



Study on a Methodology for Network-wide Road Assessment



Questionnaire



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Background

European Commission is taking action to develop a **methodology for a common network-wide road safety assessment and a safety rating system** for classification of the existing road network in categories, to provide guidance to Member States in accordance to the amendments to Directive 2008/96/EC on Road Infrastructure Safety Management (revised Directive 2019/1936). The findings of this network-wide road safety assessment will enable a follow up by targeted road safety inspections or, if possible and cost-efficient, by direct remedial action aimed at eliminating or reducing the road safety risks without imposing an undue administrative burden.

Within this framework, the following questionnaire aims to collect data for currently applied **practices across Europe and internationally for road safety assessment** relying either on accident record analysis and/or on road characteristics. Additionally, it aims to gather information related to the applied **road classification system** and to the **data sets** that are available and are usually used to assess safety.

The questionnaire includes 49 questions and will require approximately 3 hours of your time. Part A focuses on the road classification system used in your country, Part B on data availability aspects, Part C on practices that assess road safety using accident records and Part D on practices assessing road geometric and operational characteristics.

We would be grateful if you could answer the following questions and send back your reply to Tassos Dragomanovits, NTUA <dragoman@central.ntua.gr>, preferably by November 10th, 2020.



Part A: Road type classification

This section collects information related to the road classification system that is currently applied in each country.

1. Please fill in the definition of the different road classes for **interurban roads** that exist in your country, potentially falling into the scope of the Directive 2008/96/EC, revised according to Directive 2019/1936. Additionally, please provide a reference and/or link to the respective manual or guidelines for road classification (if available):

Urban roads are those (non-motorway roads) within an area of population of 10,000 or more, based on the 2011 census data that uses a revised 2001 Communities and Local Government classification. (Non-motorway) Roads outside these areas will be classified as Rural.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/743853/reported-road-casualties-gb-notes-definitions.pdf

2. For each one of the road classes that you have identified and defined in the previous question, please provide the total length of road network in kilometres (km).

Motorways: **3,076km**

Rural roads: **3,891km**

Urban roads: **305km**

3. Which of the road class in your country better corresponds to the following terms used in this questionnaire?

motorways: **Strategic Motorways for England only**



other primary divided rural roads: **Strategic rural 'A' road dual carriageways for England only**

primary undivided rural roads: **Strategic rural 'A' road single carriageways for England only**

Note: England forms about 85% of the UK by population, though a smaller proportion by surface area. Answers to these questions for Northern Ireland, Scotland and Wales would differ in some small details from those for England, but we think such differences are very unlikely to be important for the purposes of this questionnaire. Our strategic network corresponds in many ways to the intentions of the primary networks envisaged in the revised RISD

Part B: Road data availability

*This section collects information related to the availability, quality, and actuality of road design, operational, traffic and accident data sets, **for motorways and primary interurban roads** (divided and undivided). Data quality and actuality columns aim to obtain an approximation of whether the data has been collected in a consistent and error-free manner (data quality) and is being frequently updated (data actuality).*

Roadway data

1. Are the following road design data sets available across the whole of your state/country (if only a state or a region and not the whole country is considered please indicate so in the comments) for the mentioned road types? Please mark (X) all that apply. In case data are available for parts of the network please provide the approximate percentage (e.g., 65% of the roads). If you use any alternative or proxy variables, please identify them at the 'Comments' column.



For the Data quality column please indicate whether the available data is of low, medium, or high quality; for the Data Actuality column please indicate whether the available data is current (i.e., has been collected within the last 5 years) or outdated.



Road Design data	Data availability			Data quality (low/medium/high)	Data actuality (current/outdated)	Comments
	Motorways ¹	Other primary rural roads				
		divided	undivided			
Horizontal alignment (curve radii, element length)	100%			High	5 years old plus currently being coded in 2020	
Vertical alignment (gradient, curve radii, element length)	100%			High	5 years old plus currently being coded in 2020	
Number of lanes	100%			High	5 years old plus currently being coded in 2020	
Road/ lane width	100%			High	5 years old plus currently being coded in 2020	
Shoulder type (paved/unpaved)	100%			High	5 years old plus currently being coded in 2020	

¹ Motorways is the term used in Europe; in other countries the respective term is freeways or highways



Shoulder width	100%			High	5 years old plus currently being coded in 2020	
Roadside clear zone width	100%			High	5 years old plus currently being coded in 2020	
Presence of side safety barriers	100%			High	5 years old plus currently being coded in 2020	
Central median type	100%		n/a	High	5 years old plus currently being coded in 2020	

2. How are the Road Design data stored?

- database
- Geographical Information System (GIS) application
- visualization (photos)

Please indicate if the data storage varies depending on the age of the road facility:

Motorways and all-purpose trunk road network (Strategic Road Network) data are held in a GIS system and in the iRAP tools.



3. Are the following quality related data sets available across the whole of your state/country (if only a state or a region and not the whole country is considered please indicate so in the comments) for the mentioned road types? Please mark (X) all that apply. In case data are available for parts of the network please provide the approximate percentage (e.g., 65% of the roads). If you use any alternative or proxy variables, please identify them at the 'Comments' column. For the Data quality column please indicate whether the available data is of low, medium, or high quality; for the Data actuality column please indicate whether the available data is updated (i) every 1 year, (ii) every 2-3 years, or (iii) every 5 or more years.

Quality related data	Data availability			Data actuality (per 1 year, per 2-3 years, every 5 years or more)	Comments
	Motorways	Other primary rural roads			
		divided	undivided		
Pavement quality (cracking, slippery, drainage)	Done in a basic way in iRAP but HE do in a more granular manner	Done in a basic way in iRAP but HE do in a more granular manner	Done in a basic way in iRAP but HE do in a more granular manner	Every 5 years	
Marking quality	Done in a basic way in iRAP but HE may do in a more granular manner	Done in a basic way in iRAP but HE may do in a more granular manner	Done in a basic way in iRAP but HE may do in a more granular manner	Every 5 years	
Sign quality (reflectivity)	HE may do	HE may do	HE may do	Not Known	
Condition of safety barriers	HE may do	HE may do	HE may do	Not Known	



Quality related data	Data availability			Data actuality (per 1 year, per 2-3 years, every 5 years or more)	Comments
	Motorways	Other primary rural roads			
		divided	undivided		
Condition of drainage system	HE may do	HE may do	HE may do	Not Known	
Winter maintenance	HE may do	HE may do	HE may do	Not Known	

4. How are the Road Design data stored?

- database
- GIS application
- visualization (photos)

Please indicate if the data storage varies depending on the age of the road facility:

Motorways and all-purpose trunk road network (Strategic Road Network) data are held in a GIS system and in the iRAP tools

Operational data

5. Are the following road operational data sets available, across the whole of your state/country (if only a state and not the whole country is considered please indicate so in the comments) for the mentioned road types? Please cross (X) all that apply and in case that data are available for parts of the network provide the approximate percentage (e.g., 65% of the roads). If you use any alternative or proxy variables, please identify them at the 'Comments' column. For the Data quality column please indicate whether the available data is of low, medium, or high quality; for the Data actuality column please indicate whether the available data is current (i.e., has been collected within the last 5 years) or outdated.



Road Operational data	Data availability			Data quality (low/medium/high)	Data actuality (current/outdated)	Comments
	Motorways	Other primary rural roads				
		divided	undivided			
Posted speed limit	100%	100	100	High	5 years old plus currently being coded in 2020	
Actual operating speed estimation	100%	100	100	High	5 years old plus currently being coded in 2020	
Junction control at rural roads (e.g. priority control, stop control, signalized, etc)	n/a	100	100	High	5 years old plus currently being coded in 2020	
Data about signalization at intersections and ramp metering	n/a	Yes for signalization at intersections but ramp metering unknown		High	5 years old plus currently being coded in 2020	

6. How are the Operational data stored?

- database
- GIS application
- visualization (photos)

Please indicate if the data storage varies depending on the age of the road facility:



GIS coding database plus ViDA iRAP tools

Traffic data

7. Are the following road traffic data sets available, across the whole of your state/country (if only a state and not the whole country is considered please indicate so in the comments) for the mentioned road types? Please mark (X) all that apply and in case that data are available for parts of the network provide the approximate percentage (e.g., 65% of the roads). If you use any alternative or proxy variables, please identify them at the 'Comments' column. For the Data quality column please indicate whether the available data is of low, medium, or high quality; for the Data actuality column please indicate whether the available data is current or outdated, and specifically if it is updated annually, every two or three years, or less often.

Road Traffic data	Data availability			Data quality (low/ medium/ high)	Data actuality (annually, every 2 years, every 3 years, less often)	Comments
	Motorways	Other primary rural roads				
		divided	undivided			
Annual average daily traffic (AADT)	100%	100%	100%	Medium	1-8 years depending on the road type	
% of heavy vehicle traffic	100%	100%	100%	Medium	1-8 years depending on the road type	
% of Powered 2-Wheelers Traffic	100%	100%	100%	Medium	1-8 years depending on the road type	

8. Please fill in the definition of heavy vehicles applied in your country: **3.5 tonnes**.



9. Please indicate which of the following ways are implemented to collect traffic data on Motorways.

- Continuous detectors (i.e., on a 24hours per day / 7days per week basis)
- Short-term counters
- Toll station counts
- Video cameras
- other (please specify):.....

10. Please indicate which of the following ways are implemented to collect traffic data on primary rural divided roads.

- Continuous loop-detectors (i.e., on a 24-7 basis)
- Short-term counters
- Toll station counts
- Video cameras
- other (please specify):.....

11. Please indicate which of the following ways are implemented to collect traffic data on primary national undivided rural roads.

- Continuous loop-detectors (i.e., on a 24-7 basis)
- Short-term counters
- Toll station counts
- Video cameras
- other (please specify):.....



Accident data

12. Are the following road accident² data sets available, across the whole state/country (if only a state or a region and not the whole country is considered please indicate so in the comments) for the mentioned road types? Please mark (X) all that apply. In case that data are available for parts of the network provide the approximate percentage (e.g., 65% of the roads). Please provide the information related to data availability for all road user types, as indicated in the table. If you use any alternative or proxy variables, please identify them at the 'Comments' column.

² The term accident is commonly used in the European Union guidelines and manuals, thus throughout this questionnaire this term has been adopted. In the traffic safety literature alternatives terms can also be found, such as crash or collisions, that are equivalent.



Road Accident data	Data availability			Comments
	Motorways	Other primary rural roads		
		divided	undivided	
Accident type	X	X	X	
<ul style="list-style-type: none"> • Head-on • Side-swipe • Rear end • Run-off road 	X	X	X	
Number of fatalities	X	X	X	
<ul style="list-style-type: none"> • Car • Truck • Bus • Pedestrian • Bicyclist 	X	X	X	
Number of serious injuries	X	X	X	
<ul style="list-style-type: none"> • Car • Truck • Bus • Pedestrian • Bicyclist 	X	X	X	
Number of slight injuries	X	X	X	
<ul style="list-style-type: none"> • Car • Truck • Bus • Pedestrian • Bicyclist 	X	X	X	



Road Accident data	Data availability			Comments
	Motorways	Other primary rural roads		
		divided	undivided	
Number of property damage-only accidents <ul style="list-style-type: none"> • Car • Truck • Bus • Pedestrian • Bicyclist 				
Outside accident influences (weather, driving and lighting conditions, date)	X	X	X	
Road user characteristics (age, sex, etc.)	X	X	X	
Road features (curve/tangent, intersection, etc.)	X	X	X	
Vehicle characteristics (age, type etc.)	X	X	X	
Precise GPS data on accident location	X	X	X	Precision depends on method used to record and whether police attended
Use of alcohol or drugs	X	X	X	Depending whether police attended and if so on their decision whether to test



13. For which years are digital accident databases available?

1979 onwards

14. What is the delay for incorporating accident data in the database? E.g. how many months after the year ends are data for that year available?

9-10 months for full dataset, with summary data released after 6-7 months

15. How are the accident data linked with the road information?

- Road segment numbering
- Road code and chainage
- GPS Location
- other (please specify): **In various ways**

16. Based on which system are accidents classified with respect to injury severity?

- Through hospital/ medical professional records (e.g., based on MAIS)
- Police reporting based on the on-site assessment
- other (e.g., US system "KABCO" etc., please specify):.....

17. Is there a study, in your country, that provides an estimation of the percentage of accidents that are underreported, i.e., have occurred but have not been recorded into any of the existing databases. Please provide the reference below, if one is available, or provide a qualitative estimation and explanation:

Heather Ward, Ronan Lyons and Roselle Thoreau Under-reporting of Road Casualties – Phase 1. Department for Transport Road Safety Research Report No. 69: London, UK, 2006. Available online <https://discovery.ucl.ac.uk/id/eprint/3373/1/3373.pdf>



18. Is there a study, in your country, that provides an estimation of the percentage of injury accidents that are underreported, i.e., an accident has occurred and has been recorded but the injury severity assessment is not correct. Please provide the reference below, if one is available, or provide a qualitative estimation and explanation:

See 17 above

19. Is there a study or other related work, in your country, that has estimated the social cost of road accidents, based on their injury severity? Please provide the full reference and/or link:

There is an extensive literature dating from the late 1960s onwards. The current position is summarised in Statistical data set - Accident and casualty costs (RAS60): Data about the accident and casualty costs, produced by Department for Transport. Available online <https://www.gov.uk/government/statistical-data-sets/ras60-average-value-of-preventing-road-accidents#history>



Part C: Methods to assess road safety based on accident occurrence

This section aims to identify which practices are currently applied by Road Authorities (national or local) to assess accident occurrence across a road network.

1. Which of the following safety performance metrics, if any, are used, in your country, to identify sites that are prone to accidents? Please indicate whether these values are compared against a state and/or country average, a-priori accident estimations (e.g., through accident prediction models).

- accident frequency (i.e., accidents per km.year or mile.year)
- percentage of severe/fatal accident
- accident rates (i.e., accident frequency over AADT)
- other (please specify):

Compared against: other similar sites in the network being considered or some wider network and/or earlier periods of time. This process is the responsibility of the Road Authority (or combination of Authorities responsible for the site being considered, ranging from small local authorities to the authority responsible for the national strategic network in the UK territory concerned (England, Northern Ireland, Scotland or Wales) Each authority uses its judgement just which metric to use at each site.

2. Which accidents do you consider, in your country, to identify hazardous sites?

- accidents with fatalities only
- accidents with fatalities and/or serious injuries
- accidents with fatalities, serious and/or slight injuries
- all accidents (including property damage only)
- other (please specify):



3. To which road types do you usually apply methods assessing road safety based on accident occurrence in your country? Please check all that apply and specify the total length assessed. *(if answered in February 2020 Commission's questionnaire, you may skip this question)*

motorways:km

other primary divided rural roads:..... km

primary undivided rural roads:..... km

4. How many years of data are usually used to estimate the average accident frequency?

3 or more

5. What approaches are usually applied, in your country, in sites that are identified as hazardous? Please check all that may apply *(if answered in February 2020 Commission's questionnaire, you may skip this question)*

visual inspection with on-site visits

visual inspection with video data collection

analysis of accident-related information

other (please specify):

no standard activities are carried out

6. Is there a national guideline regarding accident analysis methodology in your country? *(if answered in February 2020 Commission's questionnaire, you may skip this question)*

yes

no

If yes, please provide a full reference and a link (if possible):

.....



7. Please provide examples of results of assessments based on accident occurrence including the way and the format these are displayed/ illustrated? *(if answered in February 2020 Commission's questionnaire, you may skip this question)*

8. How frequently it is, in your country, to visually inspect sites that are more prone to accidents? **Not known**

- once a year once every 3 years once every 5 years
 not at all

9. How would you rate the process of visually inspecting sites that are prone to accident in terms of effectiveness with respect to: **not known**

(a) Time needed to complete the inspection:

- high medium low

(b) Number of people needed to complete the inspection:

- high medium low

10. Please provide an estimation of the per kilometre cost or per day cost of analyzing accident records to assess road safety. If none the aforementioned values are available, please provide a cost estimation that is available to you in an interpretable way, i.e., total cost over a certain time period.

Not known

11. How often is decision making on realizing road safety investments based on the results of accident analysis methodologies in your country?

Not known

- always usually rarely never



If your answer was "rarely" or "never", please mention what other criteria are applied:.....

.....

.....



Part D: Methods to assess "in-built" safety of roads

In addition to assessing accident occurrence, road safety may also be evaluated "pro-actively", by assessing the road design characteristics of an existing road element, i.e., road segment, intersection, or network; this safety assessment approach is named "in-built" safety. In-built safety emphasizes on geometric (e.g., presence of horizontal curvature) and operational (e.g., posted speed limit) design characteristics to qualitatively estimate the safety of a road element.

1. How common it is, in your country, to assess the safety of an existing road element, e.g., a highway section, based on its design characteristics (e.g., horizontal curve radius, etc.)

- very fairly not much not at all

2. To which road types do you usually apply pro-active methods assessing the "in-built" safety of roads? Please check all that apply and specify the total length assessed. *(if answered in February 2020 Commission's questionnaire, you may skip this question)*

See answer in Part A Question 2

- motorways:km
 other primary divided rural roads:..... km
 primary undivided rural roads:..... km



3. Do you distinguish vulnerable road users in pro-active methods assessing the "in-built" safety of roads? *(if answered in February 2020 Commission's questionnaire, you may skip this question)*

yes no

If yes, please specify: ...as per iRAP specification.....

4. Are there, in your country, officially approved Guidelines or Manuals regarding the assessment of road safety based on geometric and operational characteristics of roads? *(if answered in February 2020 Commission's questionnaire, you may skip this question)*

yes no

If yes, please provide the relevant reference(s) and, if possible, attach the relevant documents in your reply This is done according to the iRAP specifications.

Please specify whether these Guidelines or Manuals focus on the following aspects (X all that apply):

- Site-specific safety assessment, i.e. short road segments (<10Km) or individual intersections
- Segment level safety assessment, i.e., large road segments (>10Km)
- Network-wide safety assessment (i.e., the entire motorway network is considered)
- Network-wide safety assessment with the ability to rank the various network components

5. Please provide examples of results of such assessments, including the way and the format these are displayed/illustrated ? *(if answered in February 2020 Commission's questionnaire, you may skip this question)*



Strategic road network iRAP assessment of total length.

iRAP also applied to tiers of network below this but sporadically.

6. Which authority/ body, in your country usually:

(a) administrates the road safety assessment?

national road authorities

regional road authorities

the project operator/ concessionaire

other (please specify): Department for Transport in the case of the Safer Roads Fund.

(b) conducts the road safety assessment?

national road authorities

regional road authorities

the project operator/ concessionaire

independent and authorized professionals

other (please specify):

7. In terms of cost-effectiveness how would you rate the used method (from very effective to not at all affective)?

high

medium

low

Please comment on the reason: **Considering the level of information available and the power of the iRAP system – high.**

8. In terms of time-effectiveness, how would you rate the used method (from very effective to not all effective)?



high medium low Please comment on the reason: ...

9. For a given segment (~50 km), how many people are usually involved?

one to two more than 2 more than 4 people

Please indicate if these people have received special training and if yes, provide further information on it: iRAP accredited coding team and consultants.

10. Please provide an estimation of the per kilometre cost of assessing road safety based on the geometric and operational characteristics of roads.

Hugely variable so unable to respond.

11. From the following list of indicative elements of network-wide road safety assessments (adopted from the EU Directive 2019/1936), please indicate which ones are considered for road safety assessment in your country (X all that apply).

Description	Considered
General	
1. Type of road in relation to the type and size of regions/cities it connects	
2. Length of road section	X
3. Area type (rural, urban)	X
4. Land use type (e.g., commercial, industrial, agricultural, etc.)	X
5. Property access points density	X
Traffic volumes	
1. Passenger car/light-duty vehicle volumes	X



Description	Considered
2. Observed motorcycle volumes	X
3. Observed heavy vehicle volumes	X
4. Observed non-motorized user volumes	
5. Estimated non-motorized user volumes based on the adjacent land use attributes	X
Accident data	
1. Number, location and cause of fatalities by road user group	X
2. Number and location of serious injuries by road user group	X
Operational characteristics	
1. Speed limit	X
2. Operating speed (85th percentile)	X
3. Speed management and/or traffic calming	X
4. Presence of ITS devices: queue alerts, variable message signs, etc.	X
Geometric characteristics	
1. Cross section characteristics (e.g., number of lanes, type and width of lanes, etc.)	X
2. Horizontal curvature	X
3. Grade and vertical alignment	X
4. Visibility and sight distances	X
Objects, clear zones and road restraint systems	
1. Roadside environment and clear zones	X
2. Fixed obstacles at the roadside	X



Description	Considered
3. Density of obstacles	X
4. Rumble strips	X
5. Road restraint systems	X
Bridges and tunnels	
1. Presence and number of bridges, as well as relevant information concerning them	X
2. Presence and number of tunnels, as well as relevant information concerning them	
3. Visual elements representing hazards for the safety of the infrastructure	
Intersections (<i>applies only for the primary national undivided rural roads</i>)	
1. Intersection type and number of arms	X
2. Presence of channelization	X
3. Intersection traffic volume	X
4. Intersection quality	X
Maintenance	
1. Pavement defects	X
2. Pavement skid resistance	X
3. Shoulder condition (including vegetation)	X
4. Condition of signs, markings and delineation	X
5. Condition of road restraint systems	X



Description	Considered
Pre/post-accident systems for traffic injury mitigation elements	
1. Network operational centres and other patrolling facilities	
2. Mechanisms to inform road users of driving conditions in order to prevent accidents or incidents	
3. AID (automatic incident detection) systems: sensors and cameras	
4. Incident management systems	
5. Systems for communicating with emergency services	

12. Which of the following barriers to assessing the "in-built", network-wide safety of roads exist in your country?

- lack of road geometric data
- lack of road operational/ traffic data
- not accurate/ reliable data
- limited data actuality
- absence of a comprehensive methodology for safety assessment
- absence of officially approved manuals or guidelines
- other, please specify:

.....

13. What are potential reasons, in your country, for which in-built safety is not assessed very often or not at all?

- financial cost
- lack of awareness of such approaches
- lack of data availability
- lack of expertise
- accident occurrence analysis appears to be effective



14. Do you regularly use any of the following established methods for assessing the "in-built" safety of roads?

- CEDR PRACT methodology
- iRAP/ EuroRAP protocols
- No such method is used
- AASHTO Highway Safety Manual
- other (please specify).....

15. How often is decision making on road safety investments based on the results of assessments of the "in-built" safety of roads in your country?

- always
- usually
- rarely
- never

If your answer was "rarely" or "never", please mention what other criteria are applied: **This is just being established**

16. Which of the two methodological approaches do you use more frequently in your country for road safety assessment?

- approach based on accident occurrence (Part C of this questionnaire)
- approach based on geometric characteristics (Part D of this questionnaire)

Please explain why (in your opinion) one approach (if any) is applied more frequently in your country: **Both are applied.**



Details of the person completing the survey

Full Name (First and family name): **Parliamentary Advisory Council for Transport Safety (PACTS)**

Affiliation:

Organisation type:

- National Road Authority
- Road Managing Company
- Academia/research institution
- Other (specify) **Charity**

Country: **England**

Can we acknowledge your name in the report that will be produced?

yes no