Informal document No. **ITS-18-05**
(18th ITS, agenda item 4.)

Proposal of Warning Principles

November 13, 2009, Geneva

UNECE/WP29/18th ITS Informal Group

Activities so far

- **Establishment of ITS Informal Group in 2002 : to consider necessity of regulatory framework in WP29**
- **Activities in 2004-2006 :**
  - **Common understanding of driver assistance systems**
  - **Exchange of information and views on technology trend**
- **Preparation of draft warning principles in 2007-2008 : to ask IHRA-ITS WG to prepare draft warning principles**
- **Proposal by ITS Informal Group in 2009 : to provide proposal of warning principles and to suggest how to deal with this document in the next WP29**

Main changes from IHRA draft

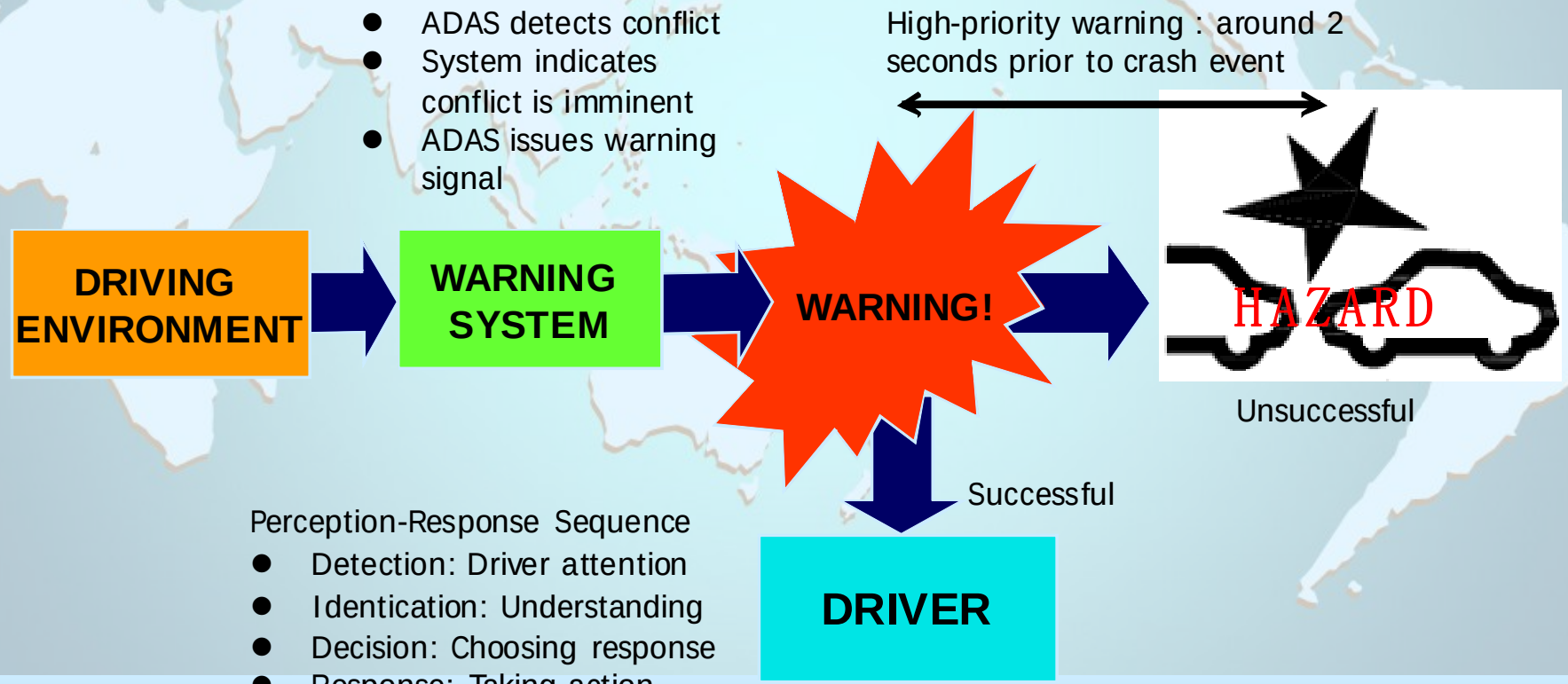
- **Expansion of vehicle category : to apply high-priority warning principles for not only passenger cars but other vehicle categories such as trucks**
- **Rewritten of Figure 1 : to ensure the definition of duration for high-priority warnings**
- **Treatment of illustrated values : to treat them as reference values**
- **Rearrangement of statement of principles : statement No.3 for spacial cues to hazard location and statement No.4 for proximity of hazard**

Introduction

- **Purpose of this document : to provide basic recommendations for the design of high-priority warnings on ADAS**
  - **Better understanding from drivers**
  - **Reduced confusion**
  - **More accurate and consistent expectations**
- **Level of warning : to focus on high-priority warnings that require the driver to take immediate action or decision to avoid crash event**

Driver perception-response

- **Rewritten of Figure 1 : to ensure the definition of duration for high-priority warning**



1. High-priority warning should be noticeable in the driving environment

- Displayed at least two modalities – auditory or haptic supplemented by visual warning
- Primary colour of visual warning should be mostly red
- Visual warnings should be visible from the driver's normal relevant viewpoint
- Auditory warnings should be enough noticeable for the driver to the signals, but not cause startle effect
- Haptic warnings should be sufficiently intense so that driver can feel them during foreseeable driving situations

2. High-priority warning should be distinguishable from other messages in the vehicle

- **High-priority warning messages should be clear to drivers and understood without confusion**
- **High-priority warnings should be immediately recognizable**
- **High-priority warning signals should be designed to avoid potential conflict**

3. High-priority warning should provide spatial cues to the hazard

- **High-priority warnings should inform drivers of the general direction of the hazard**
- **High-priority warnings should not orient the driver inappropriately – away from the hazard or appropriate response options**

4. High-priority warning should inform the driver of proximity of the hazard

- **High-priority warnings inform about the proximity of the hazard**
- **If possible, high-priority warnings suggest the appropriate avoidance response**
- **High-priority warnings should be effective without in-depth training**

Supplement for Principle No.4 : High-priority warnings inform about the proximity of the hazard

- Notice of the proximity of the hazard is more important than that of the content of the hazard in a short time
- The driver should understand the content of the hazard immediately when he or she looks ahead

5. High-priority warning should elicit timely response or decisions

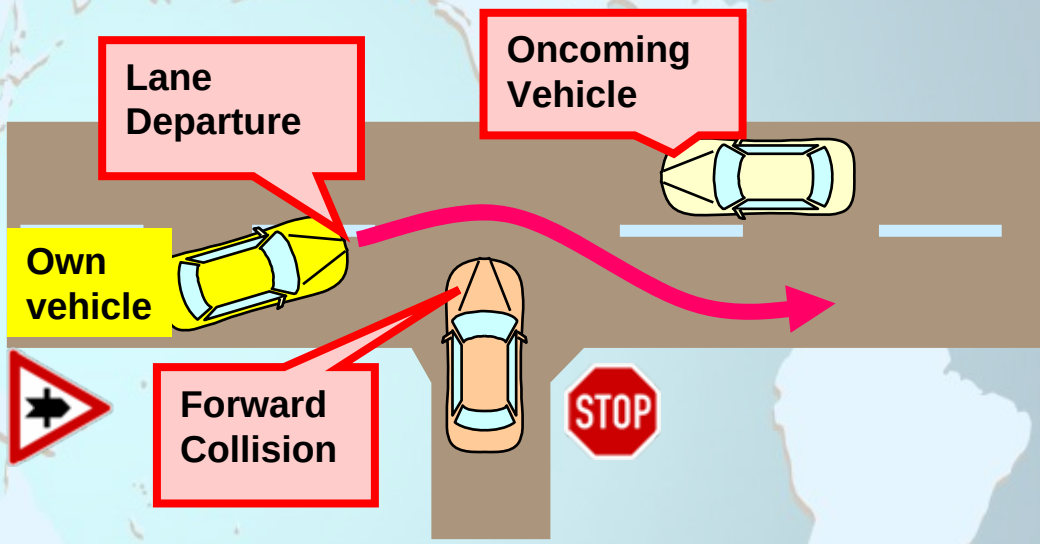
- **Warnings should allow drivers sufficient opportunity to perform an appropriate avoidance**
- **Timing should also account for the need to limit the occurrence of nuisance alarms – balance between providing greater protection and occurrence of false or nuisance alarms**

6. Multiple warnings should be prioritized

- **Prioritization should be based on the criticality and urgency ratings of the messages, and high-priority warnings are both critical and urgent**
- **Prioritization helps to determine when, where and how system messages are delivered.**
- **High-priority warnings should be displayed during maintaining its highest priority**

Supplement for Principle No.6 : Prioritization of high-priority warnings

- Being hard to make ordering among high-priority warnings, all the simultaneous different high-priority warnings should be presented to the driver



- The driver should prioritize hazards after he or she gets high-priority warnings

7. False/nuisance warnings rate should be low

- **High-priority warnings should not be issued when the situation is not critical (avoid false alarms)**
- **High-priority warnings should be issued when there is a hazard (avoid misses)**
- **Adjustable warning thresholds may be used to reduce nuisance alarms**

8. System status and degraded performance of high-priority warnings should be displayed

- **Drivers should be informed whenever the system is malfunctioning or is performing outside of its operating conditions**
- **Drivers should be informed whenever the high-priority warning system is off, if the system is default-on and on/off switch is provided**


Thank you for your attention