Speed Adaption Control by Self Explaining Roads

Final Conference

Safety at the Heart of Road Design

14 January, 2012, Arlanda, Stockholm, Sweden

→ **SP**eed **A**daption **C**ontrol by self **E**xplaining Roads

- SPACE is adressing the objective **A** of the ERA –NET Road programme Safety at the Heart of Design
- **A   Development of evaluation tools**
- B   Assessment of forgiving road safety treatment
- C   Comparision and implementatiom of approaches of self-explaining roads (SER)

To <u>identify SER solutions</u> and <u>develop a tool (method)</u> that assess the effectiveness of them, particularly in relation to their impact on speed choice.

No treatment

Curve/bend warning sign

Curve/bend warning sign and SLOW markings

Curve/bend warning sign, SLOW markings and chevron sign

Curve/bend warning sign, SLOW markings, chevron sign and coloured surface

Curve/bend warning sign, SLOW markings, chevron sign, coloured surface and VAS
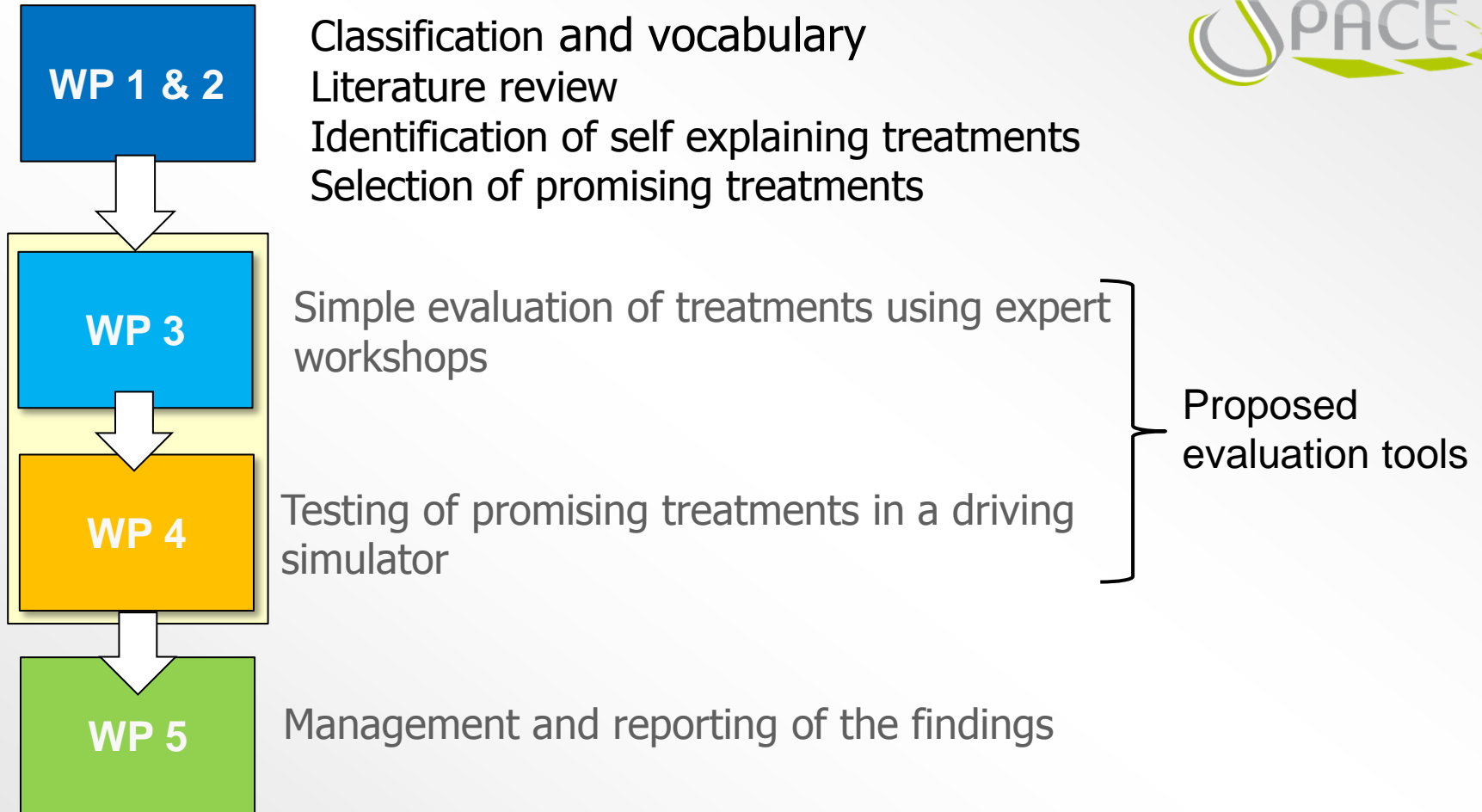
Organization	Country	Man month
VTI	Sweden	9.5
TRL	UK	3.3
BRRC	Belgium	2
CDV	Czech	3
UCD	Ireland	1
KfV	Austria	4
FEHRL	Belgium	2

Start January 2010
End 31 December 2011
Budget 314 730 Euro

WP 1 & 2

Classification and vocabulary
Literature review
Identification of self explaining treatments
Selection of promising treatments

WP 3

Simple evaluation of treatments using expert workshops

WP 4

Testing of promising treatments in a driving simulator

Proposed evaluation tools

WP 5

Management and reporting of the findings

Classification and vocabulary
Literature review
Identification of self explaining treatments

Reporting and conclusions

Expert workshops

Driving simualtor test

Literature review, definition and identification of self explaining treatments

According to the requirements of the ERA-NET Road Programme Executive Board, the treatments should be suitable for use on roads that are: Rural, Single carriageway, Higher volume (the responsibility of a National Road Administration)

(winter roads and night time condition has not been evaluated)

In total, 72 individual treatments were identified. These were grouped according to the type of road section on which they would be applied:

- **Curves**
- **Transitions**
- **Intersections**
- **Links**
- Curves and transitions was decided to be investigate further since, at these stretches of road, speed was considered most critical

Workshops was conducted in Belgium, Czech Republic, Sweden, Ireland, and Austria. Participants was typical road safety experts

The concept of all workshops was identical: the same questionnaires and the same video and photo material were used at all workshops

Procedure:

Group of experts made a brainstorming about the following questions:

What is a self-explaining road?

What works?

What does not work?

The treatments to study and discuss at the workshops was selected from the literature review made in WP1 and 2. They were limited to curves and transitions since speed has a critical role to play in loss of control crashes at curves and also in potential conflicts with vulnerable road users following transitions into villages, towns and/or semi urban areas.

The workshops had two purposes:

To create common guidelines

to give input for and select treatments to be studied in a driving simulator experiment

A guide how to conduct the workshops was developed, this include a moderator guide and requirements of materials used such as photos and videos

Lessons learned:

Longer videos that include sections before/after SER treatments

Planners, academics contra civil engineers disagree on what parts should be included in the road (engineers included signs, road markings and chevrons),(UCD ws)

An ever working SER doesn't exist, (BRRC ws)

SER Long term profit contra familiar and unfamiliar with the section ?(KFV, VTI ws)

The driving simulator study was limited to study one treatment, curves.

The objective of the simulator study was to further evaluate the effectiveness of the chosen treatments in terms of speed adaptation.

In total 35 participants, divided into two groups, drove approximately 47 minutes on a rural road with 3 baseline curves without treatment and 9 curves with treatment of varying levels.

The experiment was conducted in the VTI Driving Simulator III, which is a moving base simulator. The car body consists of the front part of a Saab 9-3 with a manual 5 shift gearbox. Noise, infra-sound and vibration levels inside the cabin approximate those of a modern car. The forward view is 120° x 30° from the participant's position in the simulator

The treatments at low level was curve warning sign, at medium level curve warning sign and a chevrons curve sign and at high level a curve warning signs, chevrons curve signs, median and side hatchings and transverse rumble strips.
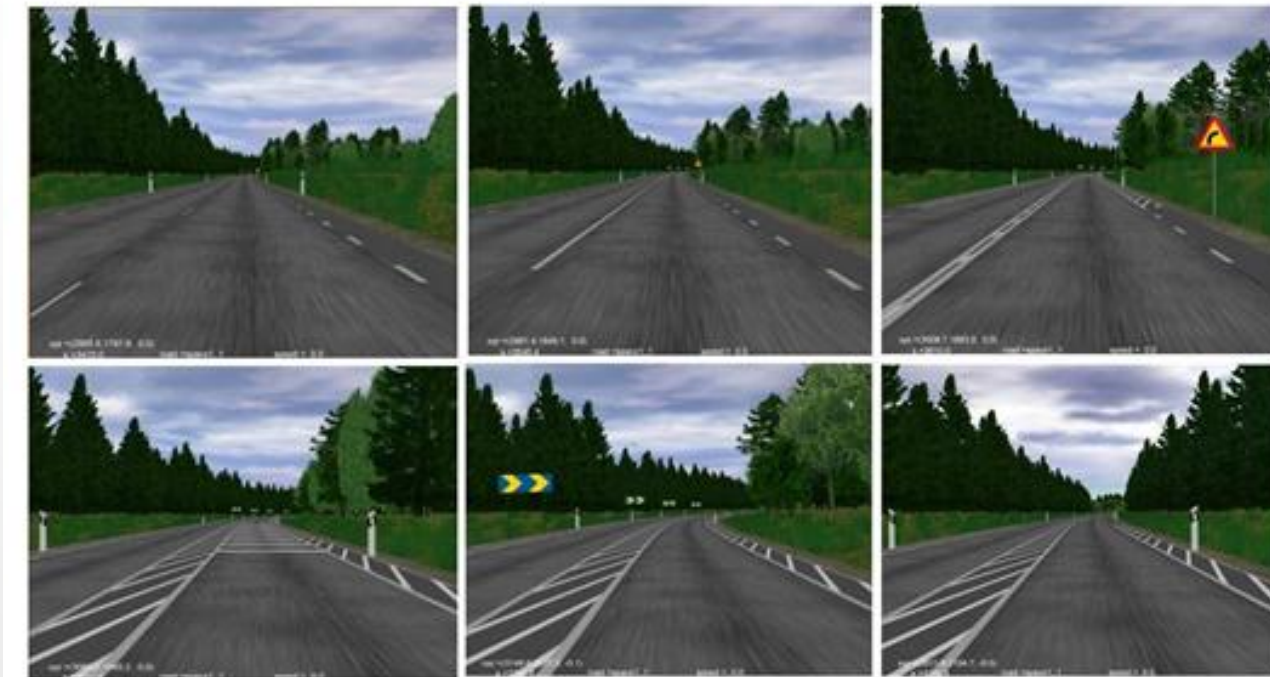
Consistent group

received treatments corresponding to the severity of the curve (slight curve – low treatment level; moderate curve – medium treatment level; severe curve – high treatment level);
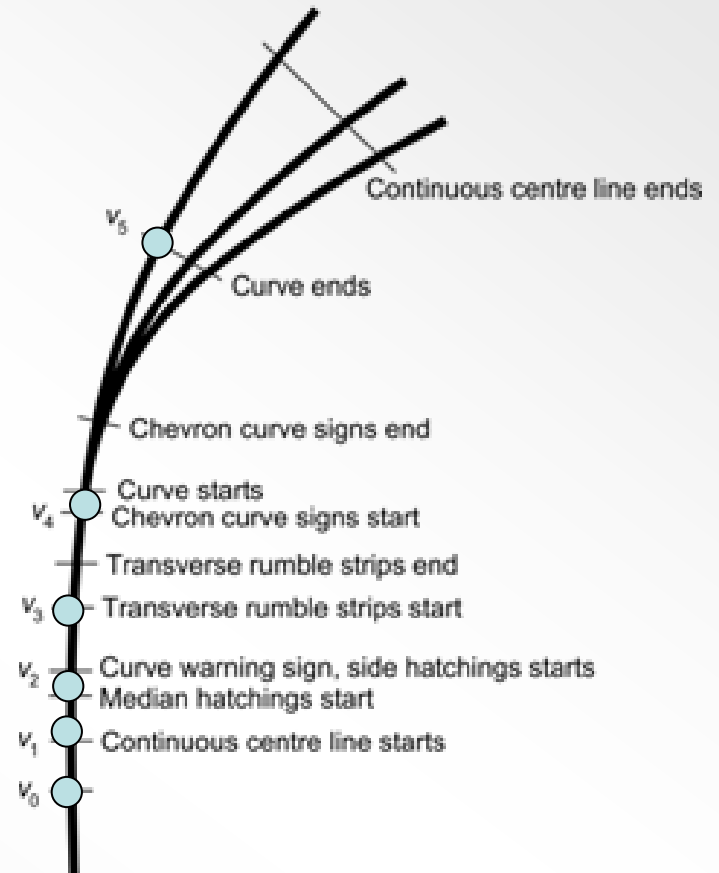
Inconsistent group

experienced inconsistent treatments by being exposed to all nine possible combination of curve and treatments.

Group	Slight curve	Medium curve	Severe curve
Consistent	3: low	3: medium	3: high
Inconsistent	1: low 1: medium 1: high	1: low 1: medium 1: high	1: low 1: medium 1: high

Dependent variables were the speed variable, instantaneous speed at six different points, v0 and v5, along the curve and the average speed through the total curve (from v0 to v5).
The results show that a consistent mapping of treatment levels to the severity of curves is a potential way to make drivers adapt their speed appropriately for the risk present.

Continuous centre line ends

Curve ends

v_5

Chevron curve signs end

Curve starts
v_4
Chevron curve signs start

Transverse rumble strips end

v_3 Transverse rumble strips start

v_2 Curve warning sign, side hatchings starts
Median hatchings start

v_1 Continuous centre line starts

v_0

Driving simulator test conclusions

For the most severe curves a consistent treatment regime (as opposed to an inconsistent one) might be expected to result in a speed reduction of around 3 km/h for the most severe curves and on the types of roads tested in the study.

In conclusion the result from the driving simulator study demonstrates one way to evaluate the effect of potential treatments (in this case categorized as "self-explaining treatments") on speed choice

Dissemination

Homepage:
*www.**fehrl**.org/**space**/*

Two page Flyer

A paper at the TRA 2012 conference in Athens, April 2012

Nr	Name	Public
D1	Self-Explaining Roads, Literature Review and Treatment Information	*www.**fehrl**.org/**space**/*
D2	Technical note: Methods to evaluate international SER measures, preparations for a workshop	*www.**fehrl**.org/**space**/*
D3	Technical note: Report from expert workshops	*www.**fehrl**.org/**space**/*
D4	Consistent treatment in relation to the severity of a curve, a driving simulator study	
D5	Technical note: Comparison of methods	
D6	Final report SPACE	

- The concept to use expert workshops ("audits") in combination with a driving simulator study is a good way to evaluate the effect of potential self-explaining treatments
- It is difficult to identify a common definition of SER
- Long term effects are difficult to study with proposed method
- Familiar/unfamiliar effects difficult to evaluate

Further work:

- Using animated PC movies created from the simulator scenarios could be a way to improve the workshops
- Using participants from different countries in the driving simulator study could be a way to evaluate the trans-national effects of a specific treatment

Thank you for your attention!