ASSESSING THE ACCEPTABILITY OF AN INNOVATIVE SAFETY SYSTEM TO WARN ROAD USERS OF WRONG WAY DRIVING ON THE APRRR MOTORWAY NETWORK

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Over the 2016-2021 period, 1,769 wrong-way events occurred on the APRR network.

In light of this fact, **APRR group** decided to implement two new, complementary systems for managing these events:

- An *automated detection system*;
- *Information at tollgates* explaining why some lanes are closed, in case of wrong-way event.

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**WRONG-WAY DRIVING: A MAJOR CHALLENGE**

7th IRTAD Conference – 27 September 2022, Lyon
OBJECTIVES OF THE EXPERIMENTATION

Inform drivers
EVALUATION OF THE SYSTEM

In case of wrong-way on motorway, one of the challenges is to keep other users safely.

The APRR Group asked Cerema to assess a new system for securing users in case of wrong-way event.

The results of the second real test, which was carried out at the Saint-Maurice tollgate (Montbéliard) on the A36 in March 2022, at night, are presented.
SYSTEM ORGANISATION

- A message displayed, the day of the experiment, on a variable message sign (VMS) located round 1 km of tool gate
- 2 audio messages played at the tollgate
- 32 testers interviewed at a rest area at the end of the experiment

1st stop:
Reception by APRR of observer and explanation of the test - Then release of observer every 5 minutes

2nd stop: Toll gate of Saint-Maurice
Observer pass through in one of the two reserved lane for the experiment

3rd stop: Ecot rest area
Interview and answer to the questionnaire with CEREMA
ON THE WAY…

A VMS message is displayed one km before the toll gate warning for the test
When arriving at the toll gate, the drivers must enter the middle lanes with red cross and stayed around 3 minutes to hear audio messages;
Two audio messages are played by loudspeakers;
The interview included **evaluation of VMS messages signs and audio messages**
EVALUATION OF THE FIRST VMS MESSAGE

Did you see the displayed message?

<table>
<thead>
<tr>
<th>Test in progress listen to 107,7</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listen to 107,7</td>
<td>4</td>
</tr>
<tr>
<td>Test or test in process</td>
<td>2</td>
</tr>
<tr>
<td>Saw another message / not memorized</td>
<td>2</td>
</tr>
</tbody>
</table>
EVALUATION OF VMS MESSAGES

In case of real wrong way, the following messages would be displayed and have been evaluated by testers during the interview.

![Message Description](image1)

- Wrong way vehicle: 22
- Danger: 6
- Closed access: 7
- Listen to 107.7: 6
- Questioning: 17

![Message Description](image2)

- Wrong way vehicle: 12
- Traffic jam: 11
- Closed access: 4
- Danger: 6
- Sign less intelligible than the first one: 22
EVALUATION OF THE 2 AUDIO MESSAGES

All the 32 participants heard the 2 audio messages broadcast at toll gate.

<table>
<thead>
<tr>
<th>windows open</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>17</td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sound level</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>well</td>
<td>22</td>
</tr>
<tr>
<td>Not strong enough</td>
<td>8</td>
</tr>
<tr>
<td>Inaudible</td>
<td>2</td>
</tr>
</tbody>
</table>

**HOW many different messages heard?**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two messages</td>
<td>18</td>
</tr>
<tr>
<td>One message</td>
<td>8</td>
</tr>
<tr>
<td>More than two messages</td>
<td>4</td>
</tr>
<tr>
<td>don't know</td>
<td>2</td>
</tr>
</tbody>
</table>
THE FIRST ONE:

"DANGER: WRONG-WAY DRIVING. LANE TEMPORARILY CLOSED, TUNE IN TO 107.7. FOR YOUR OWN SAFETY, PLEASE REMAIN INSIDE YOUR VEHICLE"

<table>
<thead>
<tr>
<th>Information</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>You are going the wrong way</td>
<td>1</td>
</tr>
<tr>
<td>Toll gate is going to open because wrong way is finished</td>
<td>2</td>
</tr>
<tr>
<td>Repeated message</td>
<td>1</td>
</tr>
<tr>
<td>Do not leave your vehicle</td>
<td>9</td>
</tr>
<tr>
<td>Listen to 107.7</td>
<td>6</td>
</tr>
<tr>
<td>closed motorway</td>
<td>3</td>
</tr>
<tr>
<td>Toll gate closing</td>
<td>5</td>
</tr>
<tr>
<td>Wrong way vehicle</td>
<td>27</td>
</tr>
</tbody>
</table>

What information was given by the 1st audio message?
THE SECOND ONE:
"END OF WRONG WAY ALERT. LANE NOW OPEN"

What information was given by the second audio message?

- Only heard one message: 3
- Do not remember: 8
- Test in process: 1
- Reverse vehicle. Access blocked. Unblocking: 1
- Closed way: 1
- Reopening of the highway: 3
- Danger lifted, the gate is going to open: 2
- Everything is back to normal, traffic goes back: 3
- Wrong way is finished: 11
GENERAL UNDERSTANDING AND ACCEPTABILITY

In case of real wrong way, the system is judged:

- Source of dangerous behavior: 4
- Source of stress: 17
- Reassuring: 21
- Necessary: 26
- Useful: 21
CONCLUSION

The tested system is considered understandable and useful by the majority of testers who participated in the test, 24 people out of 32. For 8 people, it is necessary to bring more clarification to the messages ("vehicle").

The sound level was of better quality during this second experiment, it was considered correct by 22 people out of 32 against 6 out of 28 during the first experiment.

31 testers replied that the combination of the two messages (audio and VMS) was useful. Only one person replied that it was not.

This evaluation demonstrated the good functioning of this new system. It led to a positive assessment with a goal for APRR to generalize this system, which is useful and well accepted by users. Currently, 7 toll gates are equipped.
THANK YOU FOR YOUR ATTENTION!

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