

Can the human driver be made responsible when automation is unable to handle the situation?

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Informal document No.11

Distr.: General
5 March 2021

Original: English

Economic Commission for Europe

Inland Transport Committee

Global Forum for Road Traffic Safety

Eighty-second session
Geneva, 8-12 March 2021

Item 3 (c) (i) of the provisional agenda

Automated driving:

Vehicles with automated driving systems:

The concept of activities other than driving

Submitted by Human Factors in International Regulations for Automated Driving Systems (HF-IRADS)

This document, submitted by HF-IRADS, is a position paper on driver responsibility with automation titled "Can the human driver be made responsible when automation is unable to handle the situation?". WP.1 is invited to discuss it.

Can the driver be expected to “immediately” take over control of the vehicle if requested by the ADAS/ADS?

- There is strong evidence that engagement in NDRA can lead to a longer takeover time (TOT) by the human driver and can also affect the quality of takeover (see e.g., Informal No. 9 from WP.1 September 2018 and Zhang et al., 2019)
- Zhang et al. state: “[A] high level of automation (SAE L3 and above) showed higher mean TOTs compared to partial automation (SAE L2)”.
- Research has shown that when drivers had more time to regain control they prioritized NDRA above regaining immediate control of the vehicle

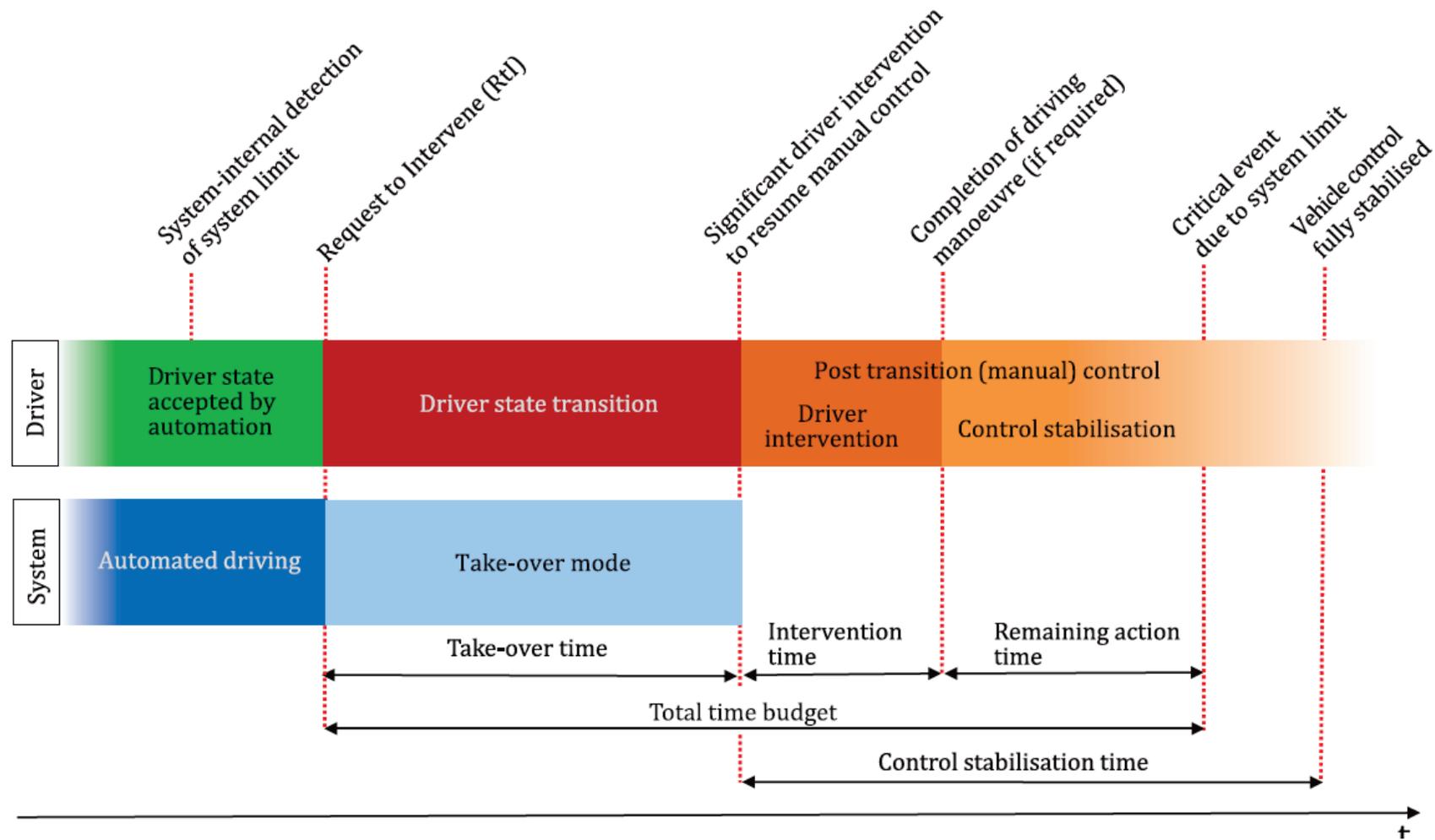
The role of good design

- The ADS should be designed to support takeover as opposed to merely demanding takeover
- An example of this would be assisting human drivers to recover situation awareness before resuming control
- Interface design can, for example, assist in the recovery of situation awareness by providing strategic (where am I?), tactical (what are the locations of the vehicles around me?), and operational (how fast am I driving?) information

Can the driver be expected “immediately” to take over control of the vehicle upon critical system failures?

- In the 1990s a series of rollover crashes caused fatalities and serious injuries to the occupants of Ford Explorer vehicles. The problem was identified as being caused by tread separation in the Firestone tyres fitted to the vehicles. A recall was eventually imposed by NHTSA on the relevant tyres. However the CEO of Firestone also stated: “When a driver of a vehicle has something happen such as a tread separation, they should be able to pull over not rollover.” (CBS News, 8 August 2001).
- The same lesson should apply to ADS: the system should be able to mitigate serious vehicle failures

Transition as a dynamic process



Source: Marberger et al., 2018; ISO, 2020)

Can the driver be required to understand the functionality of an ADS and its limitations?

- The inherent design of the ADS, and specifically of its interface of its interaction with the driver, should promote driver awareness, including when and why the ADS is reaching its performance limitations
- The Safe System approach to road safety (OECD, 2008; 2016) requires system providers to design systems with the expectation that user errors will occur

Conclusions and recommendations

ADS

- When an ADS is operating the vehicle, the safety of driving is the responsibility of the manufacturer
- It cannot be expected that the human driving in a vehicle with automated systems can take back control immediately and with “high quality”
- ADS should be designed in the hope that humans will be responsible and responsive, but in the expectation that they will not

ADAS

- The opportunity to drive for a considerable time with an ADAS performing a large part of the driving task has the potential to lull drivers into a false sense of security. Thus ADAS producers should design their systems so as to promote mental engagement in the driving task, either through requiring the driver to remain physically coupled to the vehicle controls or through requiring sufficient attention to the driving situation.

Thank you for your attention!