Safe mobility of elderly road users from the infrastructure perspective

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Let’s start with BRIDGET DRISCOLL …..

Bridget Driscoll (died 17 August 1896, aged 44 years) was the first pedestrian victim of an automobile accident in the United Kingdom. The “car” was traveling at less than 7.2 km/h.

The jury returned a verdict of "accidental death" after an inquest enduring some six hours. No prosecution was made, the coroner said he hoped "such a thing would never happen again"
Evolution of elderly fatalities in time

CARE Database, 2001-2010 (Source: Dacota Project)

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Who ..... 

Where ..... 

What ..... 

How ..... 

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Pedestrians

CARE Database, 2010 (Source: Dacota Project)

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Pedestrian Fatalities (e.g. Italy)

ISTAT database (Italy) 2012-2013
Who ..... 

Cyclists

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CARE Database, 2010 (Source: Dacota Project)

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Who ..... Car drivers

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CARE Database, 2010 (Source: Dacota Project)

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Who ..... Car drivers

Over 65 fatalities

CARE Database, 2010 (Source: Dacota Project)

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Pedestrian
Pedal cyclist
Car driver
Car Passenger
Moped rider
Motorcyclist
Others

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Drivers Fatalities (e.g. Italy)

ISTAT database (Italy) 2012-2013

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Where ..... Road types and locations

Motorways/Freeways & interchanges

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Where ..... 

Road types and locations

Urban & Suburban

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Road types and locations

Rural non freeway (two lane) roads & intersections
Ageing issues are usually associated with urban areas.

Elderly fatalities (65+)

- Motorway: 4%
- Rural non motorway: 60%
- Urban: 36%

CARE Database, 2010 (Source: Dacota Project)

Rural “non motorways” are also critical for the elderly!
Middle aged fatalities (45-64)

CARE Database, 2010 (Source: Dacota Project)
What ... are the issues

✓ Subjective evaluations:
  - inquiries

✓ Objective evaluations:
  - Driving simulators;
  - Naturalistic driving;
  - Detailed crash reconstruction.

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Subjective evaluations - drivers

Older drivers find difficult to:

- turn left at intersections, especially those without traffic lights;
- find the correct lane for turning left;
- drive across an intersection, especially if it has no traffic lights;
- drive on a roundabout that has more than one lane;
- enter a motorway, especially if it has a short acceleration lane;
- read street names in urban areas;
- follow road markings to see which way the lane goes;
- respond to traffic lights.

On the other hand road markings, street lighting at intersections, and the width of traffic lanes are considered very important safety factors.

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Driving Simulators

6 DOF Driving Simulator at the University of Florence

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Driving Simulators

Driving in tunnels

Driving in workzones

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Driving Simulators

Inquiry for test drivers: “La sperimentazione è rivolta alla fascia di età 24 – 50 anni ed è limitata al personale in possesso di valida patente di guida B.” (the experiment is limited to drivers in the range 24 -50 years old)

The experiments usually focus on the “average driver”. A special focus on elderly driver is needed.
Driving Simulators

Reproducing physical limitations in the driving simulators

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Naturalistic driving
How ..... 

.... do we increase the compatibility between infrastructures and elderly mobility?

Control skew angles in intersections (e.g. in the Italian Standard for new intersection a limit of 70° has been set)
In intersections’ protected left turns avoid negative offsets

Source: Staplin et al., 2001
Avoid multilane roundabouts (e.g. in the Italian Standard for new intersection these are not allowed anymore)
Complex roundabouts: handle with care!

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How ..... Make readability of layouts easier

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How ..... 

Improve visibility and readability of signs
How .....

Prevent wrong way manouvres
Always indicate explicitly who has to yield (do not use the right priority principle)
Always indicate explicitly who has to yield (do not use the right priority principle)
Review/Revise geometric design considering the elderly needs

- Acceleration lanes;
- Reactions perception times;
- Overtaking lengths;
- Visibility requirements in intersections;
- Geometric layout of intersections;
- Signs visibility distance;
- ......
Pedestrian/Cyclists

Use pedestrian crossing refuge islands
Pedestrian/Cyclists

Realize (where possible) protected cycle paths and highlight crossings with different colours
Conclusions

- Elderly mobility is growing but the safety levels improving are not as much as for other users;
- Elderly need to be considered in all their functions (driver, pedestrian, cyclists);
- Consideration of the elderly in rural two lane roads is crucial and often underestimated;
- The identification of needs and the evaluation of the effectiveness of different solutions should be conducted using also new tools such as driving simulators and naturalistic driving;
- Geometric design standards should be reviewed/revised considering the elderly needs.
Thank you .......

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