VRU-Proxi IWG Reversing Motion Task Force

Discussion Points

Rev. 5

2019.3.27, 28 (VRU-Proxi IWG #9)

Chair: Akinari HIRAO, Ph.D., CPE.
JAPAN

Reversing Motion Task Force #1-4

Weekly 4 times in Skype meeting
Total 26 attendees

Thank you for joining and discussing !!

2019 February 28, 9:00-11:00 (French time) via Skype
2019 March 8, 9:00-11:00 (French time) via Skype
2019 March 15, 10:00-12:00 (French time) via Skype
2019 March 22, 9:00-11:00 (French time) via Skype

Alexandra Scholz (OICA/Opel)
Ansger Pott (OICA/Hyundai Europe)
Benoit Moreau (OICA/PSA)
Benoit Job (OICA/???)
Bernd John (CLEPA/Brigade)
Bhonsle, Abhinav (OICA/Audi)
Broertjes Peter (EC)
Eckert, Gerald, Dr. (OICA/VW)
Fabrice HERVELEU (France/UTAC)
Felix Hoffman (CLEPA/Continental)
HIRAO Akinari (JAPAN)
Jean-Louis CHAZALETTE (OICA/Volvo)
Joachim Mueller (OICA/Ford)
Johan Broeders (OICA/DAF Trucks)
Jongsoon Lim (Korea)
Kneissle, Michael (OICA/Daimler)
Masahiro Oda (CLEPA/Denso Europe)
Meurer Dieter (OICA/BMW)
Mueller, Joachim (OICA/Ford)
Park Jinwoo (Korea/KOTSA)
PHAN Vuthy (OICA/Renault)
Phil Martin (TRL)
Schaber, Lisa (OICA/VW)
Schruhl, Joerg (OICA/VW)
Simone Falconi (CLEPA/Tokai Rika Europe)
Wooyong Ji (Korea/Hyundai)

Main questions

Extracted from VRU-08-10

Nr	Main questions	What / who?
1	Fallen person to be taken into account?	Accidentology (ask CP's for in-depth data)
2	Shall detection system give an audible and/or optical warning?	
3	Do we allow direct vision (turning head)?	
4	Do we allow a combination of devices with different type of HMI?	
5	Shall each row of poles (perpendicular to the longitudinal direction of the vehicle) be seen/detected by one (single) device?	CP's to answer
6	Do we allow mirror-to-mirror solution (periscope)?	
7	How to test, static or random position of poles?	
8	Shall exemptions be implemented in the UN Regulation or not?	CP's to answer

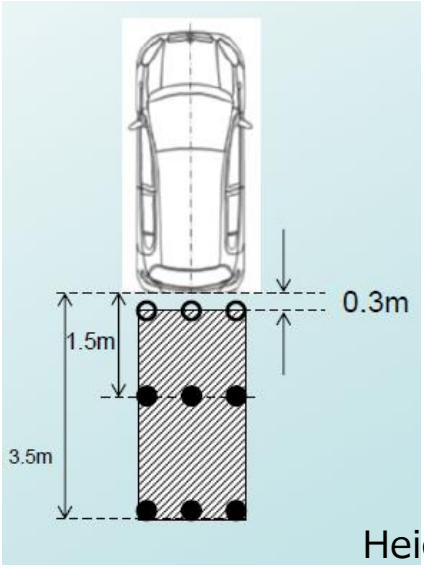
8 questions added from OICA material and IWG & TF discussions.

Summary

Category	No.	Questions	Status
Pole location and visibility	1	Fallen person to be taken into account?	Open : Discuss with Accidentology
	9	What height to be seen or detected?	Not discussed : Depends on Q1 conclusion
Detection system requirements	10	How much about warning system latency ?	Open : Still waiting CLEPA answer
	11	How much percentages can be expected for camera or sensors ?	Open : Discuss with JAPAN results
	2	Shall detection system give an audible and/or optical warning?	Open (Audible mandatory, optical option)
HMI	4	Do we allow a combination of devices with different type of HMI?	Open (Maximum device number for preventing confusion to be discussed)
	5	Shall each row of poles (perpendicular to the longitudinal direction of the vehicle) be seen/detected by one (single) device?	
Multi modal approach	3	Do we allow direct vision (turning head)?	Open (Exemption to be defined)
	6	Do we allow mirror-to-mirror solution (periscope)?	Almost conclusion (Not allowed in R46)
Scope	12	What category should be mandatory ?	Open : Discuss with accidentology data and discussion with each standing points.
Exemptions	8	Shall exemptions be implemented in the UN Regulation or not?	Open : Exemption can be communized for all country to be described. -> OICA will prepare what to be described.
Test methods for detection system	7	How to test, static or random position of poles?	Not discussed : Discuss with proposed method
	13	Does the test have to be repeated for each grid square in the monitoring area or only once?	
	14	Why not use dummy like BSIS?	Japan answer : Due to unstable conditions for reproducibility
	15	Pausing function to be discussed (currently no definition and discussion).	Open
	16	Display view can be changed or not by user? (current proposal is not allow.)	Open

Pole location and visibility (1)

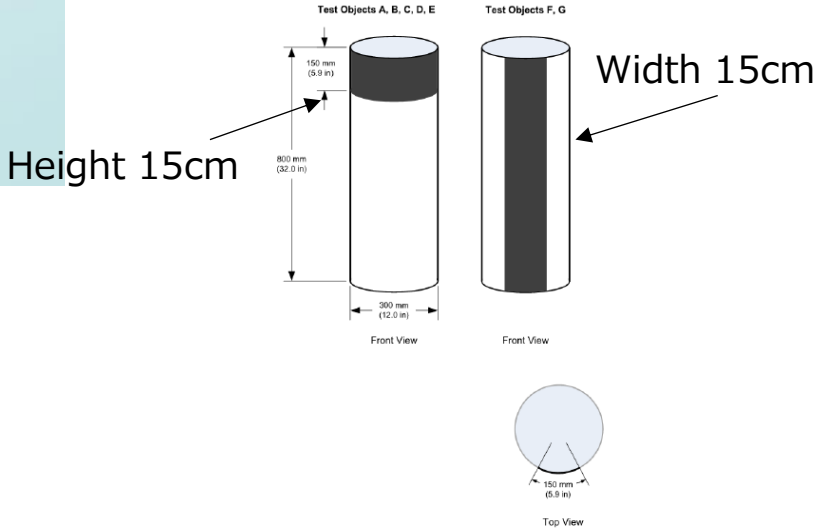
- OICA requested vehicle behind pole position to fit FMVSS



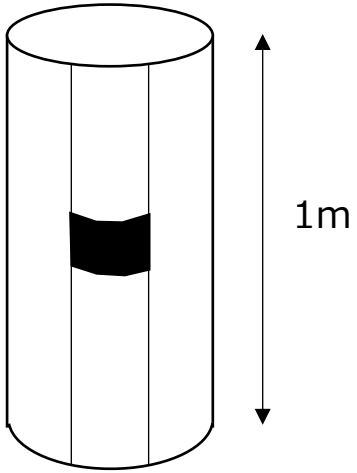
Discussion results

- Agreed with the definitions of pole visible area to secure equivalent visibility of original pole location.

- Regarding consistency with FMVSS, 15cmX15cm is good.



FMVSS 111



Temporary IWG conclusion
- 15cmX15cm area to be seen at least at one position or 15cmX15cm area on the top part of the pole on the [1m] pole.

Updated in TF #4

Pole location and visibility (2)

- UK proposed fallen down person behind the vehicle should be recognized.

Q1) Fallen person to be taken into account?
-> Accidentology (ask CP's for in-depth data)

Request to CP's
- Search about the reversing accident statistic data contains VRU victim location or postures behind the vehicle.

Discussion needed based on the accident statistics.

Yes: Statistically remarkable for saving fallen down person.

No: Statistically not remarkable.

Conclusion
- **Pole should be seen from top to ground level (or pole height discussion).**
- **Detection system should be detect fallen down person.**

Conclusion (Temporary IWG conclusion)
- **15cm x 15cm at least on the pole.**

Next step

Q9) What height to be seen or detected?

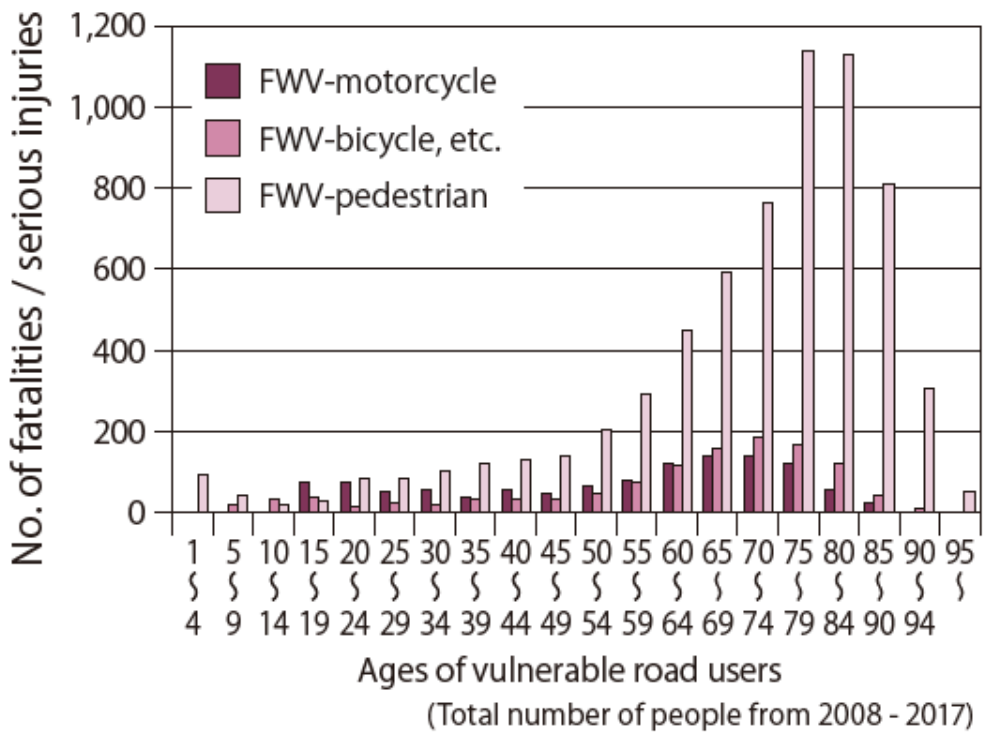
Pole location and visibility (3) Reference: Accident data in Japan

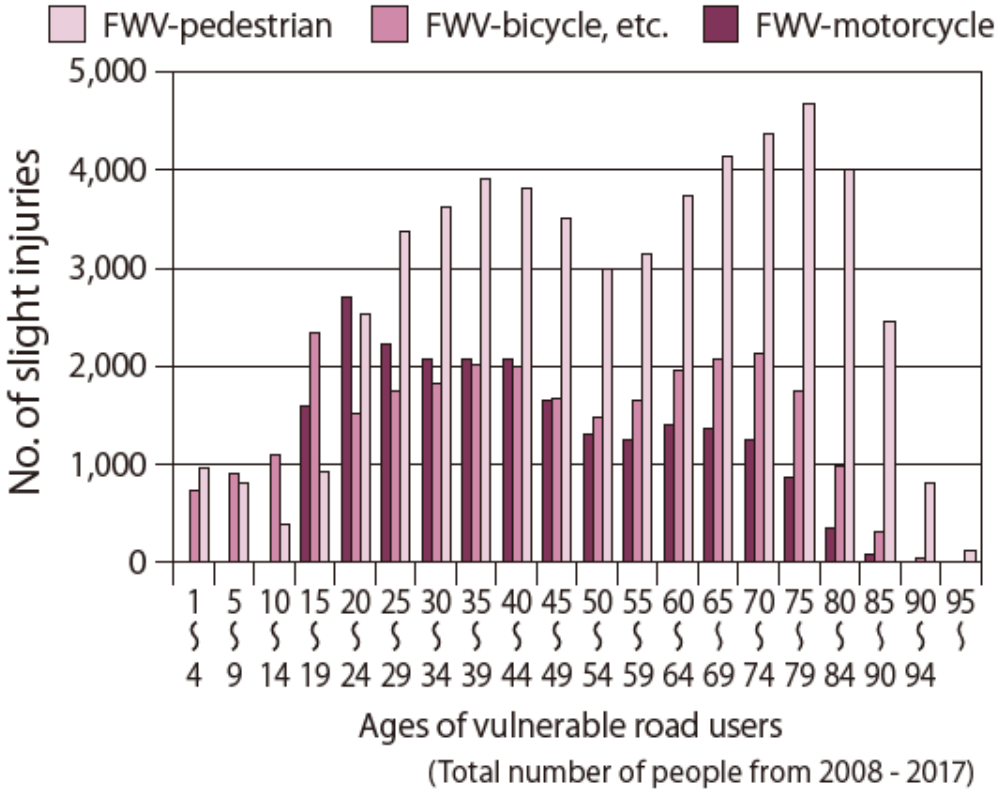
Reversing accidents data (2008-2017) in Japan

Fatal accidents			Serious injury accidents			Slight injury accidents		
Reversing accidents			Reversing accidents			Reversing accidents		
No.	Composition rate	Total No.	No.	Composition rate	Total No.	No.	Composition rate	Total No.
610 (75)	1.4%	43,345	10,840 (361)	2.5%	434,990	260,654 (75)	4.5%	5,820,001

No statistical data contained on VRU positions or postures before reversing.

Fallen child casualties are not significant.

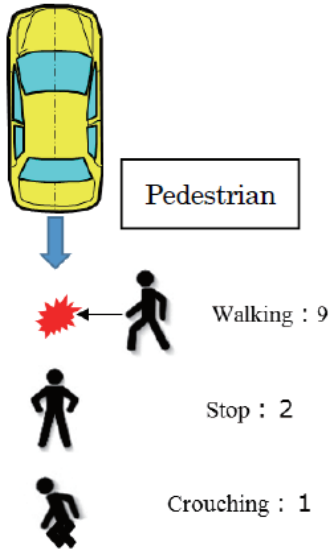




Extracted from ITARDA Information No.128 Accidents when four-wheel vehicles are reversing 2019 Jan.

Pole location and visibility (4) Reference: Micro data

Micro data analysis in Japan



Reversing VRU accidents: 15 cases
Pedestrian casualties: 11 cases
Casualties who fallen down: 0 cases
Casualties crouching: 1 cases

1 casualty out of 11 accidents exists for possibility to blind spot (not detail data obtained).

* Kinoshita, Y., Analysis of Accident in Which Pedestrians and Cyclists and Motorcyclists Were Killed or Injured by a Reversed Vehicle, Transactions of JSAE, 50, 1, 142-147, 2019 (In Japanese).

Micro data analysis in US

Backover accident: 69 cases
Casualties location within 1m: 11 cases
Casualties who fallen down: 0 cases
Casualties under 1m height: 6 cases
Casualties under 5 years old: 6 cases

6 casualties out of 69 accidents exists for blind spot existence, they were below 5 years old (1~3 years old).

* Extracted from the reports obtained from NHTSA Special Crash Investigation data Crash Viewer (2004~2015)

Answers

Q1) Fallen person to be taken into account? -> Accidentology (ask CP's for in-depth data)

	Answers
Japan	No data exist. Other reference data indicate this scenario seemed to be insignificant.
Netherlands	Our data do not show any fallen person in the accidentology. Without convincing data from others we expect this scenario to be insignificant.
France	No relevant accidentology statistic on this point in France, except the iGLAD data already shared.
EC	Accidentology by TRL, but t.b.d. subject to availability. Anticipation that it cannot be substantially justified to consider fallen person.
UK	I wonder if there is some confusion about the description of this. The situation I wish to ensure is covered is where a person is knocked over by the vehicle and the driver may not be aware that he has struck the person, who is then out of sight because he is in the area immediately behind the vehicle.
Korea	Yes. Fatal accidents(death) are occurred mainly press down(run over) the fallen down person again after vehicle hit the person.
OICA	Support data conclusion.

TF#3:
TRL: accident analysis in progress, will report at next IWG.
Discussion:
Fallen person after hit is different scope of this discussion (Regarding UK, Korea comments). Scope is to avoid accident.

Commented in TF #1 : Date due to be set for request. -> Status March 8, Final March 15.

Information about IGRAD database provided from Mr. Moreau.

Total: 5000 cases, Reversing: 17 cases, Pedestrian on the floor: 1 cases in China

TF#2: TRL provided information.

Information from current/legacy RAIDS in-depth collision investigation databases (RAIDS, HVCIS and OTS) provided by TRL.

Total (all vehicle categories): 21,083 cases (RAIDS: 4,876; HVCIS: 4,028; OTS: 12,179)

Reversing: 143 cases (RAIDS: 23; HVCIS: 51; OTS: 69)

Pedestrian on the floor (when struck by reversing vehicle): 0 cases

FMVSS combines on-road *and* off-road data (Table 6) and splits by age (Table 7/Table 8) – 34% fatals are aged <10yo across all vehicle categories

UK investigating data to quantify occurrence of off-road collisions

TF#2 Discussion

Fallen person seems very rare case.

But many accidents seemed to be occur off-road and very young children.

The data to be investigated.

-> Not only Fallen down person, but also young children (They are also short height from the ground.)

But still need significant accident statistics for their accident cases **just in behind the vehicle**.

Detection system requirements (1)

How long detection system equals to 3.5m camera?

Japan reported simulation results based on the experiments (VRU-08-11).
- 1m warning prevents 87% of accidents.
- To achieve 100% needs 1.5m detection.

EC: Japan test does not take into account system latency.
-> System latency should be considered.
100% at 1.5m equals to **1.5m + vehicle movement distance with latency**.
-> Japan also reported, 1.5m sonar including actual system latency is equivalent for camera (VRU-05-03).

Q10) How much about warning system latency ?
(CMS:200ms, Sonar ISO: 500ms maximum)

TF#4:
Still waiting CLEPA answer

Request to CLEPA: Define proper detection system latency requirement.

Calculate warning equivalent distance.

Equivalent distance
=1.5 [m] +6 [km/h] X Latency [ms]
eg. Latency 200 [ms] -> 1.83 [m], Latency 300 [ms]-> 2.00 [m]

*** Depends on the results, OICA and CLEPA need to check impact to set requirement over 1m.**

Commented in TF #1 : Current major type sonar (short range) capability 1.5m is basically 1m in ISO test. So, **over 1m is big impact for industry**.

Continue to next slide

Detection system requirements (2)

Japan reported simulation results based on the experiments (VRU-08-11).
- 1m warning prevents 87% of accidents.
- To achieve 100% needs 1.5m detection.

Continue from previous slide

Q11) How much percentages can be expected for camera or sensors ?

Japan test results for 1m sonar without Latency prevents 87%.

Reference data

JNCAP Camera safety effectiveness : **70%**

* Based on the research about effectiveness of Advanced Safety Vehicle technologies (2010).

FMVSS crash avoidance effectiveness: **76%** (Camera or sensors or mirror, only hardware)

*NHTSA Backover Crash Avoidance Technologies FMVSS No.111 Final Regulatory Impact Analysis (2014).

Keall et. al. Camera crash avoidance ratio: **41%*** (Camera), **31%*** (Sensors), **30%** (Both) ***GSR used these value**

* Real-world evaluation of the effectiveness of reversing camera and parking sensor technologies in preventing pedestrian injuries, Accident Analysis

TRL:
FMVSS estimated eff. (Table 13):

- 180° CMS: 33%
- 130° CMS: 28%
- Ultrasonic: 8%
- Radar: 8%
- Mirrors (cross-view/look down): 0%

Discussion needed.

TF#2: Regarding 1m detection with latency seems to be around 50% for Japan results.
This should be discussed with above data.

TF #3:
We can adjust Latency part of distance -> 1m sonar effectiveness
e.g. 87% w/o Latency -> Adjusted to 50% w Latency. To be discussed about Q11)
Sonar (1m) with 50% effect has compatibility with Camera (3.5m) or not.

To be reflected dis

Detection system requirements (3)

New information about global regulation

INDIA
AIS-145 Additional Safety features for Category M & N Vehicles

ANNEXURE 6 REQUIREMENTS FOR VEHICLE REVERSE PARKING ALERT (Applicable for category M1, M2 derived from M1)

Detection distance: 0.2~**1m**
Detection method: Sensor including camera
Test method: Almost the same as ISO grid test.
Test object: 75mm x 1m
Visual indicator: If fitted

ANNEXURE 7 REQUIREMENTS FOR VEHICLE REVERSE PARKING ALERT (Applicable for category M and N not covered by annexure 6)

Detection range: 0.3~1.6m
Test method: pole test for 4 rows
(row numbers different for height)

BRAZIL (In progress, ~2025)
Performance requirements for vehicle-mounted rear warning and monitoring systems.

Cars, trucks, utility vehicles and pickup trucks shall be equipped with a rear warning system as described in Annex I and / or rear monitoring system in accordance with Annex II.

Annex I - Requirements for warning and back-detection systems

Same as INDIA Detection distance: 0.2~**1m**

Annex II - Requirements for rear monitoring systems

Same as FMVSS

UN should consider consistency with these existing regulation.

Detection system requirements (4)

New information about global regulation

Hong Kong
Road Traffic Regulation 2 (Cap. 374 sub. leg.A)

Reversing Video Device

Scope: all goods vehicles (except tractors and trailers)
Seeing distance: 0~3.2m
Seeing width: Vehicle width +0.5m
Pole: 300m x 500mm
Test method: 4 poles on the corner

Korea (expansion and update in progress)
Article 53-2 Rear pedestrian safety device

Scope: all vehicles
(current M2,M3,N2,N3, July 2019~ M1,N1)

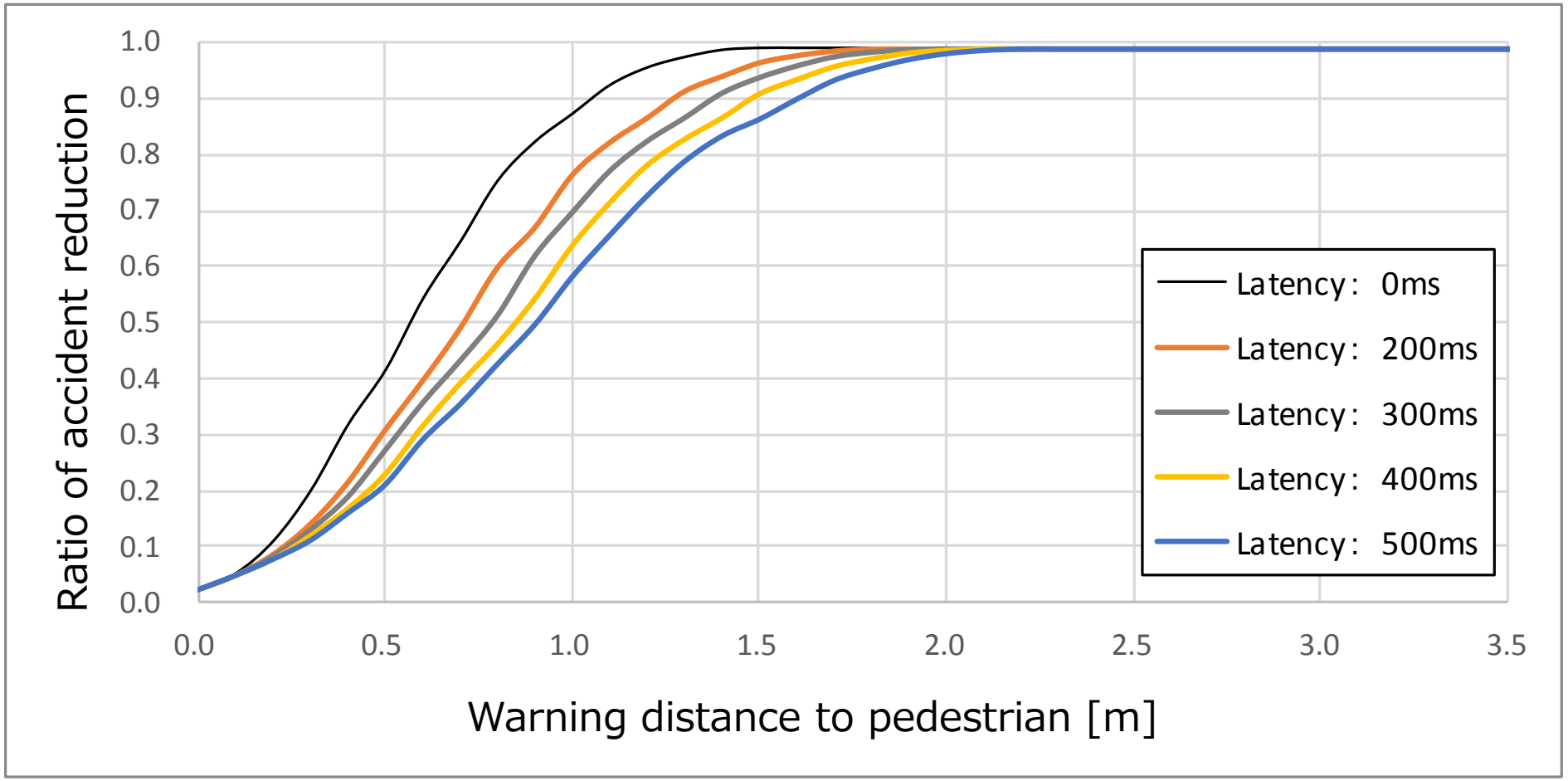
Alternatives: Camera, Sensor, Reversing Alarm to outside

Seeing distance: 0.3~2.0m
Seeing Width: current vehicle width, M1,N1 1.0m
Pole: 300m x 500mm
Test method: not specified

Detection system requirements (5)

Update: Simulation results with various latency

TF#4 Update



Detection system latency [ms]	Ratio of accident reduction [%]
0	87
200	77
300	70
400	64
500	58

Crash avoidance ratio used in GSR.
41% (Camera)
31% (Sensors)

Depends on the CLEPA answer of latency, sonar seems to be compatible with camera based on the 41%.

Detection system requirements (3)

Q2) Shall detection system give an audible and/or optical warning?

Japan proposal based on audible warning.
Regarding hearing impaired, optical warning to be considered.

Discussion needed.

Answers

Q2) Shall detection system give an audible and/or optical warning?

	Answers
Japan	No objection for “and”.
Netherlands	No data available to support the HMI discussion. But we believe an audible warning is of a more urgent nature to the driver. Furthermore to be considered: When audible: when a person is detected the signal shall be distinguishable from the ‘ordinary’ signal from the reversing/parking sensor, e.g. by using a continuous sound immediately. When optical: the warning shall be indicated on or near the device in which the rear view area is viewed.
France	We agree that audible warning signal as mandatory base seems to be needed. Optical mean could be used to more clearly defined an associated concerned area.
EC	Same position as NL
UK	It seems that both audible for a person close to the vehicle, and visual for a person further away from the vehicle are both needed. * This means HMI change for VRU distance (urgency).
Korea	Audible should be mandatory. Optical could be option.
OICA	OICA: Audible to be mandatory, Optical to be option: Study based on audible, requirement for hearing impaired (optical) is not requirement for all.

TF#2
TRL provided information.
"*Guidelines on establishing requirements for high-priority warning signals*" submitted by the Informal group on Intelligent Transport Systems (ITS). See Section VI(A), Clauses 35-37.
https://www.unece.org/fileadmin/DAM/trans/doc/2011/wp29/ECE-TRANS-WP29-2011-90e.pdf

Discussion
Regarding increase of reaction time, stimulus (auditory, visual, etc.) should be increased.
Even if optical information indicated, relationship between direction of driver's sight and location of optical information are important. (e.g. BSW LED located in the side mirror in order to see vehicle side via side mirror.)
If driver looked back, optical information in the front is no meaning.
Together is better and mandatory are different.

Need more CP's opinion.

TF#3
Discussion
OICA: Way of HMI is freedom of manufacturer. Minimum requirement for passive system to be discussed.
Korea: Support OICA. Audible not need to see, but optical need to see.

HMI

Q4) Do we allow a combination of devices with different type of HMI?

Japan proposal all any combinations of vision or detection systems.

When reversing, we usually use many devices at the same time such as mirrors, direct visions, rearview camera or parking sonar, but not confusing.

Purpose of this regulation is to recognize VRU existence, need not to keep watching during reversing.

Discussion needed.

Q5) Shall each row of poles (perpendicular to the longitudinal direction of the vehicle) be seen/detected by one (single) device?

Japan proposal all any combinations of vision or detection systems.

When reversing, we usually use many devices at the same time such as mirrors, direct visions, rearview camera or parking sonar, but not confusing.

Purpose of this regulation is to notify VRU existence, need not to keep watching during reversing.

Discussion needed.

Answers

Q4) Do we allow a combination of devices with different type of HMI?

	Answers
Japan	Proposal is not limit solution. Seems not to bring confusion like current reversing. It is likely better to have same HMI than different.
Netherlands	No data available to support the HMI discussion. In any case there shall be no confusion for the driver with regard to which device is to be used.
France	The key point is to avoid confusion for the driver (installation evaluation, OEM justification). In case of vision used, we are more in favour of a minimum number of devices as it is the case for R46 but a combination of vision and audible warning could still be relevant.
EC	Same views as NL and FR, maybe we can specify and limit acceptable combinations.
UK	A combination of devices eg sensors and cameras is likely to be needed to cover the whole area we wish to protect.
Korea	It would be reasonable to allow combination of vision and audible warning device like camera and sonar
OICA	Limited several devices…**how to decide maximum numbers?** Current vehicle : Normally 3 mirrors and direct vision (4 items), Maximum with sonar & camera (6 items) How to decide confuse or not confusing at Technical Service?

TF#2 TRL provided research literature information.

"*Differences in glance behavior between drivers using a rearview camera, parking sensor system, both technologies, or no technology during low-speed parking maneuvers*" Kidd (2014a). See Tables 1-3 and Figure 3. Lots of interesting conclusions about how drivers use multiple technologies (cameras, sensors, mirrors, direct vision) in combination.
https://www.sciencedirect.com/science/article/pii/S0001457514000104
"*Visibility of children behind 2010–2013 model year passenger vehicles using glances, mirrors, and backup cameras and parking sensors*" Kidd (2014b). Blind-spot performance characteristics of different approaches for 21 different vehicle models.
https://www.sciencedirect.com/science/article/pii/S0001457514000104

Regarding the literatures introduced by TRL, Hirao will extract findings by Kidd for the next TF.

TF#3
Japan: Explained the brief contents of the papers.
TRL:
These two papers include interesting information.
"Glance behavior" and "Differences of blind spot between the vehicles"
What should we read from these ?

Literature information (1)

Accident Analysis and Prevention 87 (2016) 92–101

Contents lists available at ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

Differences in glance behavior between drivers using a rearview camera, parking sensor system, both technologies, or no technology during low-speed parking maneuvers

David G. Kidd*, Anne T. McCartt

Insurance Institute for Highway Safety, 1005 North Glebe Road, Arlington, VA 22201, United States

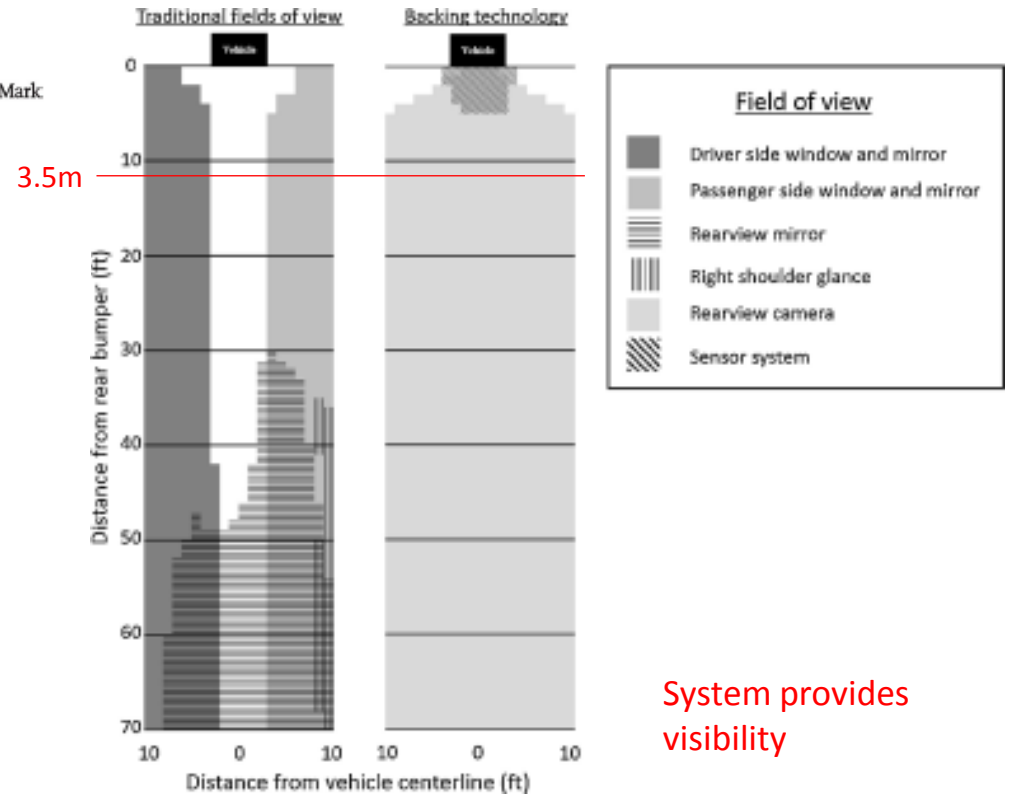


Fig. 2. Visibility of a 12–15-month-old child-size object to a 50th percentile-sized male driver in traditional fields of view and a rearview camera and the area it was detectable to the sensor system.

System provides visibility

Literature information (2)

Comparison of FoV between systems

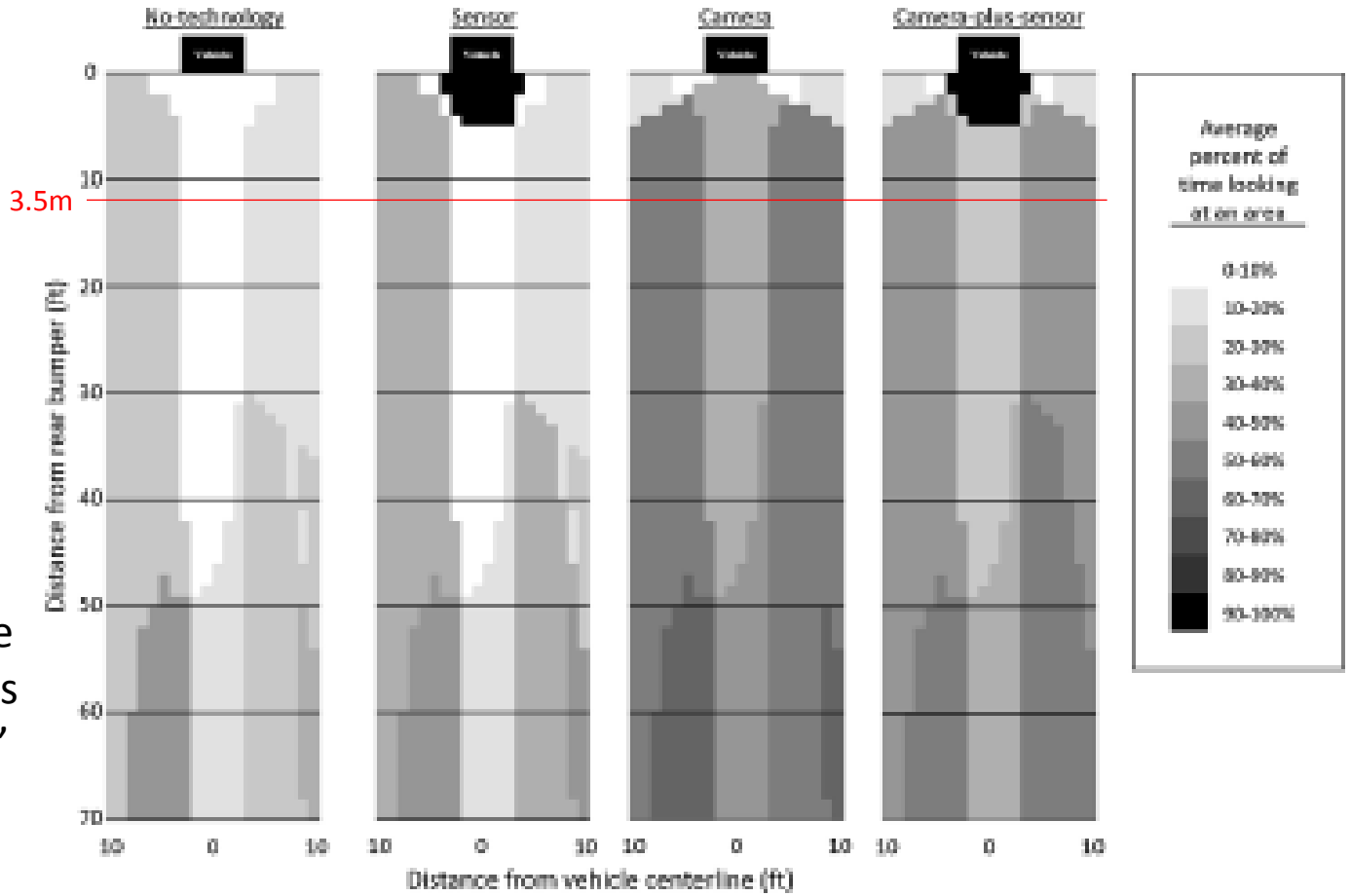


Fig. 3. Average percentage of time a 12–15-month-old child-size object in different locations behind the study vehicle would have been visible to participants in each technology condition, based on participants' glance patterns.

Table A1Average percentage [and 95% confidence interval] of glances made to different field of view categories during each backing maneuver.

Backing technology condition	Mirrors	Shoulders	Forward	Center console/ camera display	Other
No technology	53.9 [50.0, 57.7]	18.4 [14.9, 21.9]	13.7 [10.9, 16.6]	0 [0, 0]	14.0 [11.3, 16.7]
Sensor	56.1 [53.1, 59.1]	9.8 [8.1, 11.6]	17.8 [15.8, 19.7]	0 [0, 0]	16.3 [14.8, 17.8]
Camera	41.6 [38.5, 44.7]	9.6 [7.7, 11.4]	13.4 [11.6, 15.3]	26.0 [23.7, 28.3]	9.4 [8.1, 10.6]
Camera-plus-sensor	45.5 [42.1, 48.8]	10.1 [8.2, 12.1]	13.0 [10.9, 15.0]	23.0 [20.7, 25.2]	8.5 [7.2, 9.9]

Note. Row totals may not sum to 100

About 40-55% looking mirror

About 10% looking back with systems.

About 25% looking display

Literature information (3)

Accident Analysis and Prevention 87 (2016) 92–101

Contents lists available at ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

Differences in glance behavior between drivers using a rearview camera, parking sensor system, both technologies, or no technology during low-speed parking maneuvers

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Insurance Institute for Highway Safety, 1005 North Glebe Road, Arlington, VA 22201, United States

Measured results of blind sight for 21 vehicles in USA.

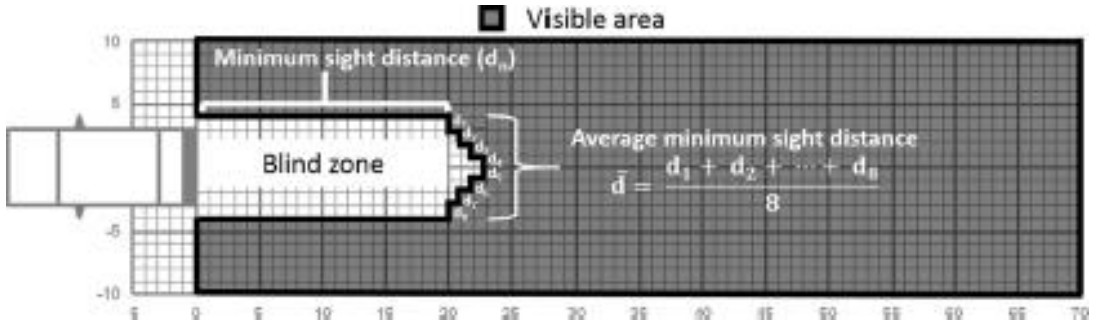


Fig. 3. Measurement field with hypothetical visibility measurements behind the rear bumper to illustrate the calculation of blind zone, minimum sight distance, and average minimum sight distance.

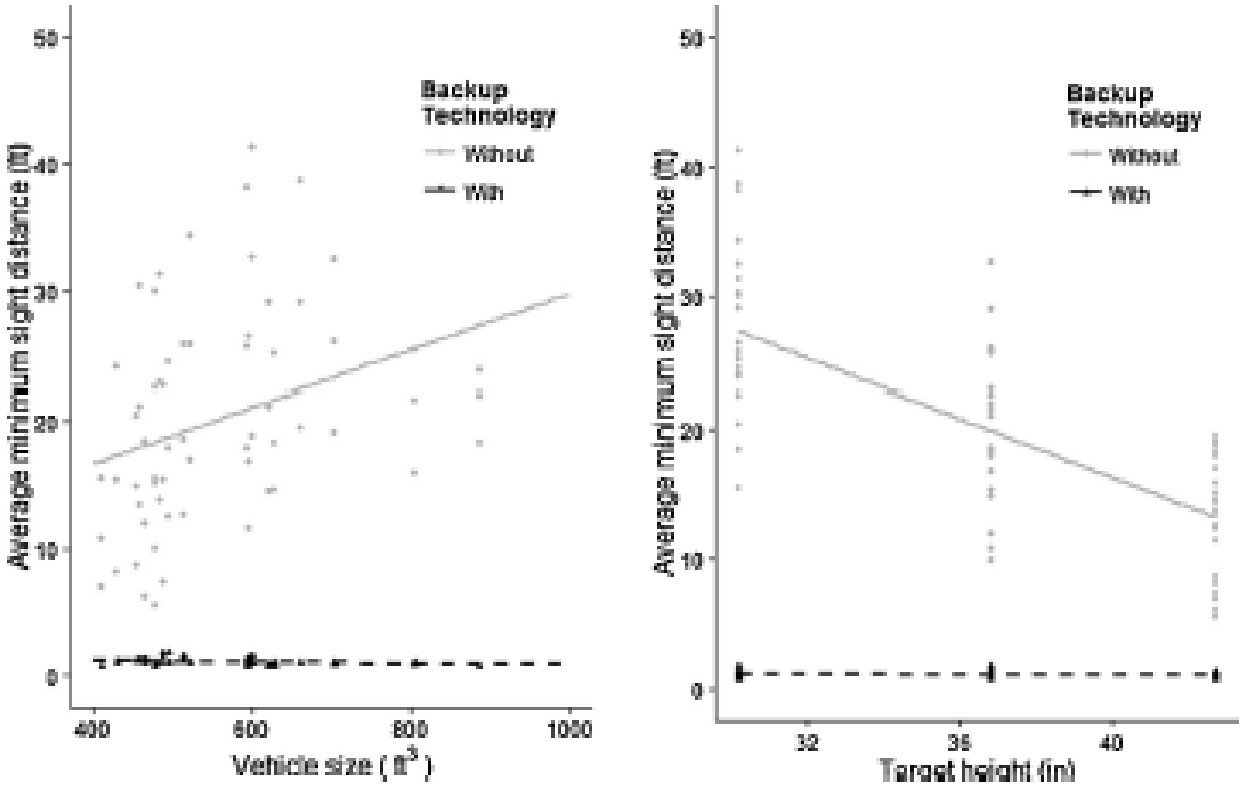


Fig. 5. (a) Sight distance (ft) with and without technology as a function of vehicle size (ft3) and (b) as a function of target height (in.).

System reduces blind sight

Answers

Q5) Shall each row of poles (perpendicular to the longitudinal direction of the vehicle) be seen/detected by one (single) device?

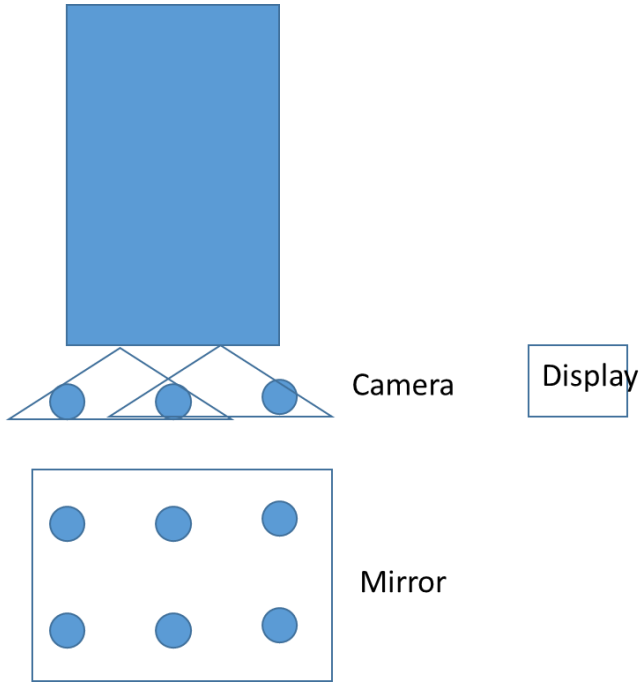
	Answers
Japan	Proposal not limit solution. Seems not to bring confusion like current reversing. It is likely better to have it in single device than scattered.
Netherlands	No data available to support the HMI discussion. In any case there shall be no confusion for the driver with regard to which device is to be used.
France	Linked to the previous question.
EC	Yes.
UK	It may be possible to have a single viewing screen with two cameras and have the areas covered stitched together by software. Ultimately the answer to this question will depend on the location of the poles. If they are directly adjacent to the vehicle then these poles will not be seen by a single camera.
Korea	Yes. If the visibility is divided, the driver could miss the other screen.
OICA	Limited several devices…how to decide maximum numbers? Current vehicle : Nomally 3 mirrors and direct vision (4 items), Maximum with sonar & camera (6 items) How to decide confuse or not confusing at Technical Service?

TF#3

Regarding UK's comment, confirmation of original concept to UTAC.

-> Multi modal solution can be selected between 3 rows.

Several sensors or camera accepted, but display them together (to be seen in the same display)



Multi modal approach

Q3) Do we allow direct vision (turning head)?

Japan proposal allow direct vision (turning head).

Test condition of rear headrests to be highest position.

Drivers always pay attention to vehicle surroundings using various postures and head movements.

If not allow direct vision, vehicle should provide all blind spots information around vehicle.

Discussion needed.

Q6) Do we allow mirror-to-mirror solution (periscope)?

Japan proposal not describe about this.

Periscope mirror solution is excluded in R46 2.1.1.

Japan: Agree. Mirror-to-mirror <u>only</u> solution is not feasible.

It seems to be visible additional Class VIII mirror via direct vision (turning head).

Discussion needed.

Answers

Q3) Do we allow direct vision (turning head)?

	Answers
Japan	Japan proposed. Regarding the obstruction by rear passenger etc., headrest position to be tested at highest setting.
Netherlands	No. There are too many variables that influence the performance. Our data include some accidents where obstructions, within the vehicle, of the rear vision had been found.
France	Basically not in favour of this approach due to number of constraints in ocular reference definition. Specific application cases could be investigated (one row vehicles for ex.)
EC	Same position as FR
UK	This does not seem to be a good solution from both ergonomic and HMI perspectives.
Korea	Not allow. All area to be seen by camera.
OICA	Take this option (Typically M1, especially small vehicle such as two seaters or K-car). Block rear window with something by customer is prohibited (Customer usage problem).

TF#2
TRL introduced the literatures.

See Figure 3 of Kidd (2014a), which shows that sensor/CMS coverage improves visibility behind vehicle vs. looking over (right) shoulder/mirrors
See Table 4 of Kidd (2014b), which calculates significant reduction in blind spot behind vehicle for 21 different vehicle models when comparing cameras/sensors vs. looking over (right) shoulder/mirrors

When reversing, driver's look 40% Mirror, 14% rear, 10% forward, 5% CMS…

Discussion about confusing, direct view

Regarding looking back,
- Drivers always looking back.
- Driving school teaches that. Some of recent school teaches not looking back, use mirror.
- Regarding aged person, looking back is not easy.

Regulation requirements and driver's mandatory behavior are different.

Not yet reach conclusion.

Regarding the literatures introduced by TRL, Hirao will extract findings by Kidd for the next TF.

TF#3
Korea asks meaning of Q3 (Looking back).

Answers

Q6) Do we allow mirror-to-mirror solution (periscope)?

	Answers
Japan	No. To be consist with R46.
Netherlands	No, a sufficient level of the HMI and the performance is not yet evidenced.
France	Not in favour of this approach, due to safety apsects and alignment with R46 approach.
EC	Open to this solution
UK	This does not seem to be a good solution.
Korea	No. It do not ensure the visibility. We have much better device(camera) already.
OICA	Support with direct view and Class VIII mirror should be available (this is not MtM solution).

TF#2
Almost agreed to be consistent with R46.
But still have opinion based without looking back with Class VIII additional mirrors.

TF#2

TRL provided information.

NHTSA Backover Crash Avoidance Technologies FMVSS No.11 Final Regulatory Impact Analysis (2014) estimated eff. (Table 13):

- 180° CMS: 33%
- 130° CMS: 28%
- Ultrasonic: 8%
- Radar: 8%
- Mirrors (cross-view/look down): 0%

Therefore use of Class VIII type mirrors were considered not to be effective.

Scope

Q12) What category should be mandatory ?

Japan proposal: All categories.

OICA: Prefer all to be if fitted. Fitment up to the country.
But some category remarkable on the accidentology can be acceptable.
EC, TRL: M1, N1 are remarkable based on the Accidentology.
But, all categories recommended to be mandatory take into account many aspects.
(VRU-08-02)

Discussion needed.

Commented in #1
GSR: Not only based on accidentology including political discussion. -> All category to mandatory.
UN: ???
OICA: Are there any problems to apply for all categories ? To be investigated.
Trailer has direct install problem.
Special vehicles has installation problem (fire vehicle, dump trucks…).

Answers

Q12) What category should be mandatory ?

	Answers
Japan	Current proposal is all categories to be in the scope.
EC	All category for the scope, mandatory or not that should be decided by CPs. This is new regulation -> need not the same construction with R46 (currently have table for mandatory or option for Class). Category not in the scope (right now)
Korea	All category (M,N,O) . Some in heavy vehicle that is not easy to equip camera to be another solution (e.g. reversing alert in GRB).
OICA	O categories is out of scope. Prefer to all categories to be if fitted. But some category remarkable on the accidentology can be acceptable (M1 & N1 mandatory, Others to be if fitted by country).

GSR All categories, Reversing warning included-> It is discussed in GRB.
Reversing alarm seems to be request to VRU for move and avoid vehicle. It is not purpose.

TF#2
To be discussed in next IWG with accidentology data and discussion with each standing points.

Exemptions

Q8) Shall exemptions be implemented in the UN Regulation or not?

→ OICA requested exemptions, such as special cases (VRU-08-08).

Request to CP's to indicate preference considering approval process.

Discussion needed.

Answers

Q8) Shall exemptions be implemented in the UN Regulation or not?

	Answers
Japan	If common exemption can be defined, to be implemented UN.
Netherlands	No, exemptions shall be subject to national/EU law (national/EU WVTA system).
France	Not in favour of exemption, as soon as this is a stand alone regulation, free application is preserved. An approach similar to R58 or R73 could be engaged, for ex : *"Vehicles where any reversing motion device is incompatible with their on-road use may be partly or fully exempted from this Regulation, subject to the decision of the Type Approval Authority."*
EC	We can be open to this. The guidelines provide for this option.
UK	Only if absolutely necessary.
Korea	Opportunity to exempt related vehicle usage. If we exempt the category, these exempted vehicles should be fitted the audible warning device instead, concerned regulation is being made by RA TF of GRBP.
OICA	OICA: Prefer all to be if fitted. Fitment up to the country. Fire truck exemption needed (in case if fitted option not applied).

TF#2
Basically it is CP's choice. But, at least, exemption should be consistent between CPs, such as ISO-Fix.
So, **exemption can be communized for all country to be described. -> OICA will prepare what to be described.**

Test methods for detection system

Q7) How to test, static or random position of poles?
Q13) Does the test have to be repeated for each grid square in the monitoring area or only once? (OICA VRU-08-08)
Q14) Why not use dummy like BSIS? (OICA at IWG)

OICA requested exemptions, such as special cases (VRU-08-08).

→ Japan will revise test protocol regarding feedbacks.

Please discuss later.

Commented in TF #1 : Proposed to be before next IWG session.

Q15) Pausing function to be discussed (currently no definition and discussion).

OICA raised new topic.

TF #3
Japan provided current idea for test methods revision.
TRL: Draft to be provided before IWG in order to check details.

Answers

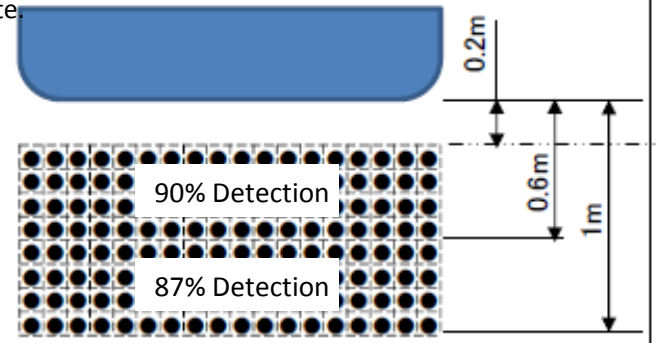
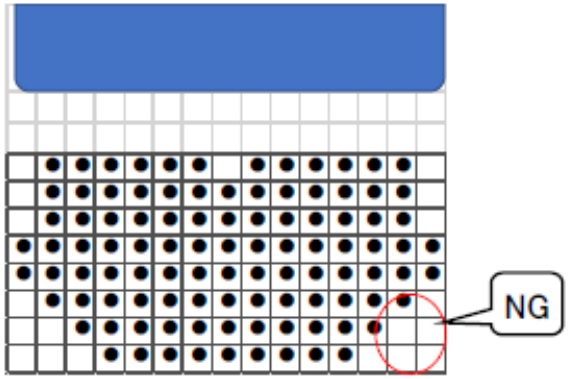
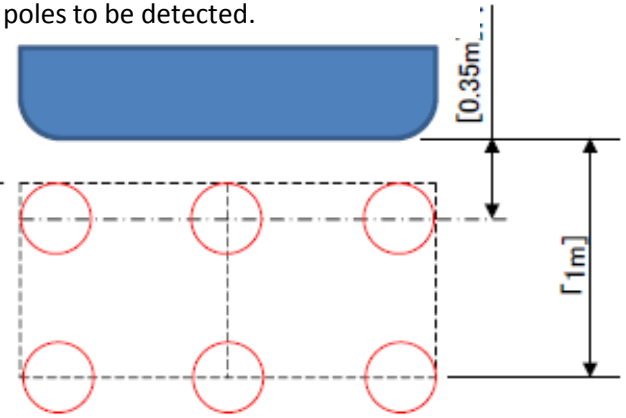
Q7) How to test, static or random position of poles?

	Answers
Japan	Make proposal later.
Netherlands	As in many UNECE Regulations we can require a minimum of [5] test positions in a defined area. The selection of test positions shall be worst case, at the discretion of the technical service (e.g. as R127 Annex 5 par. 3.5. and 4.2./5.2.)
France	To be discussed.
EC	No preference, may be a pragmatic solution
UK	Static position of poles – allowing random just introduces uncertainty into the test. We should be seeking to have a test that is both appropriate and comprehensive with no ambiguity.
Korea	Both(Random with static). Especially side corners(the most closest side to the vehicle.) should be included.

TF #3
Japan provided current idea for test methods revision.
TRL: Draft to be provided before IWG in order to check details.

Test methods for detection system proposal (1)

Q7) How to test, static or random position of poles?
Q13) Does the test have to be repeated for each grid square in the monitoring area or only once? (OICA VRU-08-08)

	Current proposal (ISO based)	**[Proposal] Additional condition (alternative test)**
Target	75 mm diameter pole (plastic)	300 mm diameter pole (plastic)
Area condition	1) Detection rate of each zone should be exceed defined rate.  2) No detection holes exceed 2 x 2 allowed.  	All poles to be detected. 

ISO based test:
Basically all grids should be examined.
The points that clearly can detect or clearly can not detect are able to remove.

When type of approval authority check test results submitted by manufacturer, random test can be allowed.

Test methods for detection system proposal (2)

Extracted from VRU-08-08

OICA

Does the test have to be repeated for each grid square in the monitoring area or only once ?

- § 4: detection latency 0.6 s: in deviation of ISO 17386 the poles are placed on the grid prior selection of rear gear „**locate the test object behind the vehicle"**
  ➔ **1 test spot ? Which ? Center of Area, Border ?**
- § 5.2 (minimum detection rate) „**There shall be no undetected hole larger than a square consisting of two-by-two grids.** "
  ➔ every second grid of the defined 0,1x0,1 grids. Example: vehicle with 2 m width the monitoring area is 0.8 m times 2 m, which gives 160 grids, which results in **minimum 40 tests** !

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Warning signal should be continued during at least 5 seconds. Single test is allowed if it satisfies above condition.
If the results are not fit above, detection test passed 4 times out of 5 times.

At least 1 spot with stable detection is ok.

Alternative for grid test proposed.

Test methods for detection system proposal (3)

Extracted from VRU-08-08

OICA Audible Warning Device: Pause function – Default Mode?

- ISO 17386 clearly defines the possibility of pause functions in §5.1. This section is not referenced from regulation.
- Draft notes that the system must be activated prior test 4.2.1 „The test vehicle in the initial state shall be with *the detection system being activated*" and notes clearly defines switch off when operation with trailers in §7.

➢ It needs to be clarified if switch off button is generaly allowed.
➢ It needs to be clarifed if there is a default mode at vehicle start when system was switched off
➢ If a switch off button is generaly not allowed, it must be clarified with in which situation the system is allowed to be automatically deactivated or which vehicle types are exempted.

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Update
"detection system being activated, which is declared by manufacturer or in owner's manual"

Update
Warning off switch can be allowed with on as default.

TF #3
Korea: KMVSS not allow deactivation (pause).
-> Japan: How about tractor with trailer ?
Korea: Big vehicles like N3 select Reversing Alarm not detection (KMVSS allow alternatives from camera, detection, alarm).
OICA (BMW): To avoid false alarm, pause function needed.

New

Q16) Display view can be changed or not by user? (current proposal is not allow.)

New question raised by Korea. FMVSS allows view change by driver.

FMVSS 111.
S5.5.5. Deactivation.
The rearview image meeting the requirements of S5.5.1 and S5.5.2 shall remain visible during the backing event until either, **the driver modifies the view**, or the vehicle direction selector is removed from the reverse position.

* S5.5.1 Field of view. , S5.5.2 Size. (Requirements of image)

TF#4
Korea
Rear gear in position: Camera turns on, Image can change to other view, but not change other purpose screen like entertainment.

OICA
Current rear view camera system has this kind of function such as additional info can be added to image (incoming call pop-up).

To be discussed.

New regulation draft

Hirao explain briefly about draft sent in advance.

Comments

- Naming of regulation
  - Seems not good for using the word “reversing safety”.
  - This is too wide.
  - **Call for idea**
- Introduction
  - In AEBS, Introduction describes about CP’s choice about scope.
- OICA: Concern about CMS specification being higher than current rear view camera system.
  - Hirao: Remaining requirements are based on Class V and VI. (I to IV is high requirements.)
  - **To be checked.**
- OICA: CMS, Mirror has much requirements. Audible warning systems does not have so much.
- Korea: Visibility of pole should be until ground. -> This is under discussion in Q1.

Conclusions of discussion in IWG #9 (1)

Category	No.	Questions	Conclusions
Pole location and visibility	1	Fallen person to be taken into account?	Step 1: Go for out of scope. Step 2: Discussion based on accidentology will continue in IWG. After reach another conclusion, regulation to be updated. Requirement to be decided. 1st row : 15cm x 15cm at any part or top 2nd, 3row : Full height of pole.
	9	What height to be seen or detected?	Not discussed : Depends on Q1 conclusion
Detection system requirements	10	How much about warning system latency ?	500ms (CLEPA answer)
	11	How much percentages can be expected for camera or sensors ?	1.0m detection is compatible for camera based on Japanese study results.
	2	Shall detection system give an audible and/or optical warning?	Audible and optical are mandatory. (Way of optical warning is manufacturer strategy.)
HMI	4	Do we allow a combination of devices with different type of HMI?	Each row of poles should be seen/detected by one (single) device. (This limit the numbers of HMI.)
	5	Shall each row of poles (perpendicular to the longitudinal direction of the vehicle) be seen/detected by one (single) device?	
Multi modal approach	3	Do we allow direct vision (turning head)?	Not allow. Exemption to be proposed by OICA. (e.g. 1-row vehicle, K-car etc.)
	6	Do we allow mirror-to-mirror solution (periscope)?	Not allowed.

Conclusions of discussion in IWG #9 (2)

Category	No.	Questions	Status
Scope	12	What category should be mandatory ?	M & N.
Exemptions	8	Shall exemptions be implemented in the UN Regulation or not?	Exemption to be considered for communized description by OICA.
Test methods for detection system	7	How to test, static or random position of poles?	Proposed alternative method o be confirmed about compatibility with ISO test regarding blind spot.
	13	Does the test have to be repeated for each grid square in the monitoring area or only once?	
	14	Why not use dummy like BSIS?	Japan expert answer : Due to unstable conditions for reproducibility
	15	Pausing function to be discussed (currently no definition and discussion).	Audible can be switched off by driver with default ON mode. Optical to be always ON. Automatic off function that can detect coupling with towing vehicles is acceptable.
	16	Display view can be changed or not by user? (current proposal is not allow.)	Driver can change view to other camera view. Not allow to other purpose screen. Rear display should be seen during the back events like FMVSS (16km/h or 10m or 10 seconds for forward motion) or gear changed immediately. Safety related information overlay allowed for field of vision. Other purpose information can not overlay in field of vision.

Conclusions of discussion in IWG #9 (3) New regulation draft

Title determined.
“Proposal for a new UN Regulation on uniform provisions concerning the approval of devices for reversing motion and motor vehicles with regard to the driver’s awareness of vulnerable road users behind vehicles”

Detail explanation through whole part was done.
Some comments to be reflected are raised.

Detail check to be continued by members.
Practical pole figure (stripe etc) to be considered with visibility on the display.
Especially, object size in the display to be discussed (Checked also current draft).

Revised draft with remarks to be provided in IWG.
Revised draft with reflecting discussion as much as possible to be explained in GRSG.

Stockyard

Reversing Motion Task Force #4

2019 March 22, 9:00-11:00 (French time) via Skype

Attendee (from Skype display)

Alexandra Scholz (OICA/Opel) ???
Ansger Pott (OICA/Hyundai Europe)
Benoit Moreau (OICA/PSA)
Benoit Job (OICA/???)
Bernd John (CLEPA/Brigade)
Bhonsle, Abhinav (OICA/Audi)
Hirao Akinari (JAPAN)
Joachim Mueller (OICA/Ford)
Johan Broeders (OICA/DAF Trucks)
Jongsoon Lim (Korea)
Kneissle, Michael (OICA/Daimler)
Park Jinwoo (Korea/KOTSA)
Masahiro Oda (CLEPA/Denso Europe)
PHAN Vuthy (OICA/Renault)
Schaber, Lisa (OICA/VW)
Schruhl, Joerg (OICA/VW)
Simone Falcioni (CLEPA/Tokai Rika Europe)

Reversing Motion Task Force #3

2019 March 15, 10:00-12:00 (French time) via Skype

Attendee (from Skype display)

Alexandra Scholz (OICA/Opel)
Benoit Moreau (OICA/PSA)
Bhonsle, Abhinav (OICA/Audi)
Fabrice HERVELEU (France/UTAC)
Hirao Akinari (JAPAN)
Jean-Louis CHAZALETTE (OICA/Volvo)
Joachim Mueller (OICA/Ford)
Jorg Schruhl (OICA/VW)
Kneissle, Michael (OICA/Daimler)
Park Jinwoo (Korea/KOTSA)
Masahiro Oda (CLEPA/Denso Europe)
Meurer Dieter (OICA/BMW)
Phil Martin (TRL)
Schaber, Lisa (OICA/VW)
Simone Falcioni (CLEPA/Tokai Rika Europe)
Wooyong Ji (Korea/Hyundai)

Reversing Motion Task Force #2

2019 March 8, 9:00-11:00 (French time) via Skype

Attendee (from Skype display)

Alexandra Scholz (OICA/Opel)
Bernd John (CLEPA/Brigade)
Broertjes Peter (EC)
Eckert, Gerald, Dr. (OICA/VW) ???
Felix Hoffman (CLEPA/Continental)
Hirao Akinari (JAPAN)
Joachim Mueller (OICA/Ford)
Jorg Schruhl (OICA/VW)
Masahiro Oda (CLEPA/Denso Europe)
Phan Vuthy (OICA/Renault)
Phil Martin (TRL)
Schaber, Lisa (OICA/VW) ???
Simone Falconi (CLEPA/Tokai Rika Europe)

Reversing Motion Task Force #1

2019 February 28, 9:00-11:00 (French time) via Skype

Attendee (from Skype display)

Alexandra Scholz (OICA/Opel)
Benoit Moreau (OICA/PSA)
Bernd John (CLEPA/Brigade)
Eckert, Gerald, Dr. (OICA/VW)
Felix Hoffman (CLEPA/Continental)
HIRAO Akinari (JAPAN)
Johan Broeders (OICA/DAF Trucks)
Jongsoon Lim (Korea)
Kneissle, Michael (OICA/Daimler)
Masahiro Oda (CLEPA/Denso Europe)
Meurer Dieter (OICA/BMW)
Mueller, Joachim (OICA/Ford)
PHAN Vuthy (OICA/Renault)
Simone Falconi (CLEPA/Tokai Rika Europe)

* Specified from display and web search, but not in circulated e-mail.

Unfortunately attendee are from industry, CP not attended due to many other IWG schedule.
So, confirmed topics and discussed from industry side point of view. (Reflected following slides)