



Driver assistance systems for noise abatement

Identify – Develop – Implement – Evaluate

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Introduction

- The aim for SP.H3 was to identify conceivable ideas that could be further developed into systems. The developed ideas was implemented into a Volvo FH12 truck to evaluate the drivers' perception of noise reduction, design and acceptance of such systems.



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- How
 - Focus groups
 - Drivers
 - Fleet Management
 - City Authorities
 - Questionnaires
 - Cultural differences
 - Occupational differences
 - Expert judgement
 - Clarifications of systems function



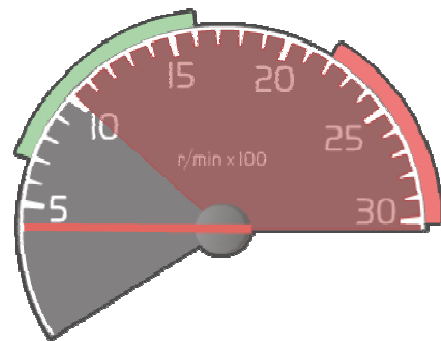
Develop (1)

- Four different system ideas from the identify task were further developed.
 - Automatic system limiting the engine speed
 - Limited access for certain vehicles
 - Speed limitations
 - In-vehicle information for driving more smoothly ~eco-driving



Develop (2)

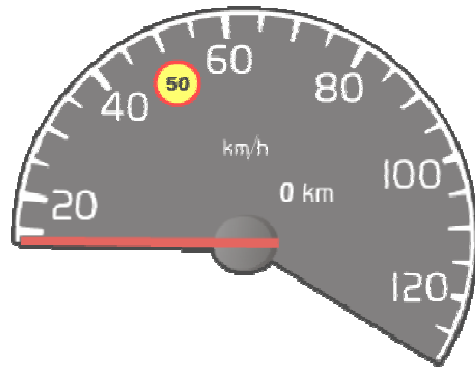
- Automatic system limiting the engine speed
 - The system limits the engine to rev over a pre-set engine speed limit.
 - Developed and evaluated with “Limited Access for Certain Vehicles”



- Limited access for certain vehicles
 - The system advise the driver on what route to take. The system should advise the driver on preferable routes depending on traffic conditions and regulations.



- Speed limitations
 - This in-vehicle information advising on speed limits in certain vulnerable geographical zones as well as the now present speed limit.





Develop (5)

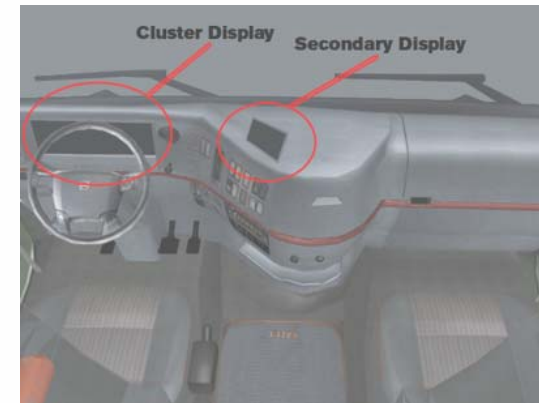
- In-vehicle information for driving more smoothly ~eco-driving
 - Direct feedback on how well the truck is driven in relation to noise (acceleration, deceleration).
 - Could be combined with other variables such as fuel consumption.



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- When implementing such systems there is crucial to inform the driver.
 - Truck
 - Volvo FH 12
 - Displays
 - Digital instrument cluster
 - SID (Secondary Information Display)



Evaluate

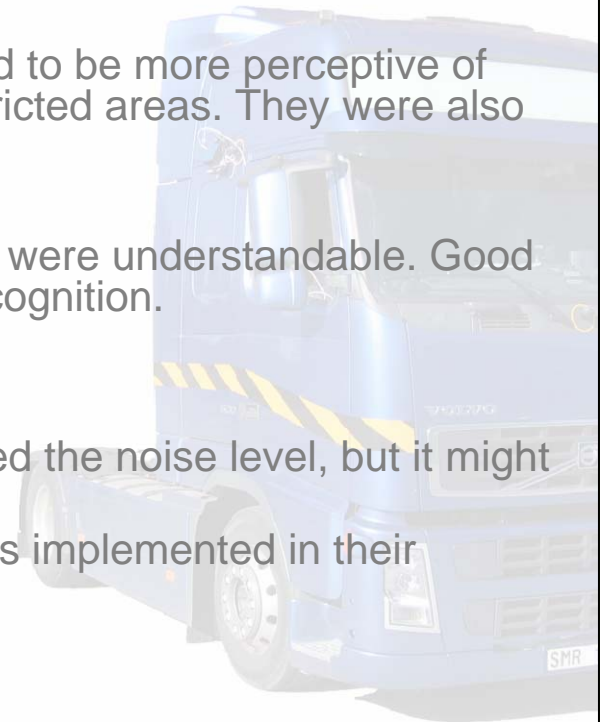
- The systems were evaluated with truck drivers in Gothenburg, Sweden.
- How
 - Background questionnaire
 - Introduction to the systems
 - Driving activity (five scenarios)
 - Overall questionnaire





Conclusions (2)

- Driver
 - All the drivers participated in the study had very positive attitude towards noise abatement work.
 - Driving behavior
 - 75% changed their driving behavior and claimed to be more perceptive of noise zones. Held a lower engine speed in restricted areas. They were also more perceptive to present speed.
 - Design
 - The symbols used (mainly Swedish road signs) were understandable. Good mapping to the road signs, gave a feeling of recognition.
 - Overall good and understandable design.
 - Noise
 - Quite low thoughts about that the driving affected the noise level, but it might do in some extent.
 - The majority also said yes to have such systems implemented in their trucks.



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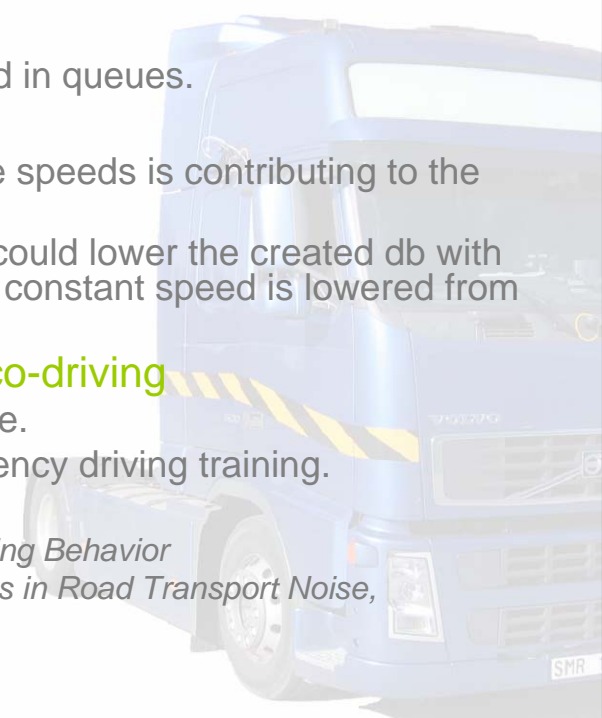


Conclusions (3)

- Noise reduction potential
 - Automatic system limiting the engine speed
 - According to Stevens (2006) propulsion (example, engine speed) noise contributes to the total noise with about 95 %.
 - Limited access for certain vehicles
 - Avoid creating unwanted noise in vulnerable areas and in queues.
 - Speed limitations
 - According to Stevens (2005) unnecessary high vehicle speeds is contributing to the total noise.
 - A decreasing constant speed from 60km/h to 50km/h could lower the created db with about 1,7db. And the same figure is about 2,7db if the constant speed is lowered from 40km/h to 30km/h.
 - In-vehicle information for driving more smoothly ~eco-driving
 - Make the drivers more aware of the truck created noise.
 - Can be seen as a teaching element such as fuel efficiency driving training.

Steven, H., 2005. Power Point: WP H2 – Noise Emission and Driving Behavior

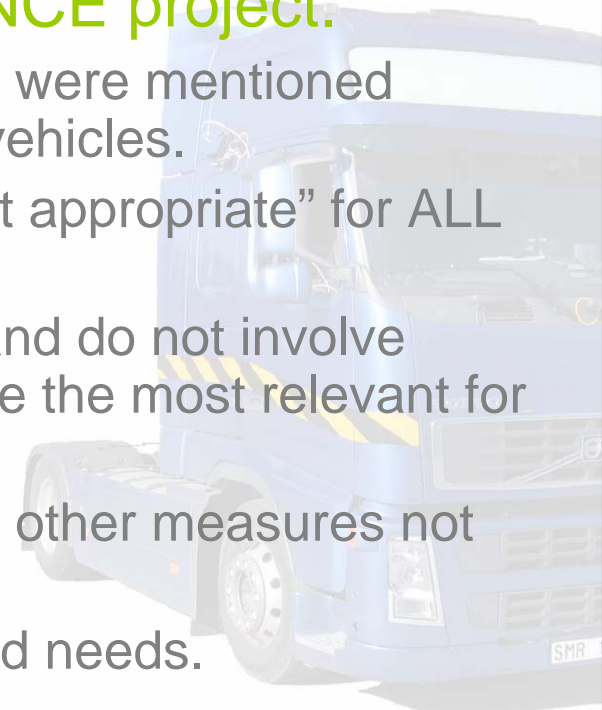
Steven, H., 2006. Power Point: From Hot Spots to Research Needs in Road Transport Noise, Calm Network





Conclusions (4)

- Cities use of functions
 - The functions were in some extent evaluated by the cities that participated in the SILENCE project.
 - Waste collection trucks and bus fleets were mentioned among the most relevant public fleet vehicles.
 - Not one system indicated as the "most appropriate" for ALL cities.
 - Systems not intervening with driving and do not involve potentially high financial effort could be the most relevant for the cities.
 - The functions could be combined with other measures not only aiming at noise reduction.
 - Differences in cities characteristics and needs.





At last

- Systems that are purely information has not directly any connection to a lower noise level. The drivers awareness of the noise problem must be more spread.
- The systems is not suitable for all cities and there is important to evolve these systems to fit for different cities.
- Driver training.
- Driver assistance systems are meet differently according to occupation.
- Further research for such systems is needed.



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The End

Thank you for listening!

- Further reading
 - [Deliverable_H.D5.pdf](#)
 - [WP3 Toolkit](#)
- Contact for questions
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