

# ROAD SAFETY AUDIT

in the context of the  
EU ROAD INFRASTRUCTURE SAFETY MANAGEMENT  
DIRECTIVE

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## Some background information in Ireland –

The National Roads Authority (NRA) look after 5,500 km of national primary and national secondary road

The local authorities look after 90,000 km of regional and local road

The EU RISM Directive applies to the TERN network.

- The Irish statutory regulations expressly stated – the TERN network
- In practice, the NRA will apply the directive on all national roads

## Road Safety Audit

- General discussion on RSA throughout Europe.
- Current Irish RSA standards.
- Impact of the EU RISM directive.
- RSA in Ireland – 10 years on

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## Road Safety Audit

*Definition:*

This is an independent detailed systematic and technical safety check relating to the design characteristics of a road infrastructure project and covering all stages from planning to early operation.

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## General discussion on RSA throughout Europe.

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British traffic engineers first developed the idea of a road safety audit as a safety check for new and improved road schemes in the early 1980s.

The RSA process started to gain pace when safety engineers realised that they were carrying out accident remedial schemes and relatively new roads.

“Prevention is better than cure”.

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In 1990 the design standard HD 19/90 was introduced to the design manual for roads and bridges (DMRB) in the UK.

This made safety audit mandatory on trunk roads and motorways schemes from 1991 onwards in the UK.

These design standards were then revised in 1994 and 2000.

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Formal safety audit procedures were then developed in a number of countries, following the work done in the UK.

During the early 1990s, Australia, Denmark, New Zealand start working in this area. Since then Canada, France, Greece, Hong Kong, Iceland, Ireland, Italy, Malaysia, the Netherlands, Peru, Singapore and the United States had been developing road safety audit procedures in their own countries.

The EU RISM Directive of 2008 brought it into EU Law.

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## Irish Road Safety Audit standards.

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In 1999 the NRA commissioned TMS consultancy to help them produce an Irish Road Safety Audit Standard and Guideline,

- initially based on the UK standard
- subject to intensive consultation
- final procedures changed significantly from UK
- feasibility stage road safety audit included
- more dialogue encouraged between auditors and designers both before and after audits.
- Strict criteria in terms of qualifications, training and experience

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RSA included in Irish DMRB in 2001

RSA Standard revised in 2004, 2009 and recently in 2012, to reflect EU RISM directive.

Revision to the standards on a regular basis is very important -

- constantly learning what works and what does not work,
- standards need to reflect this.

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The EU RISM Directive requires the establishment and implementation of procedures for:

- Road Safety Impact Assessments (RSIA)
- Road Safety Audit (& Training Requirements) (RSA)
- Network Safety Ranking & Management (NSR)
- Road Safety Inspection - Safety at Road Works (RSI)

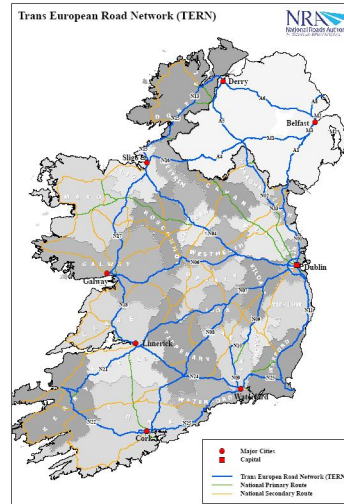
Also includes:

- Best Practice Exchange
- Data Management requirements
- Adoption of Guidelines.



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- Directive adopted by EU in Nov 2008
- Came into force in Dec 2010
- Irish Regulations SI 472 in Q3 2011.
- Irish Standards submitted in Q2 2012



The new Irish NRA RSA standard, HD 19/12, has been developed to reflect the EU RISM directive.

Among the changes from 19/09 are:

- The definitions of Road Safety Audit and Infrastructure Project have been revised to reflect the definition in directive.
- Stage 4 Road Safety Audits (Early operation) has been introduced.
- **Certificate of competence now required**

## Road Safety Audit - Certificate of Competence

Any consistency across the EU?  
Will there be legal challenges?

Irish standards state:  
that an auditor is required have  
knowledge of the Irish DMRB Standards,  
and to carry out 5 audits as a trainee and  
5 audits as a team member before  
becoming a team leader ---this will remain  
in place.



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### Stages of Audit

- Stage F: Route selection stage, prior to route choice.
- Stage 1: Completion of preliminary design prior to land acquisition.
- Stage 2: Completion of detailed design, prior to tender.
- Stage 3: Completion of construction (prior to scheme opening).
- Stage 4: Early operation, 2 - 4 months after opening with live traffic.

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## Issues with the 'Early Operation' road safety audit

Definition of "Early"

Do you need collision data for this audit, because in Ireland our collision data is usually 18 months to 2 years late - so we will have no collision data for this audit

Why not use RSI?

What is the difference between RSI and early operation road safety audit?

Why not use collision cluster analysis when the data becomes available?

Is this just one more audit on top of all the other audits that need to be carried out?

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Table 2/1: Stages of Road Safety Audit and Type of Scheme

| Type and Complexity of Scheme | Stage |   |   |     |   |   |
|-------------------------------|-------|---|---|-----|---|---|
|                               | F     | 1 | 2 | 1/2 | 3 | 4 |
| Major Scheme                  | X     | X | X | -   | X | X |
| Minor Improvement Scheme #    | -     | X | X | (X) | X | - |
| Major Development +           | X     | X | X | -   | X | - |
| Minor Development             | -     | - | - | X   | X | - |
| Junction / Traffic Scheme     | -     | X | X | (X) | X | - |
| Planned diversions *          | -     | - | - | X   | X | - |

# See NRA TA §5/11.

+ Meets criteria in NRA Traffic and Transport Assessment Guidelines Table 2.2

\*For planned diversions of significant impact, associated with NRA Major Road projects See paragraph 2.2.

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HD 19/12 RSA standard contains details on the following:

- Audit team and audit team leaders
- Audit brief
- Site visits
- Checklists - yes or no?
- Methodology

Due to the changing situation regarding qualifications, it was decided to put the RSA qualifications on the NRA website rather than in the actual standards document as they will be changing over the next 12 to 18 months.

This means that we can change our qualifications to comply with the Directive without having to go back and change the standards again.

- Engineering degree
- Chartered Eng after Dec 2013

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Audit report should contain –

- Scheme description and Audit stage
- Date of site visit and weather
- List of audit team members and others attending
- Road safety problems and recommendations
- Statement signed by audit team members.
- Feedback form for design team leader & audit team leader

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## Subsequent actions to the report.

The recipient of a road safety audit report will be the Employer who shall decide whether or not to act on the recommendations contained in the report.

On receipt of the report the Employer shall forward it to the Designer

If following the road safety audit, discussion or clarification of any issues is required by the Audit Team, the Designer or the Employer, the Employer shall convene a meeting between the Audit Team, the Designer and the Overseeing Organisation to resolve as many of the audit issues as possible.



## Subsequent actions to the report.

For Stage 1 and 2 Audits this meeting may take place some days after the audit and after a draft report has been completed. Due to time pressures for Stage 3 audits it is suggested that the meeting, if needed, takes place immediately after the Stage 3 site visit.



## Subsequent actions to the report.

The purpose of the meeting is to clarify issues raised in the draft audit report.

The auditors should be prepared to indicate the importance of issues raised in the report, and to justify why the problems are genuine safety issues.

They should not be under external pressure to change their report. However, once issues have been clarified the auditors may feel that they can amend sections of the report; for example a recommendation within their report may be amended in the light of new information that demonstrates that their original ideas could not be implemented.

As long as the auditors accept that the new recommendation will have a genuine safety benefit, they can change their draft report, and produce a final version.



## Exception report

For those cases where the Designer and the Audit Team cannot agree appropriate means of addressing an underlying safety problem identified by the audit an Exception Report must be prepared on each disputed item in the audit report.

Table 3/1: Feedback Form Responses,  
Requirement for Exception Report

| Problem accepted | Recommended measure accepted | Alternative measures or reasons accepted by auditors | Exception report needed |
|------------------|------------------------------|--|-------------------------|
| Yes              | Yes                          | -  | NO                      |
| Yes              | No                           | Yes  | NO                      |
| Yes              | No                           | No   | YES                     |
| No               | No                           | Yes  | NO                      |
| No               | No                           | No   | YES                     |

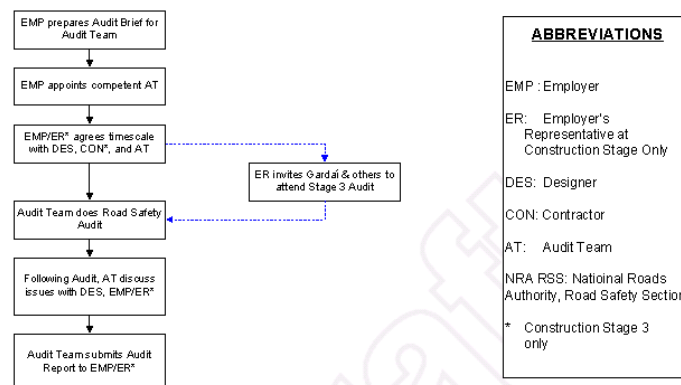
## Exception report

An Exception Report will take one of the two following forms:

Where the Designer accepts an identified problem, but the Designer and Audit Team cannot agree on an appropriate recommendation, the Exception Report should describe the reasons why the audit team recommendation cannot be implemented, and outline the alternatives considered and the difficulties involved in implementing them.

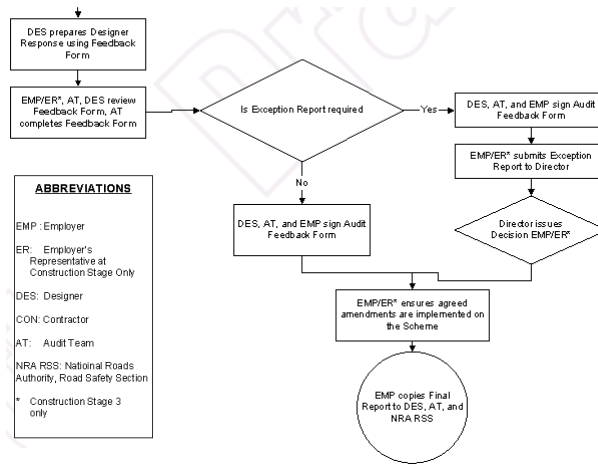
Where the Designer does not accept that the identified problem exists, the Exception Report should produce some evidence as to why the problem is not valid. It may be that the Audit Team did not have all information available, or that the scheme design has changed since the plans used in the audit were prepared.

## AUDIT FLOW CHART Page 1





### AUDIT FLOW CHART Page 2



**ABBREVIATIONS**

EMP : Employer  
 ER : Employer's Representative at Construction Stage Only  
 DES : Designer  
 CON : Contractor  
 AT : Audit Team  
 NRA RSS : National Roads Authority, Road Safety Section  
 \* Construction Stage 3 only



### APPENDIX B: AUDIT FEEDBACK FORM

#### Road Safety Audit Feedback Form

Scheme: \_\_\_\_\_ Route No. \_\_\_\_\_  
 Audit Stage: \_\_\_\_\_  
 Date Audit Completed: \_\_\_\_\_

| Paragraph No. in Safety Audit Report | To Be Completed By Designer |                                    |   | To Be Completed by Audit Team Leader |
|--------------------------------------|-----------------------------|------------------------------------|---|--------------------------------------|
|                                      | Problem accepted (y/n)      | Recommended measure accepted (y/n) | Describe alternative measure(s). Give reasons for not accepting recommended measure |                                      |
|                                      |                             |                                    |   |                                      |
|                                      |                             |                                    |   |                                      |
|                                      |                             |                                    |   |                                      |
|                                      |                             |                                    |   |                                      |
|                                      |                             |                                    |   |                                      |
|                                      |                             |                                    |   |                                      |
|                                      |                             |                                    |   |                                      |
|                                      |                             |                                    |   |                                      |

Signed: \_\_\_\_\_ Designer Date \_\_\_\_\_  
 Signed: \_\_\_\_\_ Audit Team Leader Date \_\_\_\_\_  
 Signed: \_\_\_\_\_ Employer Date \_\_\_\_\_



**APPENDIX C:**

**EXCEPTION REPORT DECISION FORM**

**Road Safety Audit Exception Report Decision Form**

Scheme: \_\_\_\_\_ Route No. \_\_\_\_\_

(If NRA scheme) NRA Project Ref No.: \_\_\_\_\_

Audit Stage: \_\_\_\_\_ Date Audit Completed: \_\_\_\_\_

| Exception Report Item | Paragraph No. in Road Safety Audit Report | Decision by Director (Accept / Reject Exception Report) |
|-----------------------|---|---|
|                       |   |   |
|                       |   |   |
|                       |   |   |
|                       |   |   |

Signed: \_\_\_\_\_ Director of Overseeing Organisation      Date \_\_\_\_\_



**RSA in Ireland – 10 years on**



## Recurring issues

### Topics to cover include:

- Crash barriers.
- Drainage.
- Sign locations and support
- Junction layouts.
- Tie-ins

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## Recurring issues – crash barriers

1. Remove or design out the hazard. (Clear zone.)
2. Locate barriers as far from the carriageway as possible
3. Minimise the number of barrier ends
4. Type and shape of barrier ends  
(Note on NRA projects all ends will be crash cushions)
5. Ensure the working width is clear of hard objects

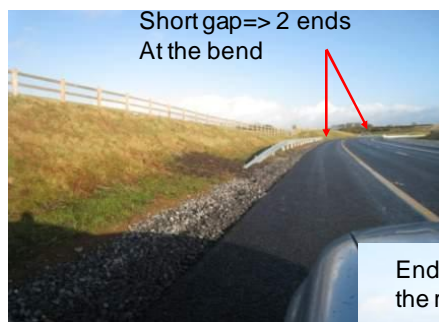
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## Number and shape of barrier ends



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Wrap around barrier end.  
 Is it better than a ramp end?  
 Does it comply with standards?



Slight wrapped and ramped.  
 Is this better?

Headwall and post and rail fence within the working width

Hazard within the working width of the barrier



Pole and Sign face within the working width

## Recurring issues – Drainage

1. Location of drainage ditches  
 Embankments, V-drains, Headwalls and water-hazards should all be located outside the clear-zone
2. Shape of ditches; avoid using “V” drains that act like tank-traps!- Use flatter profile that slows errant vehicles rather than killing the drivers.
3. High manhole covers adjacent to carriageway
4. French drains too close to running lanes;-  
 Causing loose chips to be thrown onto the road

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### V Drain

Drainage, headwalls,  
 and V drains vs U drains



**Flatter U Drain**

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**Occasionally people just slip up or simply lie down on the job!**



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**Head-wall sticking out into the U Drain**



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## Recurring issues sign location and supports

- 1 Placing signs outside clear-zone is not an option for most signs, apart from “scheme signs” and most passively safe options are expensive
- 2 Correct Sign design and location is essential to minimise the number of signs, minimise the number and size of supports, avoid clutter and prevent signs obscuring each another.



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## Need to consider: signs AND safety fencing AND working width AND sight distance



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- Roundabout splitter islands:  
 Consider direction signs, bollards and clearance **AND remember**



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- Pedestrians need clearance too...



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## Leave enough room

- This island is 8m wide and 11m long



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Where possible junctions should not be located at the bottom of long descents.  
 Loss of control can occur



Common problems

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Side roads with steep gradients should level out before they join the mainline so that vehicles do not need to hill-start when pulling out into the mainline at a junction. Between 5m and 10m back from the junction is enough.



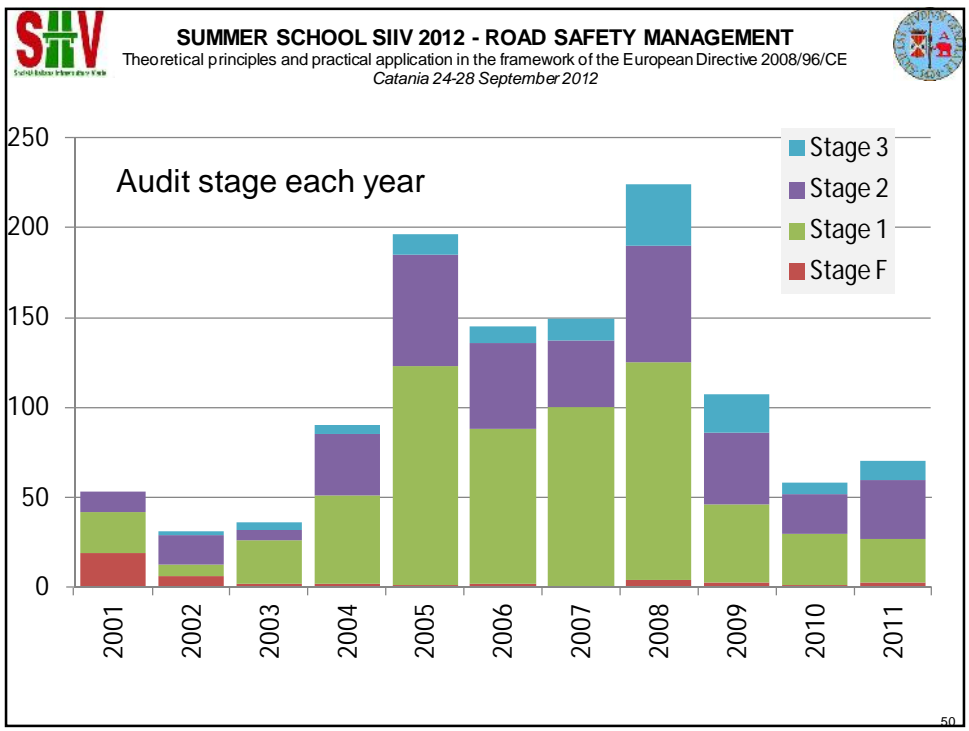
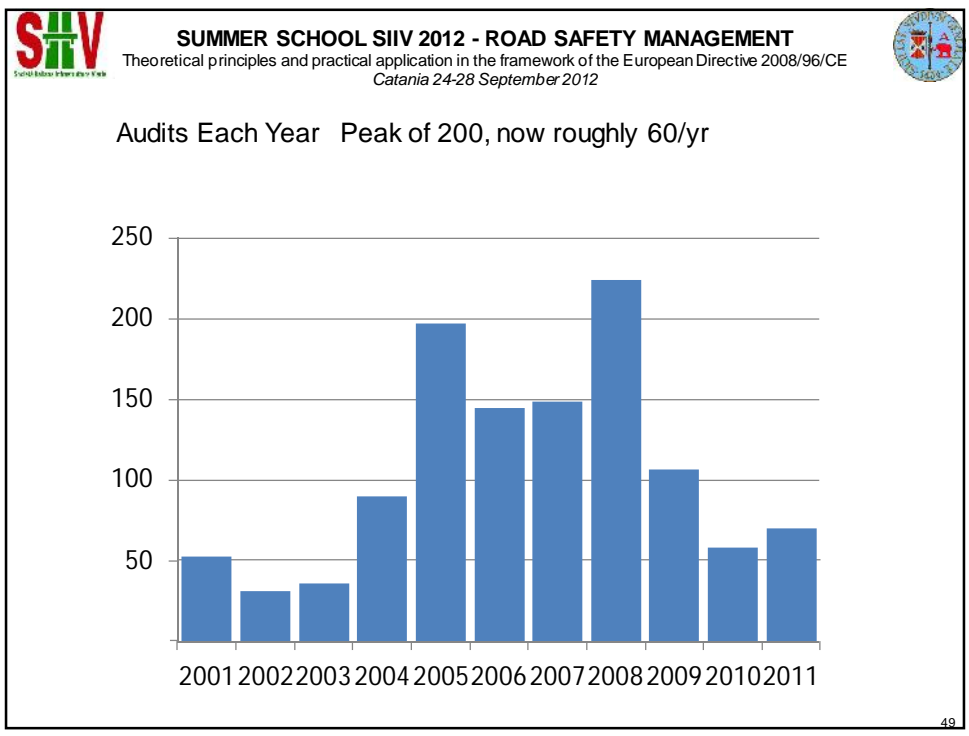
## Eleven years of Audits

11 years 2001 - 2011

1183 audits approved

928 schemes







## Many more stage 1 than stage 2

Development schemes are required by planning depts to do stage 1, then later stages not done - forgotten

Major schemes done by D&B and PPP have stage 1 done 5 or 6 times, as each consortium produces an audit

Figures are audits APPROVED – Many project managers have failed to get continuing approval for subsequent audits

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## Very few stage 3

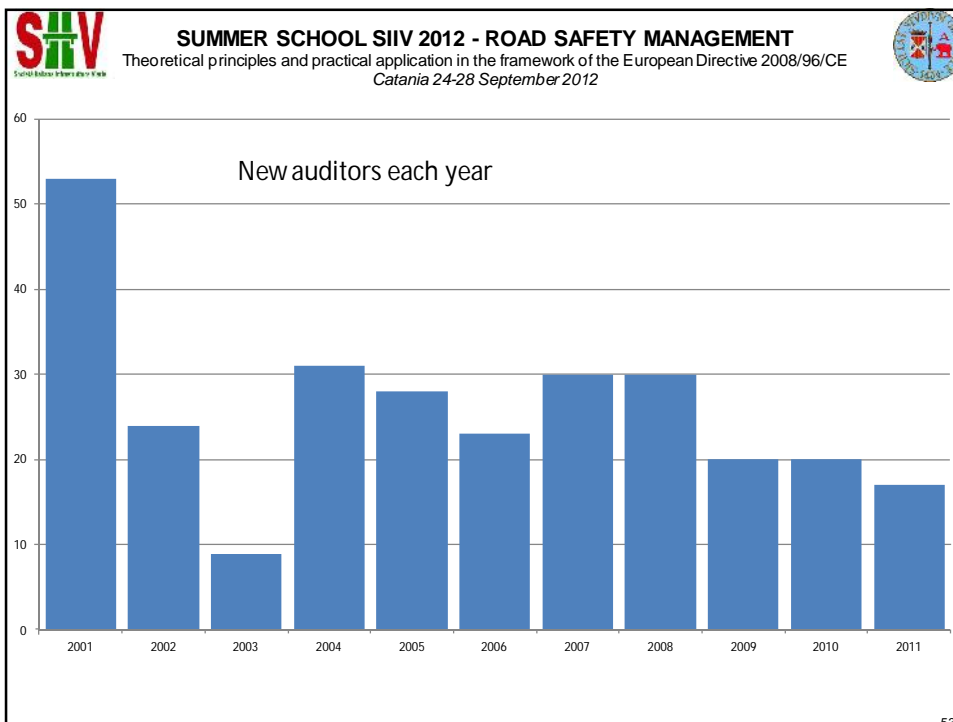
Small proportion of schemes not implemented although design done

Later stage audits not done - forgotten

No continuing approval for subsequent audits - approval is not asked for, although audit is done.

This issue has been addressed in RSAAS

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**SIV** **SUMMER SCHOOL SIIV 2012 - ROAD SAFETY MANAGEMENT**  
 Theoretical principles and practical application in the framework of the European Directive 2008/96/CE  
 Catania 24-28 September 2012

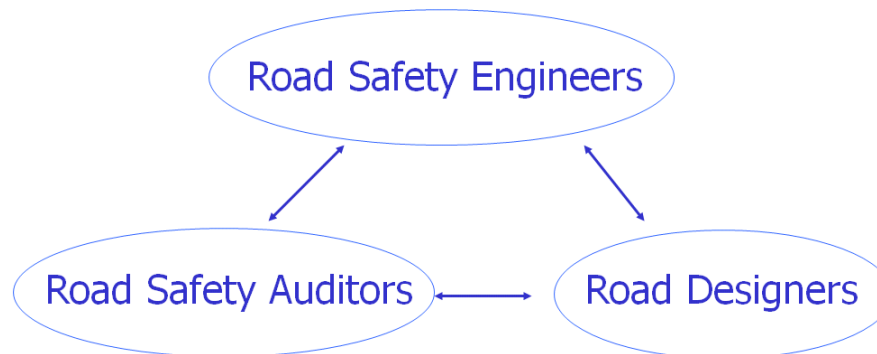
**Is Road Safety Audit Working? Yes**

Way of checking safety of new schemes

- System now firmly established
- Most schemes undergo audit at some stage, if not all required stages
- Concept of safety audit is now accepted by designers
- “Safe” design automatically and perhaps subconsciously included in new designs
- RSIA included as integral part of design process

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## RSA feedback to road design



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## Is Road Safety Audit Working? Yes

**Prevents new schemes becoming future  
accident sites**

**Still seeing a few new collision clusters  
on recently built schemes, but not as  
many as in earlier times**

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## Eleven years on What has been achieved?

**Over 900 schemes have been examined**  
**Should be no serious road-related safety flaw in these schemes**  
**Road design process now automatically considers safety**

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# ROAD SAFETY AUDIT

Thank You

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