Polytechnic University of Bari
DICATECh
prof. Pasquale Colonna

SUMMER SCHOOL SIIV 2012

Road Safety Management

Introduction to European Directive 2008/96/CE and Italian Guidelines

Polytechnic University of Bari
DICATECh
prof. Pasquale Colonna

- Professor of Road Safety at the Polytechnic University of Bari
- Vice President of the Italian Committee "Safer Road Infrastructure" of the International Road Association PIARC (2008 – 2011)
- Member of the Road Safety Group of Experts of the International Road Federation IRF
- Head, on behalf of Polytechnic University of Bari, of a research project on road safety in which tests are being carrying out on a circuit and on the road, by monitoring the behavior of some users volunteers, mostly students.

I am honored to be here at this school and in this meeting

I thank prof. Cafiso for this opportunity

I greet:

- prof. Recca and prof. Canale (Catania University)
- prof. Bocci (SIIV)
- dr. Campagnolo (European Community)
- the Italian Ministry of Infrastructure and Transport
- the distinguished international teachers of this school Rune Elvik, Jake Kononov, Bhagwant Persaud, Harry Cullen and Adewole Adesiyun
- my collegues Cafiso and Domenichini (Chairs of Session)
- all the young students and researchers

I apologize to everyone for my English language that is not good quality

Why am I here?

When Professor Cafiso has made me the invitation to come to Catania, I had some doubts for the following two reasons

1) I don’t like the stress from "Congress in the English language"

This stress is related to the experimental evidence of the **difficulty in reconciling**

- **the lack of English in my DNA** and
- **the presence in my DNA** of an evident **laziness to reset my brain in English**

2) I have no certainty on road safety

I think **we are still quite far** from having figured out **how, when, where, and especially because road accidents happen**

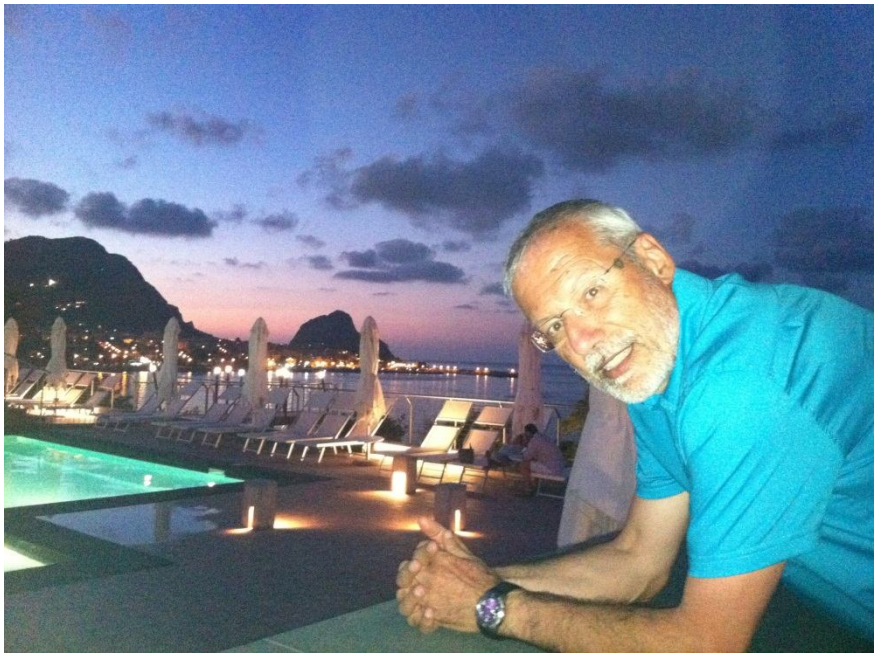
Is it right that I go to say something to the school students on road safety?

At this point I might as well get my USB stick and direct me to the airport quickly,

At this point I might as well get my USB stick and direct me to the airport quickly,

BUT

reflection, perhaps **distorted because I was on vacation in Sicily**, led me to the following conclusions.



1) question of the English language: after all, this is not my problem.

Good luck to you!

2) the only certainty I have a duty to pass on to students is that I was always trying to find the truth

Good luck to you!

THE TOPICS OF THIS PRESENTATION

An **introduction to the European Directive 2008/96/EC** on Road Safety, in particular **with regard to the Road Safety Impact Assessment (RSIA)**

while the concepts of **Road Network Management**, the **Road Safety Audits** and **Safety Inspections** will be presented by Professor Cafiso after me.

However, during this presentation, as well as in the Introduction of tomorrow and probably in the Roundtable on Friday, I'll try to explain why I have not yet certainty about road safety and, through a sort of serial story in three short episodes, I will try also to indicate some possible future developments.

The slides relative to the doubts and certainties research are easily identified because they have a green background how this.

The AIM of the Directive

Italian Guidelines for the Safety Management of Road Infrastructure
Supplement no. 182 of the Official Gazette, no. 209 of 7 September 2012

The EU Directive 2008/96/EC on the safety management of road infrastructure, aims to improve the level of safety of roads belonging to the Trans European Road Network TEN, through the introduction of a series of procedures to improve the safety of road infrastructure in the various phases of planning, design, implementation and management.

Italian Legislative Decree n. 35 of 15th March 2011

Implementation of European Directive 2008/96/EC on the safety management infrastructure

This decree introduces and standard procedures for:

- the **Road Safety Impact Assessment** for Infrastructure Projects
- the **Controls** for the Road Safety (Safety Audit)
- the Network **Safety Management**
- the **Safety Inspection**

This decree applies only to Italian roads that are part of the transeuropean road network, but from 2016 also to roads belonging to the network of national interest

Working Hypothesis of the Directive

Importance of Road Infrastructure

The European Commission has identified

- **Road Infrastructure as the third pillar of road safety policy**, which should make an important contribution to the achievement of the Community's accident reduction
- the **first two pillars** are:
  - training and information to **users**
  - equipment and ergonomics, of **motor vehicles**

Working Hypothesis of the Directive

Importance of Road Infrastructure

The management of **Road Infrastructure Safety** has a **wide margin of improvement** which should be exploited

Working Hypothesis of the Directive

Importance of Road Infrastructure

It is therefore reasonable **to develop procedures** to be followed in those **two sectors (vehicle design and infrastructure)** in order **to enhance the level of safety** of trans-European road infrastructures

Working Hypothesis of the Directive

How to work for Road Infrastructure

Research is essential to increase road safety in the European Union. Developing and demonstrating components, measures and methods (including telematics) and the **dissemination of research results** play an important role in improving the safety of road infrastructure

Working Hypothesis of the Directive

How to work for Road Infrastructure

The safety level of existing roads should be raised by targeting **investments on road sections** with the **highest concentration of accidents** and / or the **greatest potential for reducing accidents**

Working Hypothesis of the Directive

How to work for Road Infrastructure

Drivers should be **aware of road sections with a high accident concentration**, so that they can **adapt their behavior** and increase compliance to traffic rules, **in particular speed limits**

Working Hypothesis of the Directive

These working hypotheses are correct?

In particular:

upgrading of road infrastructure project:

- **significantly increases the level of road safety?**
- **represents the priority actions to be implemented for road safety?**

Italian Legislative Decree n. 35 of 15th March 2011

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Definitions
Road Infrastructure Project

a project for the construction of new road infrastructure

or

a substantial modification of the existing network which affects the traffic flow

I.L.D. n. 35 of 15th March 2011

Definitions

Road Safety Impact Assessment (RSIA)

is a strategic comparative analysis

of the impact of a new road

or of the impact of a substantial modification to the existing network

on the safety of the road network

I.L.D. n. 35 of 15th March 2011

BALTRIS – Improving Road Infrastructure Safety in the Baltic Sea Region
www.baltris.org

BALTRIS
WP 3.3 Recommendations RS impact assessment
2012 12 13

Recommendations for Road Safety Impact Assessment

Part-financed by the European union
(European Regional Development Fund and
European Neighbourhood and Partnership Instrument)

Baltic Sea Region
Programme 2007-2013

Road Safety Impact Assessment

WHEN?

- is performed during the initial planning stage, before the approval of the preliminary draft

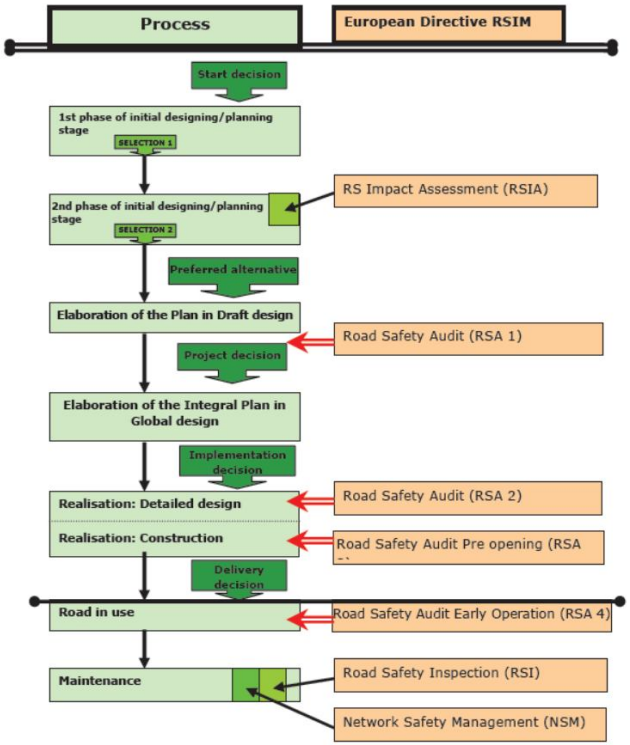
Road Safety Impact Assessment

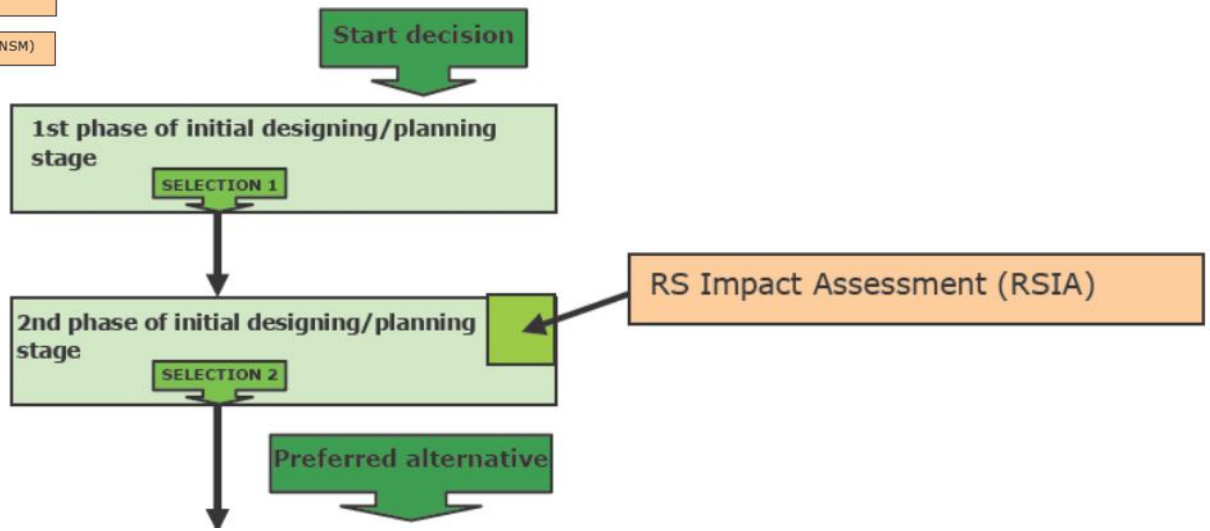
What is the purpose of RSIA?

The purpose of RSIA is to demonstrate, on a strategic level, the implications for road safety of different designing/planning alternatives of an infrastructure project.

Road safety should play an important role when routes are being selected and safety awareness should be included in the decision making during the designing/planning stage.

RSIA is a very beneficial tool that could increase transparency and the availability of information, consequently, it leads the parties concerned to well-informed decisions.


Process
European Directive RSIM
Start decision
1st phase of initial designing/planning stage
SELECTION 1
2nd phase of initial designing/planning stage
SELECTION 2
RS Impact Assessment (RSIA)
Preferred alternative
Elaboration of the Plan in Draft design
Road Safety Audit (RSA 1)
Project decision
Elaboration of the Integral Plan in Global design
Implementation decision
Realisation: Detailed design
Road Safety Audit (RSA 2)
Realisation: Construction
Road Safety Audit Pre opening (RSA
Delivery decision
Road in use
Road Safety Audit Early Operation (RSA 4)
Maintenance
Road Safety Inspection (RSI)
Network Safety Management (NSM)


Start decision
1st phase of initial designing/planning stage
SELECTION 1
2nd phase of initial designing/planning stage
SELECTION 2
RS Impact Assessment (RSIA)
Preferred alternative

The two activities of "evaluation" and "control" differ substantially.

In fact, the RSIA is multi-criteria analysis that shows the advantages and disadvantages of the different solutions available, while the control is carried out on the only design solution already identified.

In addition, the RSIA, prepared by the Authority owner and / or operator of the road, analyzes the problems of road safety related to the project on a scale greater than the control over the project, carried out instead by the Control Authority, because its purpose is to evaluate the impact of the intervention in terms of safety, not only on the infrastructure in question but also on the entire network involved.

What are the Roads Affected?

The Leg. Decree N.35/11 apply to the **TEN roads**, during the planning, design, and construction or to the TEN roads already open to traffic, while **for all other roads outside the TEN the contents of Legislative Decree constitute rules of principle** until they become mandatory because of the temporal evolution of the field of application.

What are the Roads Affected?

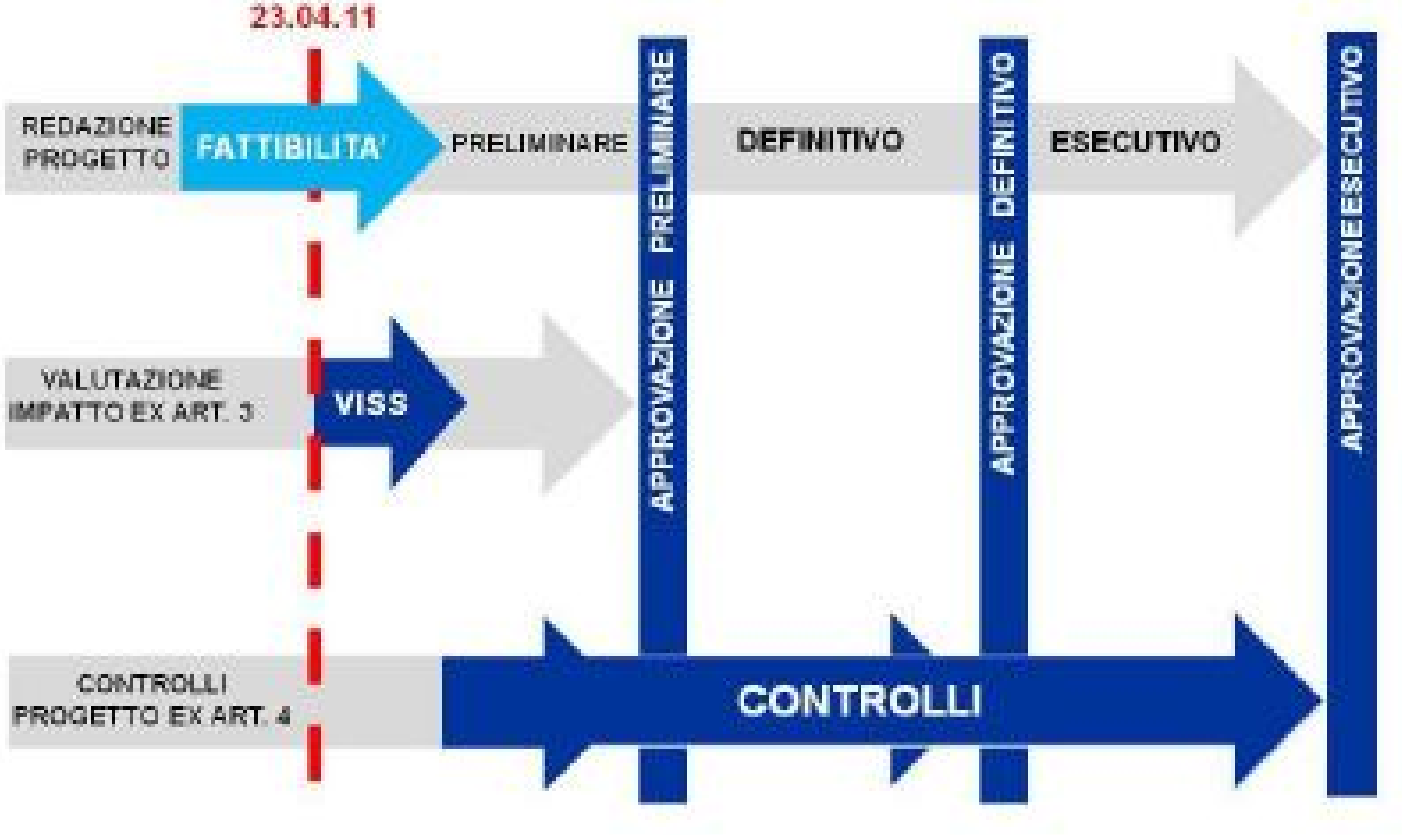
"Trans-European road network" means the road network identified in Decision 661/2010/EU of the European Parliament (see Decision No 661/2010/EU of the European Parliament and of the Council, 2010).

Member States of EU may also apply the provisions of Directive, as a set of good practices, to national road infrastructure not included in the TEN but constructed using Community funding.

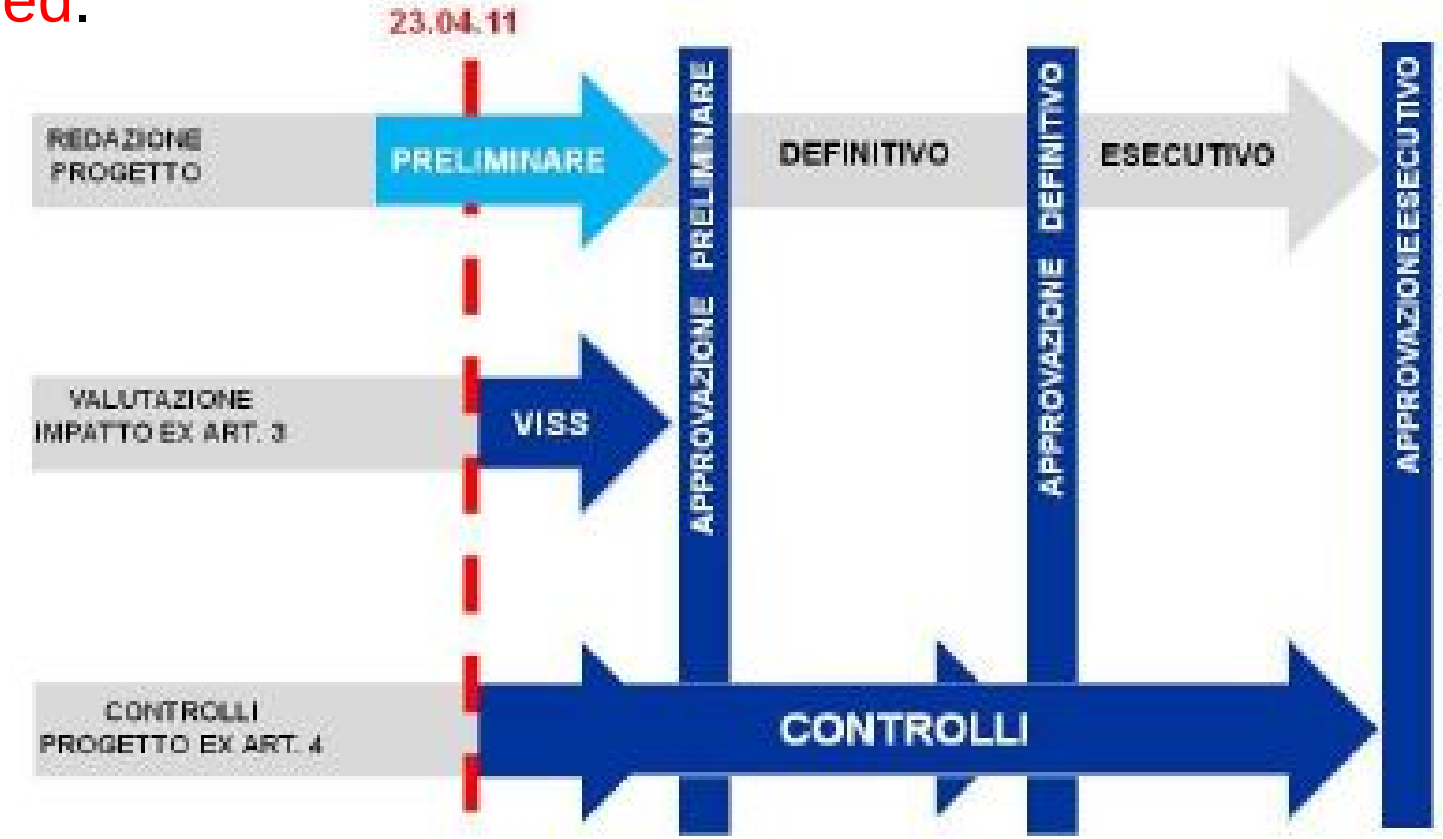
Moreover, in Italy it was expected that the Directive should be extended, with effect from 1 January 2016, "to the roads belonging to the network of national interest, identified by Leg. Decree 29 October 1999, n. 461, as amended". Was also the possibility to extend this effect no later than 1 January 2021.

For the road network of the regions, autonomous provinces and local authorities, it is intended that the provisions of L. D. N.35/11 constitute standards of principle and that, by 31 December 2020, these authorities dictate, in accordance with the principles of the decree, the discipline regarding the safety of their roads, with particular reference to roads financed using Community funding.

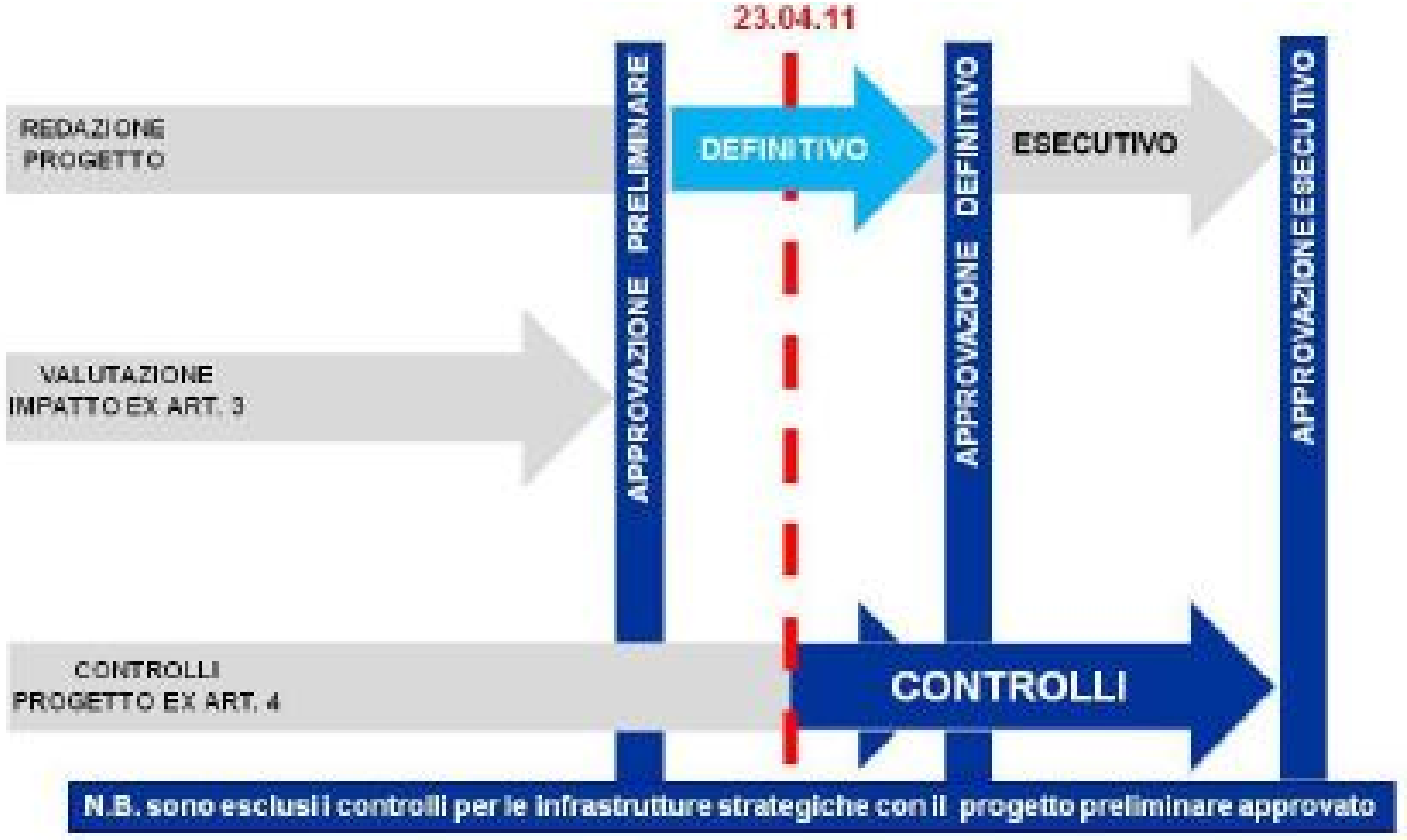
For projects with feasibility study not yet approved 23.04.2011, the RSIA and all the controls on the various levels of design are required.



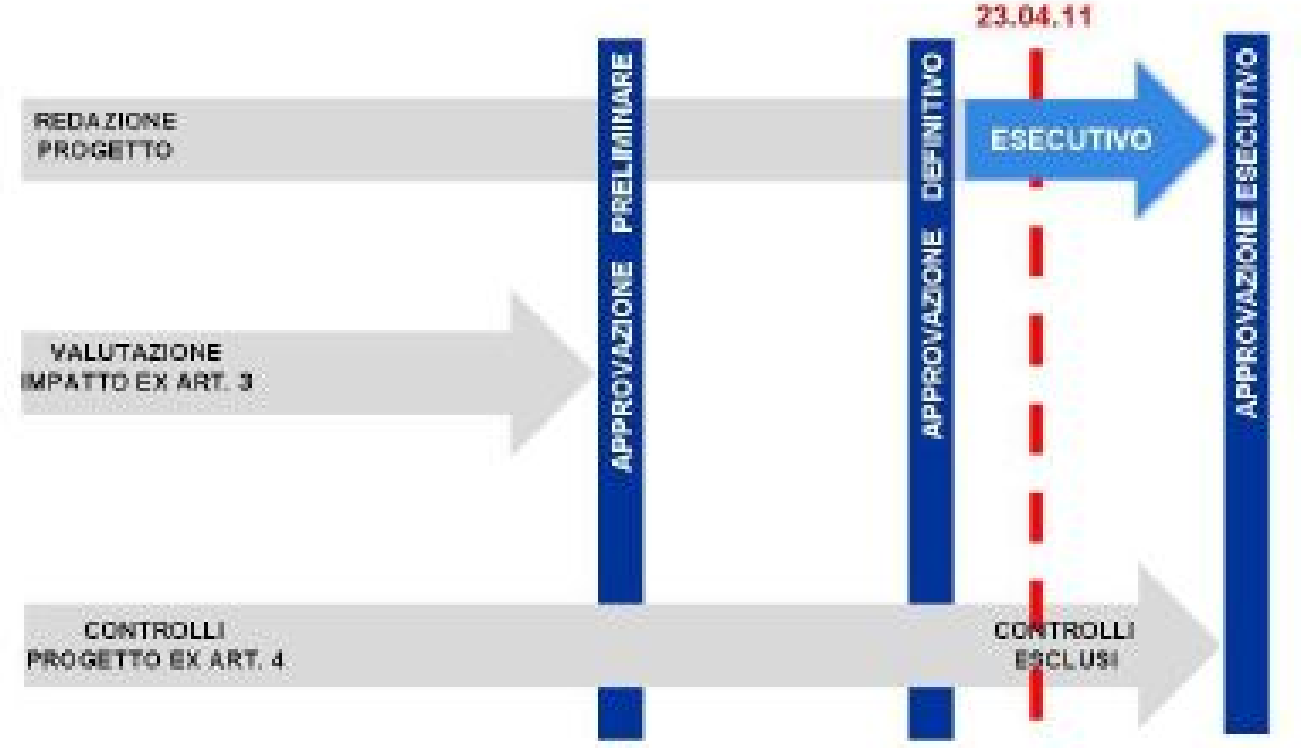
For projects with preliminary draft not yet approved 23.04.2011, the RSIA and all the controls on the various levels of design are required.



For projects with second draft not yet approved 23.04.2011, the RSIA is not required and the controls are necessary only for infrastructure ordinary (excluding strategic infrastructure).



For projects with final draft not yet approved 23.04.2011, the RSIA is not required and all the controls are excluded.



Road Safety Impact Assessment for Road Infrastructure Projects

The criteria to implement the RSIA are given in Annex I of the I.L.D. 35

1. **Components** of a Road Safety Impact Assessment are:
   a) Definition of the **problem**;
   b) Identification of the **objectives** of road safety;
   c) Analysis of the **current situation** and the status quo;
   d) analysis of the impact on road safety of the proposed **alternatives**;
   e) **Comparison of options**, including an analysis of the cost / benefit ratio;
   f) Presentation of the **possible solutions;**
   g) Finding the **best solution**

I.L.D. n. 35 of 15th March 2011

Road Safety Impact Assessment for Road Infrastructure Projects

2. The factors **to be taken in account** are:

a) **planimetric and altimetric characteristics** of the road;

b) **accidents analysis** (identification of the number of accidents, deaths and injuries to specific sections of the network);

c) **targets for reducing accident rates** and comparison with the status quo option;

d) identification of the **types of road users**, including weak users (pedestrians and cyclists) and vulnerable (motorcyclists);

e) identification of the **traffic volumes** and **types of traffic**.

I.L.D. n. 35 of 15th March 2011

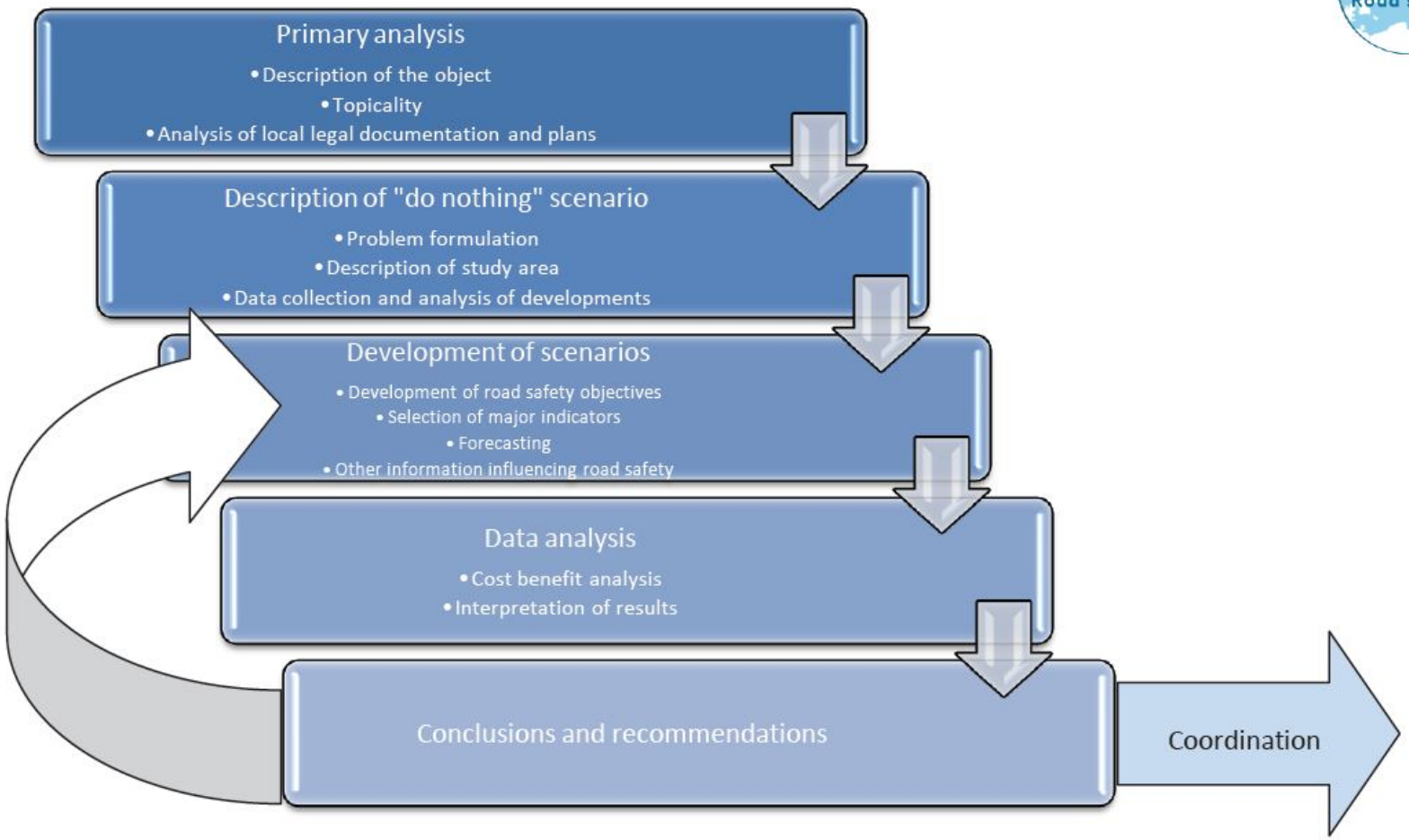
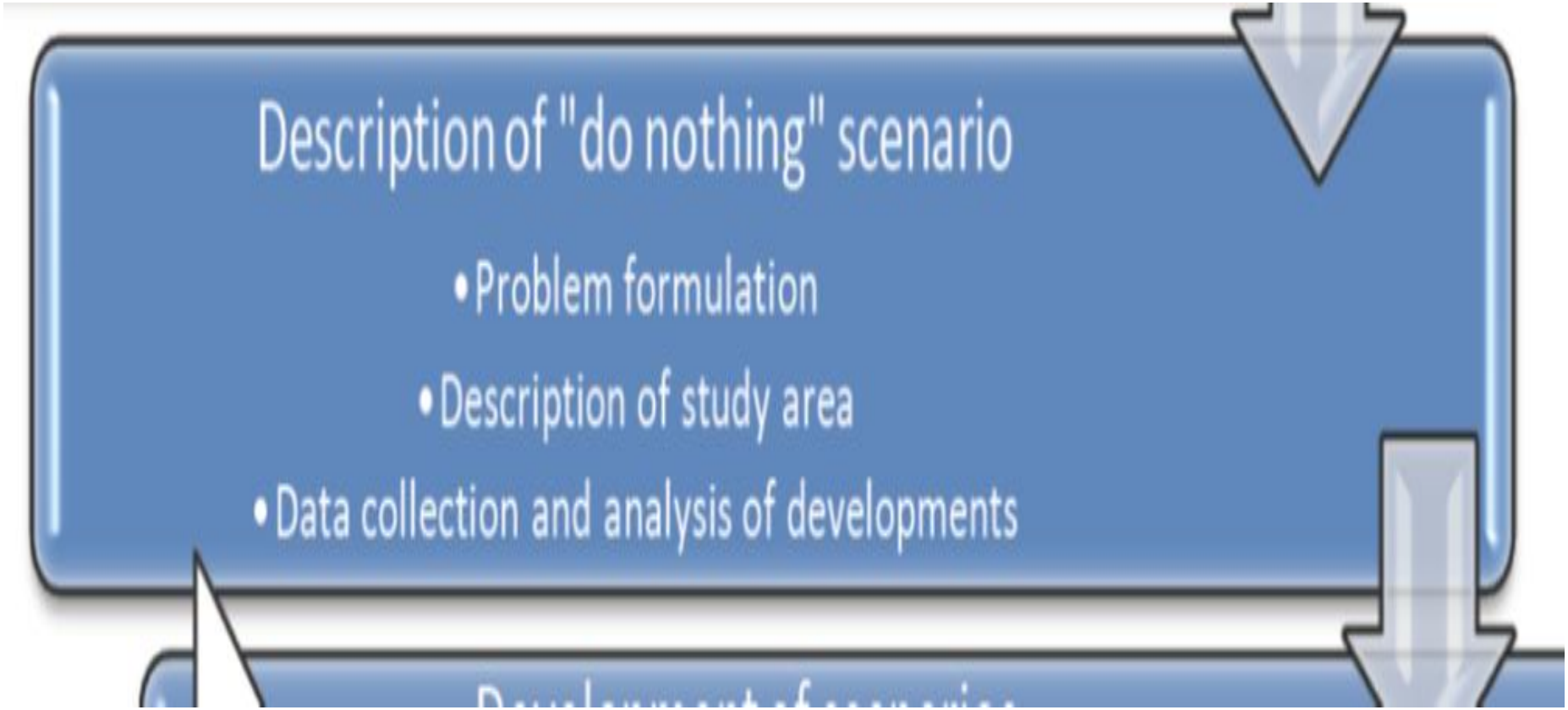
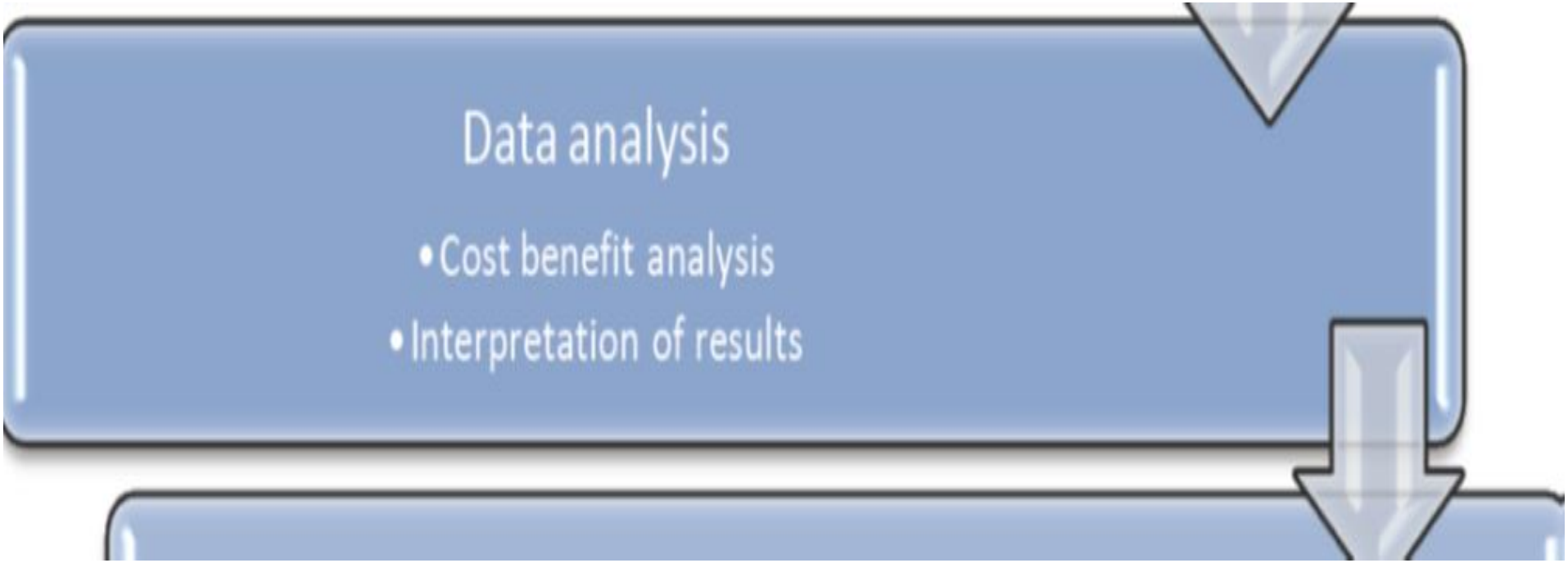


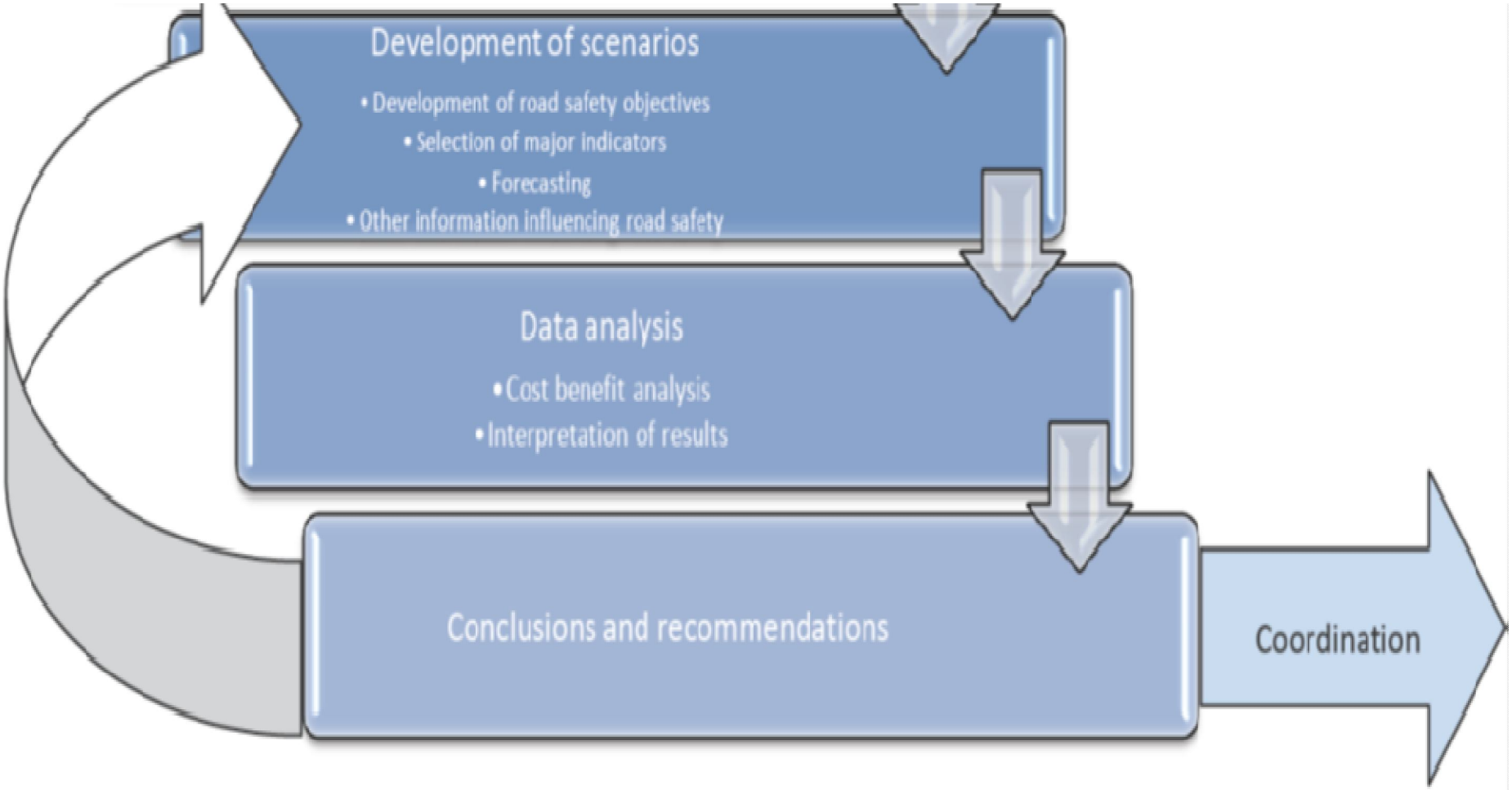
Fig. 2: Flow chart of focal RSIA procedures


Primary analysis
• Description of the object
• Topicality
• Analysis of local legal documentation and plans


Description of "do nothing" scenario
• Problem formulation
• Description of study area
• Data collection and analysis of developments


Development of scenarios
• Development of road safety objectives
• Selection of major indicators
• Forecasting
• Other information influencing road safety

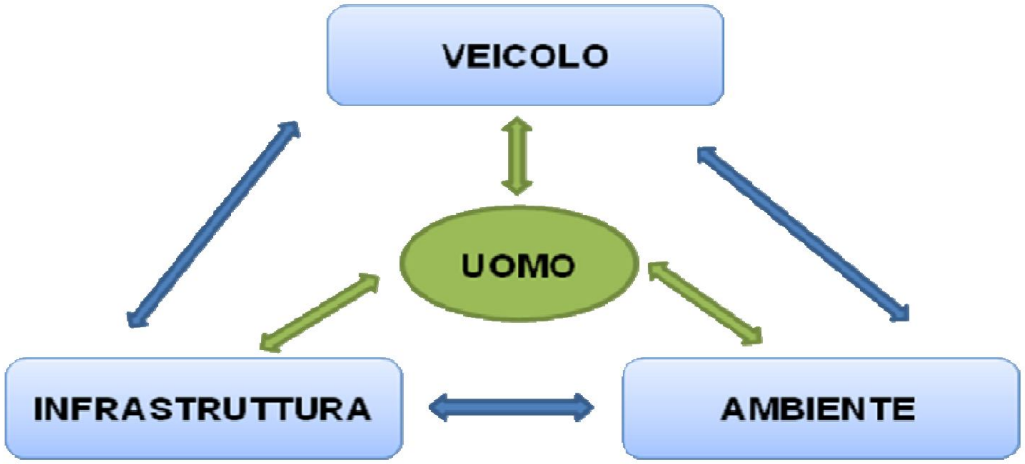

Data analysis
• Cost benefit analysis
• Interpretation of results


Development of scenarios
• Development of road safety objectives
• Selection of major indicators
• Forecasting
• Other information influencing road safety
Data analysis
• Cost benefit analysis
• Interpretation of results
Conclusions and recommendations
Coordination

The accident is not always directly related to lack of infrastructure and therefore it is necessary to analyze the road system as a whole through an analysis of the relationships between the different elements involved in the system itself, that is "man - vehicle - environment - infrastructure," in order to properly assess the causes.

The man holds a central role in the system, as he is the only element that can adapt its behavior to that of the other elements, and for this reason he is often, with his/her incorrect behavior, the main cause of the accident.

The Leg.D. N.35/11, analyzes only a portion of the complex system, through the preparation of a system of road safety management with the aim of reducing the critical issues related to it.



SAFETY IMPACT ASSESSMENT

August 1997 European Transport Safety Council

The aim and nature of safety impact assessment

Being able to estimate explicitly the impact on road safety that results from building new roads or making substantial modifications to the existing road infrastructure that alter the capacity of the road network in a certain geographic area is of crucial importance if road safety is not to suffer unintentionally from such changes. The same applies to other schemes and developments that have substantial effects on the pattern of road traffic. The procedure that has been designed for this purpose is known as **Road Safety Impact Assessment** (Wegman *et al*, 1994).

SAFETY IMPACT ASSESSMENT

August 1997 European Transport Safety Council

- The central step is to interpret these changes in terms of the **impacts** they will have on the **numbers of accidents and casualties**. To accomplish this, what are needed are quantitative indicators of risk (such as casualty rates per million vehicle-km) **for each type of road**, supplemented if possible by corresponding indicators **for each main type of junction**. One way of obtaining such indicators is to estimate them at a national level and adjust them if necessary using data for the area in question. In addition, thought should be given to any expected changes over time in the level of risk for each type of road or junction.

SAFETY IMPACT ASSESSMENT

August 1997 European Transport Safety Council

Annex 2: Safety impact assessment: a Dutch example

Road type	Speed limit (km/h)	Mixed traffic	Intersecting or oncoming traffic	Injury rate per 10^6 km
Residential areas	30	yes	yes	0.20
Urban street	50	yes	yes	0.75
Urban artery	50/70	yes/no	yes	1.33
Rural road	80	yes/no	yes	0.64
Express road or road closed to slow moving vehicles	80	no	yes	0.30
Motor road	100	no	yes/no	0.11
Motor way	100/120	no	no	0.07

Table 1. *Injury rates on different road types in The Netherlands in 1986.*

SAFETY IMPACT ASSESSMENT

August 1997 European Transport Safety Council

- A road safety impact assessment contains three steps.
- First of all basic data have to be collected on the network to be studied: the categorisation of roads and streets of that network, traffic volumes, road safety indicators, and their development over time. This requires a consensus on how to categorise roads. Furthermore, relevant data have to be collected for a certain administrative area.

SAFETY IMPACT ASSESSMENT

August 1997 European Transport Safety Council

- In the second step the possible changes to the **existing** network are defined. This, again, will be done in terms of network composition, traffic volumes for the different network components and the road safety indicators.

Methodology
SAFETY IMPACT ASSESSMENT

August 1997 European Transport Safety Council

- In the third phase the **possible future network**, traffic volumes and road safety indicators are described or estimated in order to compare the existing situation with different scenarios in the future. The results of this comparison (the existing situation with at least one situation in the future) can be brought to the consideration of those who have to decide on the basis of all kinds of impacts of each scenario. In other words: safety impact assessments allow for a better consideration to be given to safety implications of possible measures in the context of their other effects.

Methodology
SAFETY IMPACT ASSESSMENT

August 1997 European Transport Safety Council

- The results of safety impact assessments can be translated into monetary terms by using values attached to preventing accidents and casualties, and thus provide an input to monetary cost-benefit analysis.

Methodology

SIXTH FRAMEWORK PROGRAMME
PRIORITY 1.6. Sustainable Development, Global Change and Ecosystem
1.6.2: Sustainable Surface Transport

RiPCORD iSEREST

506184

Accident Prediction Models and Road Safety Impact Assessment: recommendations for using these tools

Workpackage Title		Road Safety Impact Assessment	
Workpackage No.	WP2	Deliverable No.	D2
Authors (per company, if more than one company provide it together)		Rob Eenink, Martine Reurings (SWOV), Rune Elvik (TOI), João Cardoso, Sofia Wichert (LNEC), Christian Stefan (KfV)	
Status		Final	
File Name:		RIPCORD-ISEREST-Deliverable-D2.doc	
Project start date and duration		01 January 2005, 36 Months	

Methodology

- **In order** to manage road safety, practitioners such as policy maker and road authorities need **to have a good insight in the safety level of the**ir **roads**, the variables that explain these levels and the expected effects of their road safety plans.
- In work package 2 (WP 2) of RipCord-Iserest **two instruments** have been researched, both intended to provide this insight: **Accident Prediction Models (APM) and Road safety Impact Assessments (RIA)**.

Methodology

- Traffic volumes (vehicles per day) and road lengths (km) are the most important explanatory variables in an APM, both for road sections and intersections.
- The parameters of the model, however, can vary considerably between road types and countries.
- However, the usual basis for choosing explanatory variables appears to be simply data availability. They should include variables that:

1. • have been found in previous studies to exert a major influence on the number of accidents;
2. • can be measured in a valid and reliable way;
3. • are not very highly correlated with other explanatory variables included.

Critical Considerations

- Absence of an organic theory of Road Safety
- it is unclear what is the Closed System to be considered in Models
- The available data are almost always few and insufficient (eg,. in Italy there are no official data of accidents per kilometer - cf. Colonna, 2007)
- uncertainty

Critical Considerations

- Resounding failures of policies and measures of Road Safety.....
- ..... mostly due to phenomena of risk compensation by users
- R = p x I
- The user changes his/her behavior when he realizes that changes the probability p of the accident or the intensity I of the damage

Critical Considerations

- This is not a school only x applicators, but rather is a school for researchers. Then we have to look for reasons and we must seek the truth.

- RSIA: why not for rail infrastructure?
- What are the reasons for the difference in the accident rates?

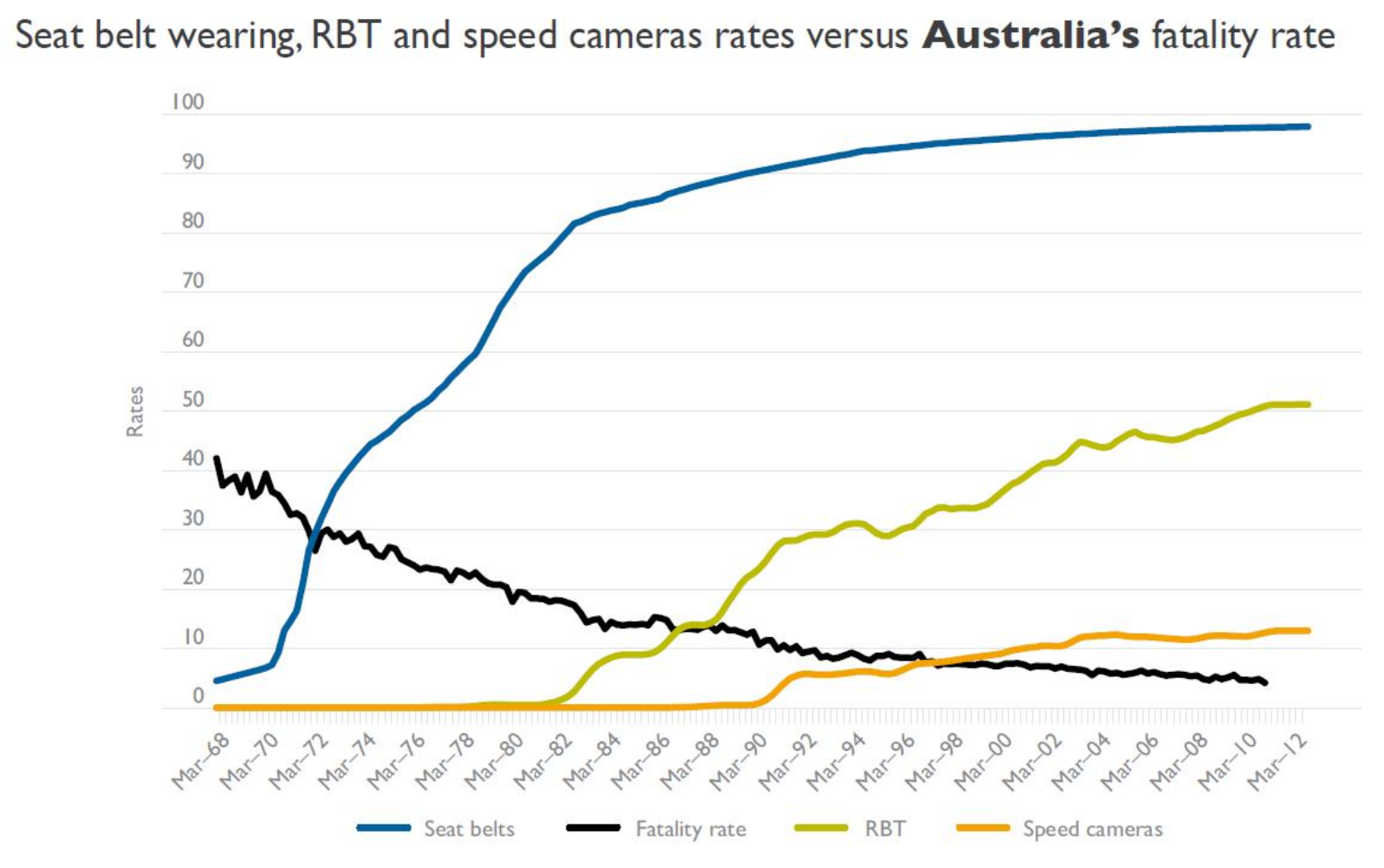
Critical Considerations

Margins of decision of different transport systems			Mode	Accident Rate
Design of the Route	Control Systems	User Behavior		
xxxxxx	xx	xx	Railroad	xxx
xxxxxxxxx	xx	xx	Airway	x
xxxxxxxx	xxxxxxxxx	xxxxxxxxxx	Road	xxxxxxxxxxxxxxx

- In this thriller we must seek the guilty, the murderess. Where the clues lead us? towards the control systems and user behavior
- But in the case of the roads to reduce accident rates where we focus? On the Design of the Route! >>> Is it reasonable?

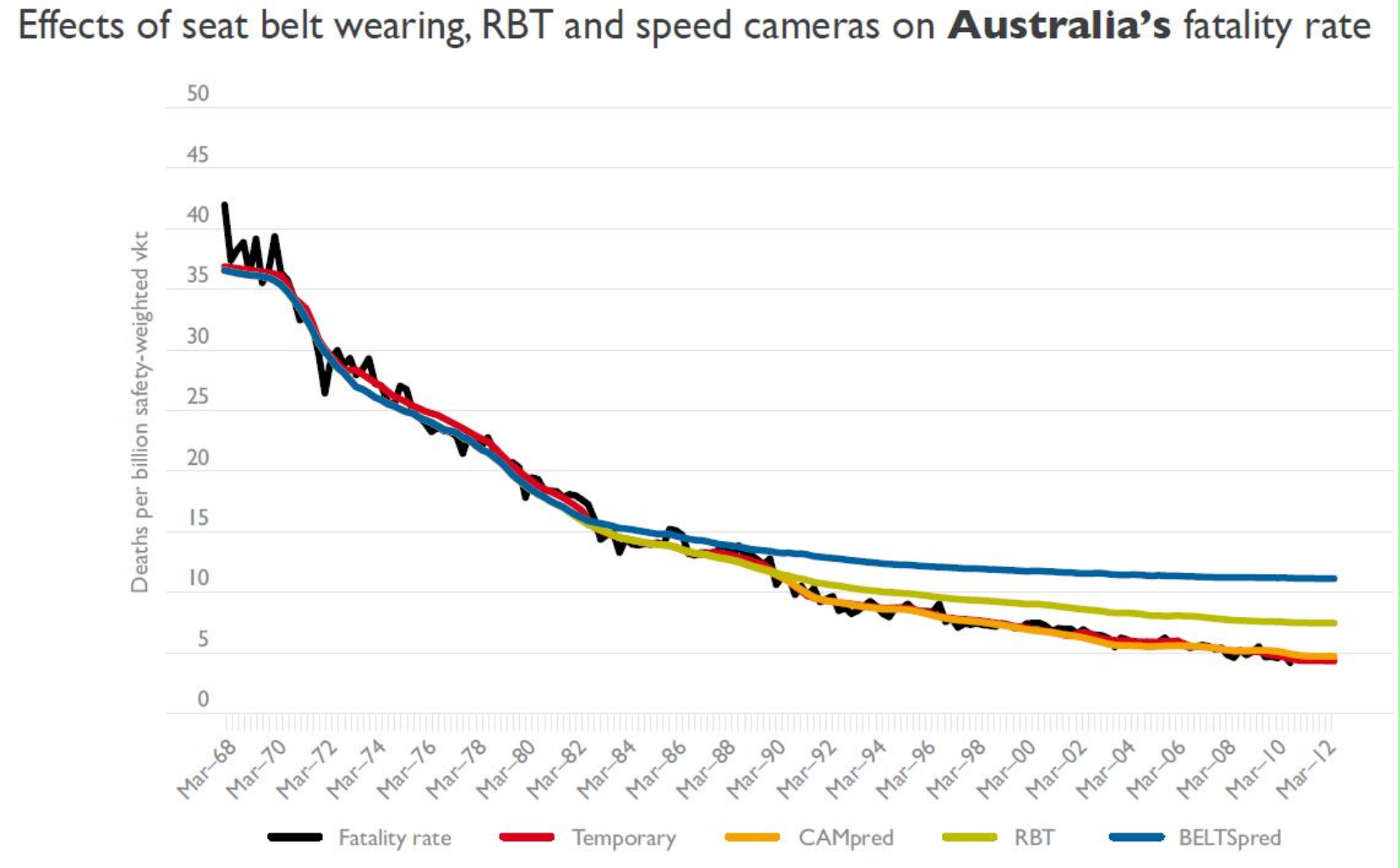
Critical Considerations

- Importance of Control Systems



Critical Considerations

- Importance of Control Systems



Critical Considerations

- User Behavior (we discuss it tomorrow)
- Under these conditions we are ready for the cogency of the standard?
- Relationship between:
  - Knowledge
  - Subjective responsibility of Behavior (Ethics)
  - Public Responsibility of Behavior (Statement)

Expected Benefits

- Acceleration for the creation of databases and general knowledge of the problem
- Development of the Research for a organic Theory of Road Safety
- Greater social awareness and possible behavioral effects generalized
- Possible reduction of road accidents (though with possible compensation, both internal and external to the road system)