Emergency Steering Function

Content

- ESF definition

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ESF Definition

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, with:

   (a)   another vehicle driving* in an adjacent lane,
         (i)   drifting towards the path of the subject vehicle and/or,
         (ii)   into which path the subject vehicle is drifting and/or,
         (iii)   into which lane the driver initiates a lane change manoeuver.
   (b)   an obstacle obstructing the path of the subject vehicle or when the
           obstruction of the subject vehicle's path is deemed imminent.

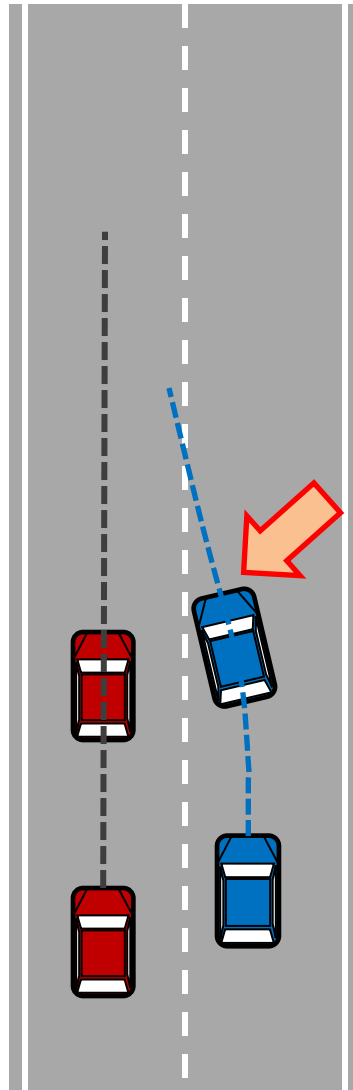ESF shall cover one or more use cases from the list above.

* the vehicle may be driving in the same or the opposite direction as the subject vehicle.
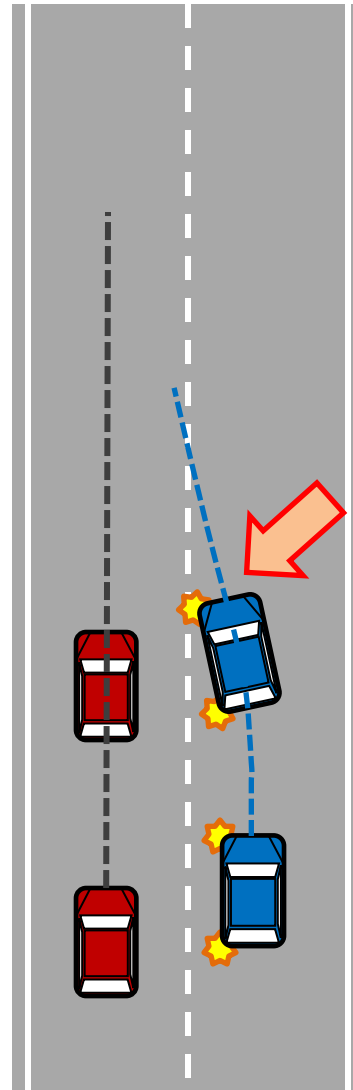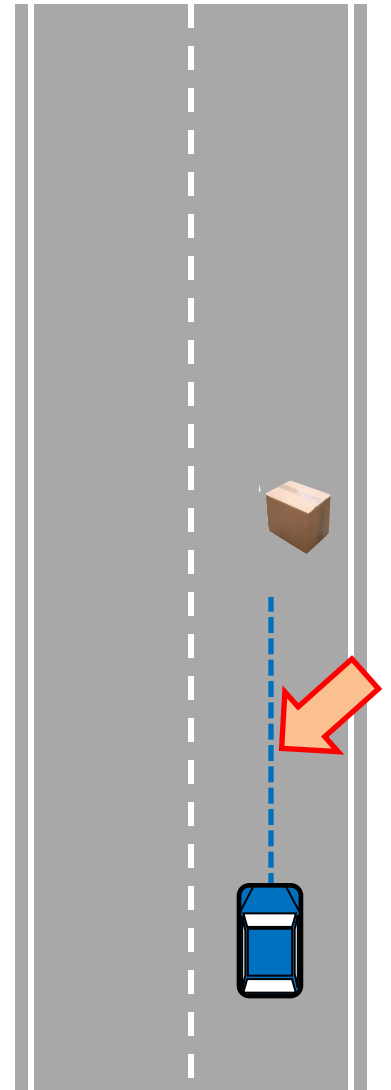
Use Cases

i.a   i.b   i.c   ii.

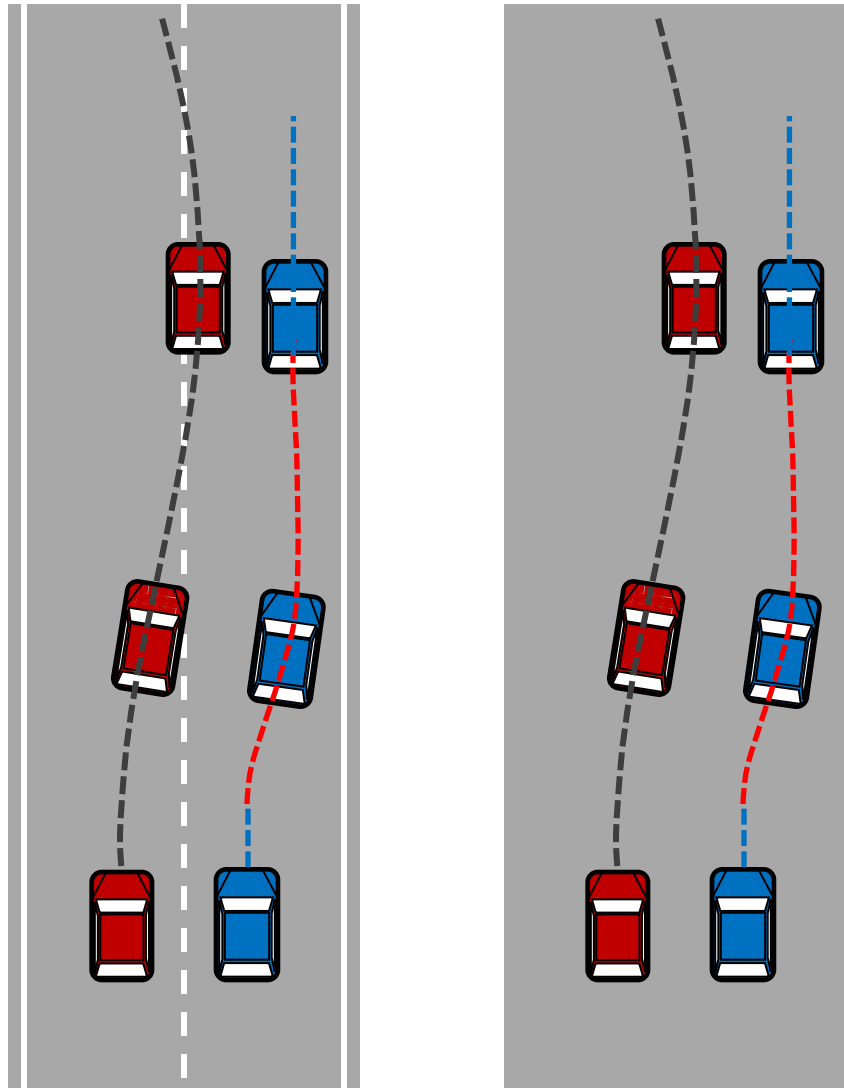Function is expected to intervene around this point
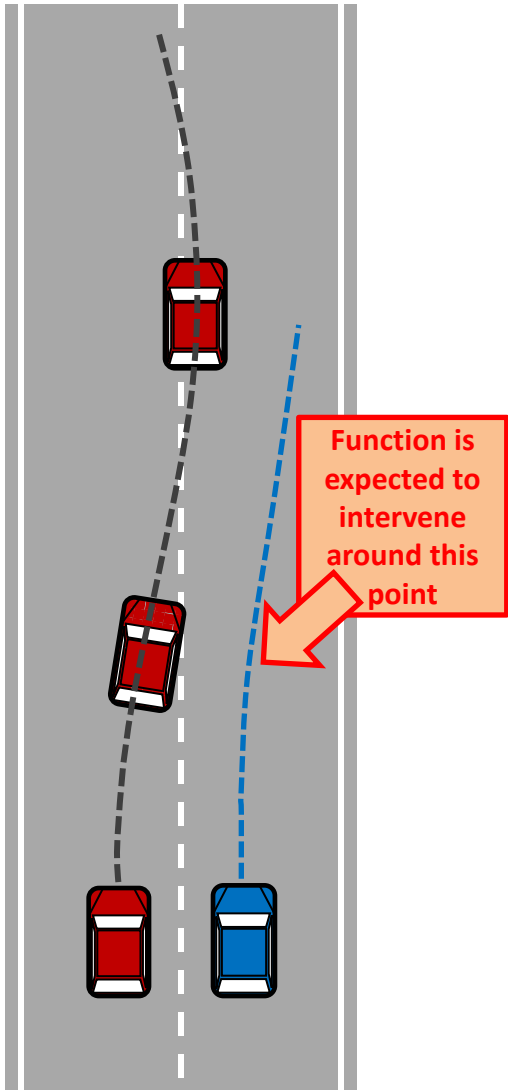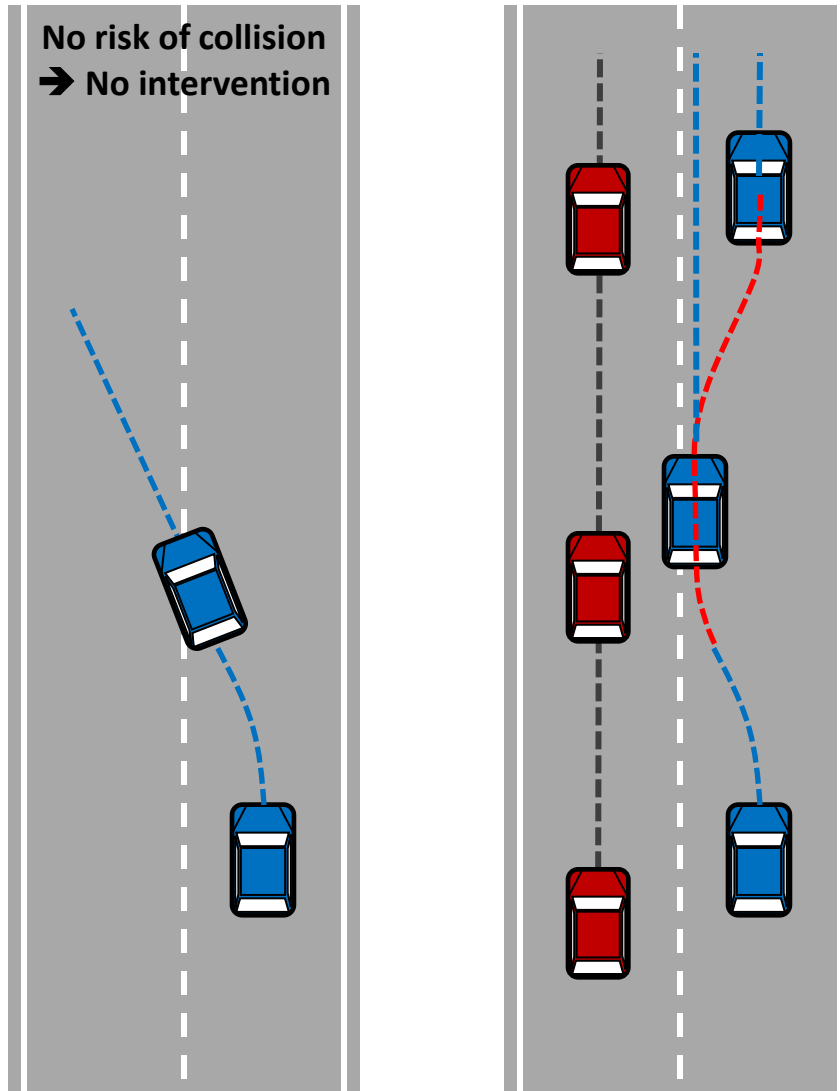
Use Case i.a

"Another vehicle drifts
towards the subject vehicle"

**No lane crossing
caused by ESF.**

If no marking:
- **Don't leave the road.**
- **Lateral movement not more than 75cm.**

No intervention ------ *Intervention* ------

Use Case i.b

"The subject vehicle drifts
towards the adjacent lane"

No risk of collision
➔ **No intervention**

No intervention – – – – –   *Intervention* – – – – –

No lane crossing caused by ESF.

However, ESF may cross a marking to steer the vehicle back into its original lane of travel (in case a risk of a collision is detected and the original crossing was done by the driver).

Use Case i.c

"The driver of the subject vehicle performs a lane change"
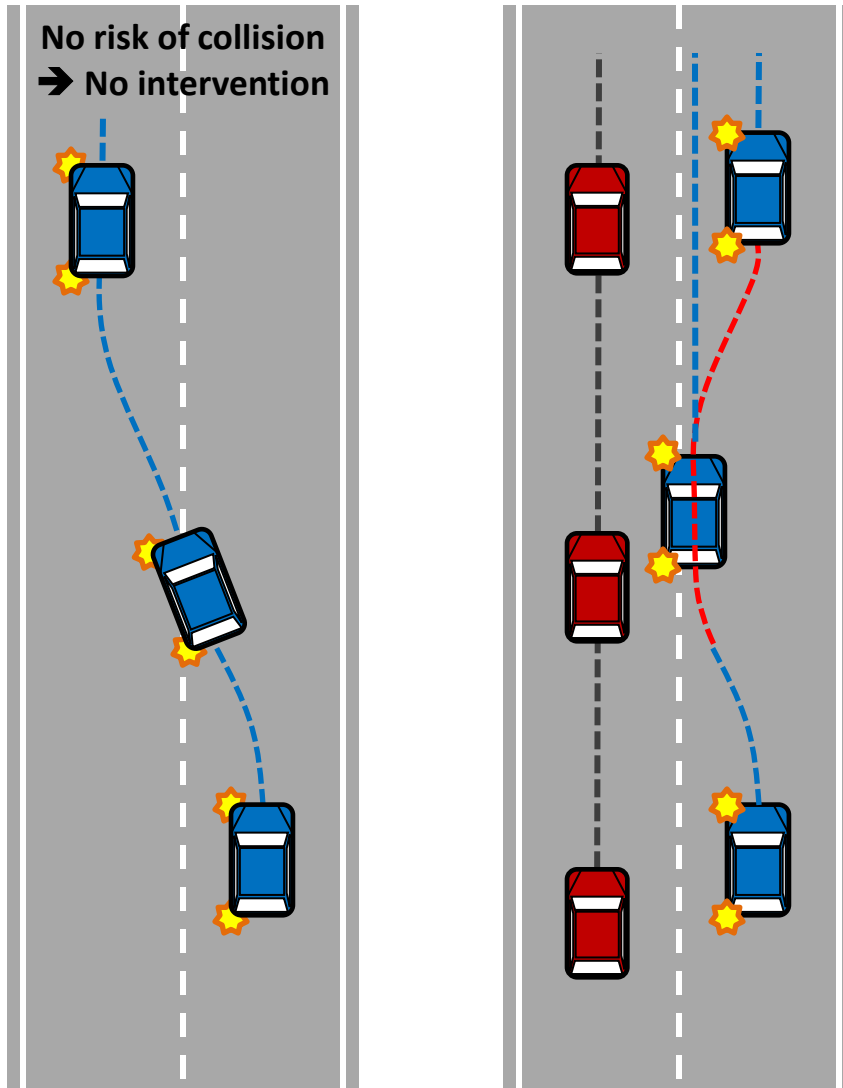

No risk of collision ➔ No intervention
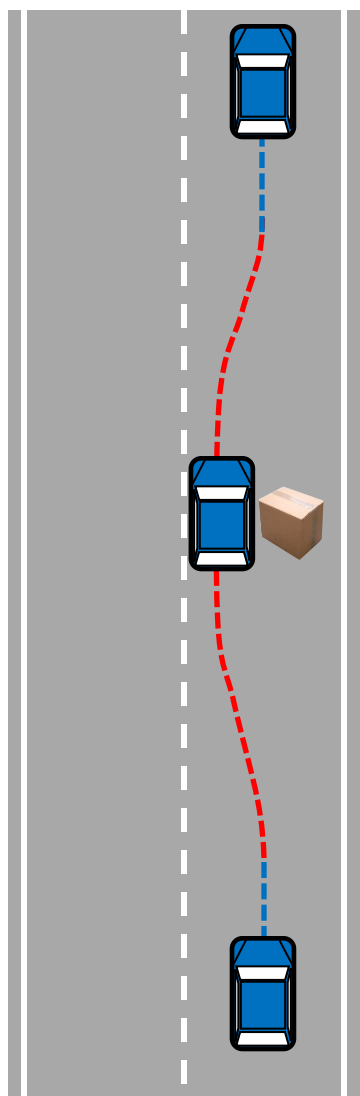
No lane crossing caused by ESF.

However, ESF may cross a marking to steer the vehicle back into its original lane of travel (in case a risk of a collision is detected and the original crossing was done by the driver).

No intervention – – – – –   *Intervention* – – – – –

Use Case <mark>ii.</mark>

"An obstacle obstructs the path"

"Obstruction of the path is imminent"

No lane crossing caused by ESF.

No intervention – – – – – *Intervention* – – – – – –

Main requirements

- ESF is subject to Annex 6 (CEL)
- ESF shall have means to monitor driving environment
- ESF can only intervene if there is a risk of a collision detected
- ESF cannot lead the vehicle:
  - To leave the road
  - To cross a marking
  - To have a lateral movement of more than 75cm in case there is no lane making
  - to collide with another road user
- ESF may cross a marking to steer the vehicle back into its original lane of travel (in case a risk of a collision is detected and the original crossing was done by the driver).
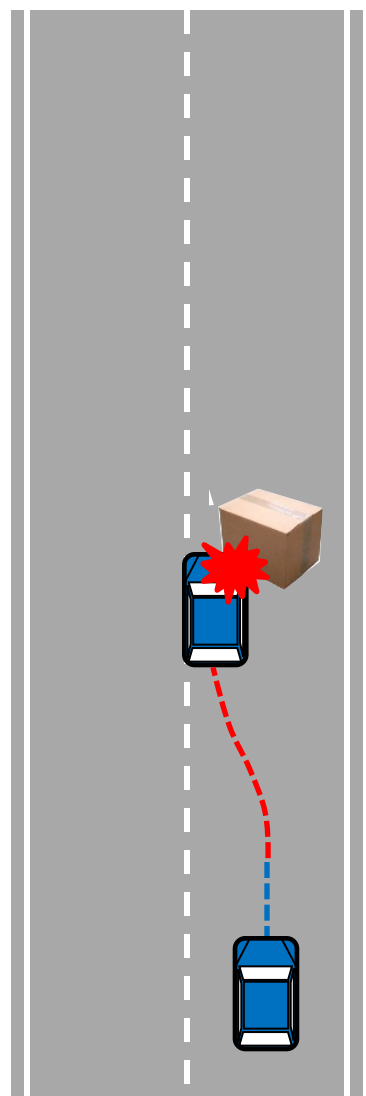- ESF intervention must be indicated to driver with a optical and an acoustic or haptic signal
- System failure shall be indicated to the driver
- Overriding force not more than 50N

Tests   /1

- Generals:
  - Activated ESF
  - Vehicle speed within operating range
  - The manufacturer shall demonstrate ESF works in the whole range of operation
- 3.3.1 Test of ESF type ia and ib   with lane markings
  - A target vehicle minimize lateral distance until ESF intervenes
  - The test is passed if ESF intervention is indicated and the vehicle does not leave its lane
- 3.3.2 Test of ESF type ic   with lane markings
  - The tested vehicle drifts towards another vehicle to cause a collision
  - The test is passed if ESF intervention starts and is indicated to driver, and the vehicle does not leave its lane

Tests   /2

- 3.3.3 Test of ESF type ii   with lane markings
  - The tested vehicle approaches an obstacle in the lane
  - The test is passed if ESF intervention avoids or mitigate the collision and is indicated to driver, and the vehicle does not leave the lane
- 3.3.4 tests of systems able to operate **without lane markings**
  - Repeat tests 3.3.1 to 3.3.3 on a track without lane markings
  - The test is passed if:
  - ESF intervention starts and is indicated to driver
  - The lateral movement (offset) is not more than 75cm
  - The vehicle has not left the road
- Fale reaction test for ESF type ii
  - Place a plastic sheet on the lane (colour contrast to road surface…)
  - The test is passed if no ESF intervention starts