UPDATE AND IMPROVEMENT OF THE TRAFFIC ACCIDENT DATA COLLECTION PROCEDURES IN SPAIN.

THE METRAS METHOD OF SEQUENCING ACCIDENT EVENTS

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for target setting and monitoring performances and progress

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- The accident is one of the most unfortunate incidents that can happen in traffic.

- Collecting the key information on the TA characteristics and consequences is important in order to monitor how it evolves and to evaluate the preventive measures.

- The collection, the record and the management of such information is complex and requires appropriate instruments that make this task entrusted to the traffic police easier.

[A practical example]::
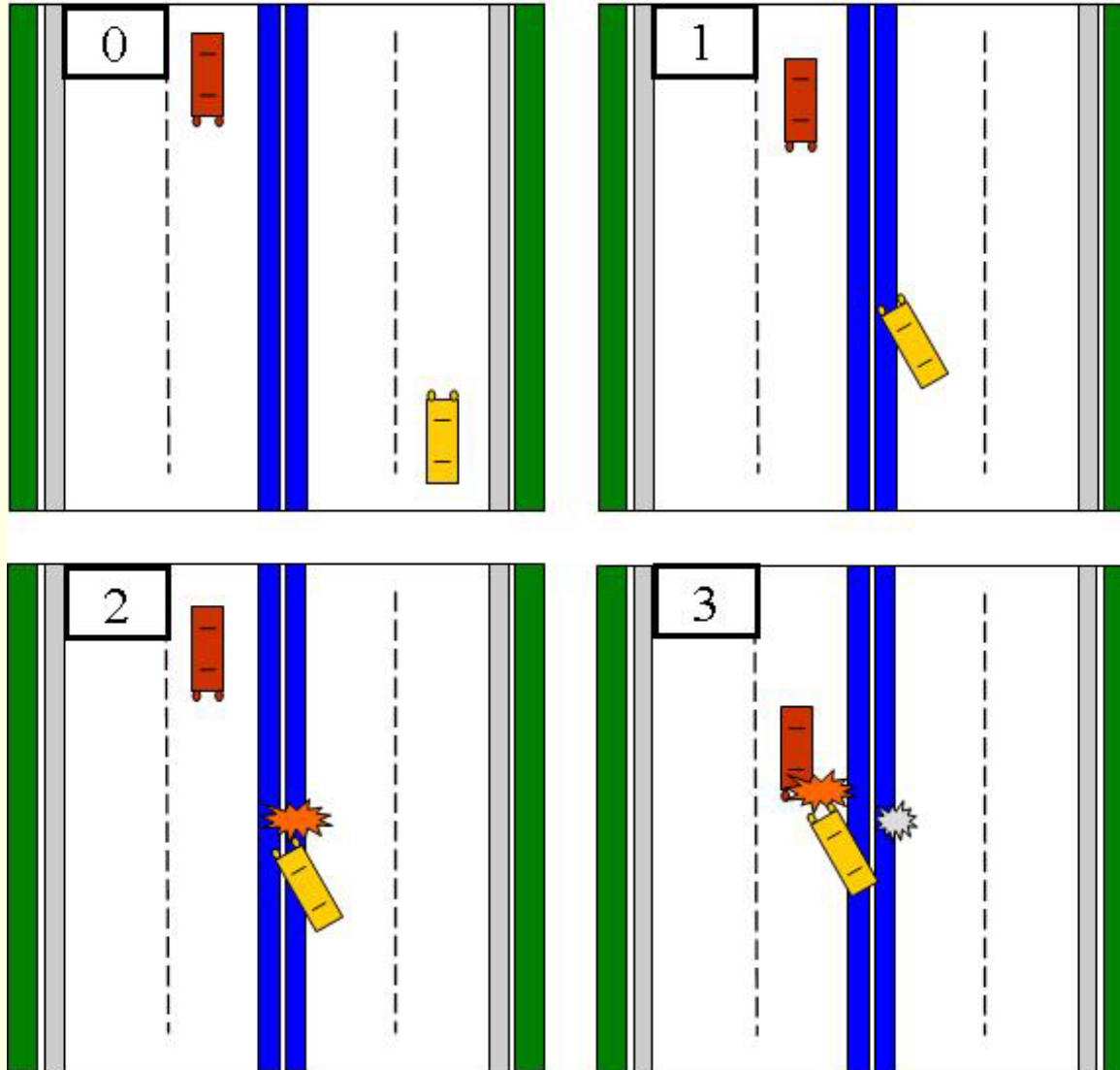
- 0). Two vehicles are circulating in a motorway in different carriageways.

- 1). The "V1" vehicle (yellow one) leaves the road from the left

- 2). The "V1" vehicle hits the centre guardrail

- 3). The "V1" vehicle makes a frontal collision with the "V2" vehicle that is circulating in the opposite carriageway
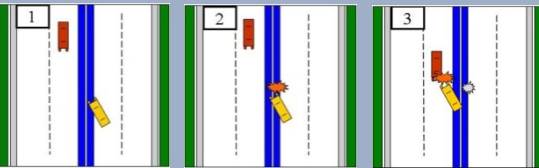
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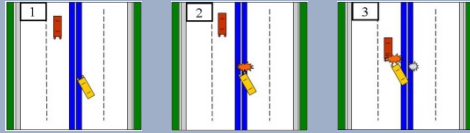
SELECT ONE OPTION ONLY

40. TIPO DE ACCIDENTE

4.1. ☐ Vuelco en la calzada

1. Colisión de vehículos en marcha

- 1. [X] FRONTAL
- 1.2. ☐ FRONTOLATERAL
- 1.3. ☐ LATERAL
- 1.4. ☐ ALCANCE
- 1.5. ☐ MÚLTIPLE O EN CARAVANA

2. Colisión vehículo-obstáculo en calzada

- 2.1. ☐ VEHÍCULO ESTACIONADO O AVERIADO
- 2.2. [X] VALLA DE DEFENSA
- 2.3. ☐ BARRERA DE PASO A NIVEL
- 2.4. ☐ OTRO OBJETO O MATERIAL

3. Atropello:

- 3.1. ☐ PEATÓN SOSTENIENDO BICICLETA
- 3.2. ☐ PEATÓN REPARANDO EL VEHÍCULO
- 3.3. ☐ PEATÓN AISLADO O EN GRUPO
- 3.4. ☐ CONDUCTOR DE ANIMALES
- 3.5. ☐ ANIMAL CONDUCIDO O REBAÑO
- 3.6. ☐ ANIMALES SUELTOS

5-6. Salida de la calzada

IZQ. [X] DCHA. [X] 6. ☐

CON COLISIÓN
- 1. CHOQUE CON ÁRBOL O POSTE ☐
- 2. CHOQUE CON MURO O EDIFICIO ☐
- 3. CHOQUE CON CUNETA O BORDILLO [X]
- 4. OTRO TIPO DE CHOQUE [X]

SIN COLISIÓN
- 5. CON DESPEÑAMIENTO ☐
- 6. CON VUELCO ☐
- 7. EN LLANO ☐
- 8. OTRA ☐

7.1. Otro ☐

ONE SINGLE CATEGORY TO DEFINE THE ACCIDENT TYPE

According to the classic classification of the accident type, the previous example could be classified in several ways:

- **5.3 Running off by the left hitting the ditch**
- **5.4 Running off by the left with another type of impact**
- **2.2 Collision against bumper fence**
- **3.1 Frontal collision**

SEVERAL CRITERIONS TO SELECT THE ACCIDENT TYPE

■Criterion of the first event of the accident

■Criterion of severity of the injuries

■Combinatorial criterion of elements

■Infrastructure criterion

■Other criterions

The accident type information is not associated with any of the involved unit (driver/pedestrian).

[Limitations of the classic classification of the accident type]::

- The classical accident typology only allows to identify <u>one event</u> in only one category.

- The <u>selection criterion</u> of a category may change according to the moment, the location, the circumstance, the research interests and even the accident characteristics.

- It may also change depending on the observer and is consequently <u>subjective</u> and not much defined.

- Difficult identification given the <u>dynamic nature</u> of the accident. It does not allow a realistic knowledge of what happened during the course of the accident.

- It does not differentiate the <u>first</u> event from the <u>most serious</u> one.

- It does not allow to <u>link</u> the type of accident or severity of the injury with fields or characteristics of the <u>involved units</u>, the drivers or the pedestrians.

[The METRAS (Measuring and Recording Traffic Accident Sequence) alternative] ::

- It integrates a structured, detailed and standardized <u>sequential description of the accident</u> to avoid the limitation of the classic category of accident type in the statistical questionnaires.

- It considers that an accident is a <u>complex process</u> having a <u>dynamic nature</u> and that one single category does not allow its description.

- It considers the <u>accident as a final result of a process</u> in which several events are caused because of previous actions, offences or errors from the persons involved in the accident, environmental conditions, the road, or the interaction between several elements present just before the start of the accident.

- It implies a generic structured protocol in order to collect the information related to the <u>sequence of the events</u> that take place in the space and in the time during the course of an accident, from a statistical perspective.

- <u>Each event</u> is considered to be an important and identifiable incident in a system of <u>pre-established categories</u>, that make an accident.

PRIOR STAGE			CONFLICT STAGE

Accident location

v1

v2

Accident sequencing
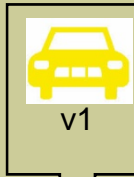
Situational data
- 8 of September 2006
- 15:00
- Motorway AP-7 km 398
- Sunny, no wind
- Road surface: dry and clean
- Free-flow traffic
- …

There are not any situational factors that have influence on the accident
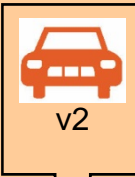
Veh. Data
passenger car
3 years old
…

Veh. Data
Minibus
8 years old
…

Prior action
Straight
Trajectory
…

Prior action
Straight
Trajectory
…

Offence
Excess
speed

Offence
None

Other
veh. / driver
/ pedestrian
factors
none

Other
veh. / driver
/ pedestrian
factors
none

2 seriously
injured persons

1 fatality
…

Involved
units

Events

Most serious
event

v1
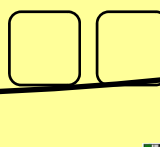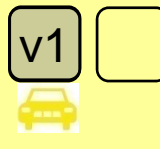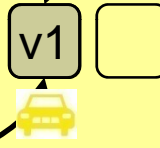
21. Running off
by the left

v1

24. Collision with
the centre guardrail

v1 **v2**

1. Frontal collision,
being in
the opposite carriageway
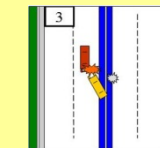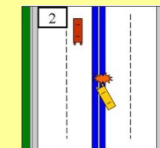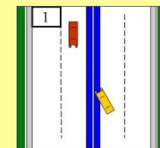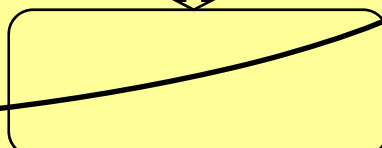
X

PROCEDURE

- Each report is filled in by up to four different police agents.
- Each participating agent fills in accident sequences from different level of complexity (number of events / units involved).
- A sample of 73 traffic accident reports, 55 agents that filled in the data and a total number of 305 accident sequences is achieved.

RESULTS OF THE PILOT TEST

- UNDERSTANDING: Practically all the agents do understand the procedure.
- Around 80% correctly answer to the first event and the most serious one.
- The reports sometimes do not have enough information, and may be interpreted differently.

- This pilot test showed very positive results as for the understanding of the method, easiness of completion, objectivity, both for motorway and urban area accidents.

Accident sequence (to fill in for serious or fatal accidents)

The vehicles will be identified as V1, V2, V3, V...
The pedestrians will be identified as P1, P2, P3, P...

METRAS METHOD OF ACCIDENT SEQUENCING		
INVOLVED UNITS	EVENTS	MOST SERIOUS EVENT

TYPES OF EVENTS:

COLLISIÓN BETWEEN VEHÍCLES
1. Frontal collision
2. Front-lateral collision affecting the right side
3. Front-lateral collision affecting the left side
4. Lateral collision
5. Positive scratch
6. Negative scratch
7. Rear collision, same direction or in platoon
8. Reverse rear collision
9. Rear lateral collision

RUNNING OVER
11. Running over a pedestrian
12. Running over an animal

FALL
13. Fall on the road
14. Fall of a passenger in a bus

COLLISION AGAINST OBSTACLES IN THE CARRIAGEWAY
15. Works elements
16. Cones or any other mobile elements of marker post
17. Mobile fence
18. Pieces of stone or vegetation
19. A stopped vehicle
20. A load or elements of other vehicles
21. Vehicles involved in a prior accident

RUNNING OFF THE ROAD
22. Running off the road by the right, no invasion of another road or carriageway
23. Running off the road by the right, invading another road or carriageway
24. Running off the road by the left, no invasion of another road or carriageway
25. Running off the road by the left, invading another road or carriageway
26. Running off a straight carriageway
27. Comeback on the road

COLLISION AGAINST FIXED ELEMENTS OF THE ROAD
28. Roundabout
29. Pedestrian refuge, traffic island
30. Kerb
31. Pylons
32. Traffic sign
33. Hedges, shrubs
34. Tree
35. Streetlight
36. Container
37. Fountain or statue
38. Bus stop
39. Barrera de contención de vehículos
40. Level crossing barrier
41. Crash cushions
42. Small bridges
43. Other elements of the road

COLLISION AGAINST ELEMENTS OUT OF THE ROAD
44. House, wall or building
45. Vegetation out of the road
46. Other elements placed out of the road: litter bins, benches, elements of children's park, advertising...)

OVERTURNING, FIRE, BLOW-OUT, OTHER
47. Spins
48. Roll-overs
49. Fall in a chasm
50. Overturning of the vehicle in its own carriageway
51. Overturning of the vehicle in the opposite carriageway
52. Overturning of the vehicle out of the road
53. Vehicle on fire
54. Other type of event

10

The METRAS method in the SIDAT application:

■ **The first stage:** the police agents fill in the serious or fatal questionnaires to evaluate from the <u>archived accident reports</u> with specific characteristics that have taken place in their municipality lately

■ **The second stage:** the completion of the statistical questionnaires for the accidents that happen during the <u>pilot test week</u> together with documents of evaluation of the difficulties and contents

■ Sample: 163 agents and 456 questionnaires. The sequencing accident METRAS method was filled in for serious or fatal accidents. (338 questionnaires).
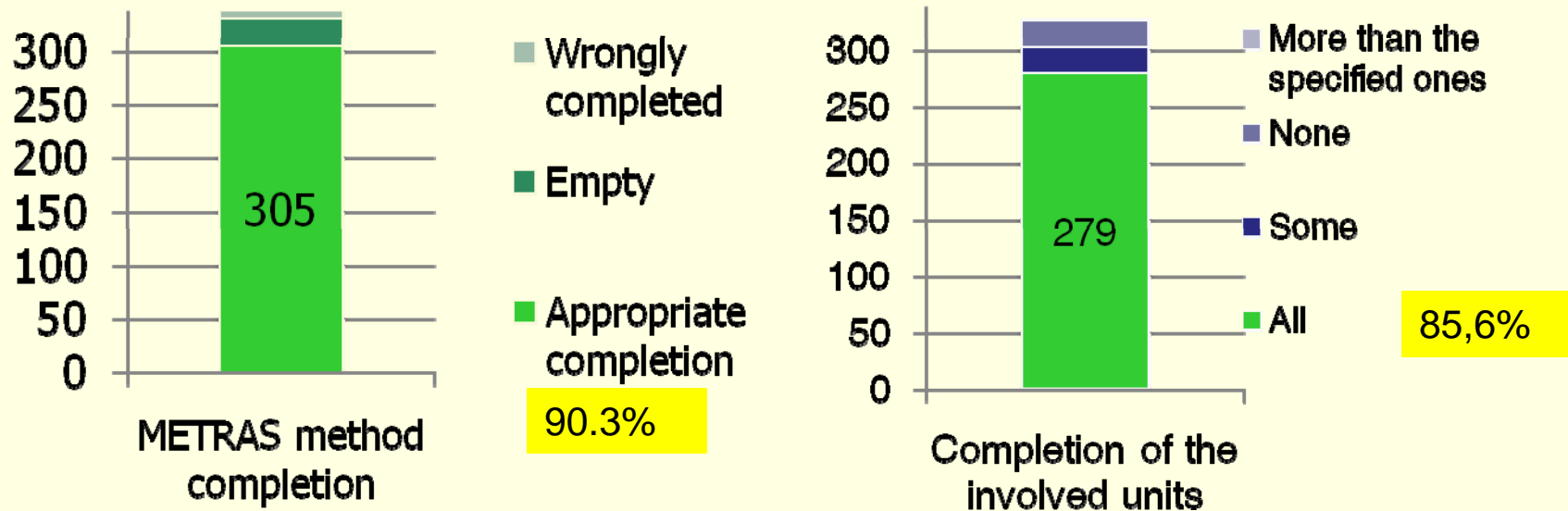
Left chart — Completion of the Events

Legend:
- All except vehicles running off the road
- Inappropriate selection
- Only the most serious one
- Only the first one
- Only the first one and the most serious one
- The first one, the most serious one and the other ones
- All

Bar value: 245

80.3%

Right chart — Completion of the most serious event

Legend:
- More than the specified ones
- More than one selected
- Not selected
- Not selected because there is only one
- Correct

Bar value: 256

10%

84%

13
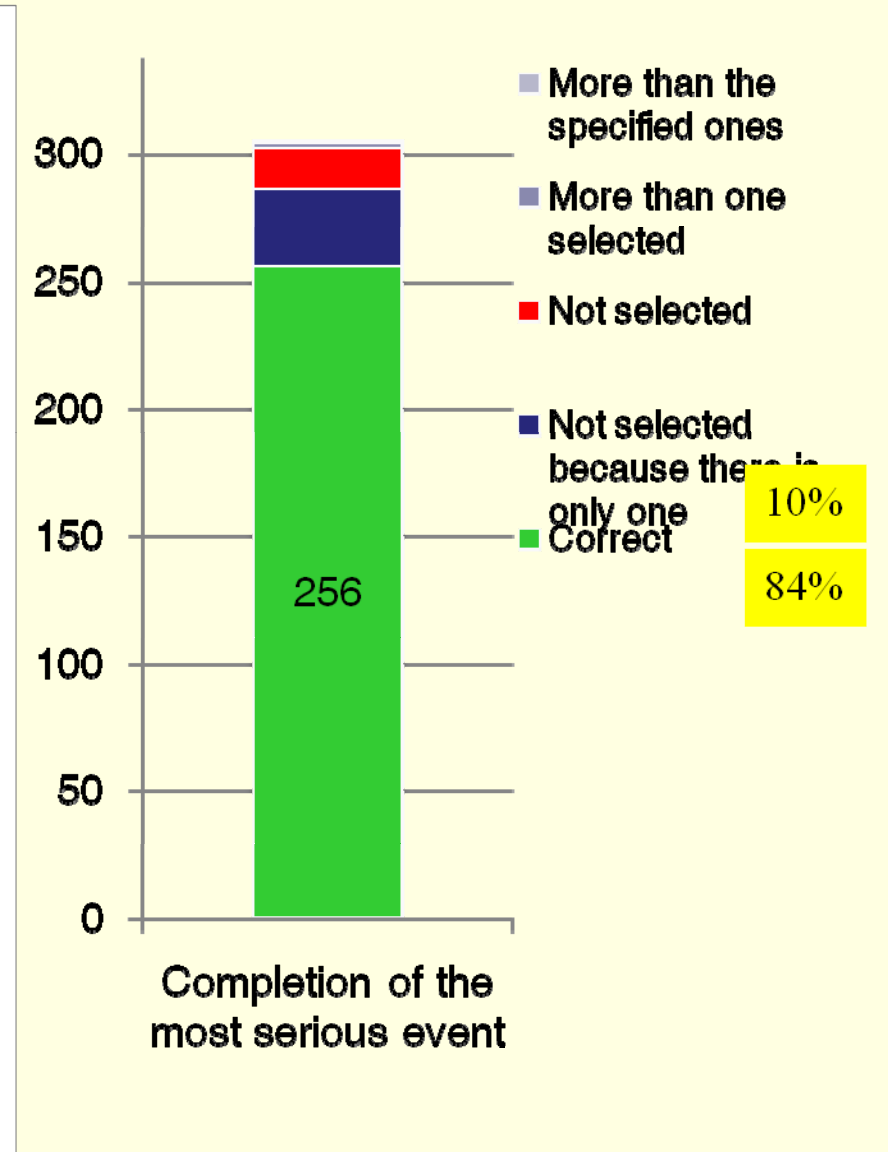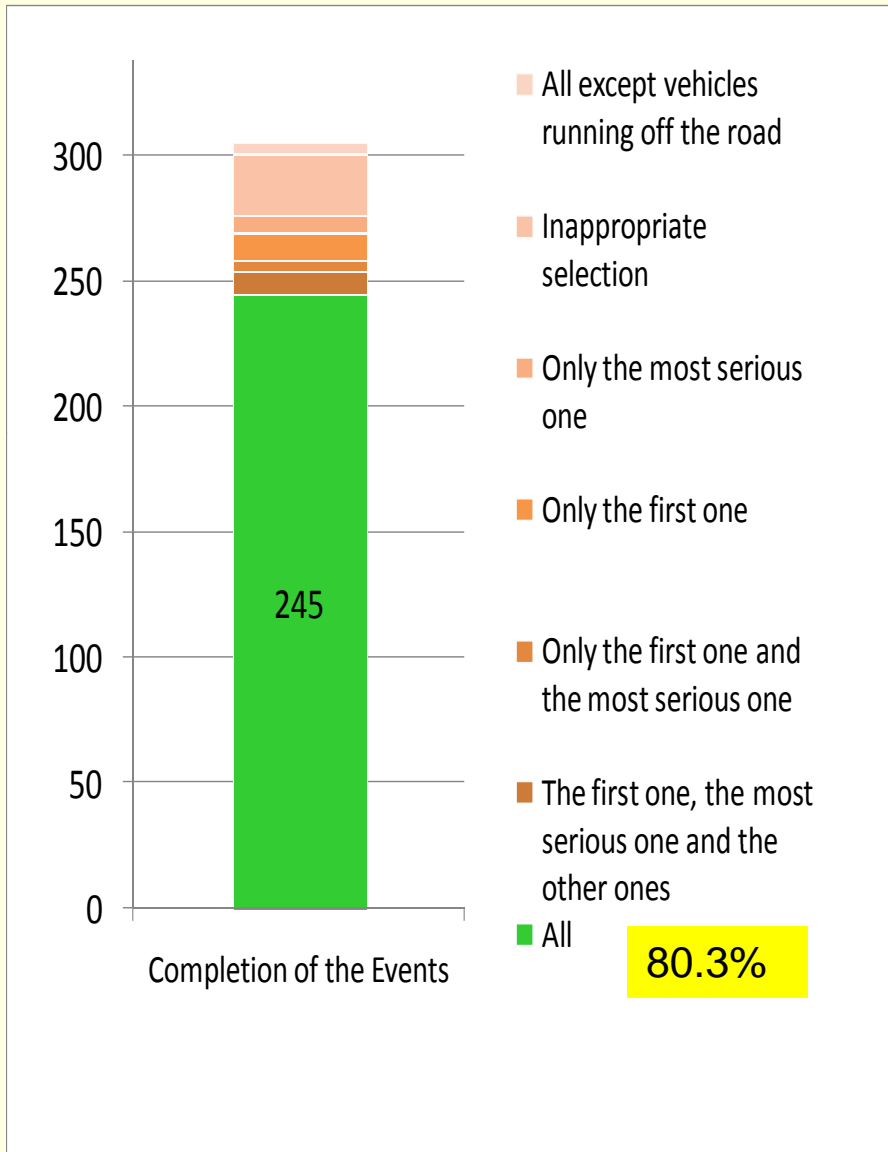
General Rule First Event

Example: In a double carriageway road with double traffic flow, in a signposted curve, a passenger car runs into the load of a lorry that is scattered on the road. Then, the passenger car runs off the road by the right and overturns.

METRAS METHOD OF ACCIDENT SEQUENCING		
INVOLVED UNITS	EVENTS	MOST SERIOUS EVENT
V1	20. Collision against a load or elements of other vehicles	
V1	22. Running off the road by the right, no invasion of another road or carriageway	
V1	52. Overturning of the vehicle out of the road	X

Type of accident in CADaS (There are several categories that could cover this accident, among which one has to be selected):

A-10.02 Single vehicle accidents with obstacles on or above the road

A-10.06 Single vehicle accidents - Leaving straight road - either side of the road

A-10.08 Single vehicle accidents on the road

A-10.09 Single vehicle accidents including rollover/overturning

14
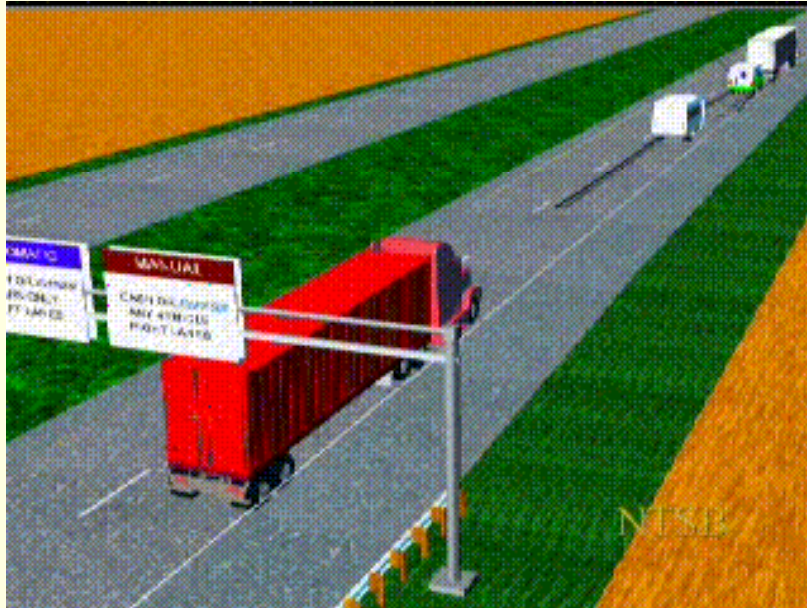
INVOLVED UNITS

V1: Red lorry   V4: First white lorry

V2: White minivan   V5: Last white lorry

V3: Ambulance

ACCIDENT SEQUENCE			
UNITS		EVENTS	MOST SERIOUS EVENT
V1	V2	7 (Rear-end collision, same direction)	X
V2	V3	7 (Rear-end collision, same direction)	
V2		25 (Running off the road by the left, no invasion of another road or carriageway)	
V1	V4	7 (Rear-end collision, same direction)	
V1		26 (Running off the road by the left, invading another road or carriageway)	
V1		51 (Overturning of the vehicle in the opposite carriageway)	
V1	V2	7 (Rear-end collision, same direction)	
V5	V3	7 (Rear-end collision, same direction)	
V5	V4	7 (Rear-end collision, same direction)	

■ **The information about the first event** allows to identify what first happened and then study the influence of the infrastructure conditions, the situational factors, the factors of the driver / pedestrian and of the vehicle to prevent the accidents. It could be a key element for the study of the active safety.

■ **The information about the most serious event** allows to know the event that has caused the most serious consequences for the involved persons. This could be a key element for the study of the elements of passive safety.

■ **Accident sequencing** may allow to draw patterns of accident rate for particular roads, vehicles and even drivers or pedestrians.
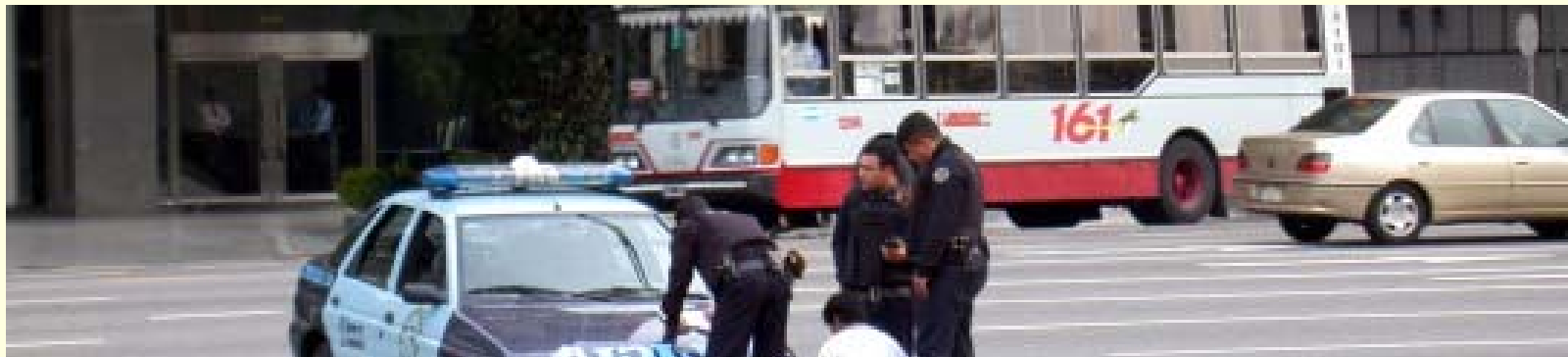
[Results and Conclusions::]

What does the METRAS method allow <u>from the point of view of the Record</u>::

- It is integrated in the traffic accident statistical questionnaire of the police.

- It allows the improvement of the quality and reliability of the information on the accident typology.

- It respects the dynamic nature of the accident. It implies a better knowledge of the accident reality that was only present in the reports up until now.

- At the police level, it gives a better utility and a more positive assessment to the statistician. For serious and complex accidents, it could be a tool to manage to describe the accident. It could be used as a basis for the automation of reports and pictograms that position the accident.

- At the urban police level, it allows getting information for interventions.

- It implies a new perspective of the accident study from the macroscopic point of view with a much lower cost that the in-depth studies.

- It is compatible and it allows the conversion to the classic accident typology as well as to the "accident type" field requested in the European "CARE" database and to the new "CADaS" proposal.

Thank you !!!!!

NOTES:

- The Metraseis Award for the most innovative contribution in the field of the survey methodology was given to the "METRAS method of event sequencing in the field of traffic accident statistical questionnaire." in the "IV Conference of Survey Methodology", organized by the Public University of Navarre in Pamplona on the 20-22 of September 2006.

- The complete study of this method is currently being finished as the doctoral thesis of Mª Teresa Tormo and will be presented and defended soon.

  - More information...

www.uv.es/metras