

With infrastructure involved in as many as a third of all accidents, beyond extending education and enforcement policies, safe road engineering supported by sound research can help ensure consistently high levels of safety along Europe's road networks.

When road safety policy is analyzed, three main areas of action can be defined corresponding to the three main actors involved in road safety: human, vehicle, and infrastructure. The three of them, usually called "the three safety pillars" are addressed in different ways. However, this range of domains must be dealt with subject to budget limitations. Consequently, cost efficiency of systems and measures needs to be a decisive factor for policy making.







In this context, RANKERS (RANKing for European Road Safety) pursues the ambitious objective of developing scientifically-researched guidelines enabling optimal decision-making by road authorities in their efforts to promote safer roads and eradicate dangerous road sections. RANKERS is a research project co-funded by the European Commission designed to gain new knowledge by performing research and empirical studies of the road's interaction with the driver and his vehicle in order to identify optimal road recommendations and predict their impact on safety. The main output of the project includes an index used for assessing and monitoring road safety and a comprehensive catalogue of road infrastructure safety recommendations ranked according to their cost-effectiveness.

RANKERS proposes to address traditional passive safety measures ("forgiving roads") together with a better understanding of the accident causation scenarios, leading to a significant mitigation of the risks posed by the road and its environment. The roads design should be directly focused to the concept of making "self-explaining roads", that is to say, advocating a traffic environment which elicits safe driving behaviour simply by its design so that the road user is neither confused nor invited to take risks.

The project has produced two main results, in line with an integrated approach for road infrastructure safety: the **eBook – Ranking of Recommendations** and the **Road Safety Index**.

The **Road Safety Index** is a methodology for the evaluation of road safety in road sections. It assesses the actual status of road infrastructure and its relationship with road safety. The main innovative aspects of this index are as follows:




- It is divided in six infrastructure topics: road alignment, junctions, overtaking, roadside, pavement and road layout consistency. This allows identifying the specific aspects where safety can be improved in road sections.

	ROAD ALIGNMENT: lanes & shoulder width, curvature radius, visibility, etc.		ROADSIDE: geometry, presence of obstacles and distance to the carriageway, safety equipment,, etc.
	JUNCTIONS: n° of junctions present, n° of private accesses and their coordination, level of signing at intersections, etc.		PAVEMENT: assessment of the pavement status, superelevation coordination and transition in curves, etc.
	OVERTAKING: coherence between road marking – vertical signs, available visibility for overtaking manoeuvres.		ROAD LAYOUT CONSISTENCY: relationship between curvature of consecutive curves, drivers' perception, etc.

RSI road infrastructure topics

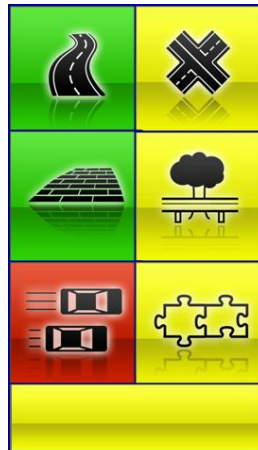
- It provides safety marks for the different infrastructure topics each 1,5 – 2 km. This means that within a road network the potential users can identify the road sections where each infrastructure category should be improved.
- Safety marks are divided in four categories:
 1. *It is urgent to take remedial measures to solve this infrastructure safety topic.*
 2. *There are deficiencies to be solved in a medium term period.*
 3. *No need of action if maintenance is kept properly.*
 4. *No action is necessary.*

Therefore, the road networks administrators can prioritize the road infrastructure investments in those sections where they are most necessary. This can be easily showed with the colour evaluation scale.

4 ≥ Mark >3 	3 ≥ Mark >2 	2 ≥ Mark >1 
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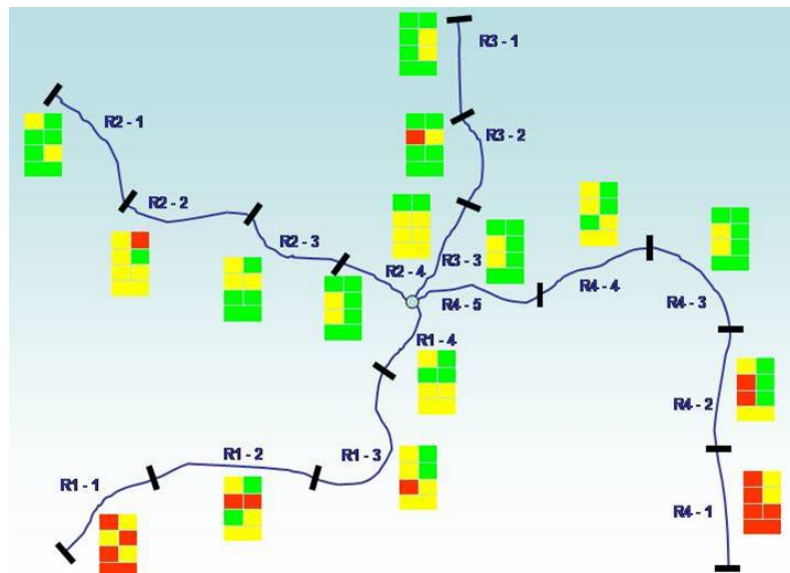
RSI colour evaluation scale

- The index therefore provides a general safety mark for each road section and six particular road safety mark for each category in each road section.



Road section evaluation results example

This can result in a colour map with the evaluation of a whole road network.



Example of the evaluation results after applying the RSI to a set of roads

After having identified the road safety deficiencies of road infrastructure, the **eBook – Ranking of Recommendations** offer the most cost – effective solutions for the above problems. WP4 produced a list of remedial countermeasures, according to different accident scenarios, that are ranked according to the relationship between their costs (installation and maintenance) and their effectiveness reducing the number of accidents or their severity.

Then, this catalogue was integrated in the interactive tool eBook developed within WP3. Therefore, this catalogue is available on the internet for all the stakeholders involved in the road infrastructure sector, mainly road operators, administrators and road safety experts. The main innovations that this interactive tool offers are the following:

- The catalogue is structured according to different accident scenarios developed through the course of the project. Therefore, it can provide the adequate solutions for different road safety problems.

- The countermeasures included in the catalogue are ranked according to the ratio between their costs and effectiveness. As the effectiveness information is not always available, the project has developed a methodology that allows calculating the ratios between the countermeasures of the same scenario. It does not provide absolute ratios but within a set of countermeasures it provides which are more cost – effective compared to the other ones.
- The calculations can be reformulated if updated information is available for the potential future users regarding the costs in the specific regions where it would be applied.

The eBook allows the users searching within the scenarios according to relevant keywords (i.e. type of collision, road users involved, environment, weather conditions ...). Therefore, this facilitates the process of finding the most appropriate countermeasure for the problem under analysis. The consortium recommends not to use this tool as a unique platform. When improving road safety in a road section, this must be inspected, previous accident data should be also considered and regional or national regulation restrictions should also be considered. The eBook should just be a guide for finding the best solution.