Proposal for ESF (c) – Emergency Assistance

Motivation:

Safety benefit in case of confirmed driver inability to perform the driving task

2.600.000
Traffic accidents in Germany 2017*

88.400
Accidents were caused by health problems of the driver

33.592	15.912	7.072
Epileptic seizures	Hypoglycemia	Cardiac incidents

Driver Assist Systems which might reduce the number of casualties resulting from driver's health problems are **available** and already **on the market.**

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With **E**ntry **I**nto **F**orce of UNECE-R79.03 **new approvals** for such systems **are no longer granted** due to a lack of functional provisions in the regulation.

MAKE THAT CHANGE

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The proposed amendment to UN-R79 aims to **permit new approvals**
for Emergency Assisstance systems
by introducing a new category ESF (c) which would allow to:

**Change automatically the lane if not critical
Bring the vehicle to a standstill on the emergency lane**

**once
driver unavailability
is confirmed!**

Optical and acoustic or haptic warning

Independent from ACSF C

Activated manually or automatically

Comparing Systems with possible Lane Change

ESF (c)	ACSF - C
Default **ON** when in manual or assisted mode	
Safety function	
Execution only in case of confirmed driver unavailability (e.g. medical emergency)	
Lane Change occurs into lane with slower traffic	
Emergency situation is indicated to the subsequent traffic followed by the indication of the lane change	

Comparing Systems with possible Lane Change

ESF (c)	ACSF - C
Default **ON** when in manual or assisted mode	Default **OFF** Must be activated by the Driver
Safety function	Comfort function with safety benefit
Execution only in case of confirmed driver unavailability (e.g. medical emergency)	Actively Initiated by the Driver while in control to get assisted in the lane change procedure
Lane Change occurs into lane with slower traffic	Lane Change possible to slower and faster lane
Emergency situation is indicated to the subsequent traffic followed by the indication of the lane change	Lane change is indicated to the subsequent traffic.

Comparing Systems with possible Lane Change

ESF (c)

Default **ON**
when in manual or assisted mode

Safety function

Execution only in case of confirmed driver
unavailability (e.g. medical emergency)

Lane Change occurs into lane with slower traffic

Emergency situation is indicated to the
subsequent traffic followed by the
indication of the lane change

Without this function, the vehicle will at best
be stopped in the lane.
Stopping on the hard shoulder or in the
slowest lane reduces the risk of collision.

ACSF - C

Default **OFF**
Must be activated by the Driver

Comfort function with safety benefit

Actively Initiated by the Driver while in control to get assisted in
the lane change procedure

Lane Change possible to slower and faster lane

Lane change is indicated to the subsequent traffic.

System creates a benefit in a situation that is
fully controlled by the driver

ESF (c) Example: "Emergency Assist"

In exceptional situations in which the driver experiences a health problem and becomes unfit to drive, Emergency Assist tries to reactivate the driver by visual, acoustic and haptic warnings.

If the driver does not react, the function takes over control of the car within its system boundaries, decelerates continuously and

aims to bring the vehicle to a safe stop preferably on the hard shoulder or the emergency lane if the surrounding traffic allows for such a manoeuvre in an uncritical way.

Hazard warning lights will turned on to warn other road users.

1. Functions to cope with temporary driver inability to control the vehicle (e.g. caused by a health problem) are currently not considered in UN Regulation No. 79. The proposed ESF of type (c) would warn and possibly reactivate the driver while automatically performing emergency lane change(s), if possible (depending on traffic, etc.) with the aim to bring the vehicle to a standstill in an area with a low risk of collision ("target stop area" e.g. hard shoulder), because it is the safest area to stop (improving the access of emergency vehicles, normally low collision risk at the emergency lane). The function may be activated manually or automatically.

2. The amendment seeks to permit such a function, aimed at reducing risks in traffic, which is currently not approvable.

3. Uncontrolled vehicle movement could be avoided or mitigated by an ESF of type (c).

4. ESF of type (c) will only perform lane changes where the traffic is expected at equal speed or slower. Other traffic participants are made aware of the criticality of the situation through the hazard warning lamps or the appropriate direction indicator. Since it is a last resort function and the result of another car in the same situation not equipped with an ESF of type (c) would be worse, shorter gaps and harsher braking of approaching vehicles are justifiable.

Thank You
For Your Attention

2.3.4.3.   "*Emergency Steering Function (ESF)*" means a control function which can automatically detect a potential collision and automatically activate the vehicle steering system for a limited duration, to steer the vehicle with the purpose of avoiding or mitigating a collision

(c) in case of confirmed inability of the driver to operate the vehicle, generally deemed as a potential collision scenario, by bringing the vehicle to a safe stop.

2.4.18.   "*Target stop area*" means an area (e.g. emergency lane, hard shoulder, beside the road, slowest lane of traffic) where an ESF function of subcategory c aims to stop the vehicle."

5.1.6.2.3.   **Special provisions for different ESF types**

5.1.6.2.3.1. Special provisions for ESF of types (a) and (b)

…

Proposal
Working document ECE-TRANS-WP29-GRVA-2020-16e.docx

5.1.6.2.3.2. Special provisions for ESF type (c)

5.1.6.2.3.2.1. General

ESF of type (c) may be initiated / activated manually or automatically when the system activation conditions are met (e.g. inability of the driver is confirmed, activation control, driver monitoring, other assistance functions etc.).

The system shall aim to bring the vehicle to a safe halt within the target stop area. In case the system cannot assess the criticality as described in paragraph 5.6.2.3.2.2. or the necessary lane changes cannot be performed in an uncritical way, ESF of type (c) or an appropriate CSF (c) shall aim to keep the vehicle within its own lane of travel while the vehicle is stopping.

It shall be possible to override the function at any time by a single action of the driver.

On activation of the system, the hazard warning lamps shall be activated, during a lane change the appropriate direction indicator lamps may be activated instead[, optionally both alternately].

5.1.6.2.3.2.2. Changing lanes

The ESF (c) shall perform lane change (s) to the target stop area only if the situation(s) is (are) not critical. A situation is deemed critical either if there is a risk of a collision with another vehicle in the predicted path, or if a vehicle approaching from the rear in the adjacent target lane would be forced to decelerate with more than [4] m/s² in order to avoid a collision. If no approaching vehicle is detected, the minimal gap to the rear shall be calculated under the assumption of an approaching vehicle travelling with the allowed or advised maximum speed, whatever is lower."

5.1.6.2.10. System information data …

The following additional data shall be provided for ESF of type (c):
(g)   Information about how the system detects the inability of the driver
(h)   The means to activate, override, suppress or cancel the system.
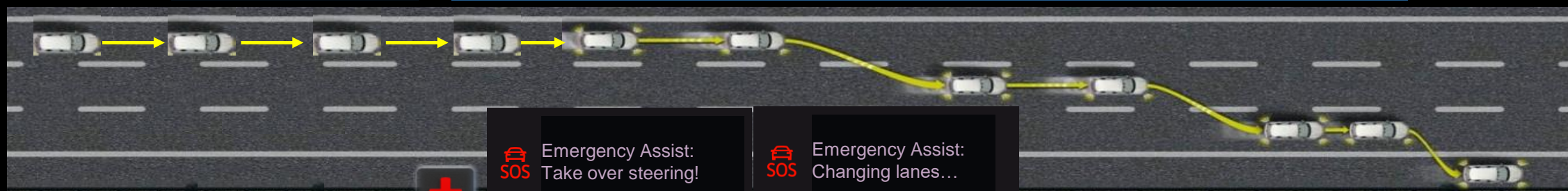(i)   The nominal functional conditions."

Proposal

Annex 8, insert a new paragraph 3.3.6., to read: "3.3.6. Tests for ESF of type (c)

ESF of type (c) shall be tested under the nominal functional conditions according to the system information data.
The vehicle with an ESF of type (c) shall be driven on a test track with multiple lanes per direction on the fastest lane.
ESF (c) function shall be activated as described in the documentation.
The test requirements are deemed to be met, if both following test cases are fulfilled:

3.3.6.1.   No critical situation as described in paragraph 5.1.6.2.3.2.2. is detected:
   (a)   The hazard warning lights / direction indicator are activated and
   (b)   The warnings specified in paragraph 5.1.6.2.6. of this Regulation.
              are provided no later than the ESF intervention starts and
   (c)   The lane changes into the direction of the target stop area are performed and the
              vehicle is brought to a standstill within the described target stop area.
3.3.6.2.   A critical situation as described in paragraph 5.1.6.2.3.2.2. is detected:

   (a)   The hazard warning lights are activated and
   (b)   The warnings specified in paragraph 5.1.6.2.6. of this Regulation are provided no
              later than the ESF intervention starts, and
   (c)   The vehicle is brought to a standstill within its lane of travel."

ESF (c) Emergency Lane Change

Driver available | Driver not available | ESF (c) | Standstill

Emergency Assist: Take over steering!

Emergency Assist: Changing lanes…

Regular Operation

- Driver steers purely manual or

- ACSF is active or

- CSF (c) is active

Detection of unavailability

- Driver does not at all respond to given warnings by taking back control (e.g. hands on warning)

- Driver manually activates the system

- Optionally driver monitoring system confirms driver unavailability

System activation

- Lateral control

- Longitudinal control (collision avoiding / mitigating)

- Driver Warning optical and (acoustical or haptic)

- Deceleration optionally speed kept, if no lane change is possible

- Activating hazard warning lights

- Emergency lane change if possible

- Optionally Direction indicator during lane change

- Rollaway prevention

- Hazard warning lights on