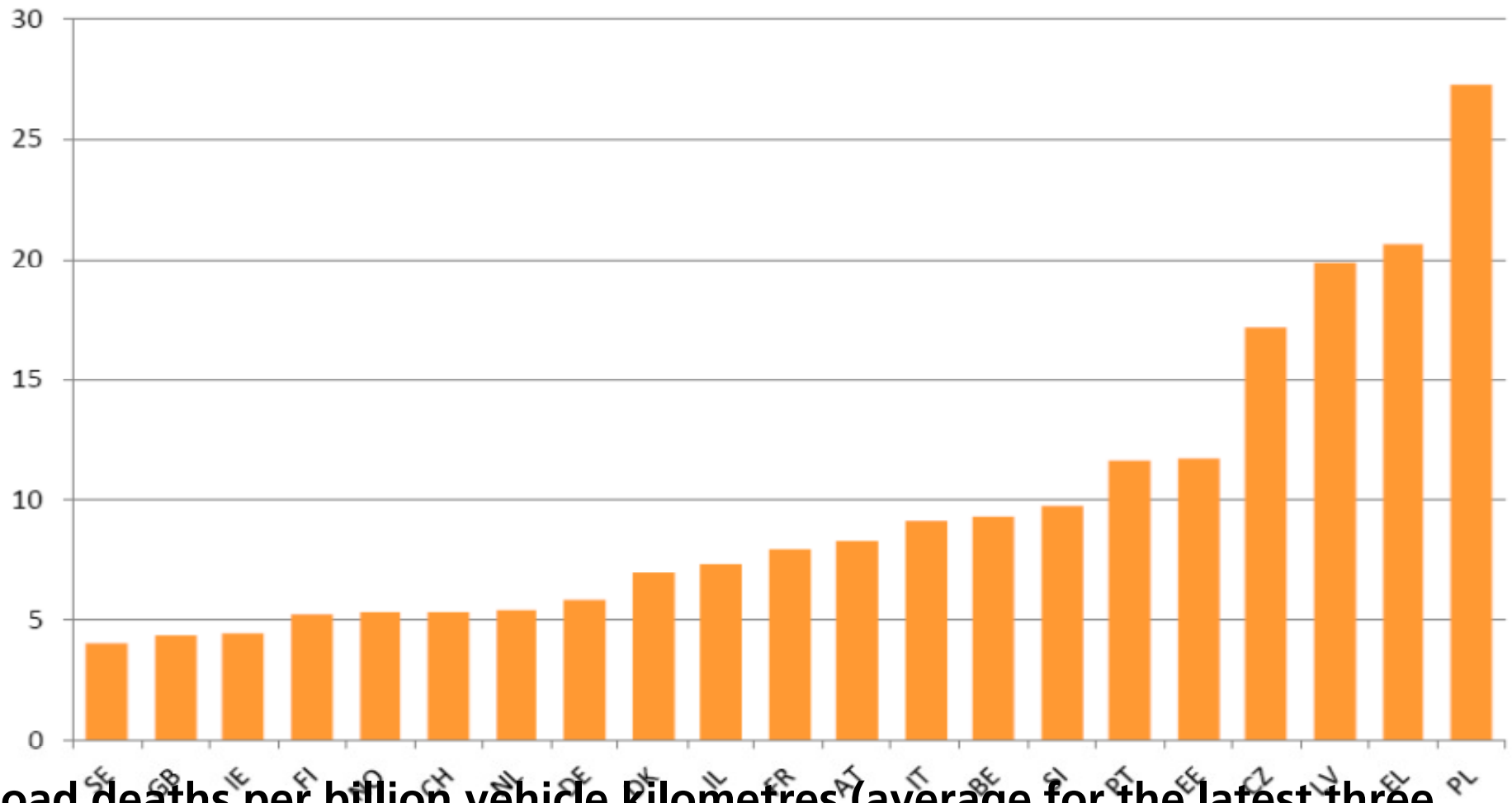


Road deaths per million inhabitants in 2011 (with road deaths per million inhabitants in 2001 for comparison)



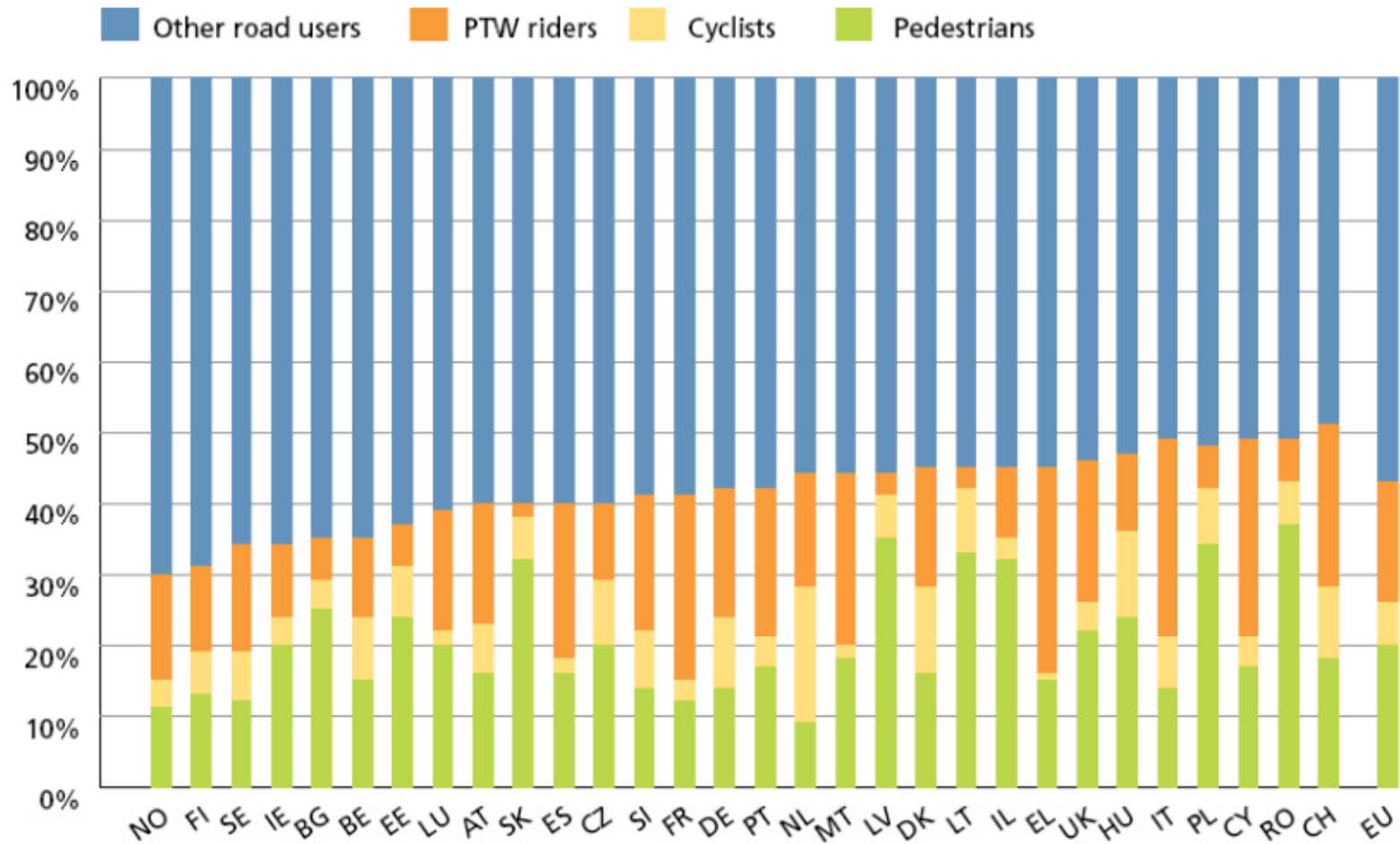
Why a stronger effort
is needed ...especially
for pedestrians and
cycle and PTW users?

Why a stronger effort is needed (Source ETSC)



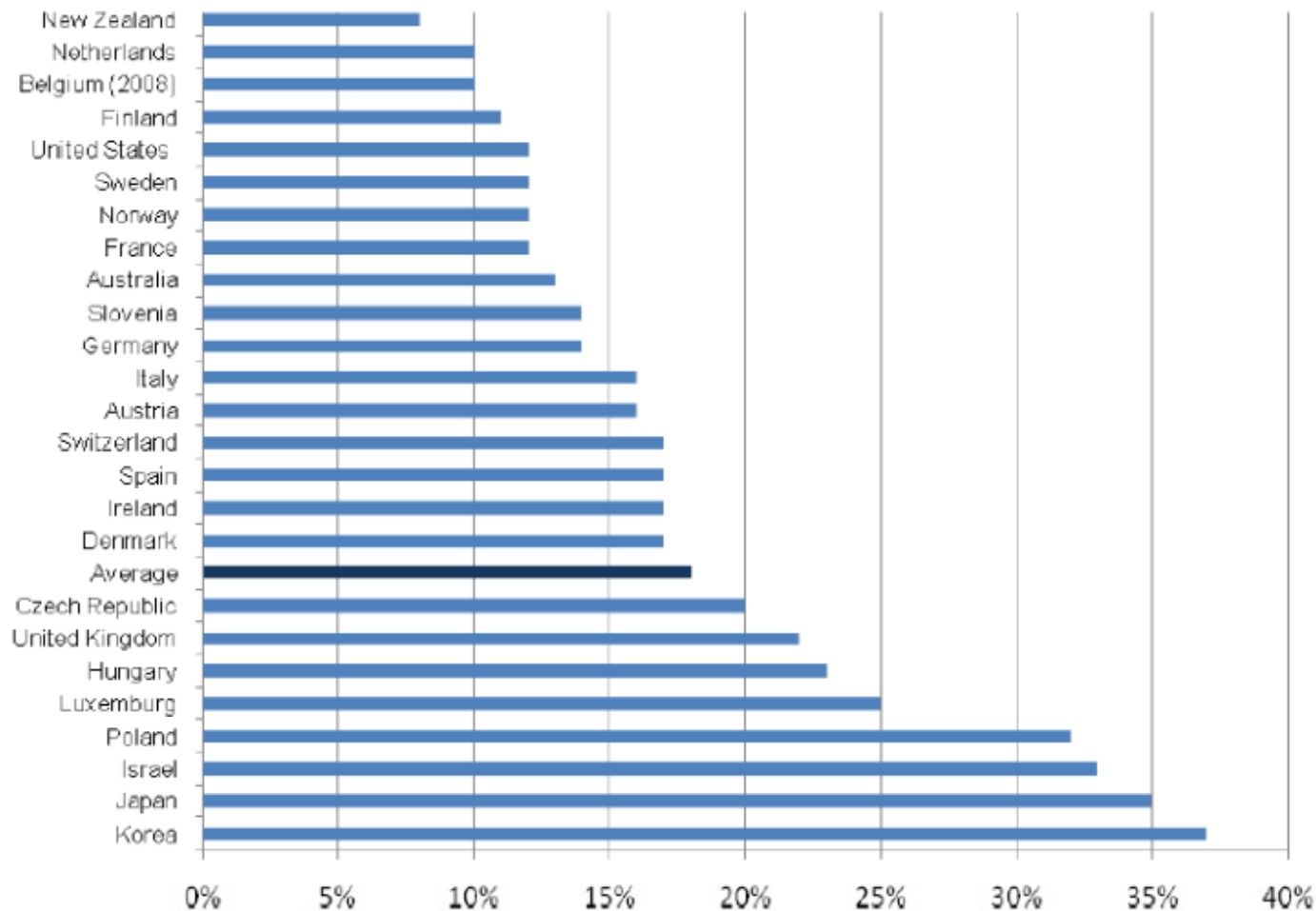
Road deaths per billion vehicle Kilometres (average for the latest three years for which both the road deaths and estimated number of vehicle-km are available)

Why a stronger effort is needed (Source ETSC)



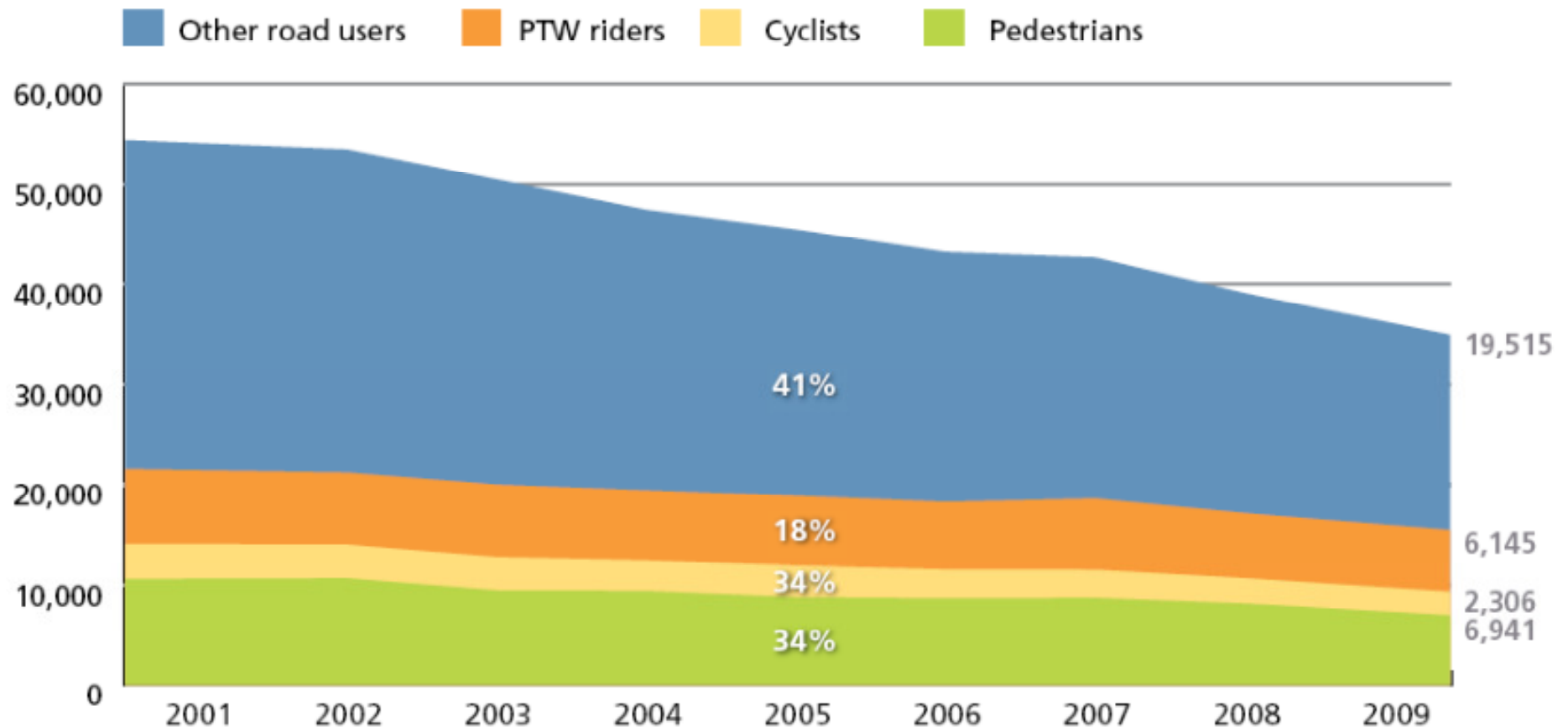
Pedestrians, cycle and PTW users' deaths as a percentage of all road deaths ranked by the share of deaths that were unprotected of all kinds taken together (2007-2009 average)

Why a stronger effort is needed (Source IRTAD)



Pedestrian fatalities as a percentage of all road fatalities (2009 , 26 OECD countries)

Why a stronger effort is needed (Source ETSC)



Reduction in road deaths 2001- 2009 for pedestrians, cyclists, PTW and other road users in EU-27

Why a stronger effort is needed (Source ETSC)

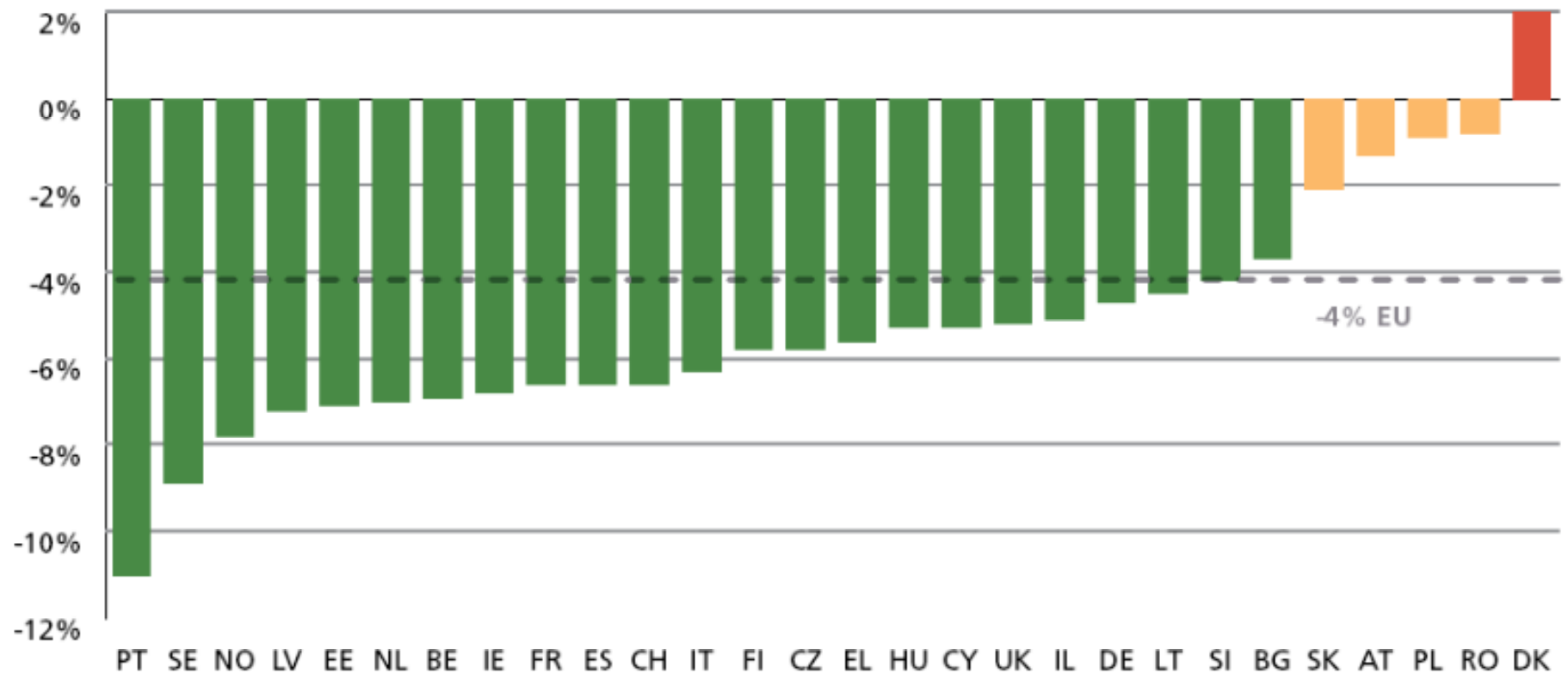


Fig. 10: Average annual percentage change in **pedestrian deaths** over the period 2001-2009.

Why a stronger effort is needed (Source ETSC)

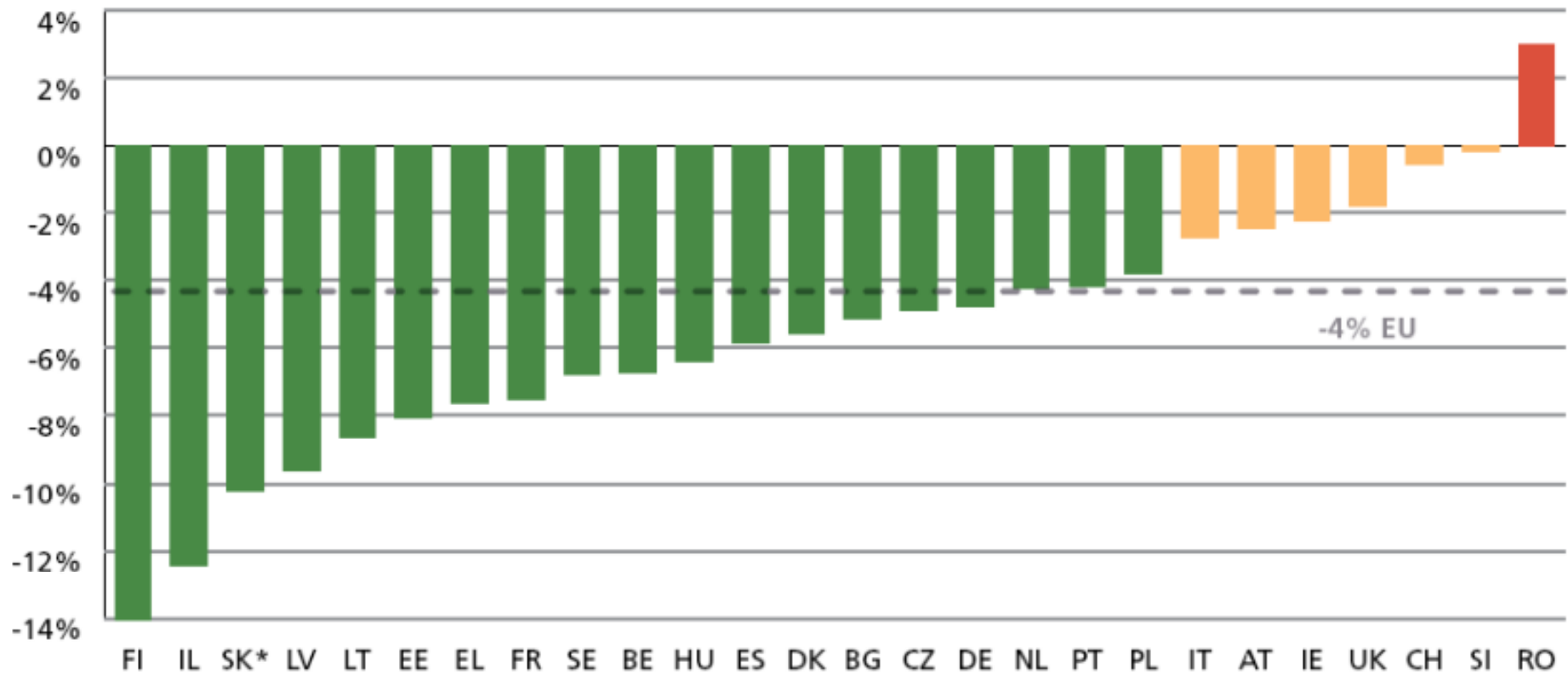


Fig. 11: Average annual percentage change in **cyclist deaths** over the period 2001-2009.

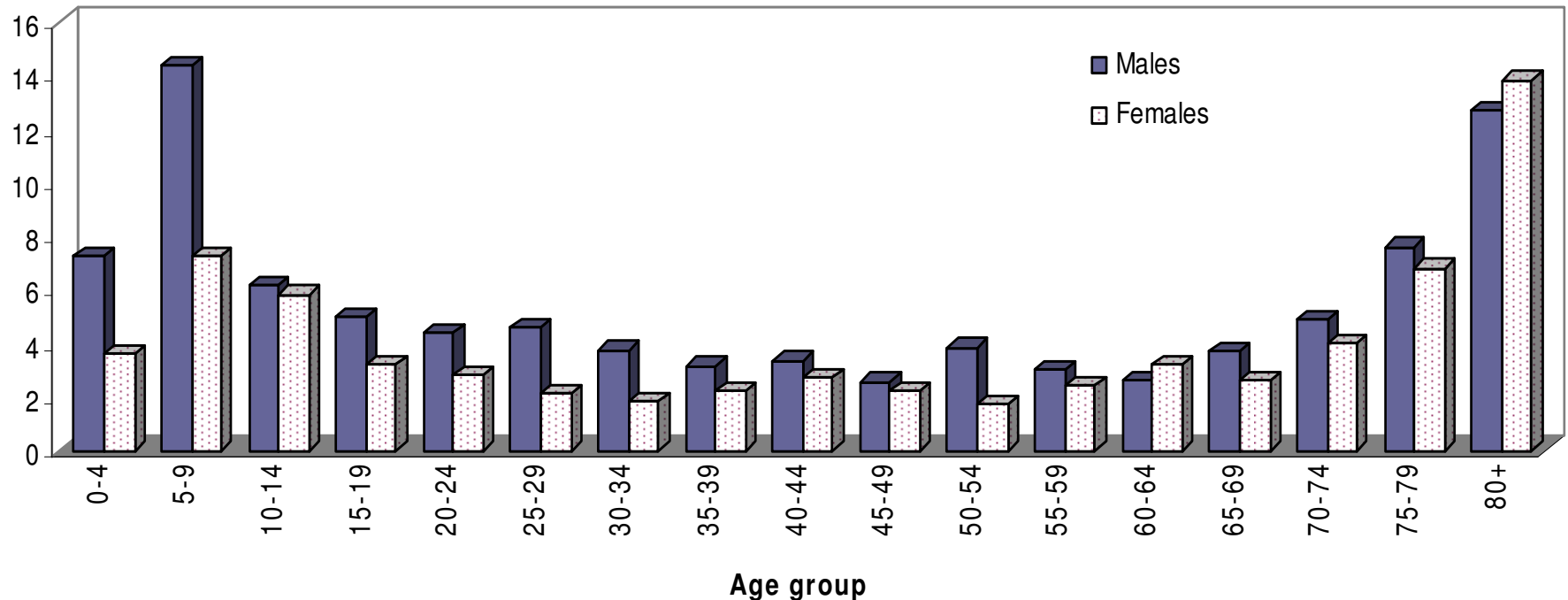
* SK 2002-2009.

CY, LU and MT are excluded from this ranking because the numbers of cyclist deaths in those countries are so small as to be subject to substantial random fluctuation.

Why a stronger effort is needed

Source: NZ Household Travel Survey

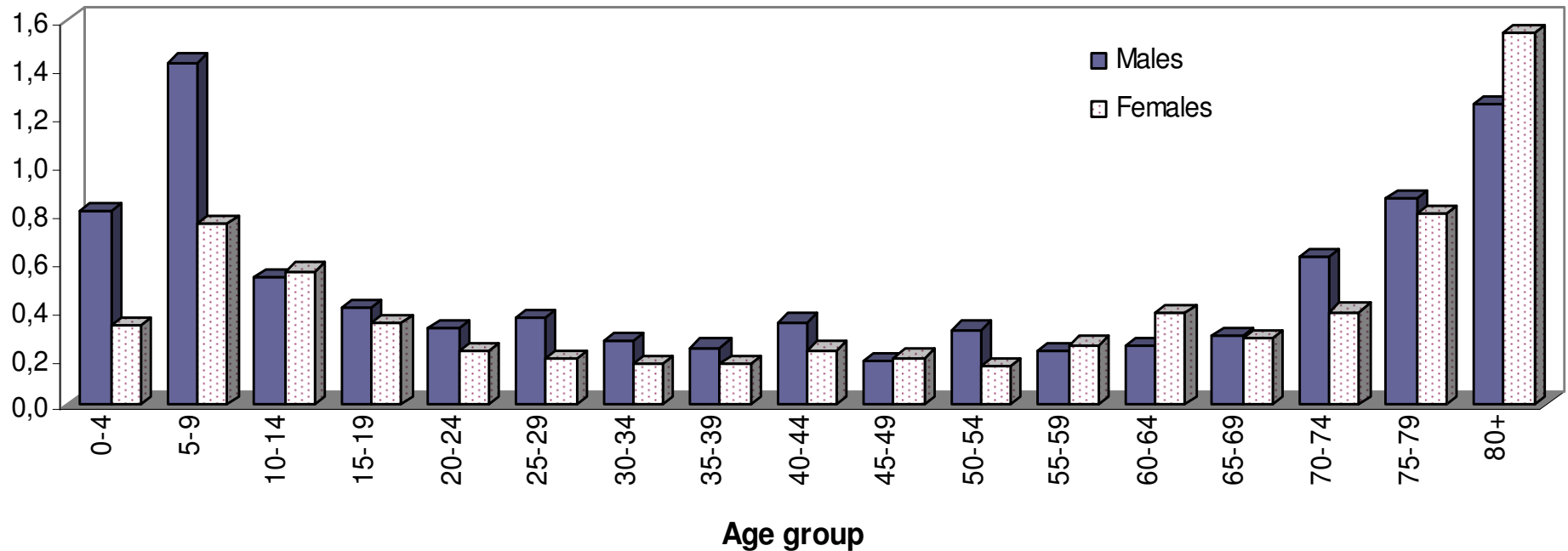
Pedestrians injured/ million hours



**Pedestrian vs motor vehicle age vs risk per time walked
(Source: NZ Household Travel Survey)**

Why a stronger effort is needed

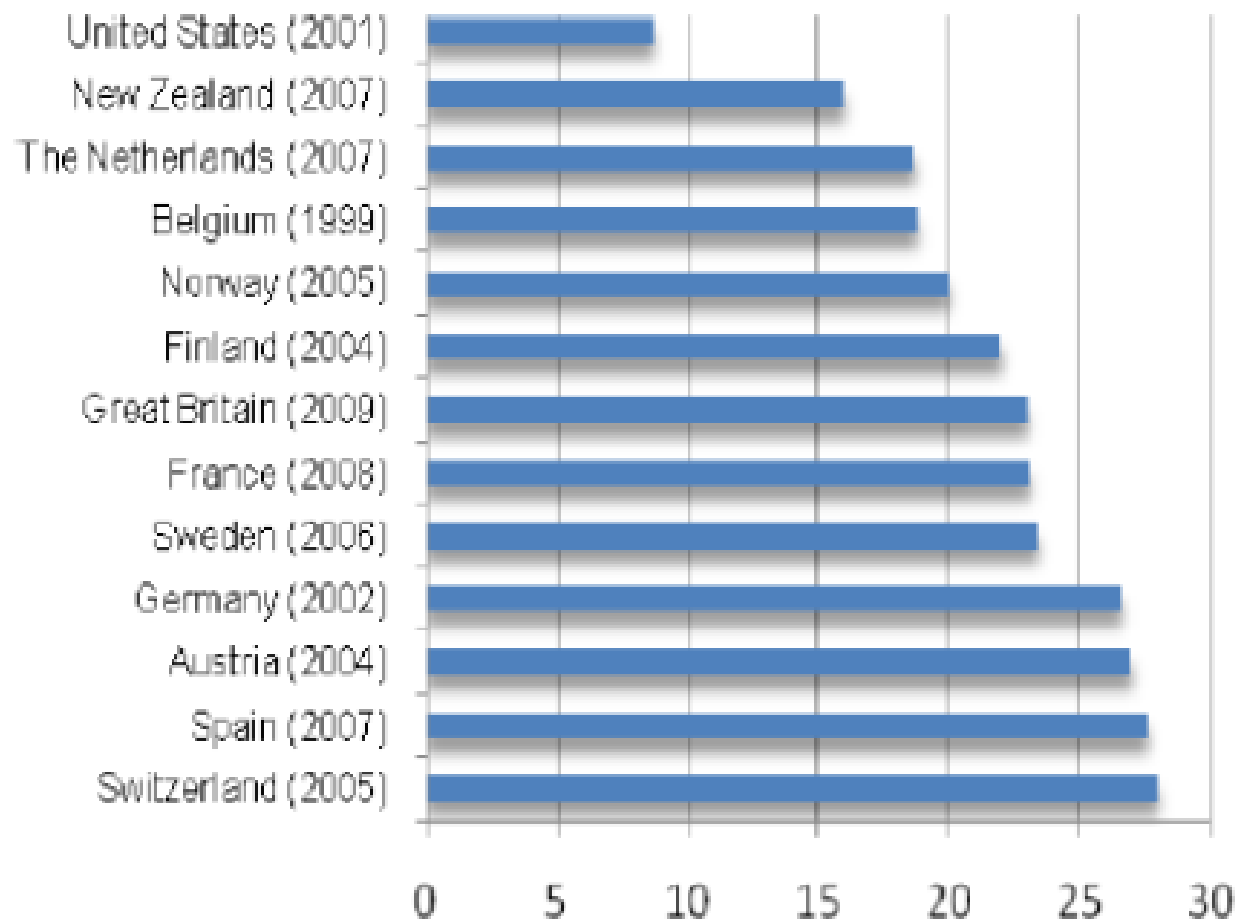
Pedestrians injured/ million road crossings



Pedestrian vs motor vehicle age vs risk per roads crossed
(Source: NZ Household Travel Survey)

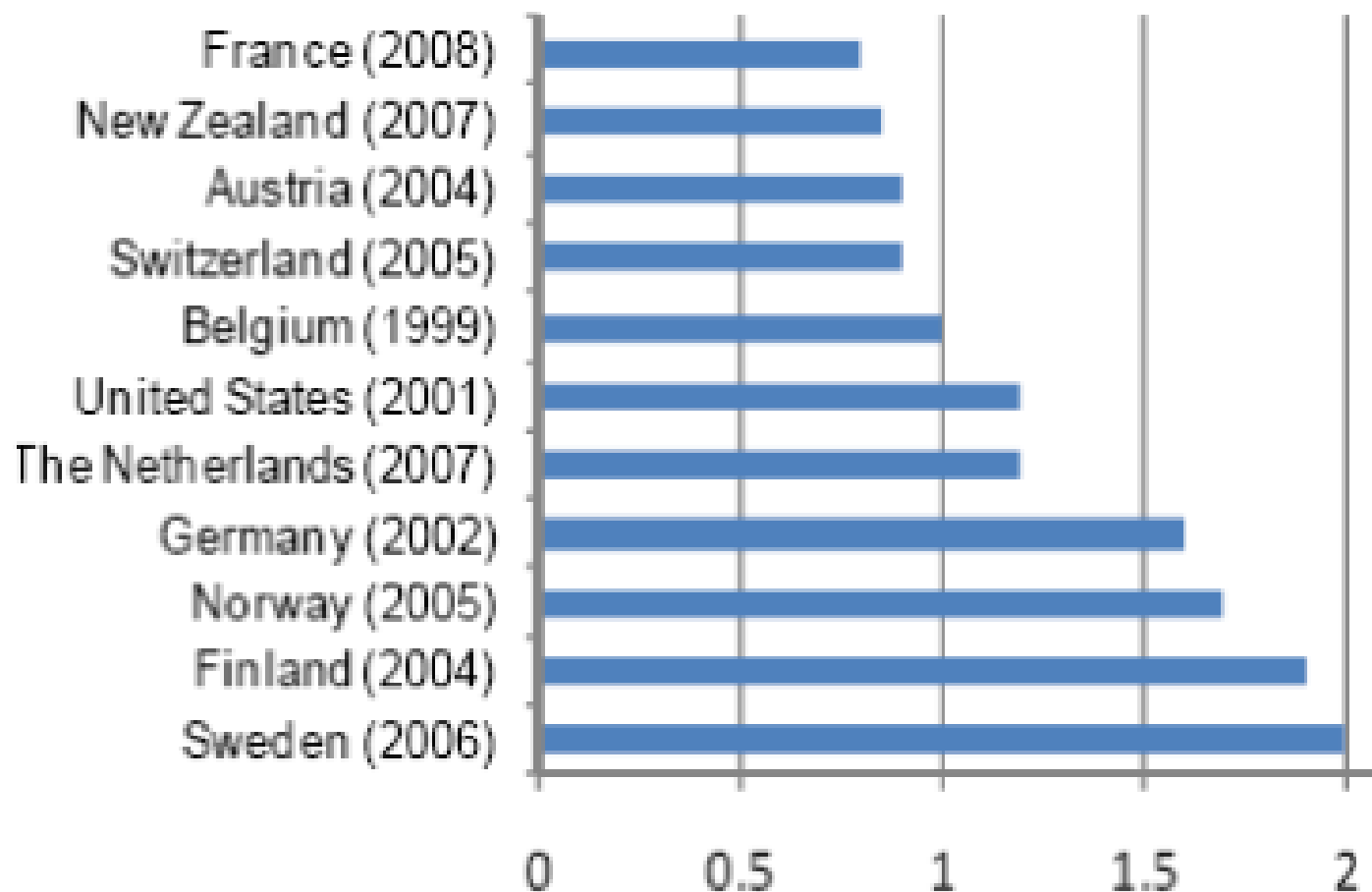
Exposure: pedestrian trips (Various national travel surveys)

Share of journeys on foot as a percentage of all trips

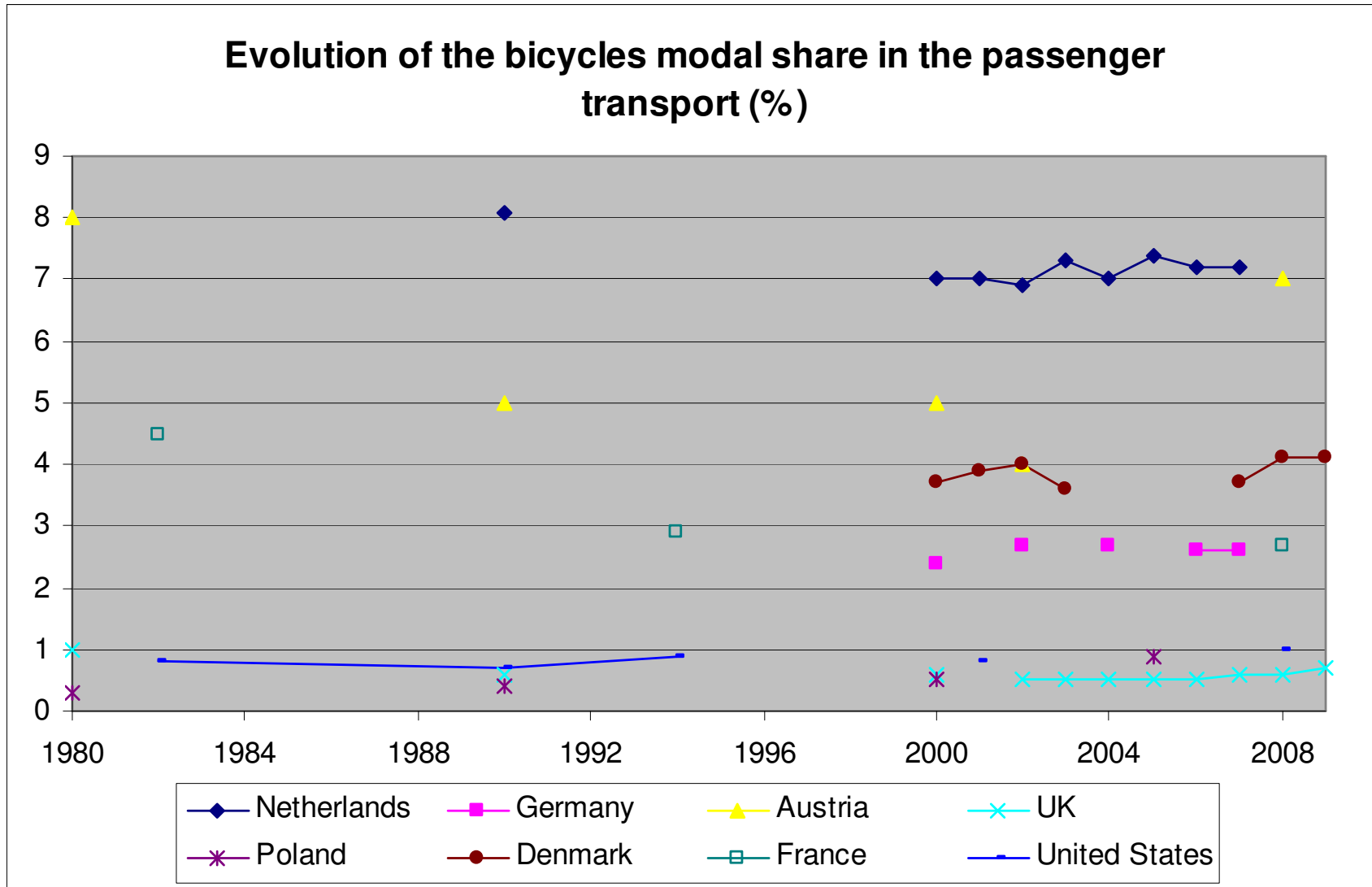


Pedestrian trips (Various national travel surveys)

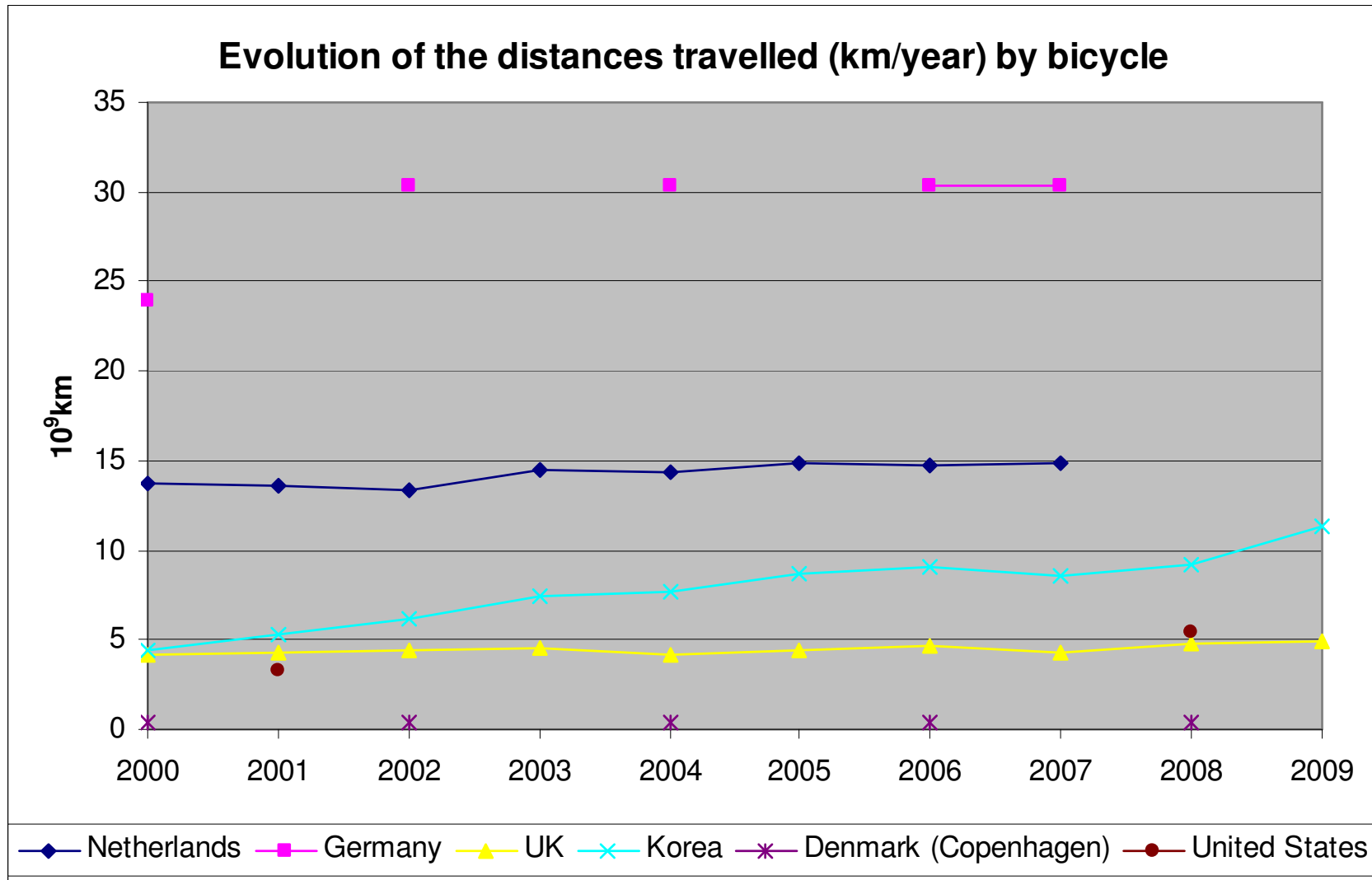
Average length of walking trip in km



Bicycle modal share (Source ITF/OECD)



Bicycle modal share (Source ITF/OECD)



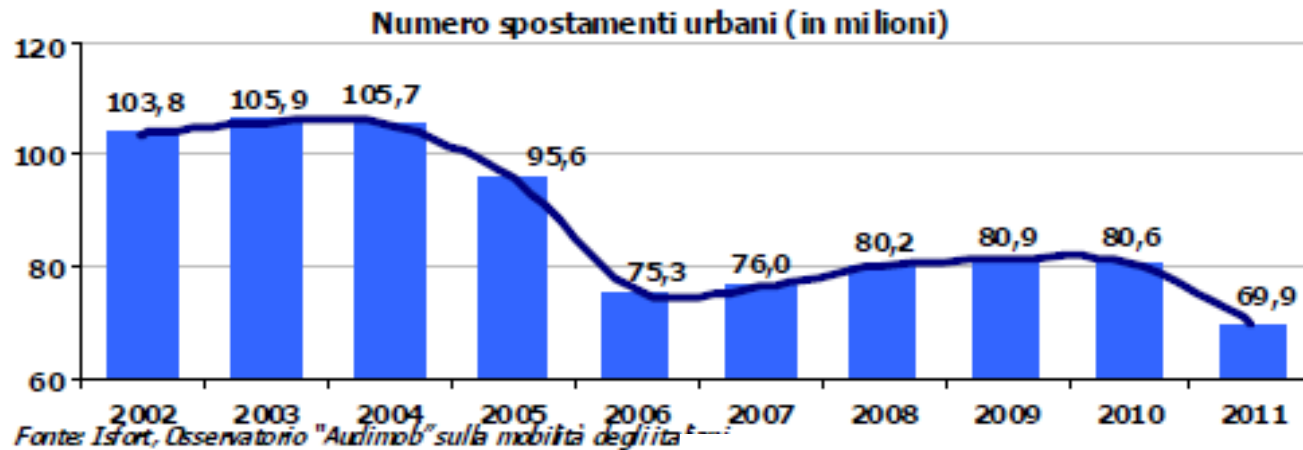
The underreporting is too important (Source: ANIA found.)

Italian ANIA Foundation for Road Safety reports 900,000 deaths + injured (serious and slight) in 2011 against the 290,000 of official statistics.

According to their data, the figure is slightly less than 2007 ...

We know that underreporting is particularly high when considering pedestrian and cycle users' accidents!

Why a stronger effort is needed (Source ISFORT - I)



Mobility demand in a spare day in Italy

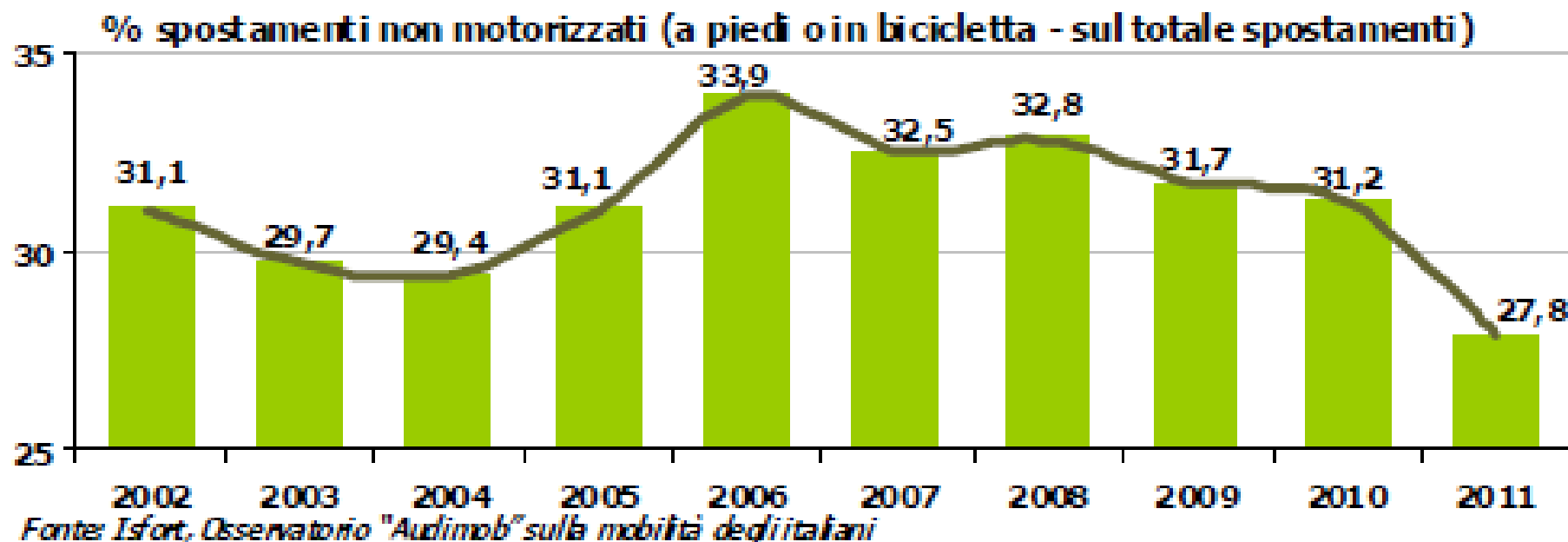
- All of trips in urban areas (up, per million) (2002-2011)
- % of trips in urban areas on the total (down) (2006-2011)

Why a stronger effort is needed

(Source ISFORT -

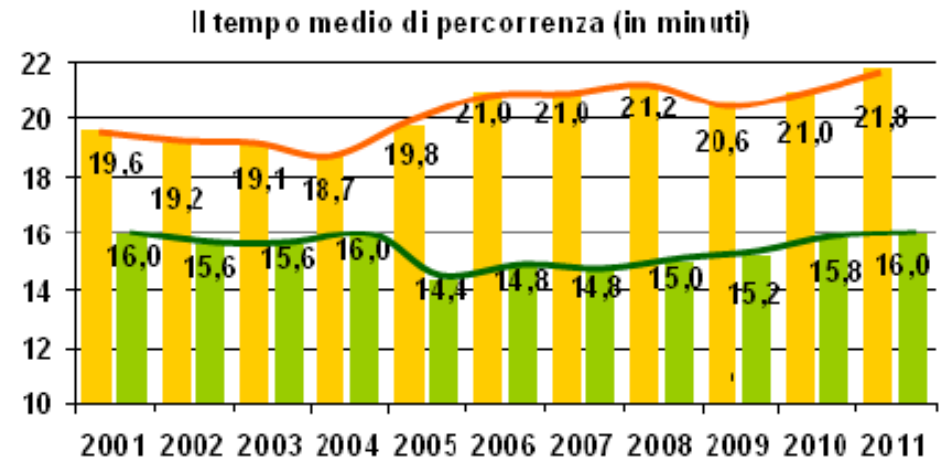
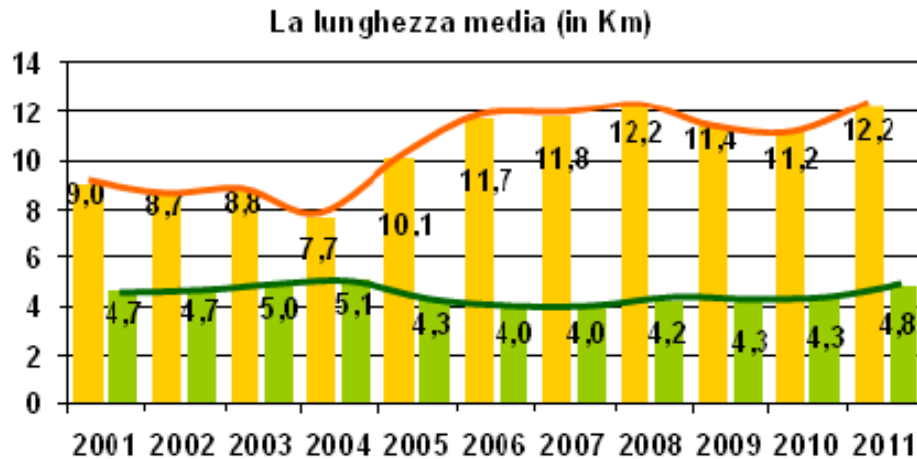
I)

B) Le modalità di trasporto



Percentage of journeys made by foot and bicycle in urban areas in Italy (2002-2011)

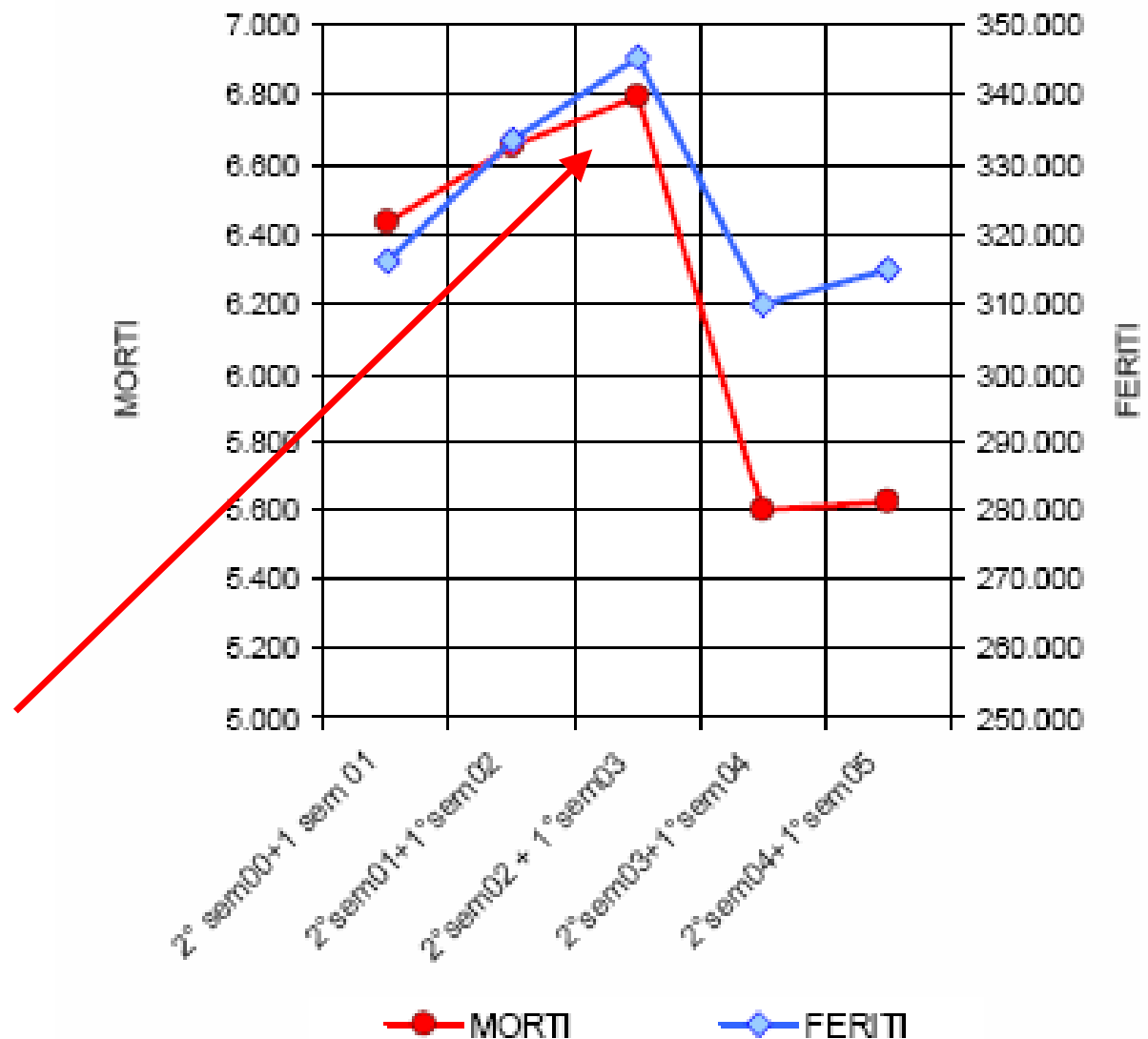
Why a stronger effort is needed (Source ISFORT - I)



-Length of trips with all modes in Italy (2001-2011):
total (in orange)
in urban areas (in green)

The effect of measures is sometimes very short (Source: M. Coppo- RST)

Fatality rates after the introduction of the penalty point system in Italy (2003)



What is yet to come?

The forgotten modes

The aim of the presentation cannot just be a repetition of (well known) data, but the effort of identifying the main reasons why walking and cycling are often forgotten in urban mobility.

So the main features of the crucial integration between mobility and urban planning will be assessed

The integration between mobility and urban planning

Lessons from history show how different cultures have tried to make urban space an asset by shaping it to the needs of the population (sometimes indeed a small portion of it)

The integration between mobility and urban planning

One aspect of cities through history has been the problem of facilitating the movement of people going about their daily life

The integration between mobility and urban planning

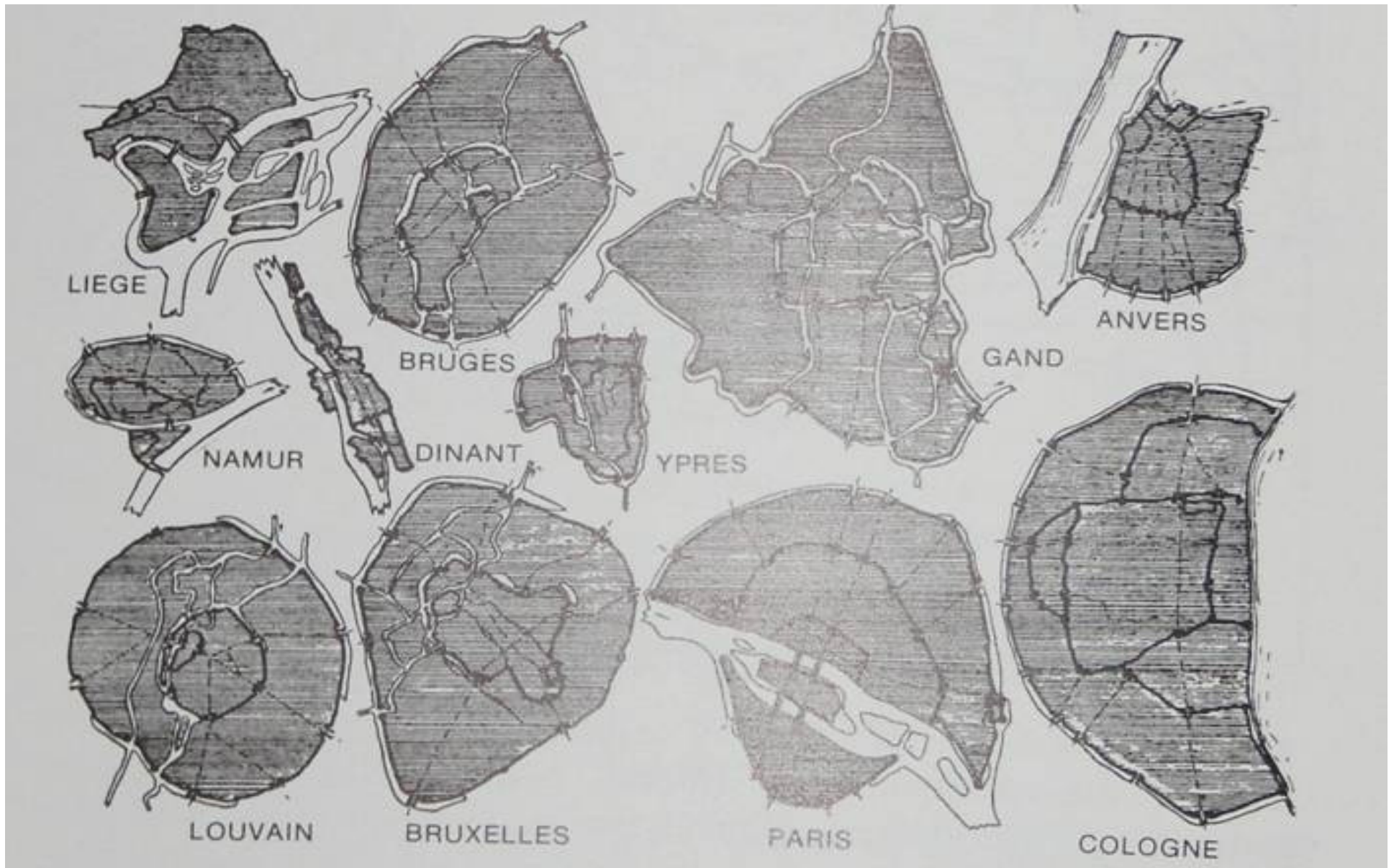
The lesson from history already gives three main hints to the actual planning issues:

- proximity as a pre-condition and a planning criteria,
- energy saving as a criteria to choose the means of transport,
- safety as a quality feature to walking and cycling.

Proximity

When living under the constraints of the sole pedestrian and animal power means of transport, urban settlements had **a reduced size being easily accessible on foot.**

Proximity was a must and life was held in a relatively narrow space.



European medieval towns of similar size in the XIV century (Benevolo, 1997)

Proximity



Proximity in the residential units. Radburn – New Jersey

The lost proximity

The era of the private car has completely changed town design worldwide. Most urban settlements have been planned explicitly assuming the use of the private car.



Loosing proximity

1

So people walk and cycle less because there are no destinations within a walkable or cyclable distance:

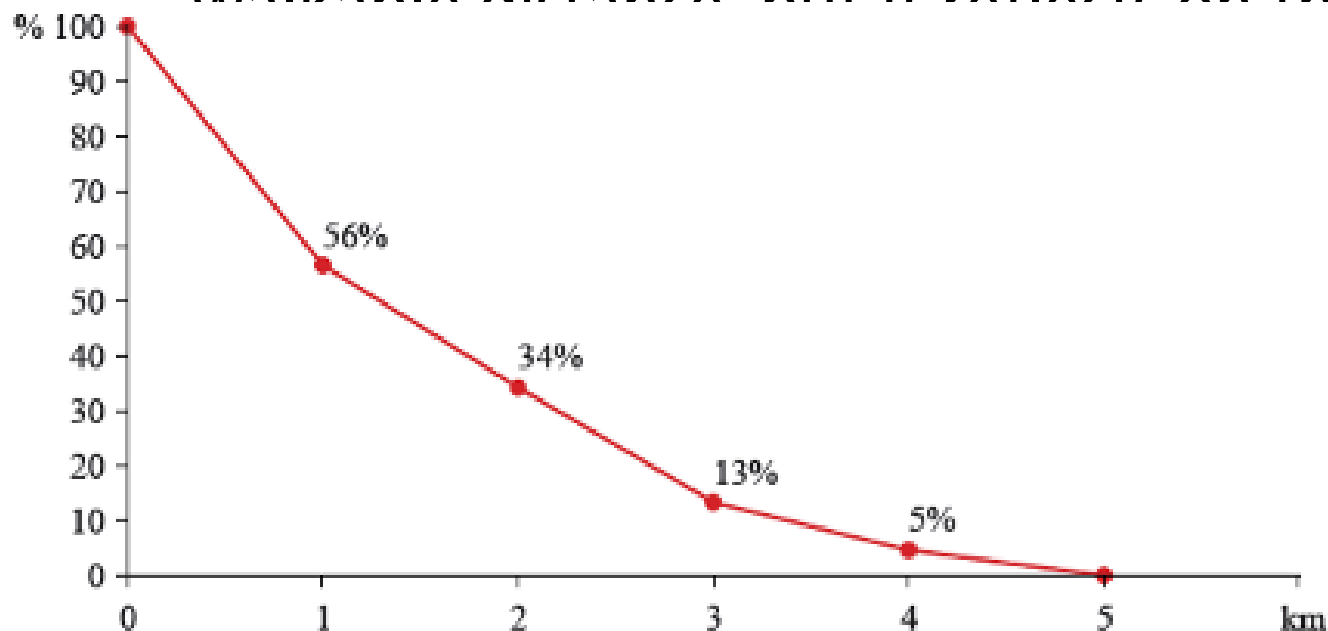
- shopping malls can be reached only by car (for distance and for safety reasons) and parking facilities are greater and free;
- services are concentrated for economic reasons (scale economy);
- public transport have then lost customers and reduced their efficiency

- work places are not fixed, so trips are multi-scope and they need a flexible means of transport;
- the relatively less expensive transformations in rural areas make sprawl more cost-efficient than urban renewal;
- low density is better appreciated by high income communities and sometimes defended for landscape

Proximity and the effect of urban distances

It seems that the acceptable walkable distance is increasing with the size of the core city. When distances appear greater, facades are longer, streets wider, people accept a longer trajectory to get to the final destination.

This is true for the travel time, foremost for the walkable distance, but it reflects on the distance



Pedestrian trips
by distance (%),
Germany 1989
(Krag, 1993)

The effect of “urban environment” as determined in urban planning

Morphology of towns is going to be lost thus influencing the ability of people to “read” urban environment

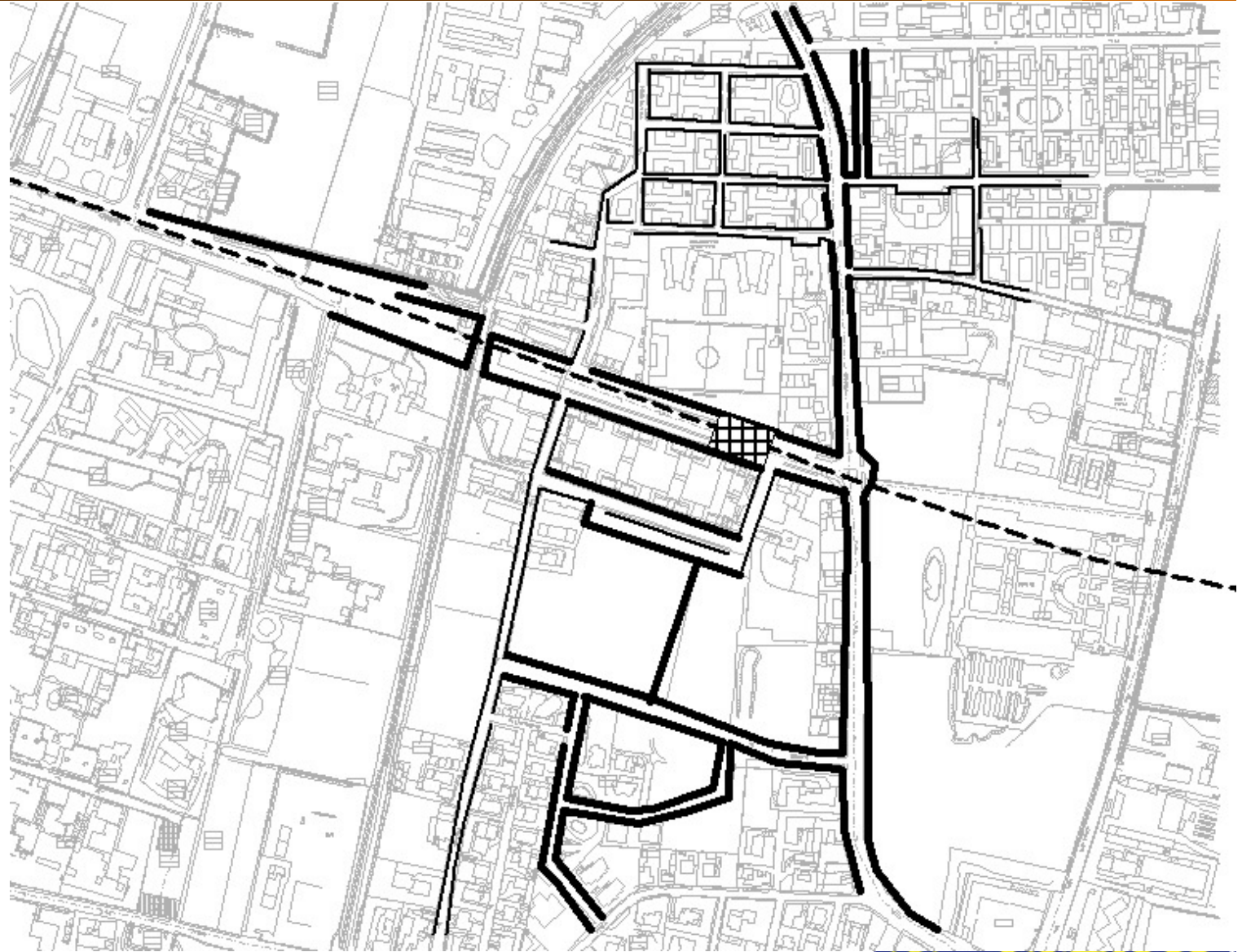
Road layout is given to users is an ever more intelligible way: the diffusion of GPS on cars is substituting maps, but continuing the tradition of clearing the way to car drivers.

Pedestrians hardly know the dedicated facility network and they cannot really plan the trip: they will not know the sidewalk conditions, width, maintenance, continuity, visibility, lighting, comfort, etc..

The lack of information can highly influence the modal choice.

WHAT KIND OF FACILITIES AND INFORMATION DO PEDESTRIAN NEED?

The dimension of sidewalks



Fonte: B. Badiani

Traffic components

LEGENDA

Le componenti di traffico nella sede stradale

———— Veicoli

- - - - - Biciclette

—— Pedoni

Percorsi riservati

◄◆► Trasporto collettivo e fermata

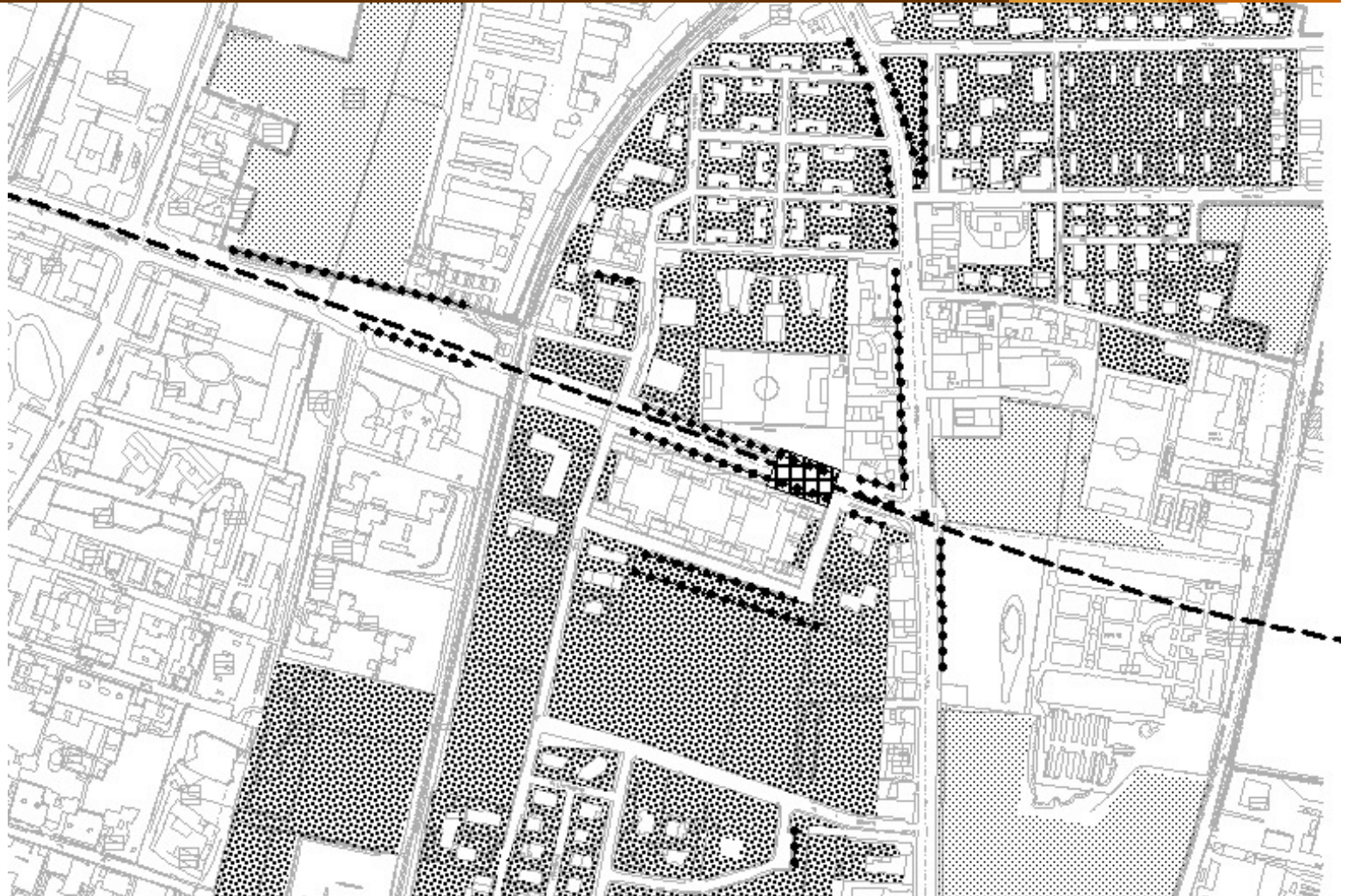
..... Ciclabile e pedonale

Impronta della fermata
sotterranea del metro

- - - - - Linea della metropolitana



Presence of green areas



Fonte: B. Badiani

Built environment



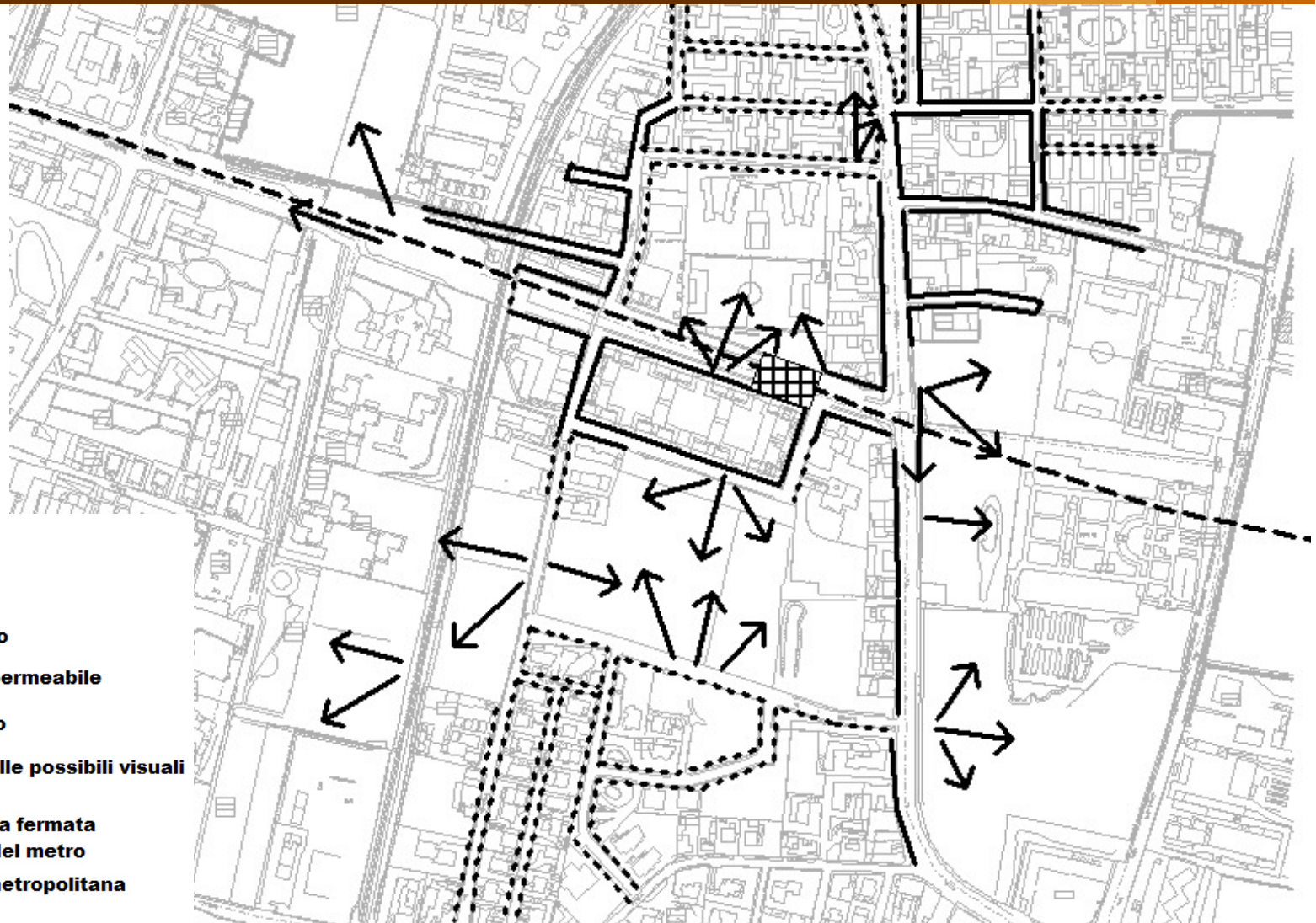
Fonte: B. Badiani

View from the path

LEGENDA

Il rapporto con i bordi

-  Bordo chiuso
-  Bordo semipermeabile
-  Bordo aperto
-  Direzione delle possibili visuali
-  Impronta della fermata
sotterranea del metro
-  Linea della metropolitana




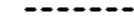


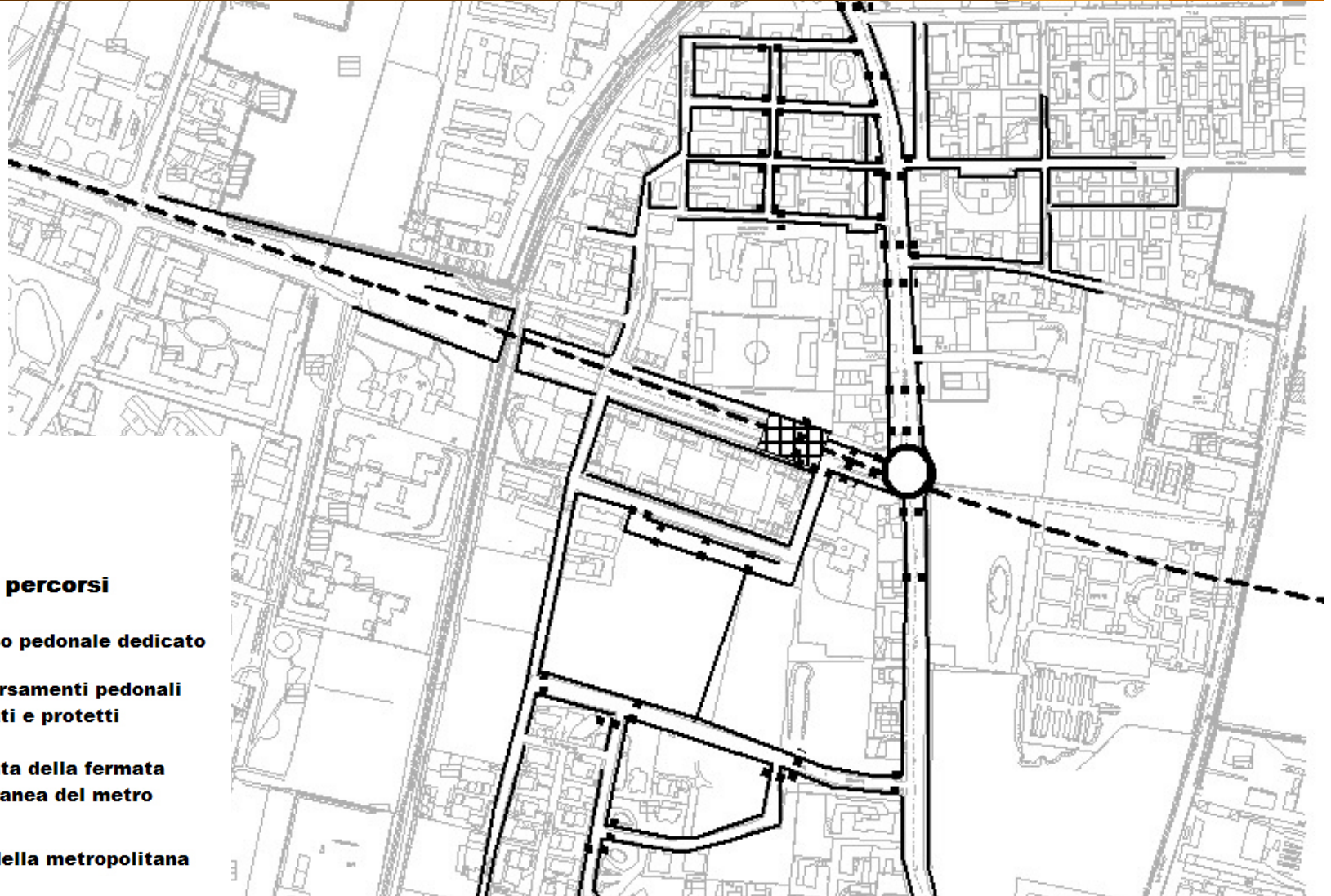
Fonte: B. Badiani

Continuity of paths

LEGENDA

La continuità dei percorsi

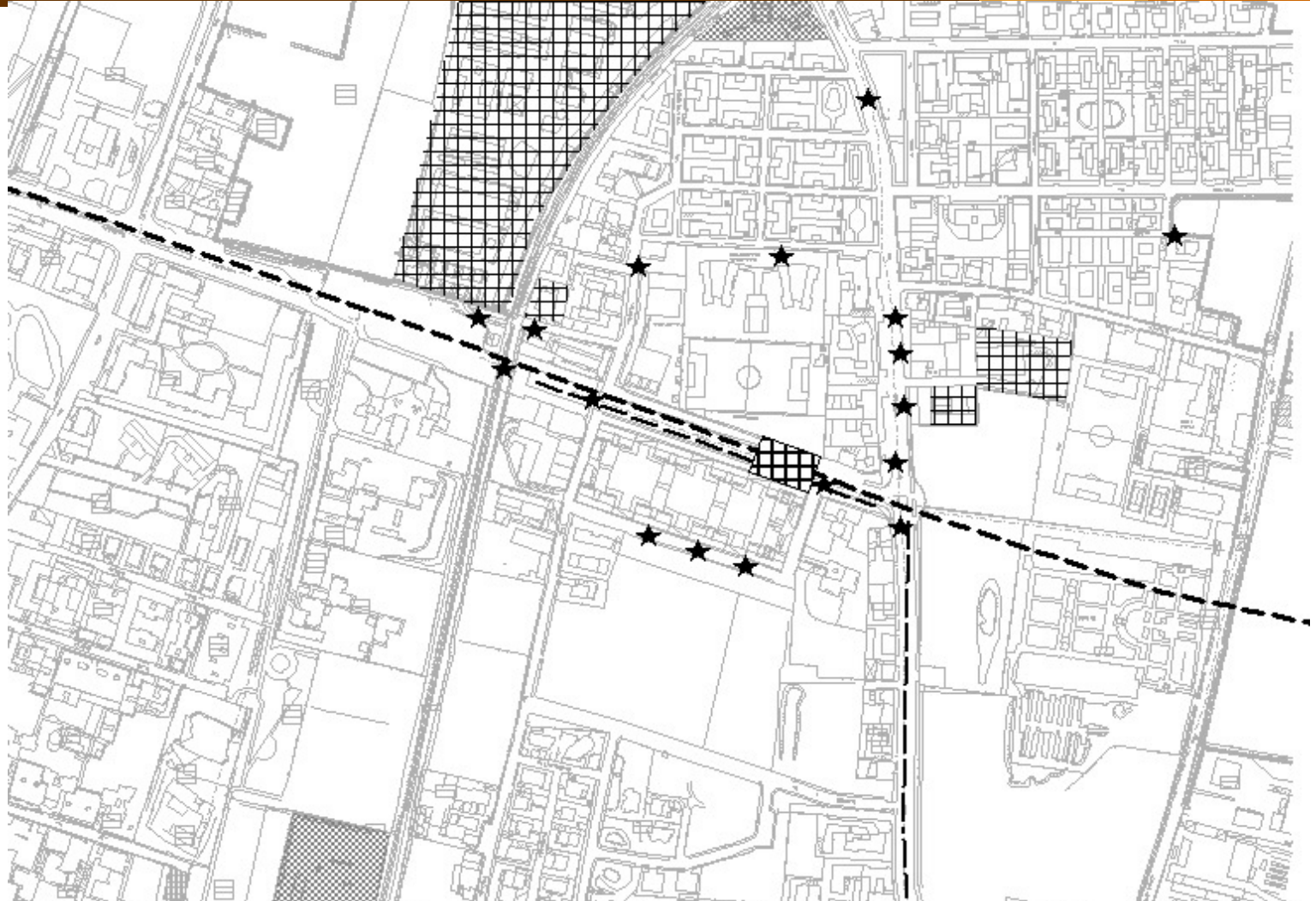
-  Percorso pedonale dedicato
-  Attraversamenti pedonali segnalati e protetti
-  Impronta della fermata sotterranea del metro
-  Linea della metropolitana



Fonte: B. Badiani

Safety of pedestrians (M Tira)

Safety and security: accident location



Fonte: B. Badiani

Energy saving

Proximity was not just a matter of rationality, but also affected by “**energy saving**” needs.

Even at the origin of several urban design in the central European hills we may find the morphological features: the fascinating slow curved medieval streets of Siena follow the contour lines in a space difficult to plan, and the secondary links have been realised with stairs.

[illegible]

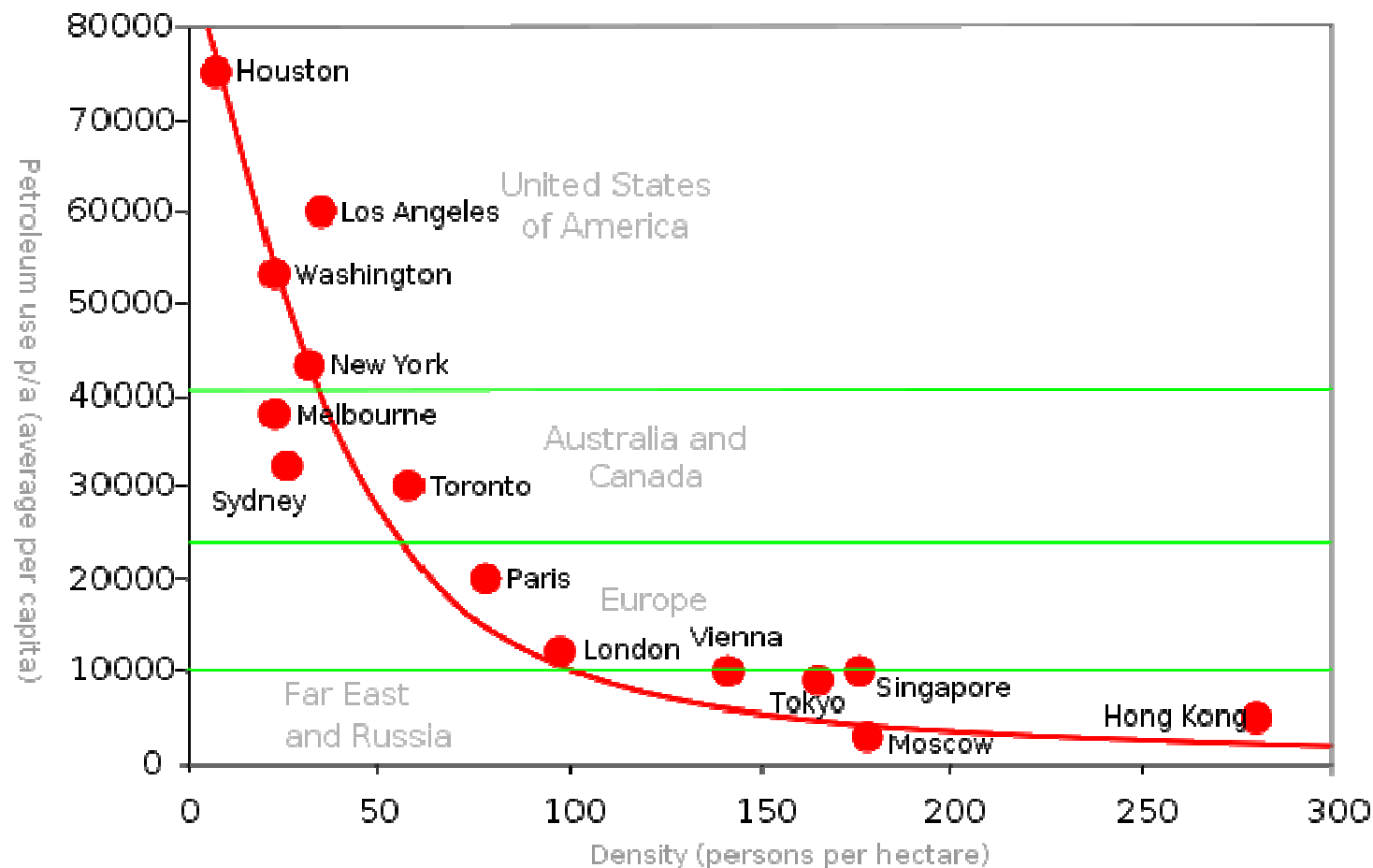
(Italy) (Google m

The logo of the European Transport Safety Council (ETSC) is displayed. It consists of the letters 'ETSC' in a stylized font, where the 'E' and 'T' are white on a dark background, and the 'S' and 'C' are dark on a light background. Below the letters, the full name 'European Transport Safety Council' is written in a smaller, sans-serif font.

Safety of pedestrian

Energy saving: transport and land use

A commonly used study of 32 cities by Newman & Kenworthy in 1989 concluded that there was a strong link between urban development densities and petroleum consumption.



Safety

Already in the roman towns pedestrian facilities were conceived to allow a more comfortable movement even at the time when animal power drive chariots were the only danger (as shown by the pedestrian raised crossings of Pompei, the Italian city destroyed under the Vesuvio eruption).





THE NEED FOR AN INTEGRATED MOBILITY AND URBAN PLANNING

The need for an integrated mobility and urban planning

Separation of urban and mobility planning have been the general rule through most of planning attempts to include cars in cities, such as Athens' Charter

The key concept was the creation of independent zones for the four 'functions': living, working, recreation, and circulation.

The need for an integrated mobility and urban planning

Some of these concepts have been widely adopted by urban planners, but mainly that of separating urban functions, rather than the inflexible approach to road hierarchy.

The need for an integrated mobility and urban planning

When considering the development of urban areas, three main phenomena occur:

- the building of city extensions (urban sprawl), consuming new land but easier for implementing mobility networks and also pedestrian-friendly schemes;

The need for an integrated mobility and urban planning in a time of crisis

... but in a time of crisis those phenomena
are mainly:

- the reconstruction of cities, through brown-field regeneration, taking into account the relationships between administrators and developers;
- the new implementation of transport networks in existing urban infrastructure.

A new (or renewed) land use development model is needed

- “New Urbanism”
 - “Smart Growth”
 - “Car-free cities”
 - “Transit-oriented Developments”
- are coming to illustrate new possibilities for integration of transport and land use planning
- ... and Urban Safety Management as a global approach to road safety

Transit Oriented Development (TOD) 1



Public transport spatial accessibility: the new proximity challenges (Brescia – I)



Present

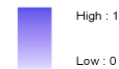


Future (after metro)

LEGENDA

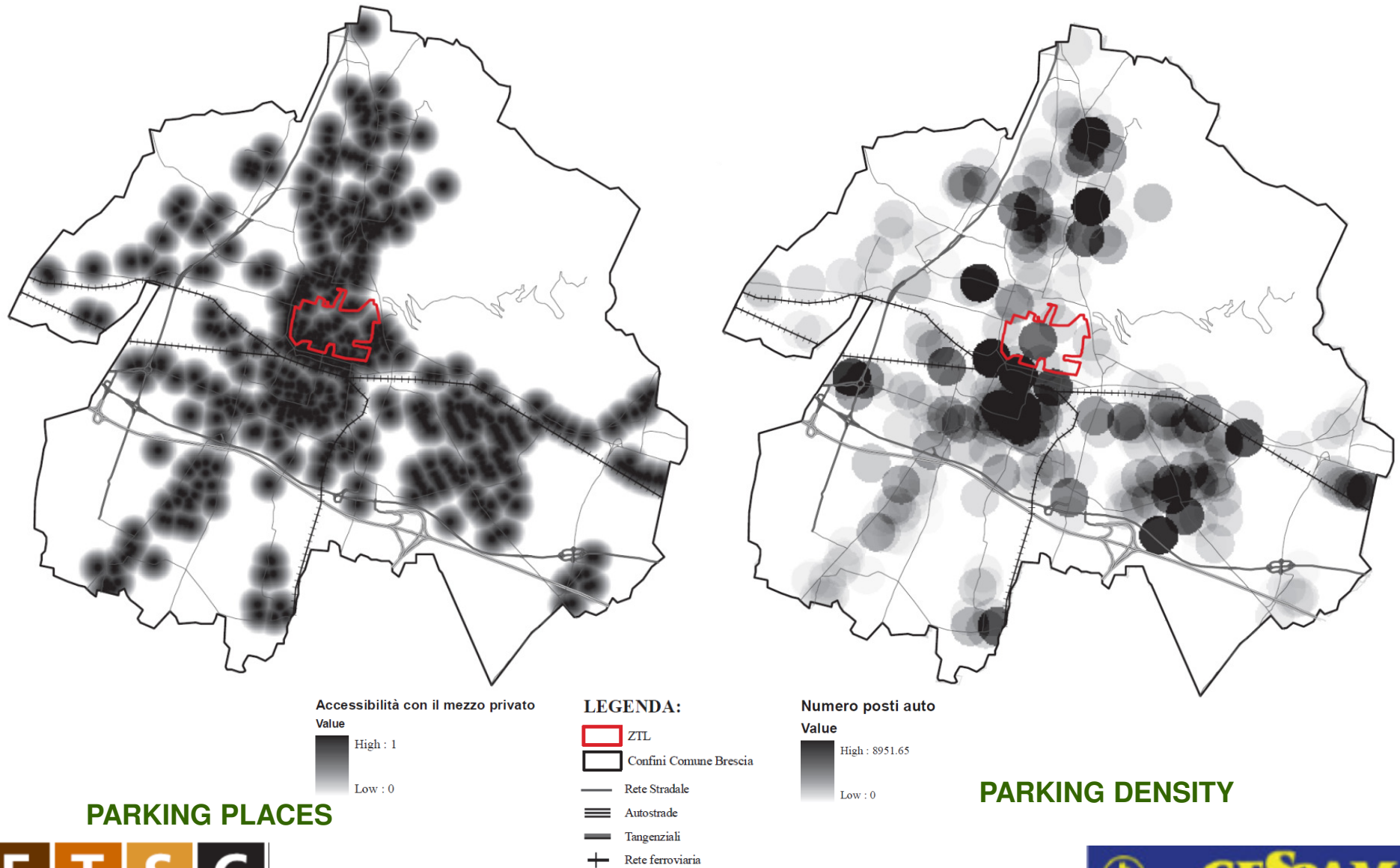
- Confini Comune Brescia
- Linee TPL
- Linea Metropolitana

Accessibilità con tutti i modi di trasporto pubblico (TPL, Metro e Bicimbia)
VALORE



- Rete Stradale
- Autostrade
- Tangenziali
- Rete ferroviaria

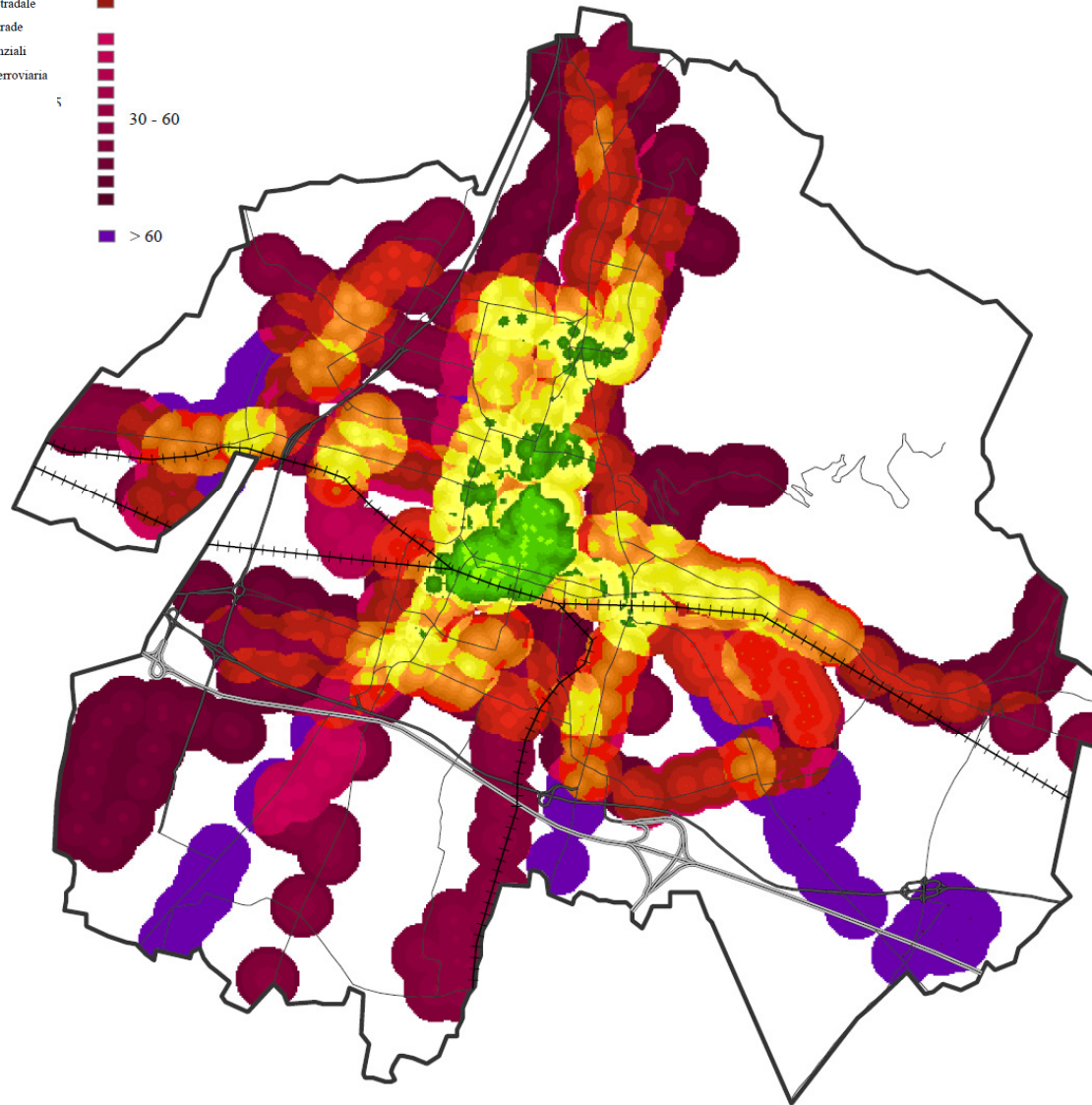
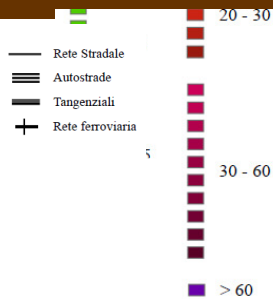
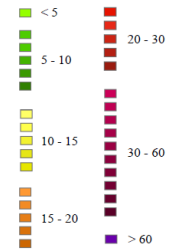
Private car spatial accessibility



Time accessibility by public transport 5.00 – 7.00

LEGENDA

Confini Comune Brescia
Tempo di accesso al mezzo pubblico
nelle ore di morbida mattutina e serale [minuti]



Time accessibility by public transport 7.00 – 9.00

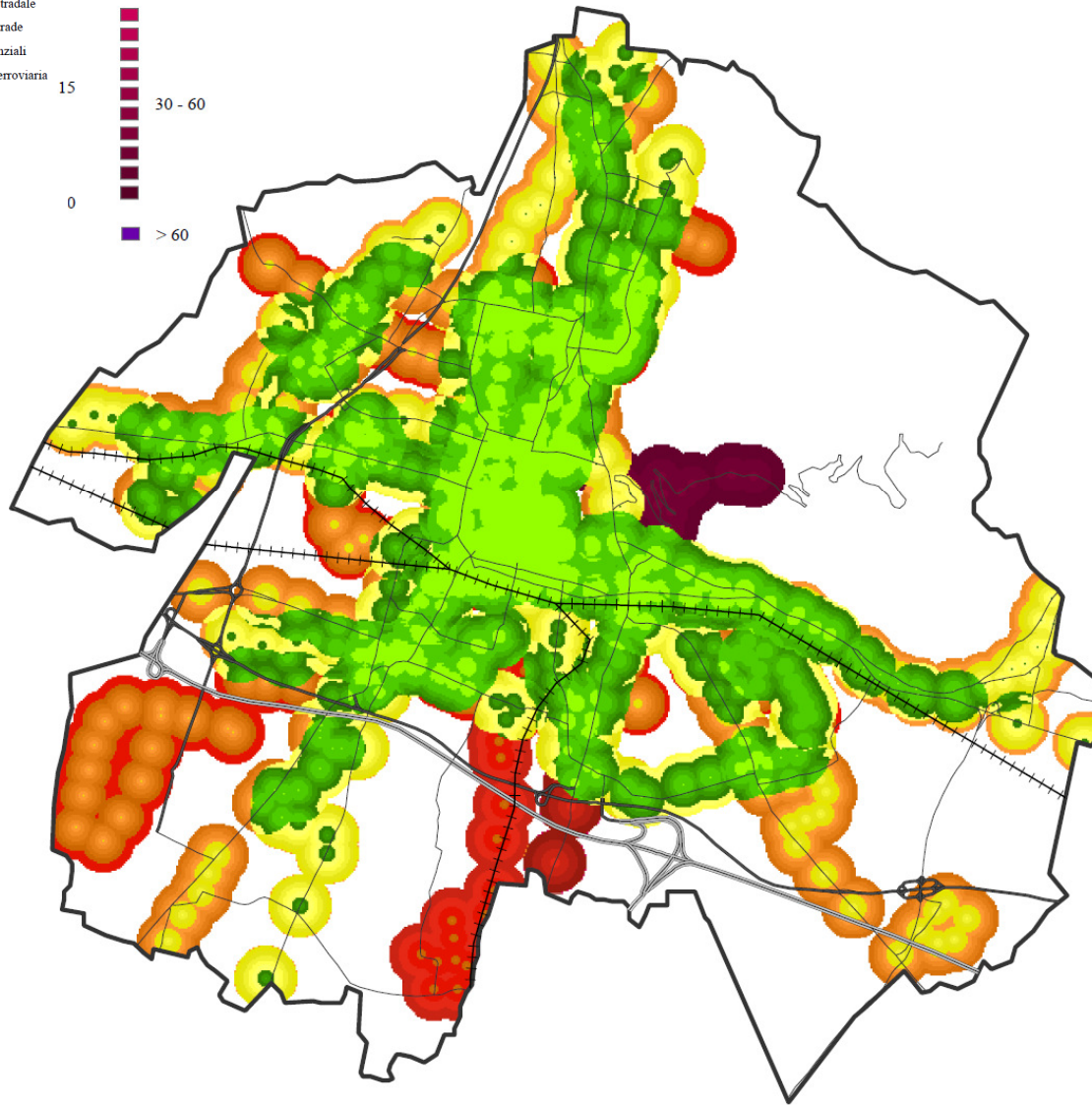
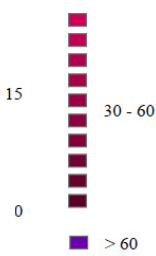
LEGENDA

Confini Comune Brescia

Tempo di accesso al mezzo pubblico nelle ore di morbida mattutina e serale [minuti]

< 5	20 - 30
5 - 10	30 - 60
10 - 15	> 60
15 - 20	

Rete Stradale
Autostrade
Tangenziali
Rete ferroviaria



Time accessibility by public transport 9.00 – 11.30

LEGENDA

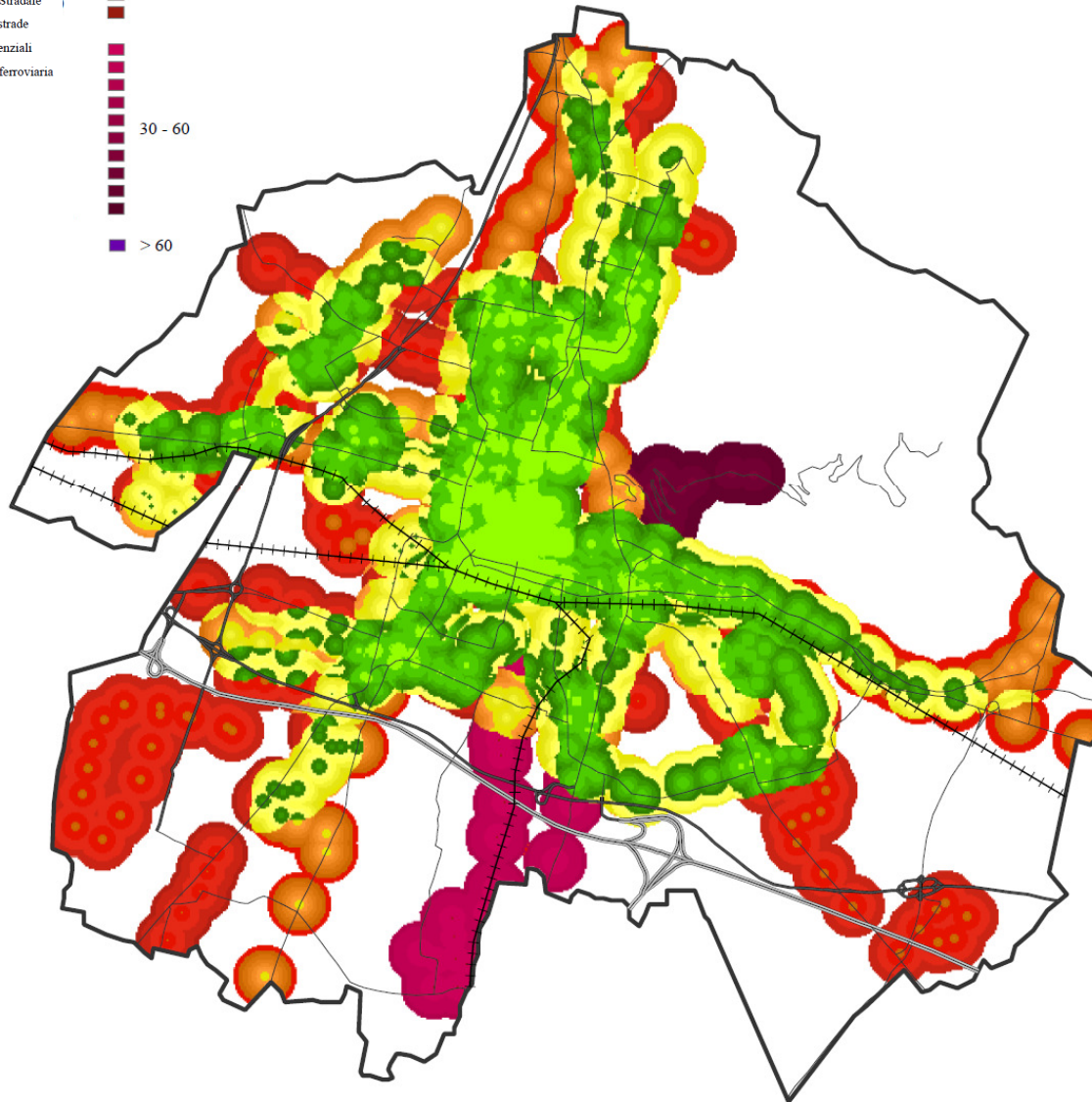
Confini Comune Brescia

Tempo di accesso al mezzo pubblico
nelle ore di morbida mattutina e serale [minuti]

< 5	20 - 30
5 - 10	30 - 60
10 - 15	> 60
15 - 20	

Rete Stradale
Autostrade
Tangenziali
Rete ferroviaria

30 - 60
> 60



Time accessibility by public transport 11.30 – 14.00

LEGENDA

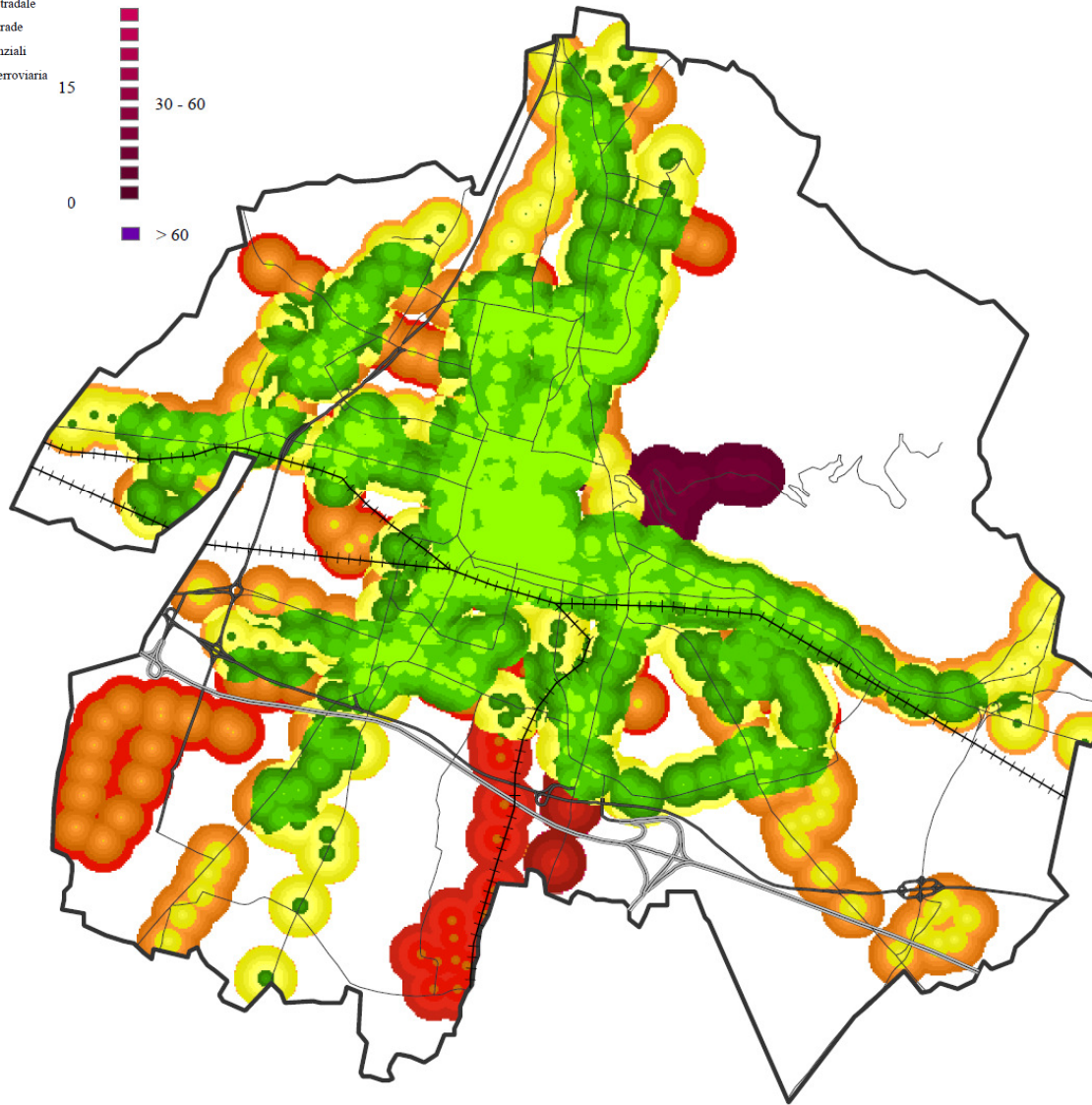
Confini Comune Brescia

Tempo di accesso al mezzo pubblico
nelle ore di morbida mattutina e serale [minuti]

< 5	20 - 30
5 - 10	30 - 60
10 - 15	> 60
15 - 20	

Rete Stradale
Autostrade
Tangenziali
Rete ferroviaria

15
0
30 - 60
> 60



Time accessibility by public transport 14.00 – 19.00

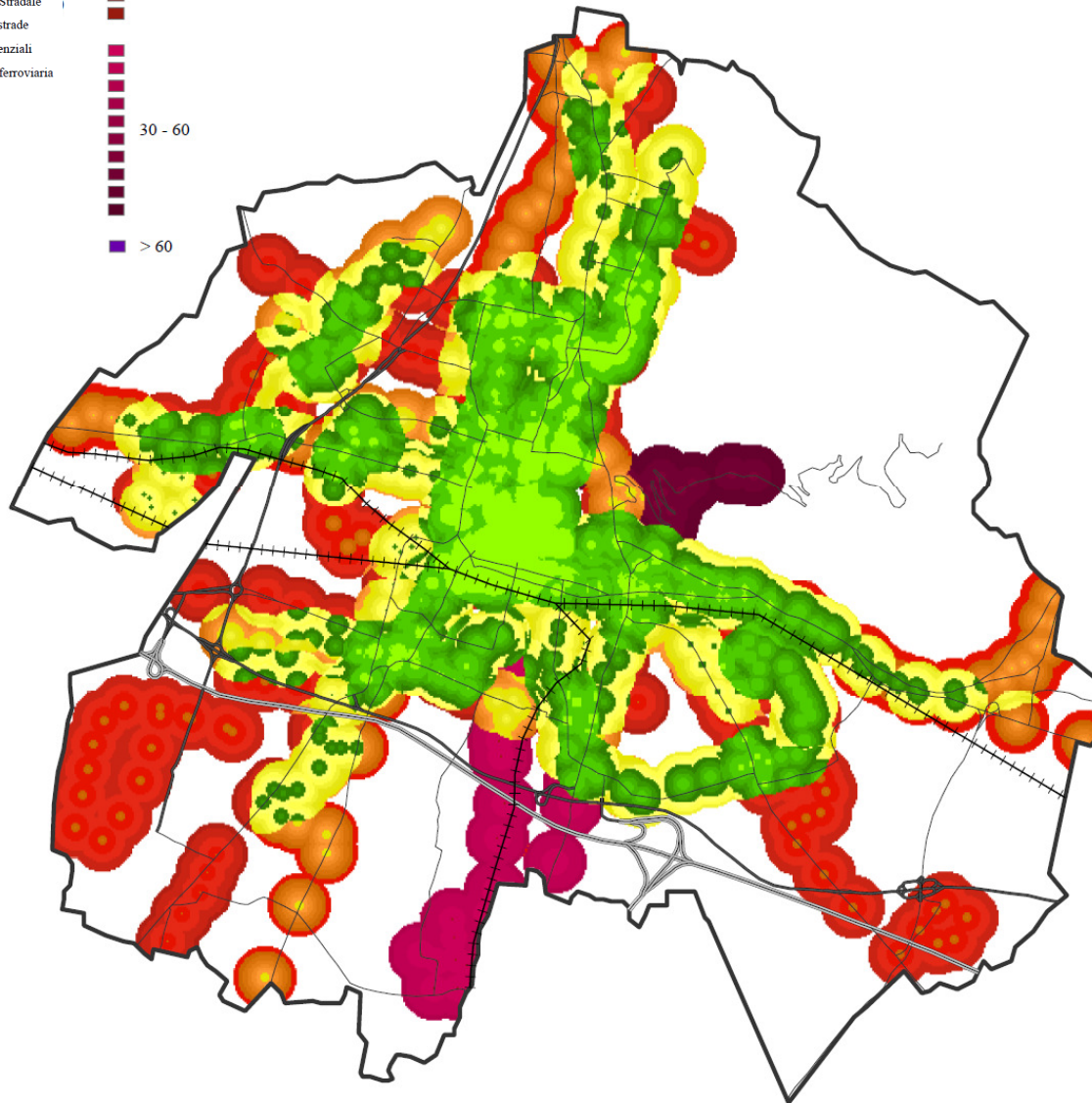
LEGENDA

Confini Comune Brescia
Tempo di accesso al mezzo pubblico
nelle ore di morbida mattutina e serale [minuti]

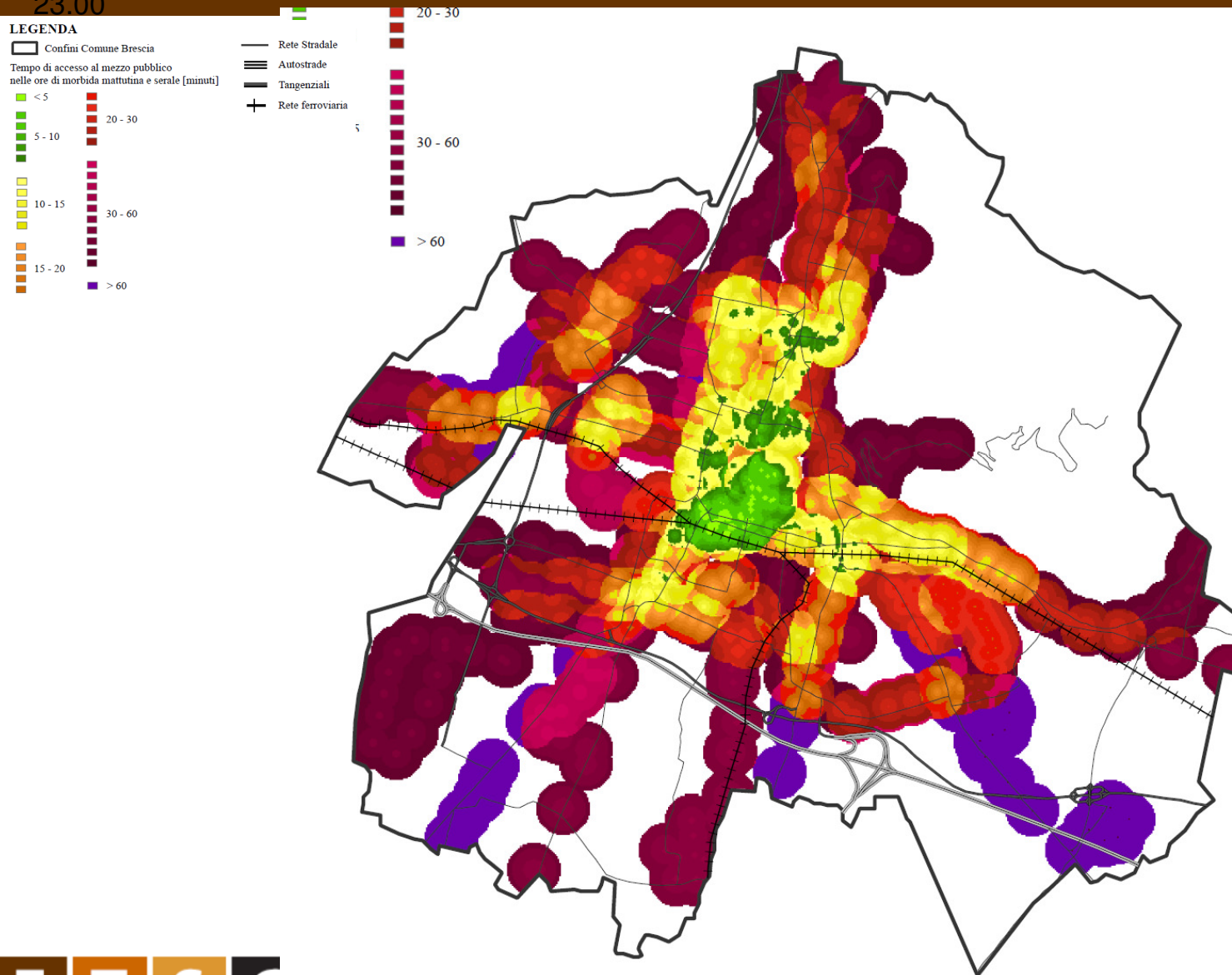
< 5	20 - 30
5 - 10	30 - 60
10 - 15	> 60
15 - 20	

Rete Stradale
Autostrade
Tangenziali
Rete ferroviaria

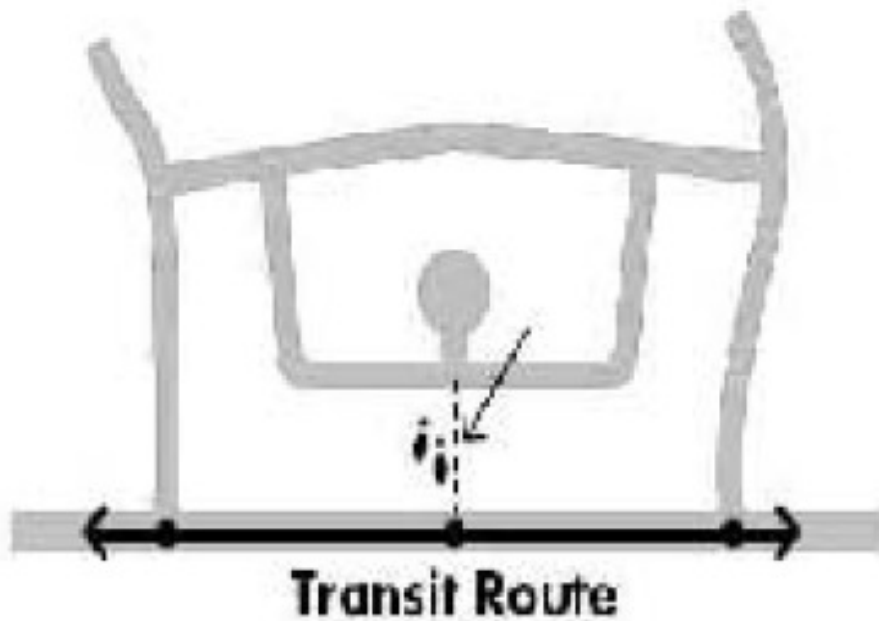
30 - 60
> 60



Time accessibility by public transport 19.00 – 23.00



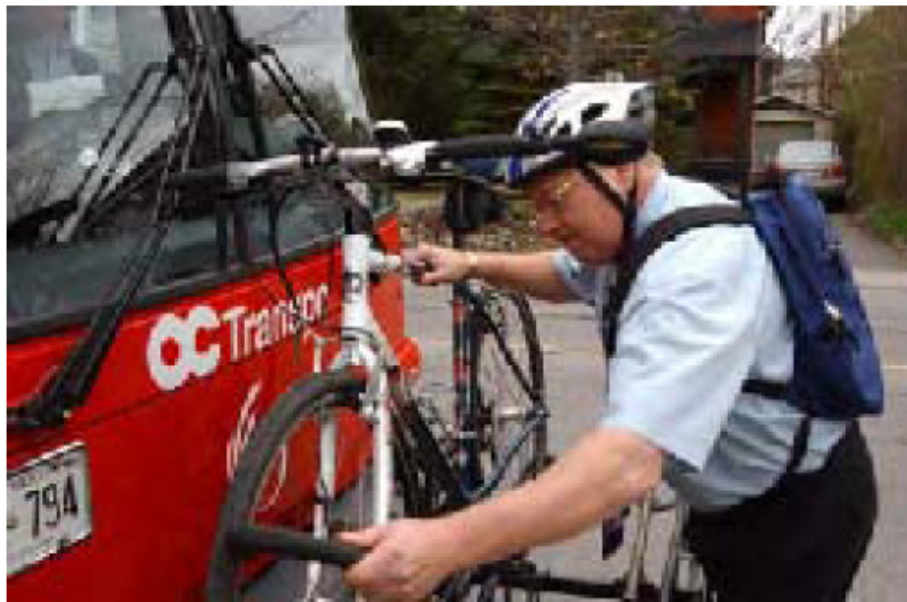
Transit Oriented Development (TOD) 2



Transit Oriented Development (TOD) 3



Transit Oriented Development (TOD) 4



Transit Oriented Development (TOD) 5



Safety of pedestrians (M Tira)

Transit Oriented Development (TOD) 6



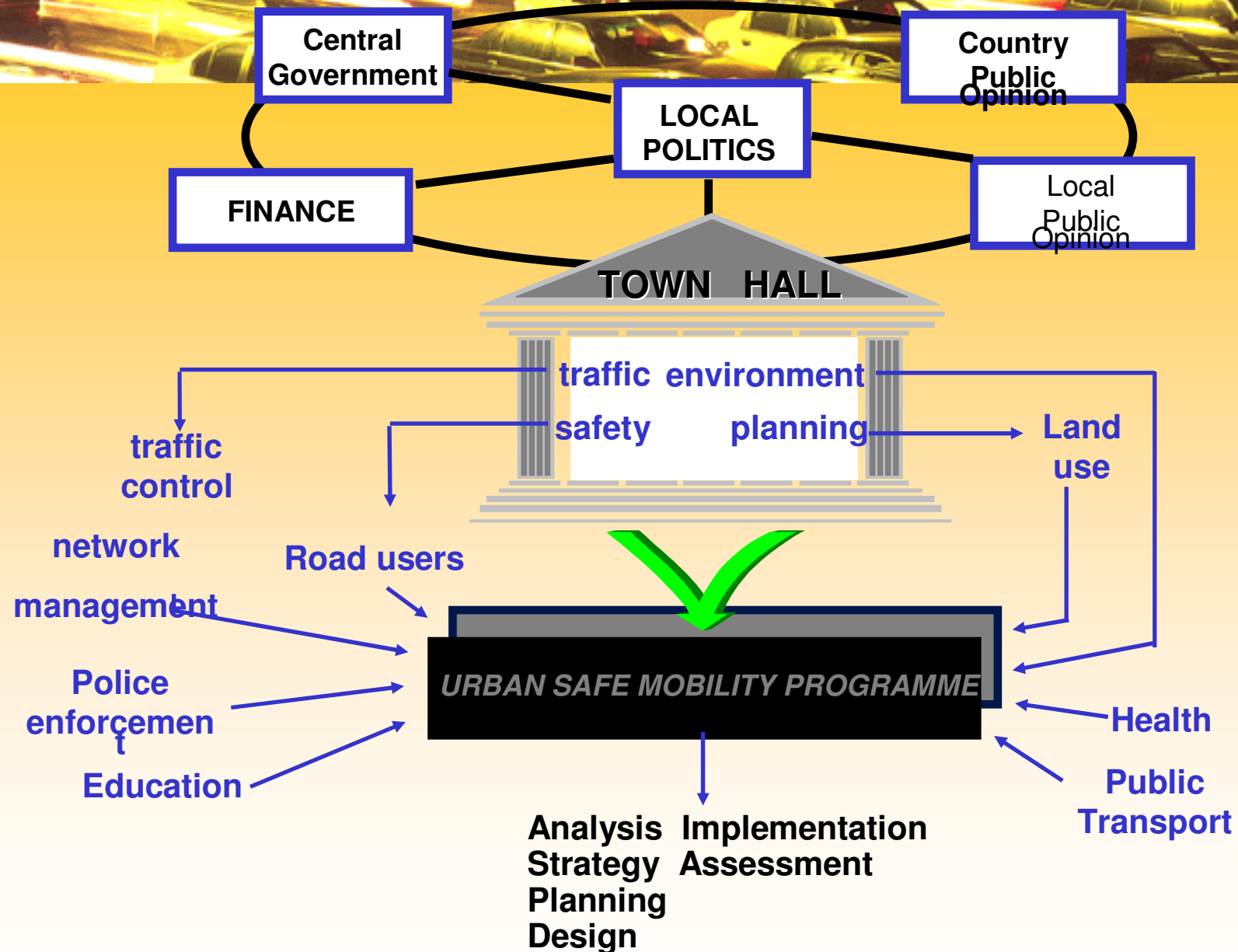
The USM approach (Source DUMAS Project)

1

Among others, the “strategy setting” and ‘sharing interests’ turned out to be successful safety policies, in those European Countries where applied. It is an approach that looks at urban environment from the point of view of global safety and comfort, pointing them as the core strategy for any action

The USM approach (Source DUMAS Project)

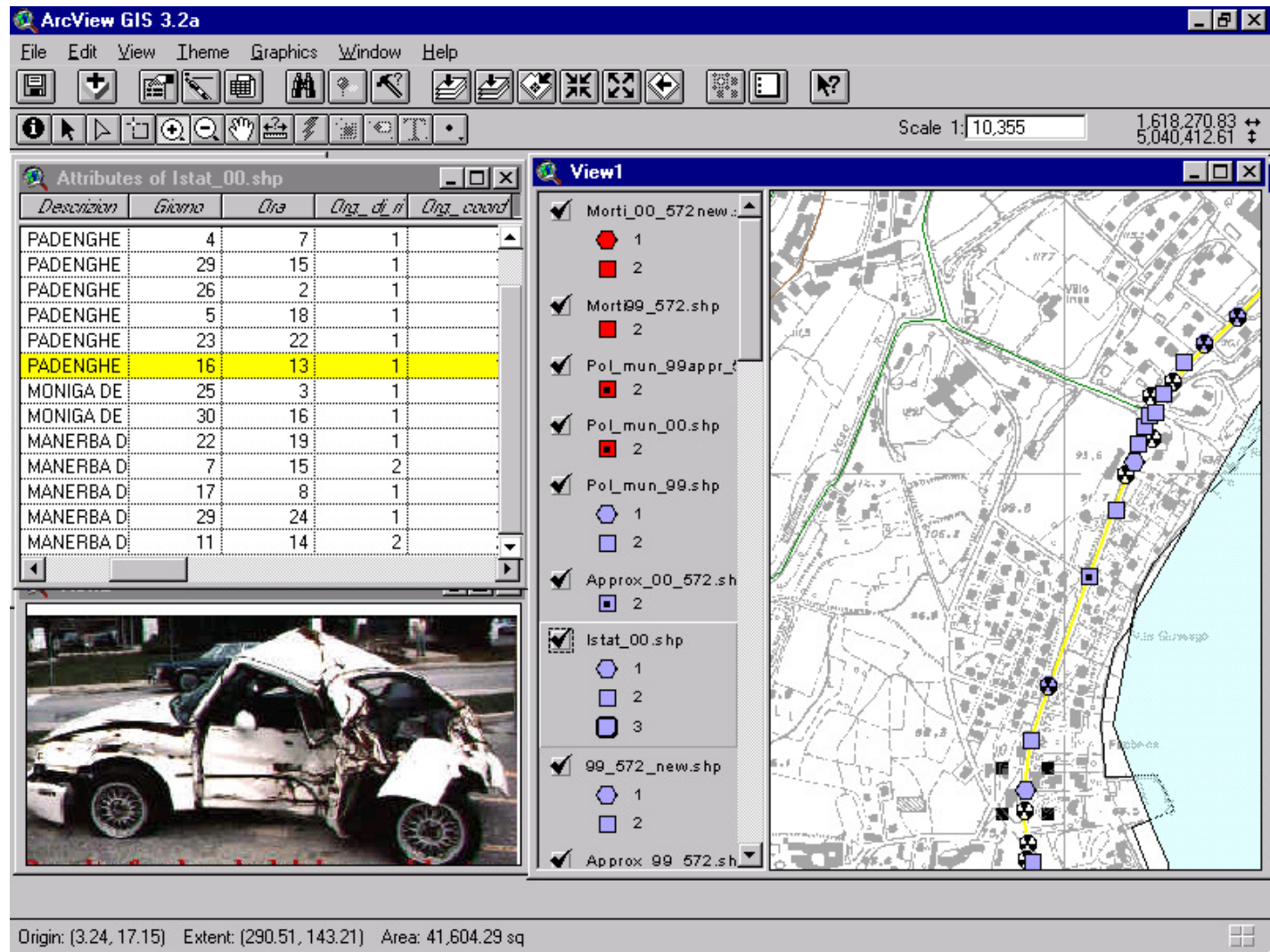
2



- A road hierarchy or classification is the essential basis for the planning process of speed management schemes
- In-depth analysis of non-clustered accidents when assessing sustainability of plans
- Integrating the managing offices of the cities (urban planning, public works, environment, maintenance, ...)
- Monitoring procedures and information transfer
- Co-ordination with other strategies, such as the case of noise reduction or pollution control

The detailed accident analysis

Accidents mapping

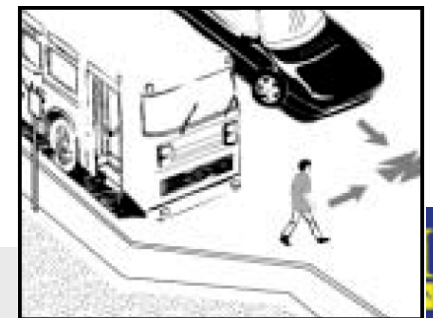


The proto-typical Accident Scenarios

Analysis of Police accident reports occurred in an area, in order to classify their temporal and casual development. Every group of accidents which have particular similarities constitutes a scenario, and for every scenario some solutions are proposed.

Driving situation	Accidents situation	Emergency situation	Collision
A senior citizen is going out from a bus stopped at a bus stop along an high volume street.	Initially covered by the bus, the pedestrian crosses in front of the bus.	Motorist fails to yield to pedestrian.	The pedestrian is hit by the vehicle.

An example of a typical accident scenario involving a senior citizen



The Operational (Road) Safety Review

“Operational Safety Review” (OSR) is a proactive assessment of the safety aspects of an existing road, which, in the case of a future road is called Road Safety Audit

Crosswalks (example)	
1	At the crosswalk are children visible?
2	Is motorized traffic visible by pedestrians?
3	Are there crosswalks next to bus stops?
.....

Existing roads - Check list 8 - Vulnerable Road Users (Italian Ministry of Infrastructure and Transportation, 2001)

The Integration between those two different techniques

- the “Accident scenario approach”
(accidents database is necessary)
- the “Operational Safety Review”
(proactive method)

The Integration between those two different techniques

Relevant question #1

Motorist fails to yield to pedestrian or pedestrian crosses during inadequate gap in traffic due to limited visibility distance at intersection

General Countermeasures

- a. Move bus stop to far side of intersection or crosswalk.
- b. Install curb extension.
- c. Consider an alternative bus stop location.
- d. Install pedestrian crossing islands or raised crosswalk.
- e. Install or improve roadway lighting.
- f. Install crosswalk markings to encourage pedestrians to cross in the crosswalk behind the bus.
- g. Mark bus stop area with pedestrian warning signs.
- h. Remove parking in areas that obstruct the vision of motorists and pedestrians.

The Integration between those two different techniques

Relevant question #2

Pedestrian has difficulty walking along roadway and crossing at midblock location with high vehicle speeds and/or high volumes.

General Countermeasures

- a. Provide bus pull-off area.
- b. Consider an alternative bus stop location.
- c. Install midblock curb extensions.
- d. Provide curb ramps and an accessible sidewalk.
- e. Install sidewalk and/or sidewalk barriers to direct pedestrians to a nearby crossing location.
- f. Provide pedestrian education/training.
- g. Add bike lanes or painted shoulder.
- h. Add recessed stop lines.
- i. Increase police speed enforcement.
- j. Install or improve roadway lighting.
- k. Reduce number of roadway lanes.
- l. Install traffic and pedestrian signals, if warranted.

The Integration between those two different techniques

Relevant question #3

Pedestrian has difficult time crossing, waiting, or walking in the vicinity of school bus stop.

General Countermeasures

- a. Select safer location for school bus stop.
- b. Implement pedestrian/driver education programs.
- c. Involve school, neighborhood groups, and PTA in promoting enforcement and education.
- d. Provide sidewalks.
- e. Provide street furniture or other amenities at bus stop.
- f. Install or improve roadway lighting.
- g. Enforce regulations against passing stopped school bus.
- h. Educate pedestrians to cross behind the bus.

The Integration between those two different techniques

OSR Check-list

Relevant question #1

Motorist fails to yield to pedestrian or pedestrian crosses during inadequate gap in traffic due to **limited sight distance at intersection.**

Relevant question #2

Pedestrian has difficulty walking along roadway and crossing at midblock location with **high vehicle speeds and/or high volumes.**

Relevant question #3

Pedestrian has difficult time crossing, waiting, or walking **in the vicinity of school bus stop.**

Crosswalks	
1	Is the visibility of the crosswalk by motorists satisfactory?
2	At the crosswalk are children visible?
3	Is motorized traffic visible by pedestrians?
4	Is the visibility by night satisfactory?
5	Is there vegetations which in some periods could represent an obstacle to visibility?
6	Are crosswalks and pedestrian areas well coordinated?
7	Is there the distance among crosswalks sufficient to deter crossing road at unsafe locations?
8	Is the crosswalk type adequate to road width (refuges)?
9	Is the speed road adequate to pedestrian flow crossing?
10	Are traffic calming measures necessary to slow down traffic?
11	Is there adequate space for pedestrians to wait on footway?
12	Can vulnerable road users cross within a single phase?
13	Is there special kerb height reduction for disabled at crosswalks?
14	Is there special tactile pavements for disabled at crosswalks?
15	Are there crosswalks next to bus stops?
Pedestrian paths	
16	Are there sidewalks where pedestrian flow is present?
17	Is sidewalks width adequate to pedestrian flow?
18	Are there obstacles on sidewalks?
19	Are there shops that obstacle pedestrian flow on sidewalks?
20	Are there drainage devices that obstacle pedestrian flow on sidewalks?
21	Are pedestrian paths continue?
22	Is pavements of crosswalks adequate?
23	Are restrictions to motorized traffic necessary?
24	Are traffic calming measures necessary to slow down traffic?

The Integration between those two different techniques

Relevant question #3

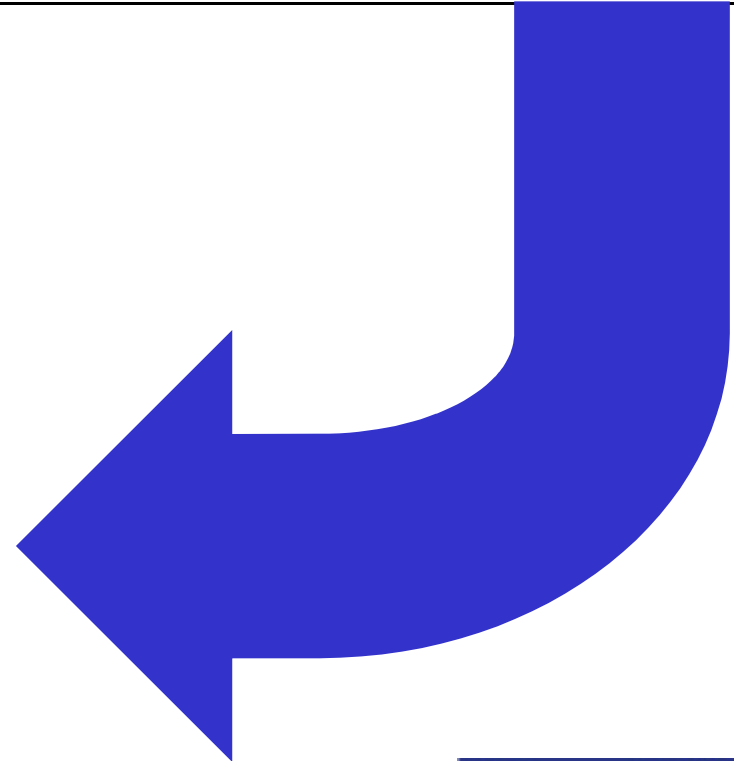
Pedestrian has difficult time crossing, waiting, or walking in the vicinity of school bus stop.

17	Is sidewalks width adequate to pedestrian flow?
18	Are there obstacles on sidewalks?
19	Are there shops that obstacle pedestrian flow on sidewalks?



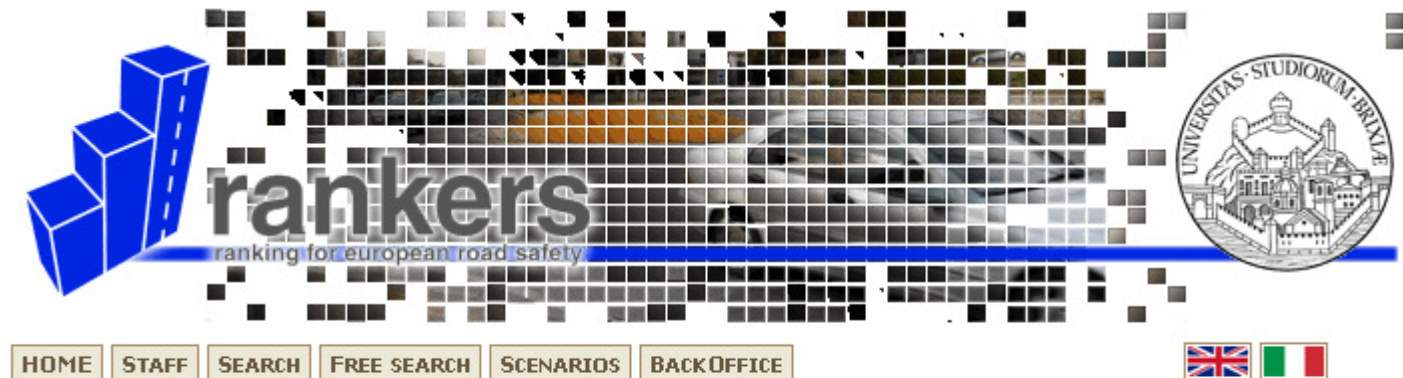
General Countermeasures

- Select safer location for school bus stop.
- Implement pedestrian/driver education programs.
- Involve school, neighborhood groups, and PTA in promoting enforcement and education.
- Provide sidewalks.
- Provide street furniture or other amenities at bus stop.
- Install or improve roadway lighting.
- Enforce regulations against passing stopped school bus.
- Educate pedestrians to cross behind the bus.



The e-book (Source: CeSCAm - RANKERS)

Pre-selection



Select the weakest user involved

Pedestrian

Pedestrian

Bicycle

Bicycle

Moped or Motorcycle

Moped or Motorcycle

Car

Car

Heavy vehicle

Heavy vehicle

Free Search

Search

The e-book (e)

Accident statistical database fields

Keywords

Accident localization

any

Kind of road

any

Kind of intersection

Intersection

Kind of non intersection

any

Kind of collision

any

Kind of vehicle (first vehicle)

Moped / Motorcycle

Kind of vehicle (second vehicle)

Car

Circumstances of accident

any

Relevant questions

Relevant questions

RQ Road specific context

any

RQ What is the manoeuvre of the first vehicle ?

No particular manoeuvre, it goes ahead

RQ What is the manoeuvre of the second vehicle ?

Left-turn manoeuvre

RQ Is there an influence of a view obstruction ? (Powered two-wheelers accidents)

any

RQ Is there one of the vehicles involved which travelled in a bus lane or in a cycle lane ?

any

The e-book (source: RANKERS)

Accident scenario short definition

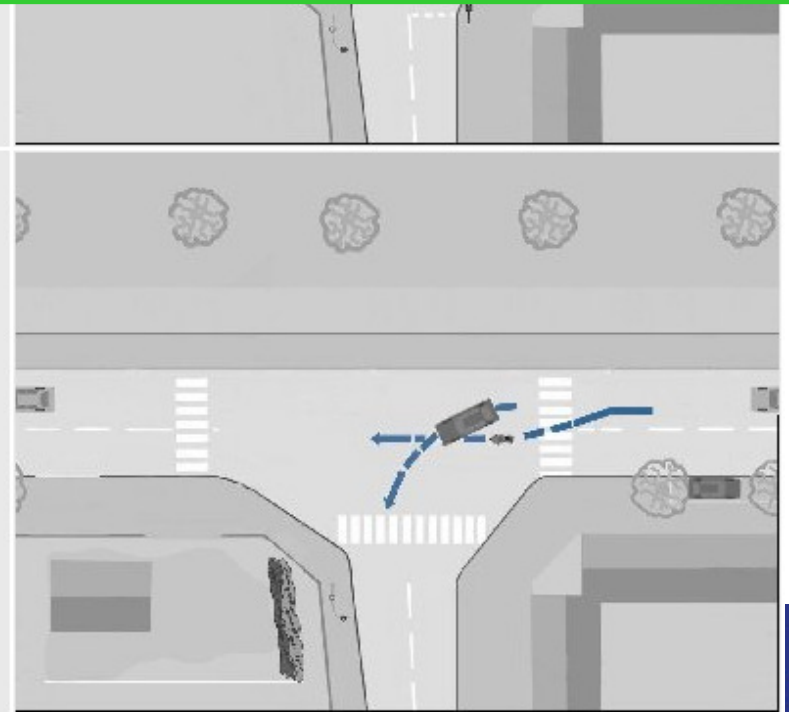
SC88
38.46

Driver turning left without seeing a powered two-wheeler travelling in the opposite lane. (According to Clabaux, 2006).

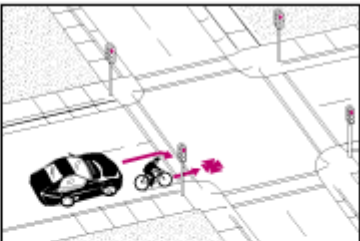
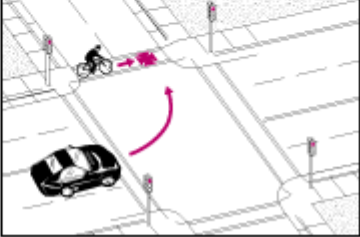
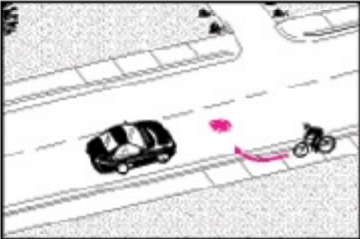
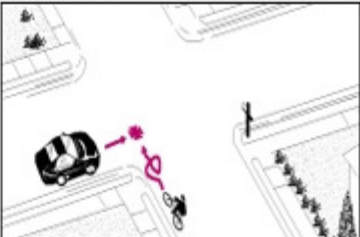
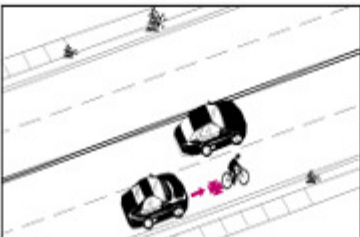


SC81
38.46

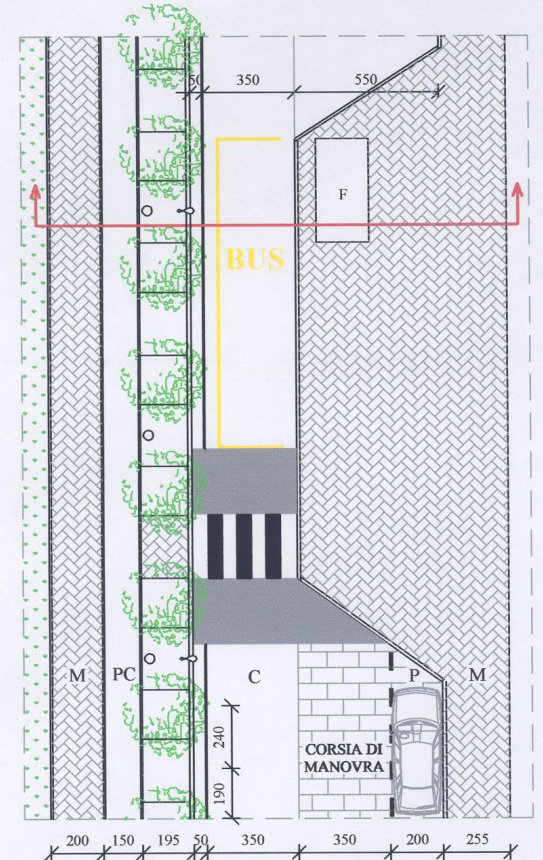
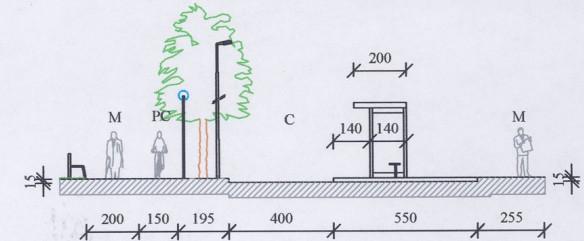
Driver turning left into another street or into a private alley and collision with a powered two-wheeler overtaking him (According to Clabaux, 2006).



The e-book (source: RANKERS)

SC66	<p>The motorist fails to yield to a bicyclist when making a right turn</p> <p>The motorist may misjudge the speed of the cyclist or believe (mistakenly) that the bicyclist should wait for them</p>		
SC67	<p>The motorist turning left hits a cyclist who is traveling straight ahead in the same direction as the motorist</p> <p>The bicyclist is riding the wrong way against traffic</p>		
SC70	<p>The cyclist rides off the sidewalk into the road without stopping and is hit by a motorist.</p>		
SC72	<p>The cyclist is swerving to avoid an obstacle (perhaps a pothole, some debris or a utility cover) and is hit by a passing motorist</p>		
SC77	<p>The motorist detects the bicyclist but misjudges the amount of space necessary to safely pass the bicyclist</p>		

Accident scenario location and solution



THE ROAD USER HIERARCHY

Road User Hierarchy

Ranks the importance of road users:

People with mobility impairments

Pedestrians

Cyclists

Public transport users

Powered two-wheelers

Commercial/business

Car-borne shoppers

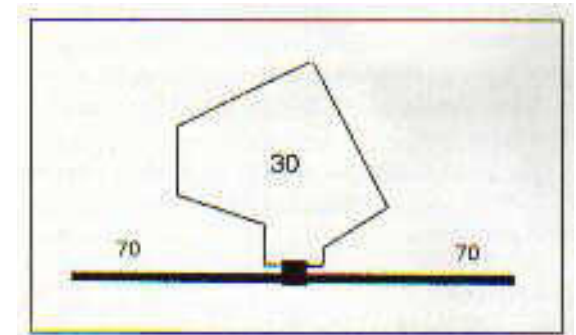
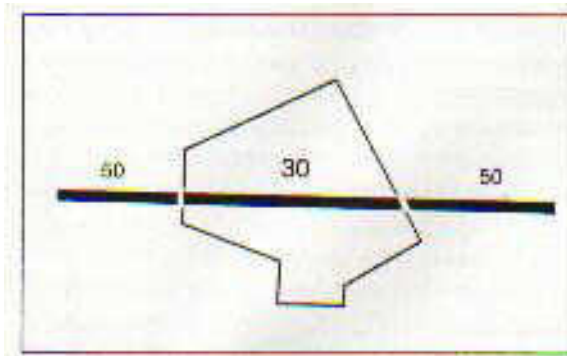
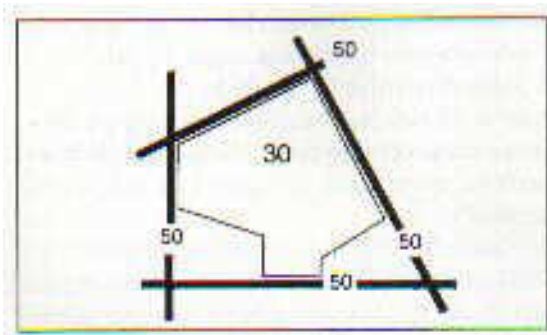
Car-borne visitors

Car-borne commuters

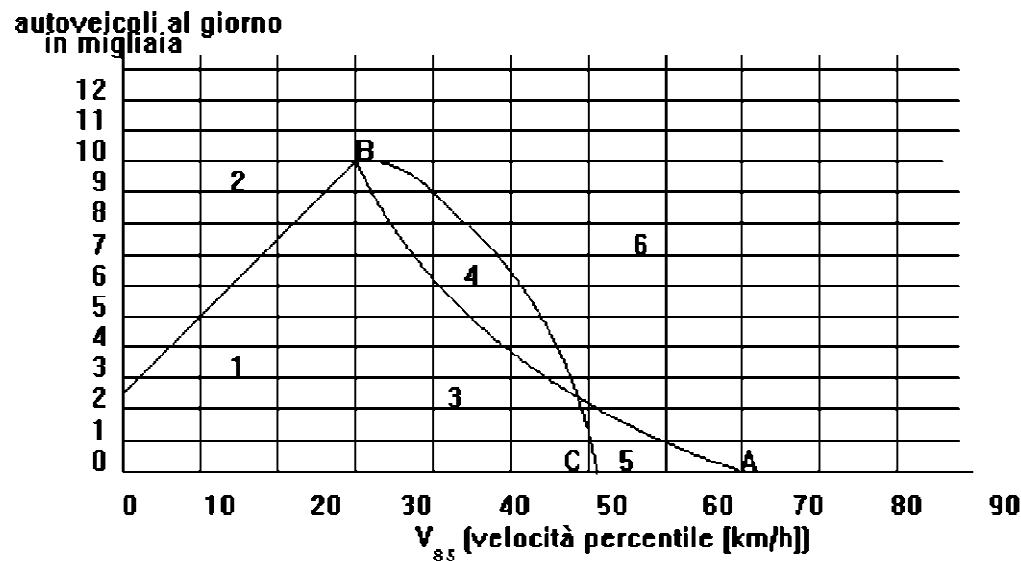
↑
Increasing Importance



Different solutions for pedestrians and cyclists



Bicycle compatibility index



Area 1: speed lower than 30 km/h no specific facility

Area 2: low speed and high traffic: need assessment

Area 3: if $V_p = 60$ Km/h cycle paths must be done

Area 4: cycle path or lane must be realised

Area 5: low traffic and high speeds (60 – 80 km/h). Cycle paths only

Area 6: crucial physical separation

(CROW, 1994)

Old pedestrian area





New pedestrian area



New pedestrian area

Residential streets



Environmental island



30km/h (20mph) zones



... Towards liveable streets



(fonti: www.transport2000.org.uk, www.paving.org.uk/pdf/hzone.pdf)



Porto Alegre



Lyon

Cremona

**... Towards
liveable
streets**



Safety of pedestrians (M Tira)

... Towards liveable streets

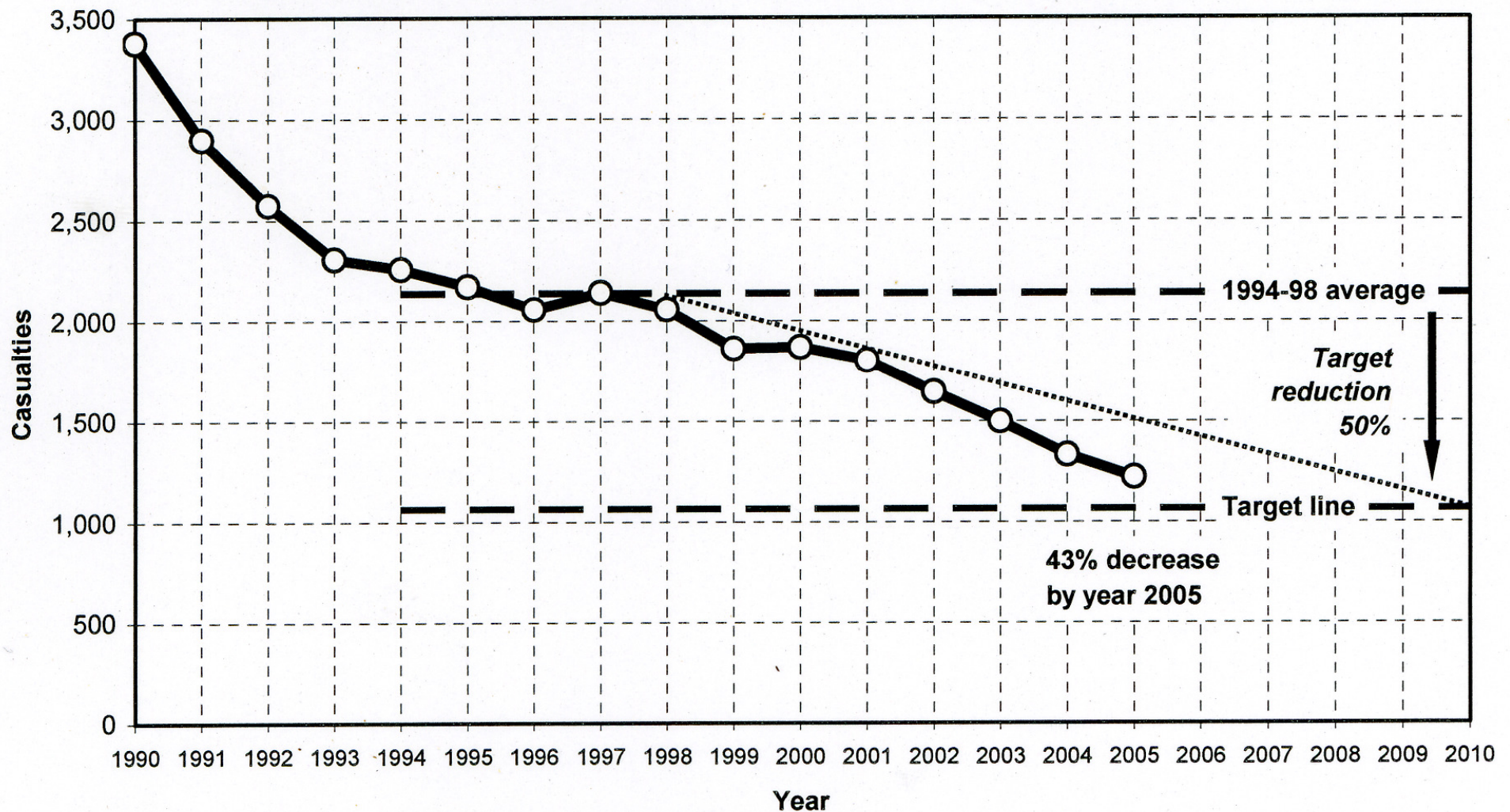


Limited traffic zones



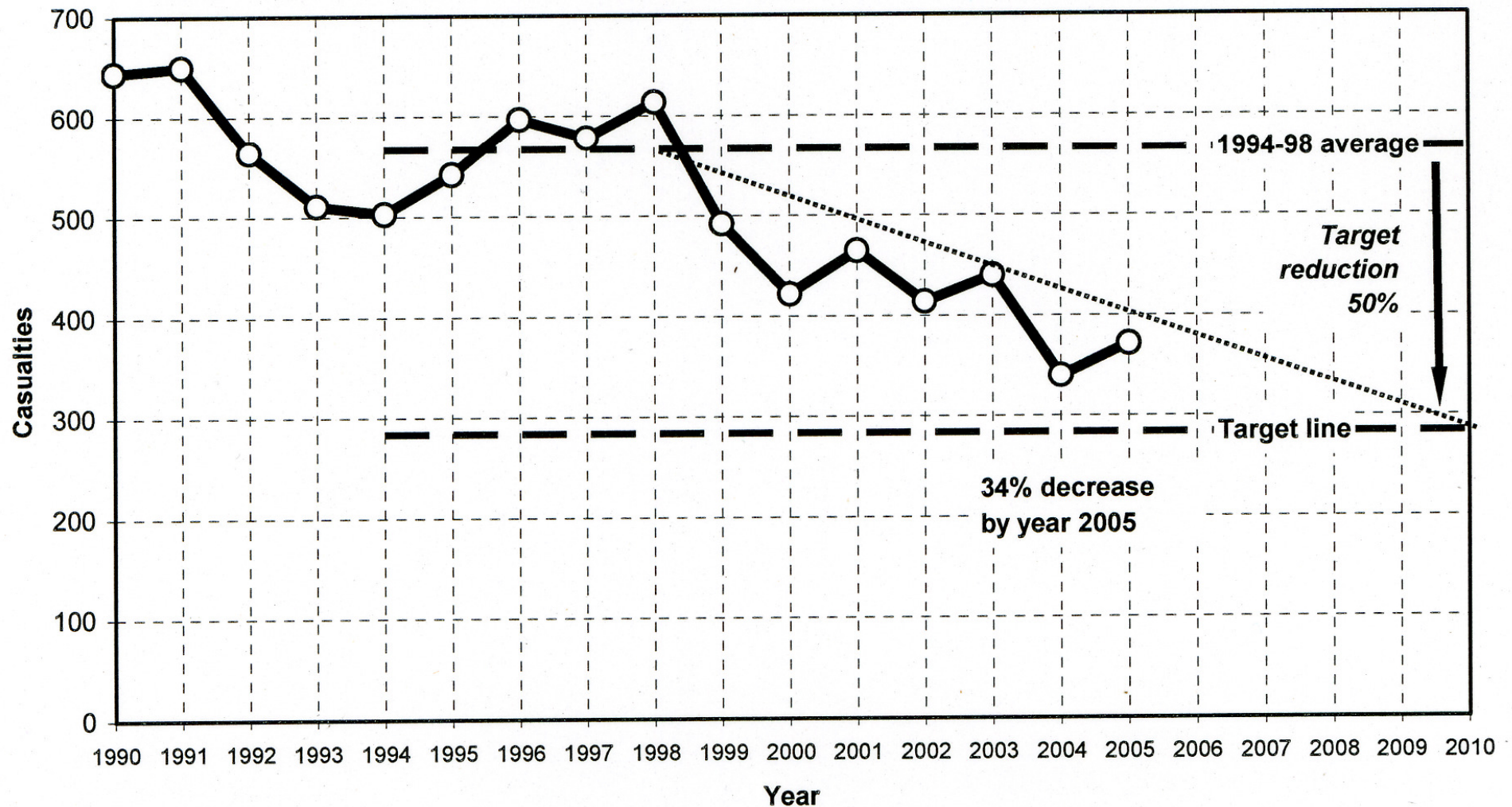
A positive experience: the London Road Safety Unit

Fig. 7: Greater London - Pedestrian killed or seriously injured casualties (*London Target category*)



A positive experience: the London Road Safety Unit

Fig. 8: Greater London - Pedal cyclist killed or seriously injured casualties (*London Target category*)



Recommendations

1

Integrate mobility management and urban planning and take better account of the needs of pedestrians and cyclists from the earliest stages of urban development projects and transport investments, with the object of creating seamless, high-quality networks.

Establish clear administrative responsibilities among relevant government departments at all levels for co-ordinating walking and cycling programmes and initiatives. The purpose of such arrangements is to stimulate and support actions in government and private sector organisations in an integrated way. This might take the form of a national committee or an interministerial co-ordinator supported by a national observatory.

Improve knowledge about walking and cycling to adequately inform government policy development in relation to this fundamental aspect of mobility. This requires a standardized methodology for reporting, measuring and monitoring pedestrian and cyclists' mobility and injuries (from traffic crashes and falls).

Incorporate public transport services as an integrated part of the development of new urban areas and the regeneration of existing areas, through planning guidance and financial support for public services. This can support a long-term shift towards higher density, mixed-use, walking and transit-oriented urban form and a reduction in urban sprawl.

Encourage the responsible authorities to give higher priority and more space to non-motorised traffic and public transport in city centres. This includes a number of key actions: providing easy, safe, well-maintained and secure pedestrian access to public transport and to all city centre destinations; development of car-free areas; parking policies to discourage over-use of cars in city centres; and regulations to prevent parking on pavements and crossings, which undermines the quality of walking and, in severe cases, renders it impracticable or dangerous..

Develop national pedestrian and cycling planning guidance for local administrations. Plans should be required to give consideration to the impact of projects on pedestrians, and cyclists, as part of project appraisals and environmental impact assessments. Plans should also consider the development and setting of targets for future levels of walking and cycling , as well as addressing needs for financial support.

Recommendations

7

Encourage employers to implement a broad range of incentives for employees to include active transport in commuting trips. Government agencies should demonstrate leadership in this area.

Adopt a safe system approach for the design of the urban environment for pedestrians and cyclists so that it is organised in such a way that specific risk groups are not exposed to avoidable risks.

Implement traffic-calming policies and generalise 30 km/h zones in city centres, residential areas and other high pedestrian activity areas. This should be based on a functional classification of urban spaces, streets and road networks, supported by appropriate infrastructure design criteria to create low-risk and amenable urban environments for non-motorised road users.

Encourage the introduction of high-quality education programmes in schools and local community centres, to teach safe road user behaviour and promote the benefits of walking and cycling through a range of effective forms of communication. Adult retraining initiatives are also indicated. School mobility plans should be developed aiming to produce a safe and supportive environment in which children can walk or cycle to school.

Conduct a critical review of current traffic codes to strengthen the legal and financial protection of pedestrians and cyclists in case of a crash, and give higher priority to more vulnerable road users in order to provide safer, more equitable conditions among the different road users.

Develop a research strategy to better understand mobility trends in a changing society.

This should include evaluating the effectiveness of measures to reduce dependence on private car travel, achieve higher-density urban forms, protect the environment, improve health and achieve more efficient and sustainable use of energy.

Acknowledgments

The Author wish to thank:

Dominique Fleury, Chris Lines, Michela Tiboni, Michele Pezzagno, Barbara Badiani, Anna Richiedei, Silvia Rossetti, Nicolas Clabaux and Riccardo Bonotti for some of the data and results here presented

Thank you for your kind attention!

Prof. Ing. Maurizio TIRA
Università degli Studi di Brescia
Via Branze, 43
25123 BRESCIA

Tel. 030 3711 304
Fax. 030 3711 312

