

SURE: Users' Safety on Existing Roads



3-5 October ETC 2005

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Road Safety: an international stake

In Europe* each year:

- About 1 300 000 accidents
- 46 000 fatalities
- 1 700 000 injuries

2002 18 countries

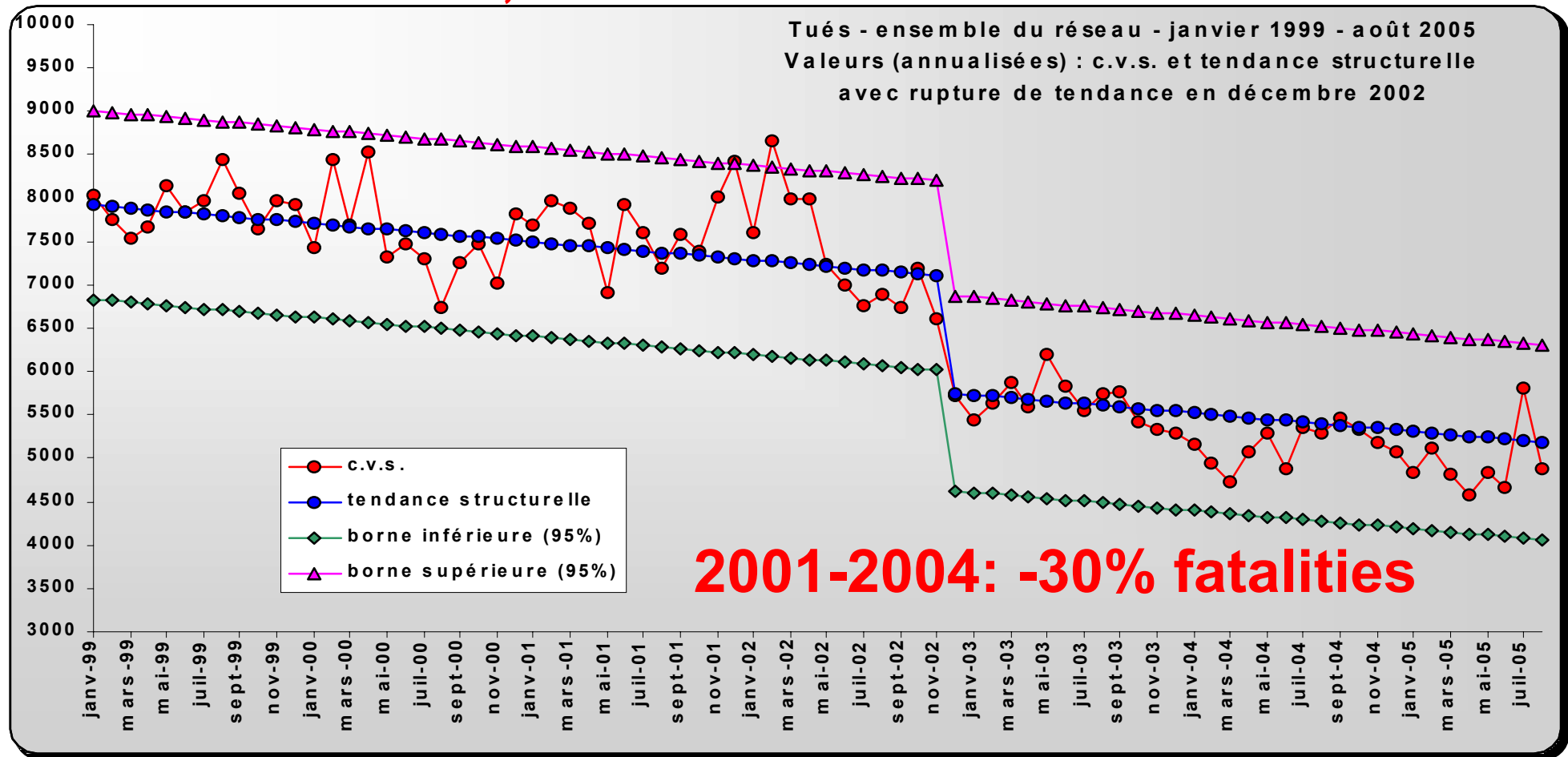


**Objective 2001-2010: halve
by 2 number of fatalities**

Road Safety is a national priority

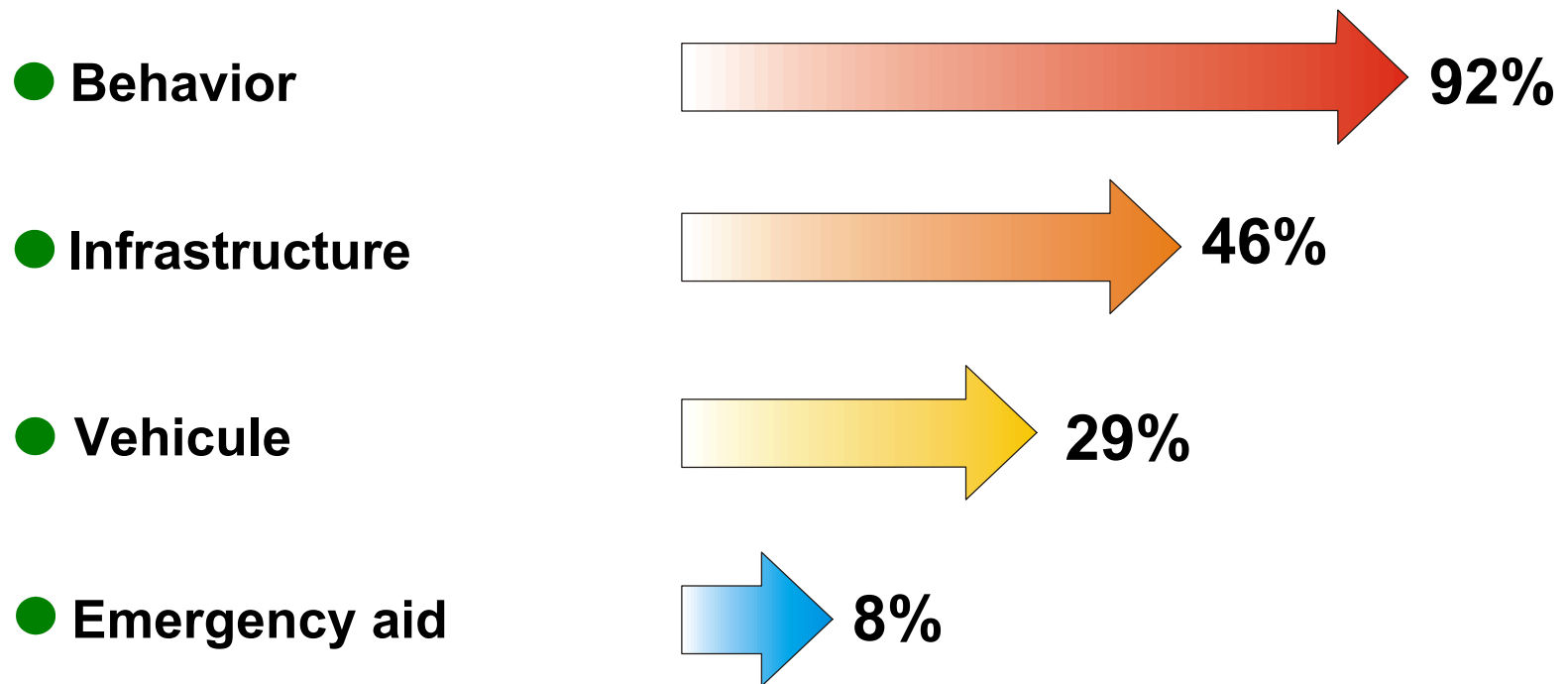
- July 2002: President Chirac made road safety a government priority
- In 2001, around 8.000 fatalities, 26.000 injuries:
unacceptable
- Consequence: accelerated plan of action
- Law on « road violence » in June 2003

**In 2003, significant results:
- 20 % fatalities, - 15 % accidents**



Number of fatalities between
January 1999 and August 2005

Infrastructure's role in fatalities



Source : investigation 1992 - 1998



Actions on road network

- Setra's technical guidelines and corresponding policy:
 - Roadside obstacles
 - Curves signalization and safety
- 2 main methods for:
 - road projects: CSPR (road safety audits and quality demarche management)
 - existing road: SURE (network safety management)

SURE's Origins

- 1989 White book on road safety
- 1992 Road safety reference book
- 1993 Normative approach tested
- 1996 Assessment

Poor results



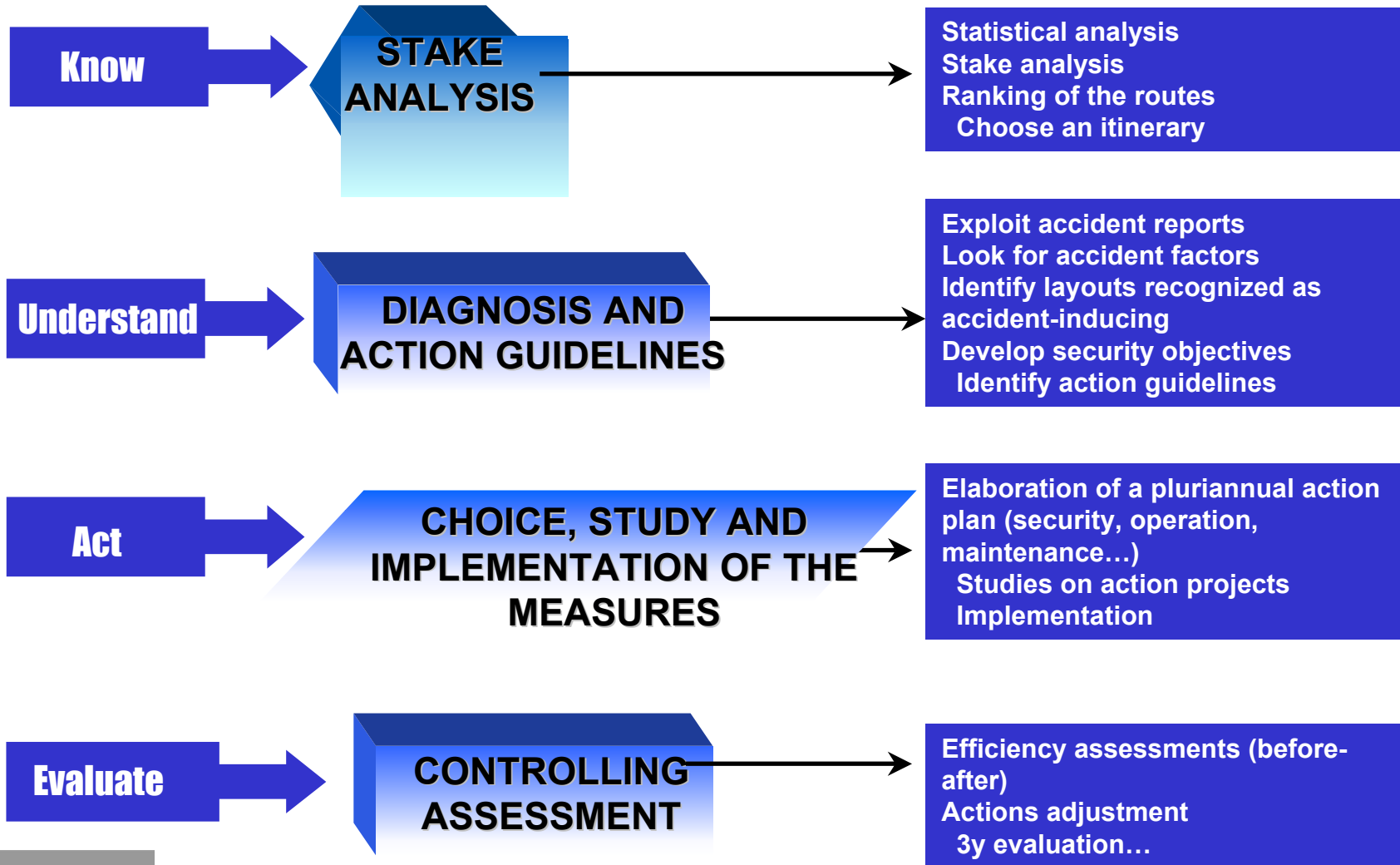
SURE's advantages 1/2

- **Comprehensive/global** method
- Establishes **priorities** according to accidents' reductions to be expected
- Allows **understanding** of the observed dysfunctions specific to each type of road

SURE's advantages 2/2

- Integrates a **preventive** element
- Pursues a **coherence** of safety facilities
- Proposes a **global approach** assessment
- Establishes a **dialogue** between road actors (authorities- police- operators- local associations and local elected officials) on road safety issues

Methodology





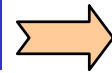
STAKE ANALYSIS

« Know »



Ranking of the routes – methodology

« Black spots »

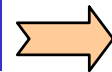


Number of
« avoidable »
accidents



**Safety
potential:**

High risk road sections



Number of
« avoidable »
accidents



« avoidable »
accident
Cost
per km



Ranking of
the routes



DIAGNOSIS AND ACTION GUIDELINES

« Understand »



Determination of accident factors

What is an accident factor ?

- It's a state of one of the components of the Road User-Vehicle-Environment system :
 - which was necessary for an accident (but other factors may occur),
 - and for which a remedial measure can be possible
- Objective
 - Understand before acting

Diagnosis and action guidelines – methodology

Uses and functions

Accident factors

**Configurations
recognized as
accidents inducing**



**Global layout
principles –
Safety objectives**



**List of actions
guidelines**



Determination of accident factors (INRETS) Sequences

D Driving stage

A Accident stage

E Emergency stage

C Collision stage



Determination of accident factors (INRETS) Sequences

Type of accidents: qualitative sameness

Regrouping in accident
families



Configurations recognized as accidents inducing

- Cross-sections
- Curves
- Shoulders (including obstacles)
- Vulnerable users
- Cross-town links
- ...

Configurations recognized as accidents inducing, for a cross section

Visibility



Legibility



CHOICE, STUDY AND IMPLEMENTATION OF THE MEASURES

« Act »



Choice - Study and Implementation of the measures

Choice of actions



Programming



**Conception studies and
implementation**



Potential Efficiency

Action on infra	Efficiency or model projection
Roundabout	Accident nb = $J \times 0.15 \times 10^{-4} \times TE$
Level junction	Accident nb = $J \times 2.73 \times 10^{-5} \times Ts^{0.62} \times Tp^{0.51} \times Fbra \times Fvoie \times Fc$
Hard shoulder	-20 à 30% run off roadway accident and frontal collision (width 0,6m à 1,2m)
Traffic island	-30 à 80% accidents by shear (80% if poor legibility at junction)
Left turn file	-80% on back collision accidents



**CONTROLLING
ASSESSMENT**

« Evaluate »



Objectives

- Security follow up
- Controlling
- Organizational feedback.
- Optimization: safety impact assessment
- Communication



Network safety management: SURE

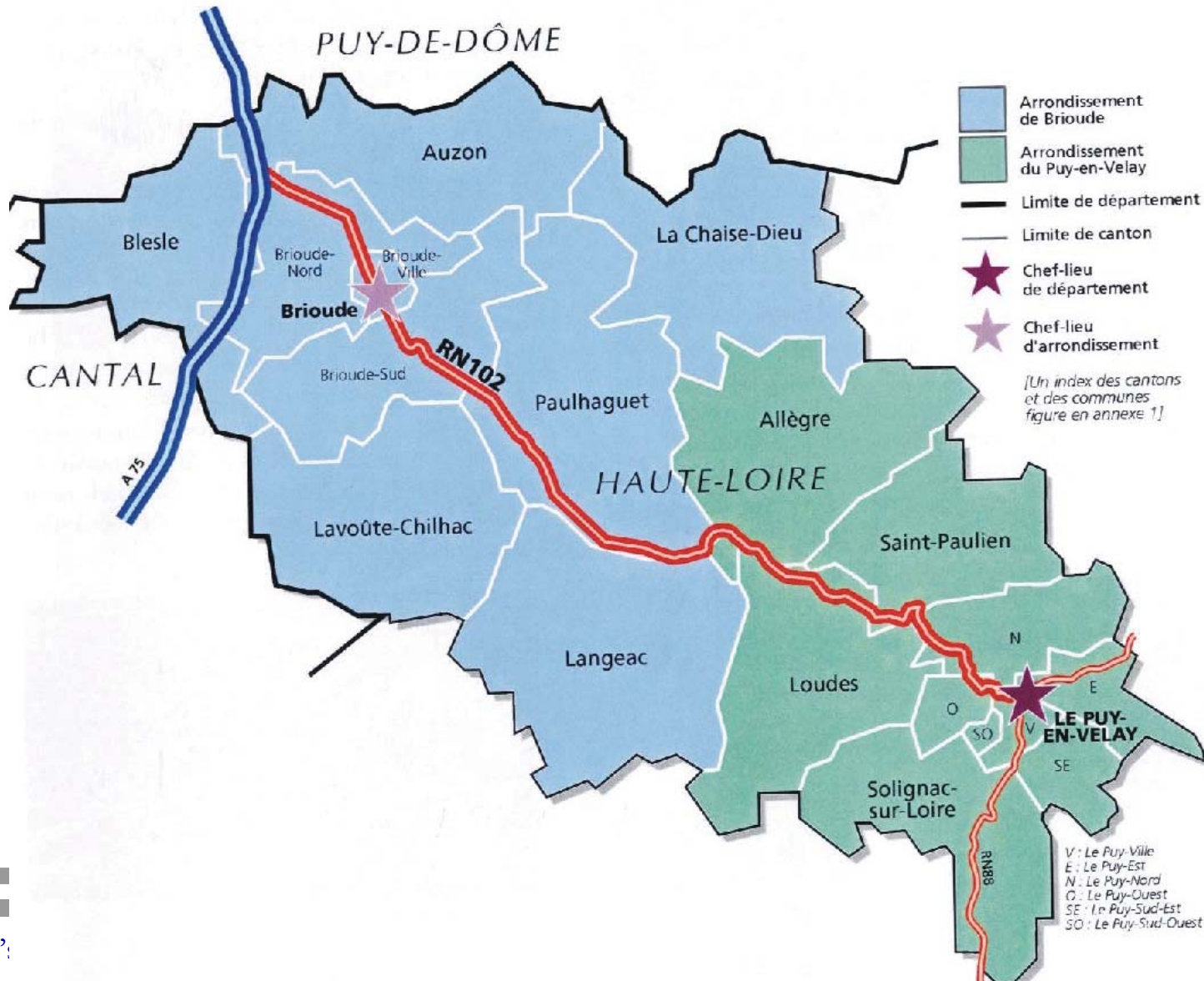
- A global process that results in concrete measures:
 - Priority: sites with abnormal concentration of accidents/ best cost effectiveness ratio
 - Implementation of remedial measures
 - Diagnosis based on understanding of the road dysfunctions
 - Focus on itineraries approach
- A methodology developed for the French national road network but which can be applied by all road authorities on their own network

Where do we stand now?

- Method in place at the national level
- Feedback on the experimentations
- ...



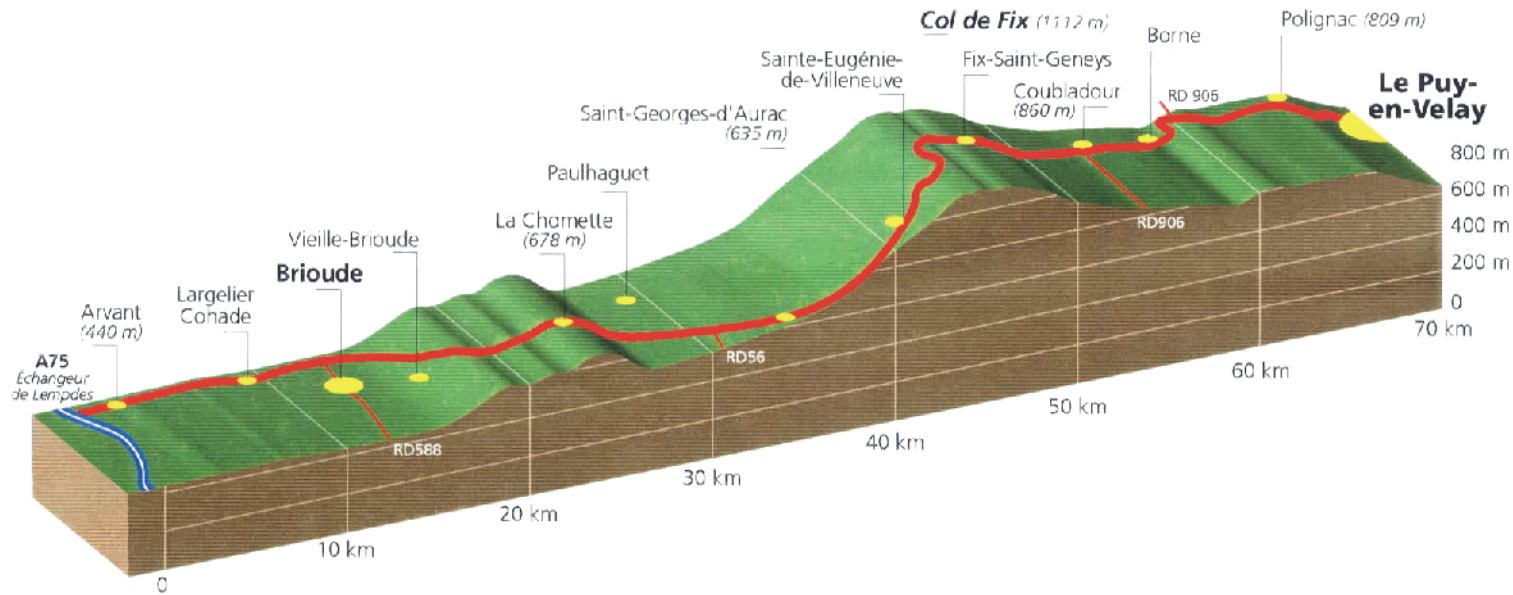
Illustration



User's

RN102

Two Highland domains, separated by the "col de Fix" (1112 m)



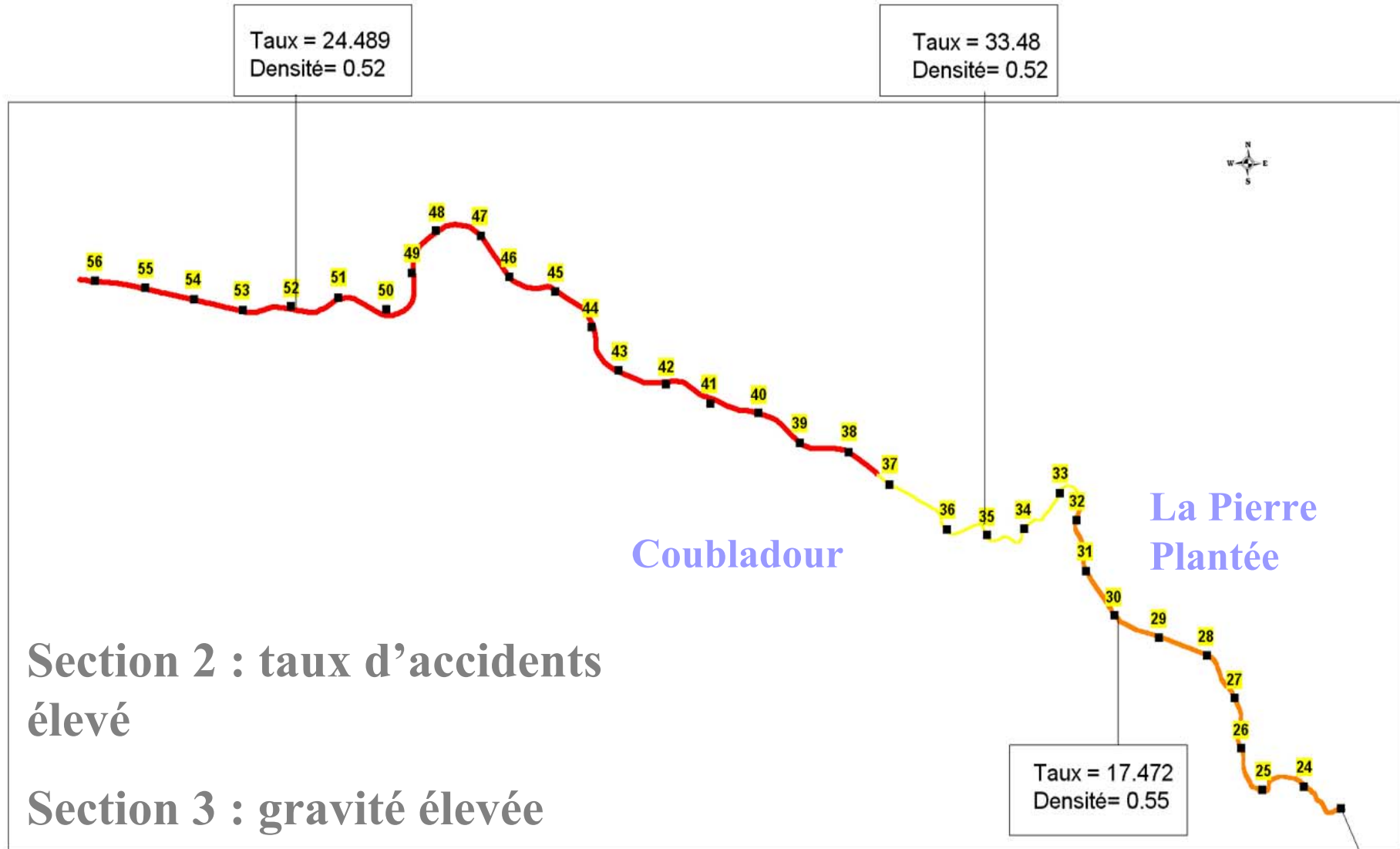
Stake analysis

- Over 5 years (1998-2002) on 30km, there was 97 accidents, from which 49 serious. There was 22 fatalities, 50 seriously injured, and 105 slightly injured.
- The average daily traffic is on the 3 sections, respectively, 8700, 4300, 6800 (vehicle/day).
- The route has either 2 or 3 lanes.

Safety potential = €450 000



Accidentology



Diagnosis and action guidelines

- 3 accident types:
 - In curve
 - On wet driveway
 - In slope
- 7 high risk road sections:
 - 2 junctions
 - Coubladour
 - La Pierre Plantée
 - 3 curves
 - Carrières de La Denise
 - La Chazotte
 - Pouzols
 - 2 zones
 - Plaine de Bleu
 - 1 zone by night

Diagnosis and action guidelines

8 accident families

4 major accidents scenarios	Accident number (NA)	SI/NA
1 – Loose of control on wet roadway	27	0,74
2 – Junction with a secondary road	14	0,69
3 – Due to a passing/overtaking maneuver	11	0,63
4 – In a curve, on dry roadway	11	1

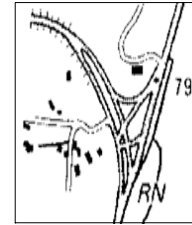
Detailed analysis of scenario 1: Accident factors

- Curve w/ radius < 250 m (14), sometimes < 150 m (6)
- Poor geometry
- Poor grip
- Poor legibility (4)
- cross-town junction too broad (3)
- No hard shoulder
- Obstacles: trees (2) pole (1) wall (1)

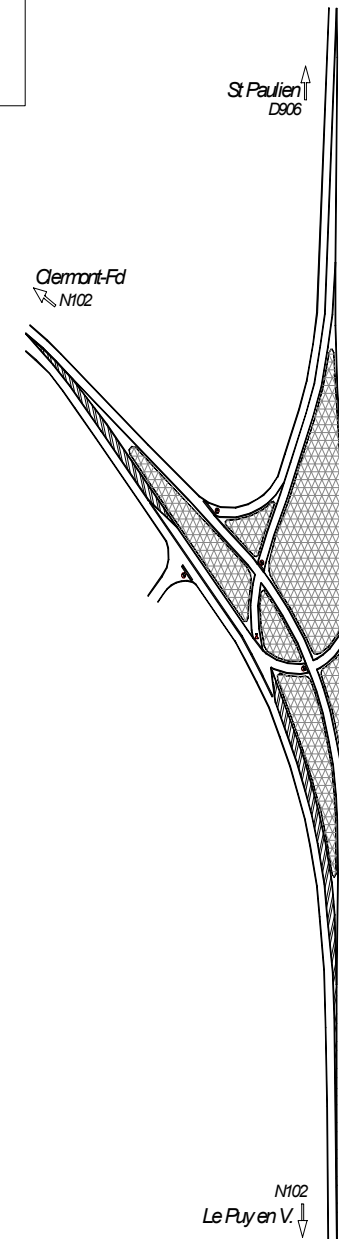
Action guidelines for scenario 1

Factors	Nb	Action guidelines
Poor grip in curves w/ radius<250 m	14	<u>Cross town</u> Maintain CTF> 0.5 in curves w/ radius<250 m <u>Outside build up areas</u> Maintain CTF> 0.5 in Chazotte, des Carrières de la Denise et de Pouzols
Poor geometry		According to each location (local clusters)
Poor legibility, excess right of way	4	Create a visual mask; work on trees alignment and marker posts

La Pierre Plantée/RD906 (5 accidents)



La Pierre Plantée N102 - D906



La Pierre Plantée RD 906 (5 accidents)

Factors	Nb	Action guidelines
Complexity – multiple trafic islands	5	Creation of a roundabout
Poor legibility for secondary road user		
Poor configuration for right turn (tangential)	4	
Important flow on secondary road	4	
Ambiguous marking	1	Modify marking

Choice - Study and Implementation of the measures: from PR 35+200 to PR 36+070

Action details	State of implementation
High grip surfacing, with crossfall and evenness optimisation in the 3 curve	In progress
Creation of a hard shoulder	
Guidance posting	done
Trees suppression (La Chazotte)	Local concertation
Correction of a curve (La Chazotte)	Not programmed for now

Conclusion

- SURE allows identification of itineraries w/ safety issue
- Implementation of targeted remedial measures
- Cost efficiency



Sétra

service d'Études
techniques
des routes
et autoroutes



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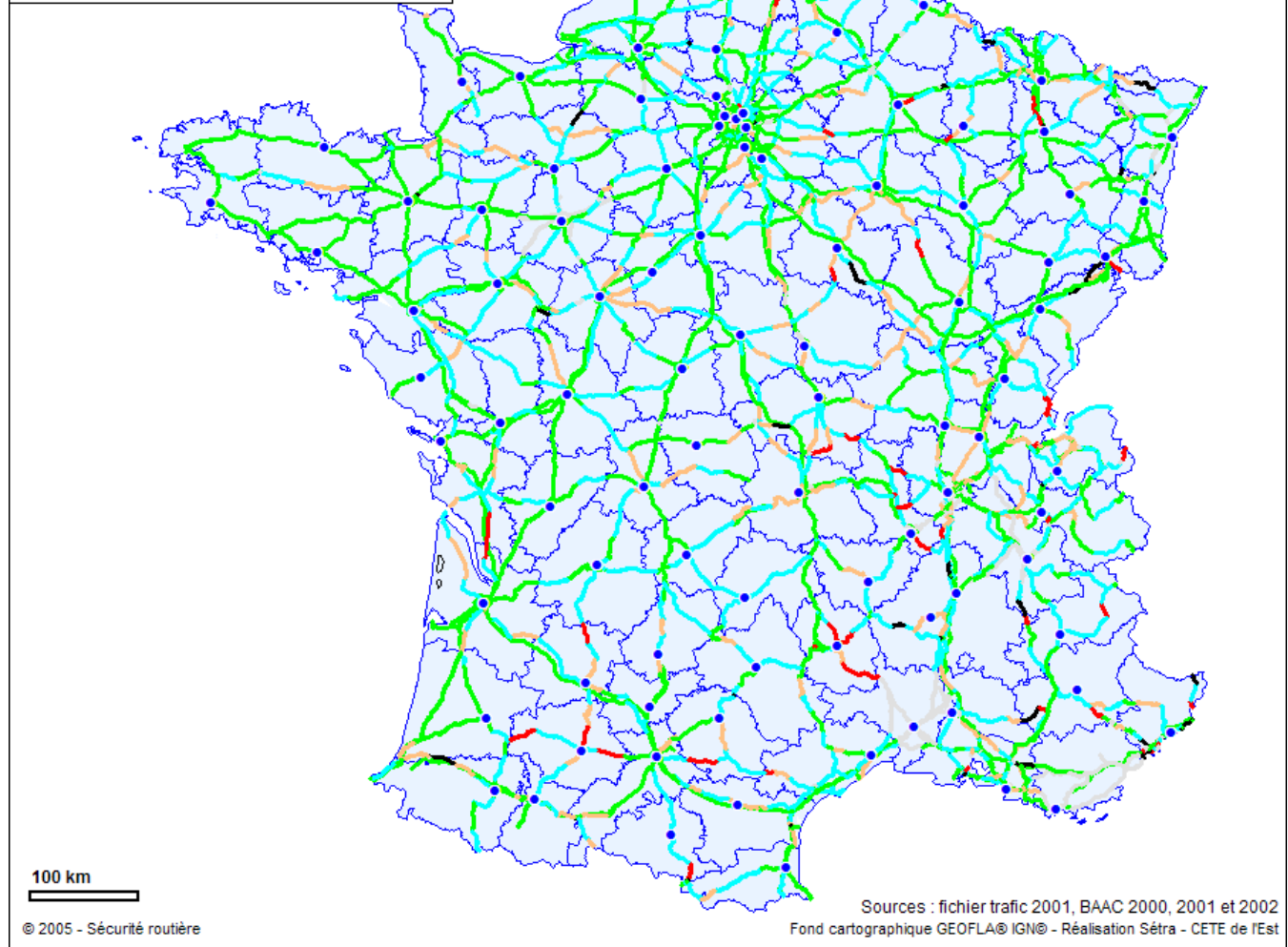


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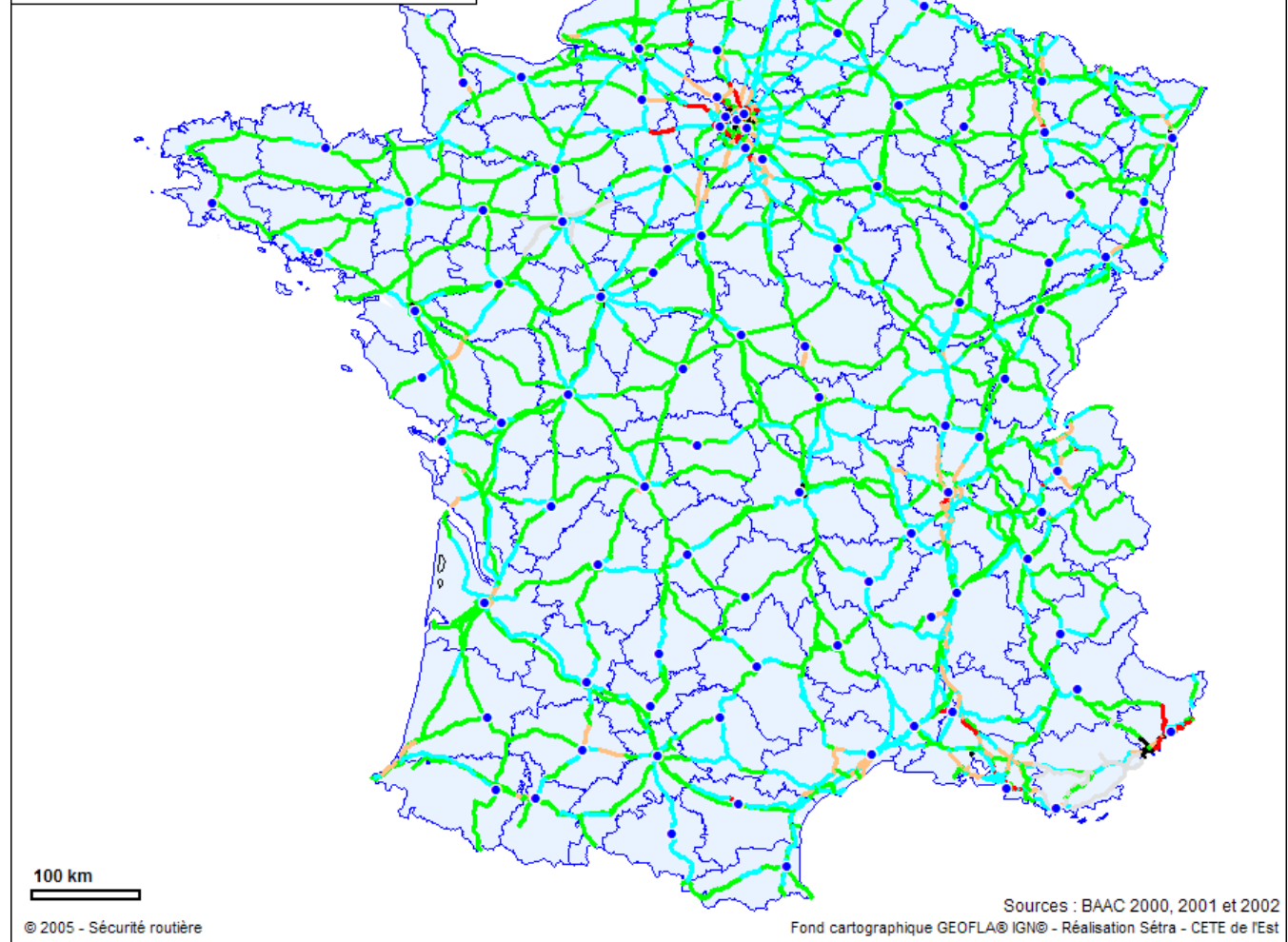
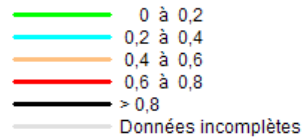
Taux d'accidents graves sur autoroutes et routes nationales, années 2000 à 2002

en accidents par milliard de kilomètres parcourus



Densité d'accidents graves sur autoroutes et routes nationales, années 2000 à 2002

en accidents par kilomètre et par an



Les objectifs de sécurité

- À l'issue du diagnostic
 - traiter les 6 ZAAC dont 2 prioritairement
 - diminuer la fréquence des 3 principaux scénarios
 - réduire
 - la fréquence sur la section 2
 - la gravité sur la section 3
- Permettent de cibler les pistes d'actions



SURE, la démarche

DRE**DDE**

Lance SURE, identifie les itinéraires à étudier (en principe, tout le réseau national non concédé)

Étudie les enjeux par itinéraire découpé en sections homogènes (cas où la DRE délègue)

Arrête une liste hiérarchisée des tronçons d'itinéraires à diagnostiquer

Diagnostic et propose un plan d'actions (par tronçon)

Arrête les programmes d'actions à réaliser et les propose au financement de la DR

A

SURE, la démarche

DRE**DDE****A**

Étudie les actions
financées par la DR

Prépare l'évaluation des
actions, individuellement et
sur l'itinéraire (tronçon)

Réalise les actions

Pilote les évaluations

Nouvelles études d'enjeux
après 3 ans

L'élaboration de la démarche SURE

- 2002-2004 : la méthodologie en cours d'élaboration a été testée dans trois départements pilotes (Calvados, Jura, Indre)
- 2004 : une étude d'enjeux a été réalisée au niveau national et la méthodologie diagnostic a été testée par l'ensemble des CETE (11 itinéraires sur l'ensemble du territoire national) = SURE 2004
- 2005 : déploiement avec formations

Mise en œuvre de la démarche

Des guides seront à disposition

- Un guide pour l'étude d'enjeux
- Un guide pour le diagnostic
- Un guide pour l'étude et la réalisation des pistes d'actions
- Un guide pour l'évaluation

• ...en complément du guide du Managérial

Automated fines

- Speed (priority)
- Then : red light running, vehicle distance, use of bus lanes, railway crossing, ...
- 100 cameras in 2003 and **1000 in 2005**, entirely automated
- Choice of camera sites based on accident analyses
- A general decrease in speed, in particular for very high speeding

Two management and consultation process in which Setra is involved

- DGO – five years reference document for local road safety policy
- MPSR – action frame work for the publics works directorates; intends to develop and enforce safety knowledge and skills of all workers in transport administration

Road safety audits (CSPR)

- A quality approach at every stage of a road project
- A pre opening inspection
 - 300 auditors trained
- A safety assessment (6 months and three years after the opening of the road)
- Compulsory for new national road projects