



Network Safety Management – From Case Study to Application

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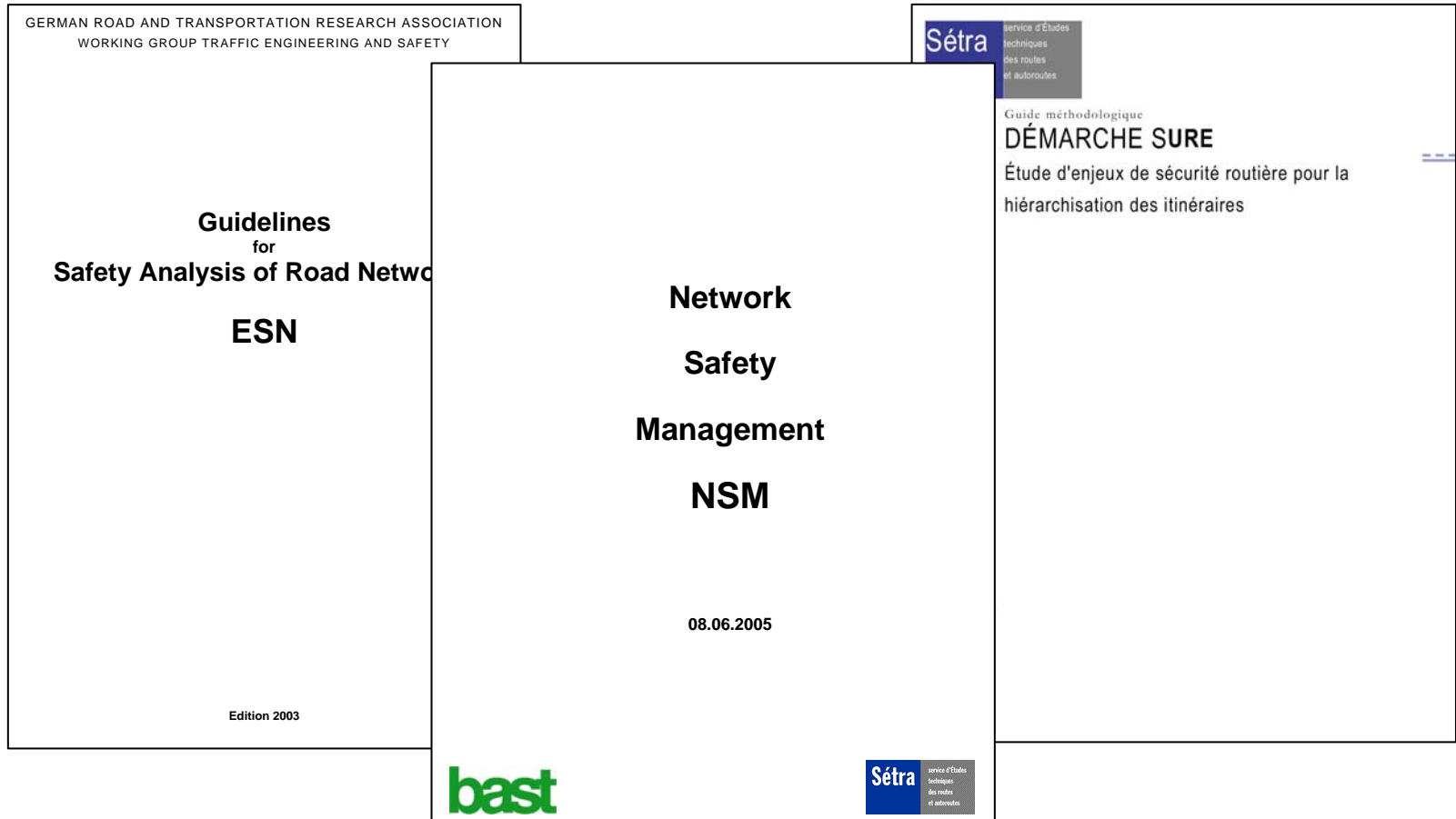
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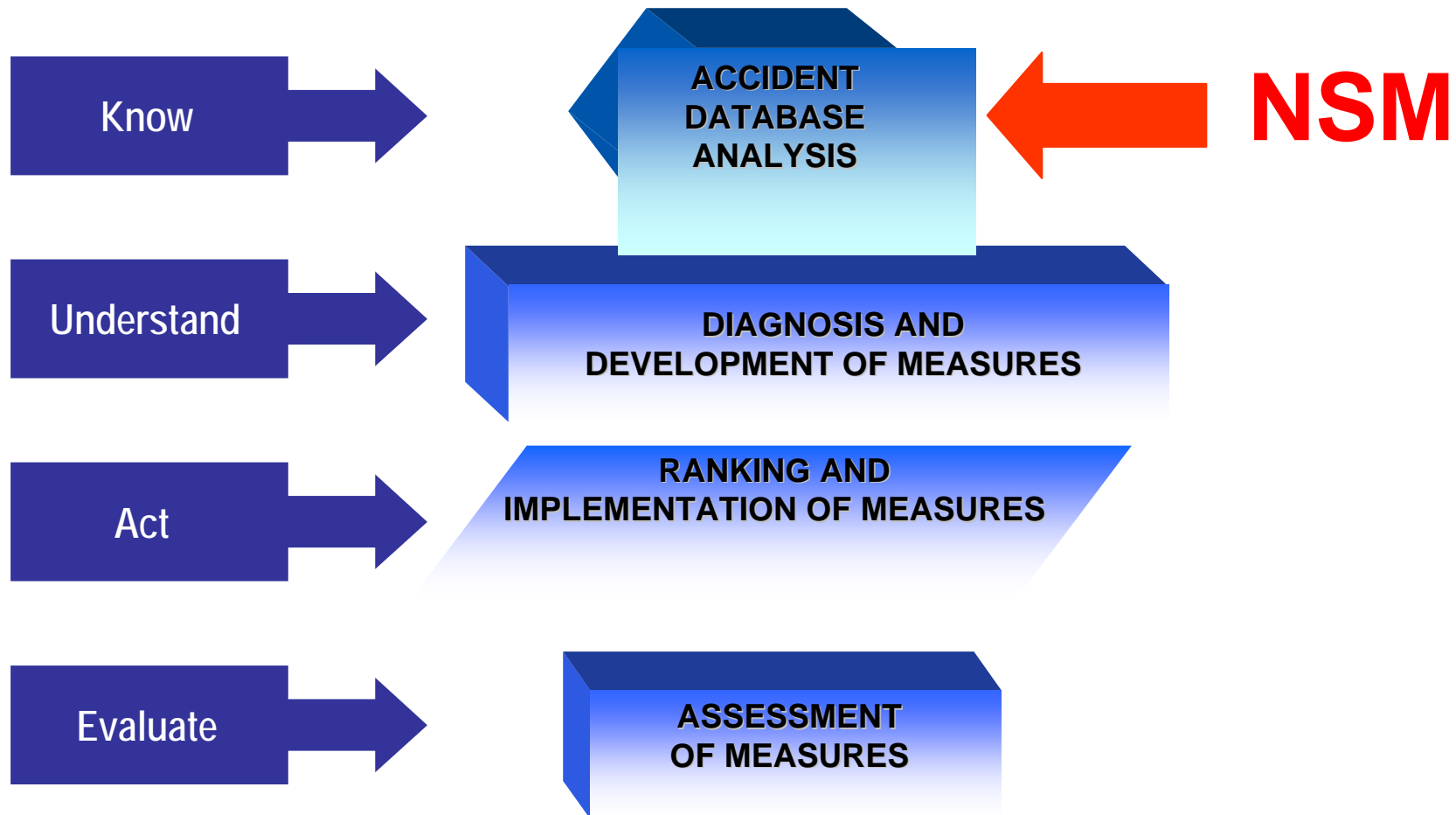
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National Guidelines



Improving Safety of Existing Road Networks





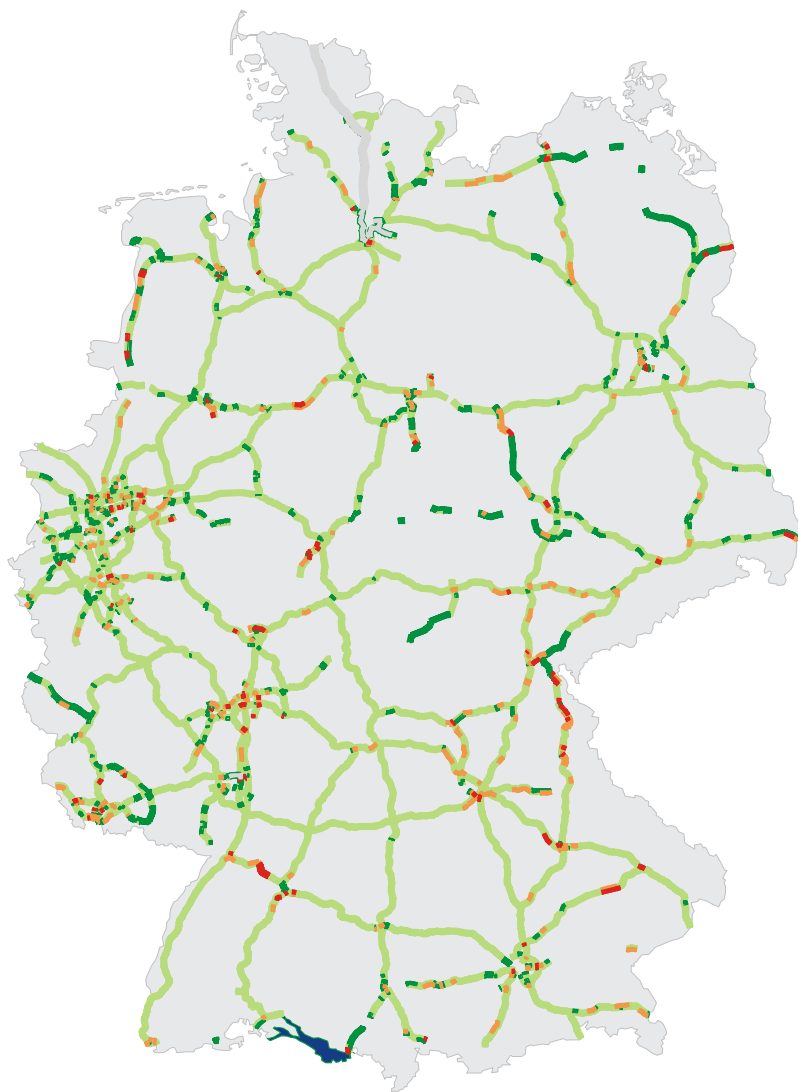
Methodology Requirements

Road administrations have to determine poor road sections/itineraries where possible improvements will be highly cost-efficient.

Methodology for accident analysis has to

- ⇒ be based on costs (€)
- ⇒ provide a ranking of sections for further analysis

Accident Rate

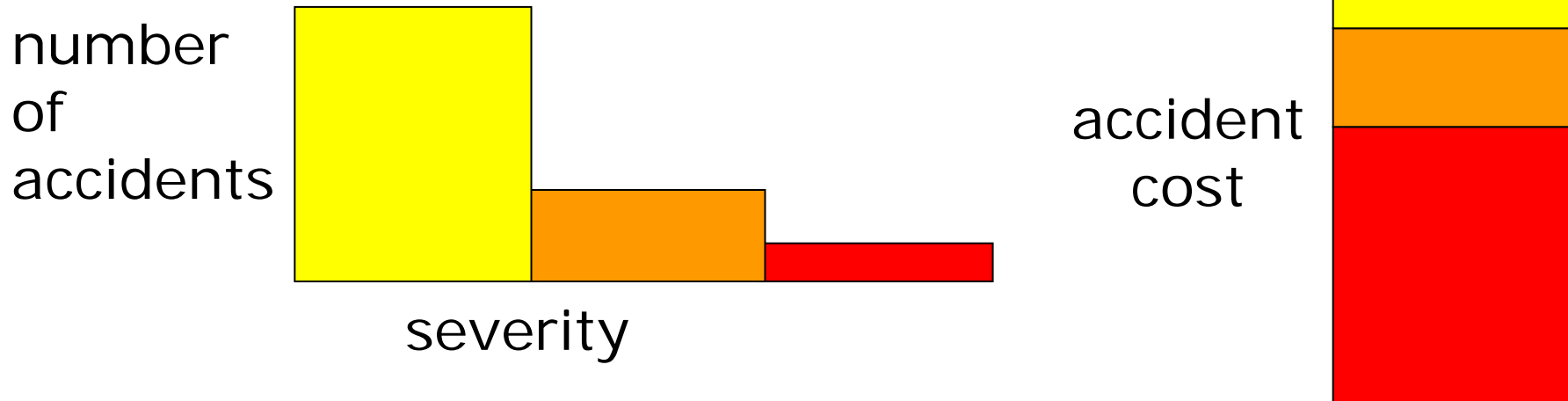


Accident Rate $\frac{\text{Accidents}}{10^6 \text{ veh} \cdot \text{km}}$

0 - 0,06	(n=1158)
0,06 - 0,25	(n=3661)
0,25 - 0,42	(n=360)
0,42 - 0,72	(n=106)
0,72 and more	(n=37)

Accidents with personal injury on German motorways 2002

Accident Cost instead of Number



- joint analysis of accidents of different severity
- consideration of different casualty structures
- basis for cost-benefit analysis

Safety Potential

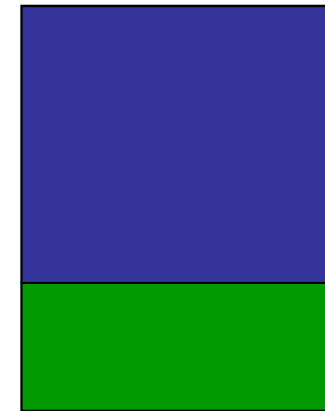
actual accident cost per km

-

target accident cost per km

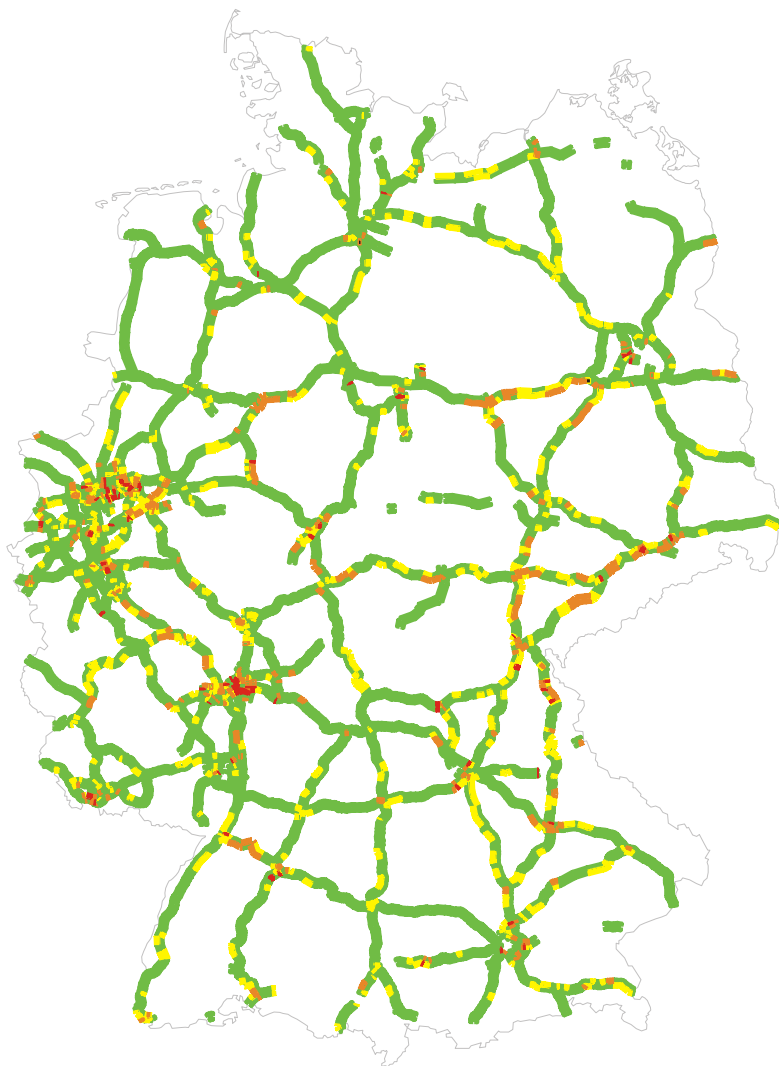
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safety potential







- = accident cost/km that could be saved by improvement measures
- = accident cost to be compared with costs for measures (cost-benefit analysis)

Safety Potential

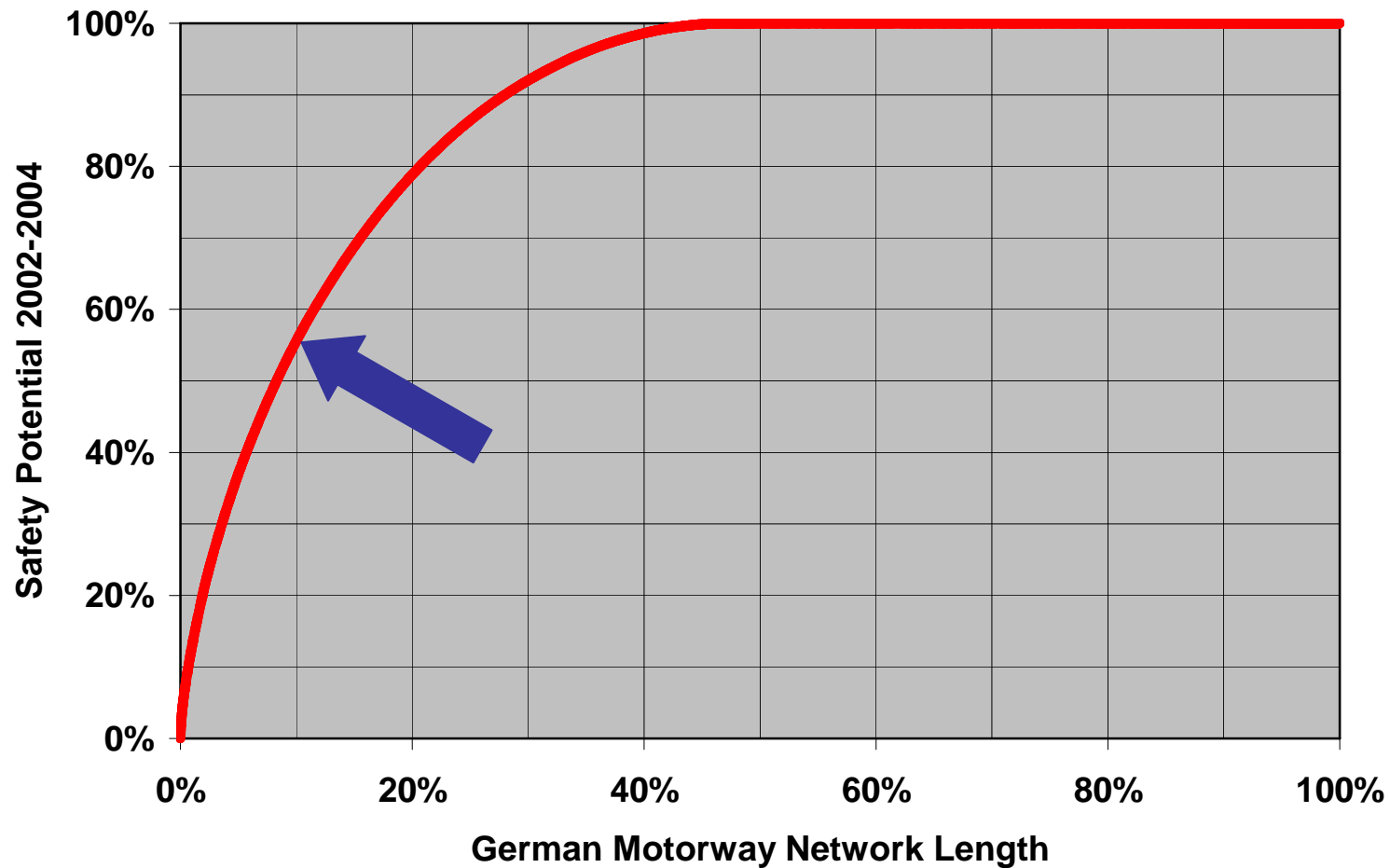


Safety Potential $\frac{1000 \text{ Euro}}{\text{km}}$

	until 50	(n = 4.124)
	50 - 105	(n = 562)
	105 - 250	(n = 316)
	250 and more	(n = 82)

Accidents with personal injury and serious damage-only accidents on German motorways 2002-2004

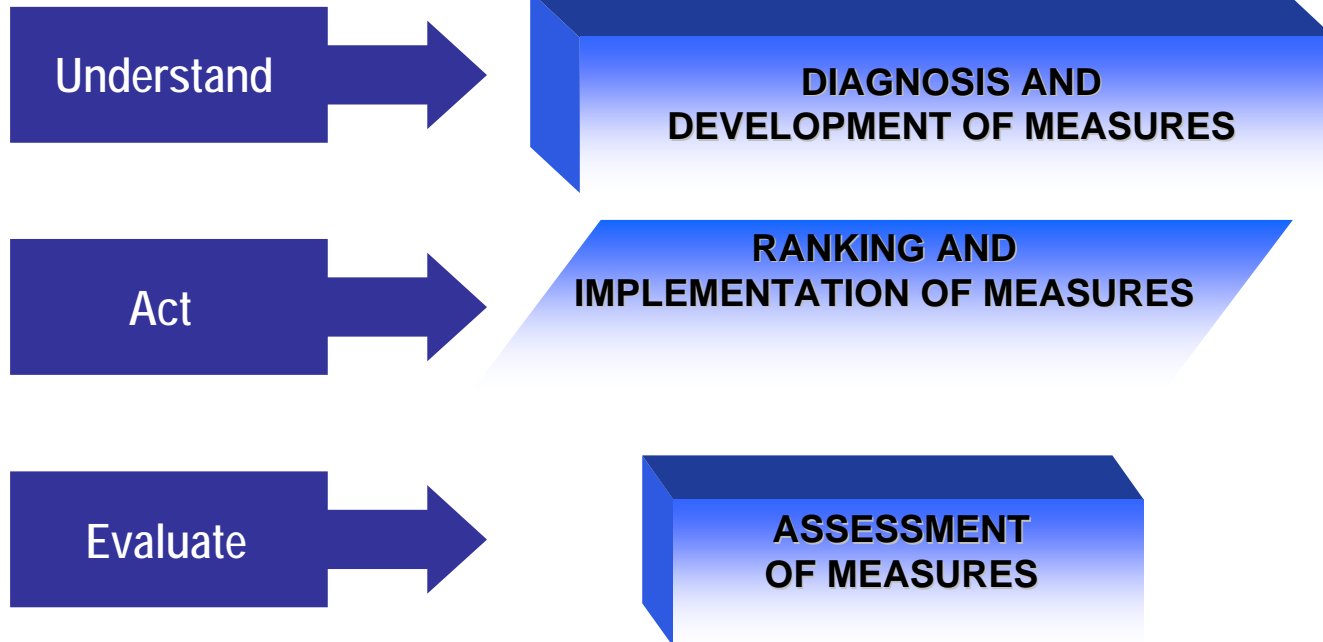
Safety Potential / Network length



Improving Safety of Existing Road Networks

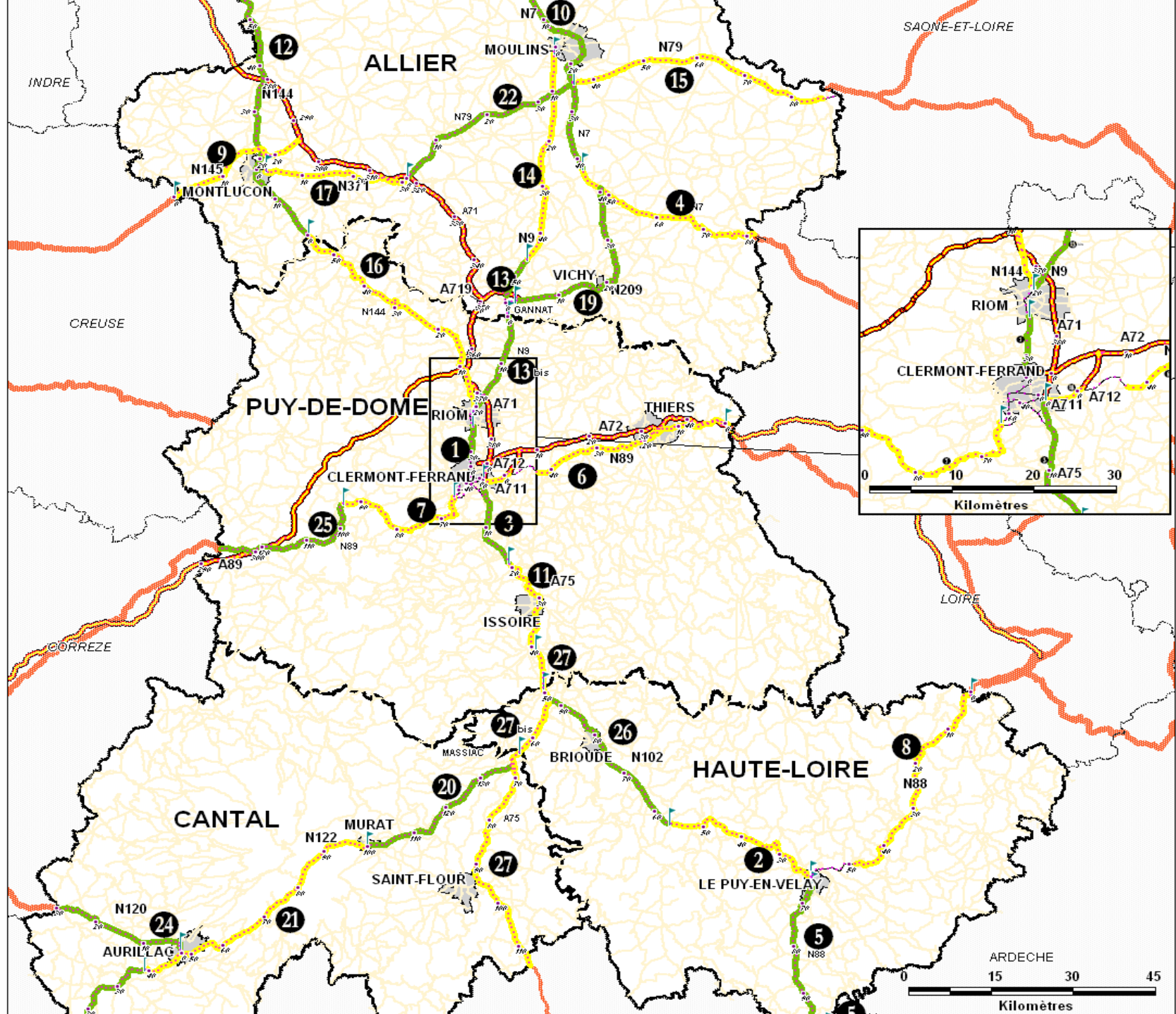
Ranking of sections/itineraries

NSM





From Safety Potential to measures - A concrete example



Stake analysis

1998-2002:

- 97 accidents (49 serious)
- 22 fatalities
- 50 seriously injured
- 105 slightly injured

Safety potential = €450 000

Diagnosis

33km, 3 sections with poor & heterogeneous geometric characteristics – series of punctual improvements

Average daily traffic: 8700, 4300, 6800 (vehicle/day) – mostly short distances journeys

	Length	Nb accidents	Density	National density	Rate (/10 ⁹ veh.km)	National rate
1st section	9 km	26	0,55	0,35	17,5	12
2nd section	6 km	18	0,52	0,35	33,5	12
3rd section	18 km	53	0,51	0.35 to 0,43	20.5	9,7 to 12

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

4 major accidents scenarios	Accident number (AN)	SI/AN
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 < 150m (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

Treatment of a dangerous crossing

- Right turn lane suppression
- Private property access suppression
- Marking reconditioning to actual standards
- Traffic island simplification
- Width reduction



Where do we stand now?

Germany:

Safety potential map for motorways (since 2003)

Pilot for all interurban roads in one state (2006)

France:

Method applied at national level (2005)

400km thoroughly analysed by end 2006

~600km more in 2007.

16.6 M€ for corrective measures in 2005&2006

Conclusion

NSM:

- highlights worst performing sections/itineraries
- provides a priority ranking of sections/ itineraries to be further analysed and improved
- permits a direct comparison: potential savings in accident costs vs. costs of improvement measures => cost effective
- focuses on longer sections/itineraries complements Black Spot Management
- coincides with EU Commission's definition

References

- “Network Safety Management (NSM)”
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http://www.bast.de/cIn_007/nn_82230/EN/e-BASSt/e-organisation/e-abteilung-v/e-referat-v1/e-sicherheitsanalyse/e-sicherheitsanalyse.html
- „Guidelines for Safety Analysis of Road Networks (ESN)“, FGSV, Germany 2003, <http://www.fgsv-verlag.de>
- “User Safety on the Existing Road Network (USER)“, <http://www.sure.equipement.gouv.fr>



Thank you for your attention

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