



## Draft Report to the GRB

IG QRTV 15.07.2010

## Objectives

1. Recommend to GRB the requirements for an acoustic system that will notify pedestrians to the presence and operational mode of road transport vehicles
2. Determine parameters that govern the detectability of the acoustic signals
3. Determine the suitable acoustic signals that convey information to pedestrians in order for them to make decisions
4. Determine the environmental impact of the acoustic signals on vehicle occupants (driver and passengers) and third parties (people outside the car)

## Roadmap

- Give consideration to the lessons learned from the initial introduction of systems prior to completion of the Japanese guidance document and the NHTSA work
- Define elements of the AVAS systems that are essential for international adoption
  - Identify common elements that have been adequately addressed
  - Identify those elements that require future studies/research
- Carry out work to resolve outstanding issues
- Develop a detailed recommendation for a globally harmonized system

# Key Elements

1. Information Content – Or what are we trying to convey?
  - Do we need to know vehicle presence in all conditions?  
Do we need to know what is the vehicle doing? Speed, distance, acceleration/deceleration? Direction of travel?
2. Determine the suitable acoustic signals that convey information to pedestrians in order for them to make decisions
  - Spectral components
  - Frequency shift with speed
  - Amplitude shift with speed
  - Other patterns (modulation, fluctuation)
3. Determine parameters that govern the detectability of the acoustic signals
  - Correlation to detection distance; what is necessary detection distance
  - Detection in various ambient environments (55, 65 dB Leq ?); detection distance (time)
  - Localization
4. Determine the environmental impact of the acoustic signals on vehicle occupants (driver and passengers) and third parties (people outside the car)
  - Environmental Impact
  - Driver Impact
5. Evaluation/assessment of adequacy of these systems for meeting the objectives

# 1. Information Content – Or what are we trying to convey?

Actions:

Human behavior research:

Current

Future

- Driver

- Acceptance

- Japan, Industry , Germany

- Industry

- Benefit/costs

- Industry, Germany

- Industry

- Health

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- Pedestrian

- Needs

- Japan, USA , Germany, Industry

- Industry

- Acceptance

- Japan, Germany, USA

- Industry, Japan

- Usefulness

- Japan, Germany, USA

- Industry, Japan

- Third party

- Acceptance

- Japan, Germany

- Industry, Japan

- Concerns

- Japan, Germany

- Industry

- Health

- Germany

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## 2. Determine the suitable acoustic signals that convey information to pedestrians in order for them to make decisions

Actions:

	Current	Future
- Spectral components	- Industry, Japan, USA	- Industry
- Frequency shift with speed	- Japan, Industry	- Industry
- Amplitude shift with speed	- Industry	- Industry
- Other patterns (modulation, fluctuation)	- Industry	- Industry

Comment:

➔ EC will consider work in all elements

### 3. Determine parameters that govern the detectability of the acoustic signals

Actions:

	Current	Future
- Signal detection vs. distance	- Japan, Industry, USA	- Japan, In.
- Signal masking by environment	- Japan, Industry	- Japan
- Vehicle localization	- Industry	-

Comment:

➔ USA will consider signal masking

#### 4. Determine the environmental impact of the acoustic signals on vehicle occupants (driver and passengers) and third parties (people outside the car)

Actions:

	Current	Future
- Environmental Impact	- Japan	- Japan
- Driver impact	- Industry	-

Comment:

➔ USA will consider environment impact



## 5. Evaluation/assessment of adequacy of these systems for meeting the objectives

Actions:

	Current	Future
- Preliminary adequacy	- Japan, USA	-
- Final adequacy	-	- Japan, USA

## Proposed deliverables of GRB to WP.29 concerning QRTV (1/2)

- Description of the issues
  - QRTV issues
  - Pedestrian issues
  - Driver issues
  - Environment issues
- Summary of work completed
  - Countries
    - Japanese guidance document
    - USA research
    - German research
    - UK research
  - Industry
    - Japanese
    - USA
    - European
    - other
- Recommendation for system performance
  - Sound characteristics (frequency content, time structure of signal, etc.)
  - Operational modes
  - Signal detectability
  - Information content
  - Ability of interpretation

## Proposed deliverables of GRB to WP.29 concerning QRTV (2/2)

- Future work required
  - Human factors
  - Public acceptability
  - Market acceptability
  - Pedestrian acceptability
  - Environmental assessment
  - Discussion of Japanese Guideline in the GRB with the view for update
  - Discussion of other national research
- Recommendation regarding regulatory action
  - Short term solution based on the Japanese guideline
  - Future GTR